

Chapter 4

Students' Backgrounds and Attitudes Towards Science

With its overarching goal of improving student learning in mathematics and science, TIMSS focuses primarily on curricular, instructional, and school resource factors in presenting information on the context in which learning takes place. However, as documented extensively by previous IEA studies of science achievement,¹ student achievement also is related to home background factors, and to students' activities and attitudes. Since information on such factors is indispensable for interpreting the achievement results, this chapter provides detailed information about students' home backgrounds and resources for learning, how they spend their time out of school, their self-confidence in learning science, and the value they place on science. Also provided is information on trends in attitudes to learning science across 1995, 1999, and 2003.

What Educational Resources Do Students Have in Their Homes?

IEA's ongoing assessments of student achievement in mathematics and science (TIMSS) and reading literacy (PIRLS) have shown that in almost every country, students from homes with extensive educational resources have higher achievement in science and other subjects than

¹ For results from TIMSS 1999, see Martin, M.O., Mullis, I.V.S., Gonzalez, E.J., Gregory, K.D., Smith, T.A., Chrostowski, S.J., Garden, R.A., and O'Connor, K.M. (2000), *TIMSS 1999 International Science Report: Findings from IEA's Repeat of the Third International Mathematics and Science Study at the Eighth Grade*, Chestnut Hill, MA: Boston College. For TIMSS 1995 results, see Beaton, A.E., Martin, M.O., Mullis, I.V.S., Gonzalez, E.J., Smith, T.A., and Kelly, D.L. (1996), *Science Achievement in the Middle School Years: IEA's Third International Mathematics and Science Study*, Chestnut Hill, MA: Boston College;

those from less advantaged backgrounds. For the 2003 data presented in this report, TIMSS has focused on just a few central variables: level of parental education, students' educational aspirations, speaking the language of the test at home, having a range of study aids in the home and computer use at home, and at school.

Because for most children, parents are their first and probably most important educators, the level of education of the parents may be the most important educational resource in the home. 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 percentages of students in each of five categories of parents' educational level, together with their average science achievement. Standard errors for percentages and averages also are shown. The education level of the parent with most education was used in assigning students to categories.

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

Exhibit 4.1 reveals great diversity in levels of parental education within and across the TIMSS countries. On average across countries, the percentages of eighth-grade students reporting that the highest level of education attained by either parent was as follows: finished university – 28%; finished post-secondary education but not university – 17%; finished upper secondary – 28%; finished lower secondary – 15%; and no more than primary (includes not attending school at all) – 12%. Countries with the highest percentages (40% or more) of students reporting university-educated parents included Armenia, Estonia,

Israel, Japan, Latvia, Norway, the Russian Federation, Sweden, and the United States. Among benchmarking participants, Indiana and Ontario were included. In contrast, countries reporting the highest percentages (40% or more) of parents with no more than primary education included Botswana, Iran, Morocco, Saudi Arabia, and Tunisia.

The different educational approaches, structures, and organizations across the TIMSS countries make comparisons of educational levels difficult, and this is exacerbated by high levels of 'do not know' and missing responses in some countries. Nonetheless, Exhibit 4.1 makes it clear that higher levels of parents' education are associated with higher eighth-grade student achievement in science in almost all countries. At 507 score points, the average science achievement of students with university-educated parents was more than 90 points greater than the average of students whose parents had no more than primary education.

As shown in Exhibit 4.2, students generally had high expectations for university education, particularly those who had a parent with a university education. More than half the eighth-grade students (54% on average across countries) reported that they expect to finish university, 30 percent do not expect to complete a university education, and a further 15 percent do not know. Students expecting to finish university had substantially greater average science achievement than those without university expectations. Among those expecting to finish university, the average achievement of those students with a parent who finished university (21% of students) was 30 points greater than those without a university-educated parent (33%).

Although speaking more than one language has advantages, TIMSS 1999 showed 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 at eighth grade than those who spoke it more often. Exhibit 4.3, which presents students' reports of how frequently they spoke the language of the TIMSS test

Exhibit 4.1: Highest Level of Education of Either Parent*



Countries	Finished University or Equivalent or Higher		Finished Post-secondary Vocational/Technical Education But Not University		Finished Upper Secondary Schooling	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	51 (1.5)	475 (4.1)	22 (0.9)	461 (4.4)	24 (1.1)	451 (4.8)
Australia	r 29 (1.3)	564 (4.7)	27 (1.0)	540 (4.7)	25 (1.1)	517 (4.6)
Bahrain	33 (0.7)	462 (2.6)	7 (0.5)	446 (5.6)	23 (0.6)	449 (3.5)
Belgium (Flemish)	s 25 (1.4)	542 (3.2)	26 (1.0)	540 (3.0)	31 (1.1)	516 (3.5)
Botswana	10 (0.7)	419 (8.8)	14 (0.6)	388 (4.4)	16 (0.8)	360 (4.1)
Bulgaria	28 (1.3)	494 (10.1)	36 (1.4)	485 (5.2)	29 (1.4)	469 (6.3)
Chile	16 (1.0)	480 (4.3)	10 (0.5)	444 (4.6)	32 (1.1)	415 (3.2)
Chinese Taipei	17 (1.4)	619 (3.7)	11 (0.6)	593 (4.2)	46 (1.0)	568 (3.3)
Cyprus	28 (0.8)	470 (3.5)	14 (0.7)	459 (3.7)	36 (0.9)	439 (3.4)
Egypt	24 (1.1)	482 (4.8)	0 (0.0)	~ ~	11 (0.6)	452 (6.6)
Estonia	40 (1.4)	574 (3.1)	39 (1.1)	548 (2.7)	19 (0.7)	534 (3.4)
Ghana	10 (0.7)	310 (9.5)	17 (0.9)	285 (8.5)	22 (1.0)	276 (7.3)
Hong Kong, SAR	12 (1.0)	577 (5.9)	12 (0.5)	565 (4.3)	36 (0.9)	558 (3.0)
Hungary	r 37 (1.6)	580 (3.1)	0 (0.0)	~ ~	49 (1.6)	530 (2.8)
Indonesia	9 (0.9)	465 (6.7)	6 (0.5)	438 (6.4)	24 (1.1)	433 (5.1)
Iran, Islamic Rep. of	10 (0.8)	490 (5.7)	10 (0.7)	471 (3.8)	15 (0.8)	475 (3.9)
Israel	r 45 (1.3)	523 (3.9)	24 (0.9)	487 (4.2)	18 (0.9)	468 (5.0)
Italy	21 (1.3)	514 (5.7)	5 (0.4)	507 (6.1)	40 (0.9)	501 (3.1)
Japan	r 45 (1.4)	576 (2.5)	18 (0.7)	555 (3.2)	36 (1.1)	536 (2.5)
Jordan	35 (1.8)	506 (5.2)	15 (0.8)	488 (4.9)	30 (1.0)	475 (3.6)
Korea, Rep. of	35 (1.2)	580 (2.2)	15 (0.6)	560 (3.0)	41 (1.0)	551 (2.0)
Latvia	r 43 (1.8)	532 (3.7)	0 (0.0)	~ ~	34 (1.4)	517 (3.5)
Lebanon	19 (1.2)	434 (6.7)	21 (1.0)	417 (5.9)	19 (0.7)	405 (5.8)
Lithuania	r 36 (1.6)	548 (2.6)	31 (1.0)	523 (3.2)	30 (1.3)	497 (2.7)
Macedonia, Rep. of	22 (1.3)	498 (5.0)	19 (0.9)	476 (4.3)	43 (1.2)	449 (3.7)
Malaysia	11 (0.9)	548 (6.4)	20 (0.9)	526 (4.1)	27 (0.9)	518 (4.2)
Moldova, Rep. of	34 (1.4)	495 (3.9)	18 (1.0)	483 (4.8)	21 (1.1)	471 (4.8)
Morocco	r 16 (1.3)	413 (6.1)	0 (0.0)	~ ~	17 (0.8)	405 (5.9)
Netherlands	r 22 (1.6)	563 (4.6)	32 (1.3)	560 (3.7)	43 (1.9)	527 (3.2)
New Zealand	s 28 (1.9)	558 (7.0)	30 (1.5)	541 (5.9)	34 (1.9)	518 (5.3)
Norway	s 66 (1.4)	517 (2.3)	16 (1.0)	494 (4.0)	12 (0.9)	496 (6.5)
Palestinian Nat'l Auth.	27 (0.9)	469 (4.4)	12 (0.5)	443 (5.4)	36 (0.8)	441 (3.3)
Philippines	19 (1.2)	440 (7.8)	22 (0.8)	399 (6.8)	33 (0.9)	368 (5.9)
Romania	17 (1.8)	522 (5.8)	16 (1.0)	489 (5.1)	47 (1.5)	475 (5.0)
Russian Federation	44 (2.3)	536 (3.3)	26 (1.5)	515 (4.3)	24 (1.2)	494 (4.4)
Saudi Arabia	27 (1.9)	424 (6.0)	0 (0.0)	~ ~	12 (0.5)	404 (5.9)
Scotland	x x	x x	x x	x x	x x	x x
Serbia	20 (1.2)	514 (3.1)	68 (1.2)	467 (2.6)	2 (0.2)	~ ~
Singapore	r 16 (0.6)	638 (3.6)	4 (0.3)	605 (7.2)	21 (0.8)	602 (4.1)
Slovak Republic	r 34 (1.9)	556 (3.8)	0 (0.0)	~ ~	65 (1.9)	512 (3.2)
Slovenia	r 26 (1.3)	548 (2.9)	31 (0.8)	530 (2.3)	34 (1.1)	515 (3.1)
South Africa	r 11 (1.0)	341 (20.1)	13 (0.7)	280 (12.5)	30 (0.9)	250 (7.1)
Sweden	s 48 (1.8)	550 (3.7)	18 (1.1)	540 (4.5)	22 (1.3)	518 (4.3)
Tunisia	11 (0.9)	426 (5.1)	12 (0.8)	424 (3.7)	16 (0.6)	411 (4.3)
United States	r 56 (1.3)	554 (3.4)	9 (0.4)	522 (3.6)	26 (0.9)	511 (3.0)
‡ England	x x	x x	x x	x x	x x	x x
International Avg.	28 (0.2)	507 (0.9)	17 (0.1)	487 (0.8)	28 (0.2)	472 (0.8)
Benchmarking Participants						
Basque Country, Spain	34 (2.1)	510 (4.5)	14 (1.1)	493 (3.6)	21 (1.1)	488 (3.7)
Indiana State, US	r 46 (2.1)	551 (5.5)	10 (0.8)	531 (5.4)	33 (1.3)	530 (5.4)
Ontario Province, Can.	s 46 (2.3)	557 (3.4)	37 (1.6)	534 (3.1)	13 (1.1)	527 (4.5)
Quebec Province, Can.	r 33 (1.6)	549 (4.4)	34 (0.9)	540 (3.8)	21 (1.1)	516 (3.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by students.

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

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

() 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. An "x" indicates data are available for less than 50% of the students.

Exhibit 4.1: Highest Level of Education of Either Parent*

Countries	Finished Lower Secondary Schooling		No More than Primary Schooling	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	2 (0.4)	~ ~	1 (0.2)	~ ~
Australia	r 15 (0.9)	505 (5.4)	3 (0.4)	461 (11.6)
Bahrain	20 (0.7)	426 (4.1)	17 (0.7)	421 (3.4)
Belgium (Flemish)	s 11 (0.7)	505 (4.8)	6 (0.7)	446 (9.9)
Botswana	20 (0.8)	357 (4.9)	41 (1.2)	352 (3.2)
Bulgaria	6 (0.7)	462 (13.3)	2 (0.4)	~ ~
Chile	31 (1.0)	387 (3.2)	11 (0.9)	363 (5.3)
Chinese Taipei	21 (1.1)	547 (5.0)	6 (0.5)	540 (6.3)
Cyprus	15 (0.7)	409 (3.8)	7 (0.4)	398 (6.3)
Egypt	29 (0.9)	413 (4.8)	36 (1.4)	403 (4.5)
Estonia	2 (0.3)	~ ~	0 (0.1)	~ ~
Ghana	37 (1.2)	235 (6.6)	14 (1.0)	223 (5.8)
Hong Kong, SAR	25 (0.8)	555 (2.9)	15 (0.7)	549 (4.4)
Hungary	r 14 (1.3)	489 (6.5)	0 (0.1)	~ ~
Indonesia	22 (0.9)	402 (6.0)	39 (1.6)	412 (4.7)
Iran, Islamic Rep. of	22 (0.8)	446 (2.9)	43 (1.6)	440 (2.5)
Israel	r 8 (0.6)	458 (7.0)	5 (0.6)	456 (9.5)
Italy	30 (1.1)	469 (3.8)	5 (0.4)	434 (7.7)
Japan	r 2 (0.3)	~ ~	0 (0.0)	~ ~
Jordan	12 (0.9)	455 (5.7)	8 (0.6)	428 (7.2)
Korea, Rep. of	6 (0.4)	531 (5.0)	3 (0.4)	507 (6.4)
Latvia	r 23 (1.1)	508 (3.4)	0 (0.1)	~ ~
Lebanon	15 (0.8)	375 (5.9)	26 (1.7)	349 (5.8)
Lithuania	r 2 (0.3)	~ ~	1 (0.2)	~ ~
Macedonia, Rep. of	11 (0.8)	398 (5.8)	5 (0.6)	362 (14.0)
Malaysia	24 (1.0)	494 (3.9)	18 (1.0)	493 (4.3)
Moldova, Rep. of	17 (0.9)	460 (5.4)	10 (0.8)	435 (7.2)
Morocco	r 17 (1.1)	388 (5.3)	50 (1.7)	397 (3.3)
Netherlands	r 0 (0.0)	~ ~	3 (0.4)	488 (10.2)
New Zealand	s 5 (0.7)	498 (10.9)	2 (0.4)	~ ~
Norway	s 4 (0.5)	470 (9.1)	2 (0.3)	~ ~
Palestinian Nat'l Auth.	18 (0.8)	420 (4.6)	6 (0.5)	385 (7.6)
Philippines	13 (0.5)	337 (6.5)	14 (0.9)	332 (6.8)
Romania	13 (1.6)	464 (10.8)	7 (0.8)	398 (9.0)
Russian Federation	6 (0.5)	475 (7.3)	0 (0.1)	~ ~
Saudi Arabia	19 (1.7)	391 (4.8)	41 (1.7)	390 (3.8)
Scotland	x x	x x	x x	x x
Serbia	9 (0.9)	412 (5.3)	1 (0.2)	~ ~
Singapore	r 48 (0.8)	570 (4.6)	11 (0.5)	529 (6.7)
Slovak Republic	r 1 (0.3)	~ ~	0 (0.1)	~ ~
Slovenia	r 8 (0.7)	486 (5.4)	1 (0.2)	~ ~
South Africa	r 18 (0.7)	220 (5.3)	28 (1.1)	193 (5.4)
Sweden	s 9 (0.8)	504 (6.4)	3 (0.5)	463 (12.6)
Tunisia	17 (0.7)	403 (2.7)	44 (1.5)	393 (2.3)
United States	r 6 (0.4)	479 (5.8)	3 (0.3)	456 (6.0)
‡ England	x x	x x	x x	x x
International Avg.	15 (0.1)	442 (1.0)	12 (0.1)	416 (1.4)
Benchmarking Participants				
Basque Country, Spain	20 (1.5)	477 (4.3)	11 (0.8)	454 (5.7)
Indiana State, US	r 7 (0.9)	492 (9.9)	4 (0.5)	493 (14.8)
Ontario Province, Can.	s 3 (0.5)	526 (11.4)	2 (0.4)	~ ~
Quebec Province, Can.	r 10 (0.7)	518 (4.6)	1 (0.3)	~ ~

Background data provided by students.

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

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

() 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. An "x" indicates data are available for less than 50% of the students.

Exhibit 4.2: Students' Educational Aspirations Relative to Parents' Educational Level*

Countries		Finish University and Either Parent Went to University or Equivalent		Finish University but Neither Parent Went to University or Equivalent		Not Finish University Regardless of Parents' Education		Do Not Know Regardless of Parents' Education	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	r	36 (1.5)	493 (4.1)	18 (0.9)	479 (4.9)	37 (1.5)	440 (4.6)	9 (0.5)	456 (6.1)
Australia	s	22 (1.3)	574 (4.5)	22 (1.0)	556 (4.4)	45 (1.4)	511 (3.8)	11 (0.7)	522 (6.7)
Bahrain	r	28 (0.7)	473 (2.7)	39 (0.8)	455 (2.5)	16 (0.7)	395 (3.3)	16 (0.6)	427 (4.7)
Belgium (Flemish)	s	16 (1.2)	553 (3.4)	17 (0.9)	548 (3.2)	46 (1.6)	511 (3.3)	21 (0.8)	508 (4.5)
Botswana		8 (0.6)	436 (8.1)	36 (0.9)	401 (2.9)	45 (1.0)	337 (3.0)	12 (0.6)	329 (6.4)
Bulgaria		23 (1.3)	500 (11.3)	28 (1.1)	493 (6.0)	37 (1.7)	464 (6.2)	12 (0.9)	466 (8.1)
Chile		15 (1.0)	487 (4.3)	43 (1.1)	420 (3.5)	36 (1.0)	382 (2.7)	7 (0.4)	385 (7.0)
Chinese Taipei		15 (1.3)	624 (3.7)	56 (1.0)	587 (2.7)	16 (0.9)	506 (4.0)	14 (0.6)	540 (5.5)
Cyprus		23 (0.8)	481 (3.6)	40 (0.9)	458 (2.5)	18 (0.8)	397 (3.8)	19 (0.6)	414 (3.8)
Egypt	r	23 (1.1)	496 (4.6)	44 (1.2)	443 (4.2)	18 (0.8)	382 (5.0)	14 (0.8)	424 (4.8)
Estonia		25 (1.2)	588 (3.4)	19 (0.7)	566 (3.6)	37 (1.1)	540 (2.8)	19 (0.6)	533 (3.8)
Ghana		6 (0.6)	350 (10.8)	21 (1.4)	318 (7.8)	67 (1.5)	239 (5.3)	7 (0.6)	198 (12.1)
Hong Kong, SAR		11 (0.9)	583 (4.7)	63 (1.1)	567 (2.5)	19 (1.0)	524 (5.5)	8 (0.4)	550 (5.8)
Hungary	s	38 (1.8)	588 (3.0)	36 (1.2)	549 (3.1)	19 (1.4)	484 (4.6)	8 (0.7)	508 (8.4)
Indonesia		8 (0.9)	474 (6.8)	46 (1.3)	431 (4.4)	25 (1.2)	401 (6.4)	21 (1.0)	407 (4.7)
Iran, Islamic Rep. of		7 (0.6)	504 (7.0)	37 (0.9)	467 (2.9)	16 (0.8)	436 (3.8)	39 (1.1)	441 (2.7)
Israel	r	35 (1.1)	532 (4.1)	29 (0.9)	494 (3.4)	23 (0.8)	454 (5.1)	14 (0.6)	478 (5.0)
Italy		15 (1.1)	527 (5.6)	35 (1.1)	511 (2.8)	38 (1.2)	469 (3.7)	12 (0.6)	462 (5.3)
Japan	r	29 (1.3)	592 (2.9)	17 (0.7)	575 (2.7)	37 (1.2)	530 (2.3)	18 (0.7)	538 (3.6)
Jordan		27 (1.6)	519 (6.0)	35 (1.2)	489 (3.7)	13 (0.8)	429 (5.2)	24 (1.0)	464 (3.6)
Korea, Rep. of		31 (1.2)	584 (2.2)	48 (0.9)	560 (1.9)	11 (0.5)	506 (4.2)	9 (0.4)	540 (4.3)
Latvia	s	35 (1.7)	539 (3.3)	34 (1.5)	526 (3.2)	16 (1.3)	515 (5.5)	15 (0.9)	490 (5.8)
Lebanon		16 (1.1)	447 (6.6)	52 (1.2)	405 (4.9)	16 (0.9)	351 (6.0)	16 (0.9)	353 (6.7)
Lithuania	r	33 (1.6)	554 (2.9)	42 (1.3)	521 (2.5)	26 (1.2)	494 (3.3)	0 (0.0)	~ ~
Macedonia, Rep. of		20 (1.3)	508 (4.7)	40 (1.1)	480 (3.3)	30 (1.1)	406 (4.8)	10 (0.8)	408 (6.6)
Malaysia		10 (0.9)	552 (6.6)	54 (1.5)	519 (3.5)	26 (1.3)	487 (4.0)	10 (0.7)	508 (5.2)
Moldova, Rep. of	r	23 (1.3)	507 (4.2)	23 (1.0)	488 (4.6)	37 (1.4)	460 (4.2)	17 (0.9)	454 (4.6)
Morocco	r	13 (1.2)	417 (5.7)	38 (1.2)	406 (4.0)	20 (1.1)	392 (3.8)	29 (1.3)	393 (4.4)
Netherlands	r	13 (1.3)	577 (4.7)	16 (1.5)	580 (4.1)	55 (2.5)	529 (3.0)	16 (1.1)	539 (5.2)
New Zealand	s	17 (1.6)	577 (8.0)	22 (1.3)	549 (7.2)	36 (1.9)	519 (5.0)	25 (1.3)	517 (6.2)
Norway	s	47 (1.3)	521 (2.6)	13 (0.9)	502 (5.2)	19 (1.0)	483 (4.6)	21 (0.8)	502 (3.3)
Palestinian Nat'l Auth.		20 (0.8)	484 (4.2)	34 (0.9)	458 (3.2)	19 (0.8)	394 (4.6)	26 (0.8)	427 (3.7)
Philippines		15 (1.2)	456 (6.9)	26 (1.2)	405 (6.3)	44 (1.7)	346 (6.0)	15 (0.9)	357 (7.4)
Romania		14 (1.6)	536 (5.5)	30 (1.2)	505 (4.6)	41 (1.7)	457 (5.4)	16 (1.2)	435 (7.5)
Russian Federation		35 (2.2)	547 (3.4)	30 (1.4)	518 (3.7)	21 (1.2)	489 (5.7)	13 (0.6)	481 (4.7)
Saudi Arabia	r	24 (1.9)	432 (6.6)	45 (1.6)	404 (3.9)	13 (1.0)	381 (6.3)	19 (1.7)	393 (4.7)
Scotland		x x	x x	x x	x x	x x	x x	x x	x x
Serbia		15 (1.1)	528 (3.6)	27 (0.9)	506 (3.7)	48 (1.3)	440 (2.4)	10 (0.6)	432 (5.6)
Singapore	r	13 (0.5)	643 (3.7)	43 (1.1)	604 (3.2)	28 (1.0)	530 (6.0)	15 (0.5)	574 (6.2)
Slovak Republic	r	25 (1.8)	573 (3.9)	27 (1.1)	544 (3.6)	36 (1.5)	496 (2.8)	13 (0.8)	482 (5.9)
Slovenia	r	18 (1.1)	565 (3.2)	26 (0.9)	548 (3.3)	42 (1.1)	499 (2.6)	14 (0.8)	517 (3.4)
South Africa	r	8 (1.0)	386 (18.7)	26 (0.9)	273 (9.3)	54 (1.2)	221 (5.6)	12 (0.8)	202 (8.9)
Sweden	s	32 (1.4)	561 (4.1)	14 (0.8)	539 (5.9)	33 (1.5)	515 (3.6)	21 (0.9)	522 (4.3)
Tunisia		8 (0.7)	436 (4.6)	46 (1.1)	409 (2.7)	26 (0.8)	394 (2.4)	21 (0.7)	402 (3.1)
United States	r	48 (1.3)	558 (3.5)	27 (0.8)	518 (3.1)	16 (0.7)	487 (3.7)	9 (0.3)	520 (4.0)
‡ England		x x	x x	x x	x x	x x	x x	x x	x x
International Avg.		21 (0.2)	520 (0.9)	33 (0.2)	490 (0.7)	30 (0.2)	446 (0.9)	15 (0.1)	453 (0.8)
Benchmarking Participants									
Basque Country, Spain		23 (1.7)	520 (4.9)	27 (1.3)	503 (3.9)	18 (1.2)	470 (4.1)	32 (1.3)	470 (3.5)
Indiana State, US	r	40 (2.4)	557 (5.7)	33 (1.5)	536 (5.2)	16 (1.5)	499 (4.8)	11 (1.0)	517 (6.4)
Ontario Province, Can.	s	39 (2.2)	561 (3.6)	26 (1.4)	544 (3.6)	22 (1.7)	517 (4.6)	13 (0.9)	531 (3.6)
Quebec Province, Can.	r	26 (1.6)	553 (4.9)	28 (1.1)	539 (4.2)	35 (1.9)	520 (3.2)	11 (0.7)	529 (4.8)

Background data provided by students.

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

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

() 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. An "x" indicates data are available for less than 50% of the students.

at home in relation to their average science achievement, shows that this remains true for the TIMSS 2003 countries, and holds also for science achievement at the fourth grade. At both eighth and fourth grades, students from homes where the language of the test is always or almost always spoken had higher average achievement than those who spoke it less frequently.

Whereas in most countries a large majority of students at each grade are from homes where the language of the test is spoken frequently, on average, internationally, about 20 percent of students were from homes where the language of the test was spoken only sometimes, or never. Countries where the majority of students speak the language of the test so infrequently included Botswana, Ghana, Indonesia, Lebanon, the Philippines, Singapore, and South Africa at the eighth grade, and Morocco, the Philippines, and Singapore at the fourth grade. Although in general average science achievement in such countries was relatively low, Singapore was a notable exception, with average achievement above the international average even among those rarely speaking the language of the test at home.

Many countries tested in more than one language in order to cover their whole student population. These included Bahrain (Arabic and English), Egypt (Arabic, English, and French), Estonia (Estonian and Russian), Hong Kong SAR (Chinese and English), Israel (Hebrew and Arabic), Latvia (Latvian and Russian), Lebanon (French and English), Macedonia (Macedonian and Albanian), Moldova (Moldavian and Russian), New Zealand (English and Maori at grade 4 only), Norway (Bokmål and Nynorsk), the Palestinian National Authority (Arabic and English), Romania (Romanian and Hungarian), the Slovak Republic (Slovak and Hungarian), and South Africa (English and Afrikaans). Among benchmarking participants, the Basque Country, Spain tested in Basque and Castilian, and the Canadian provinces of Ontario and Quebec in English and French. However, in countries like Botswana, Ghana, Indonesia, Morocco, the Philippines, Singapore, and South Africa, testing in all possible dialects and languages was prohibitive.

Exhibit 4.3: Students Speak Language of the Test at Home

Countries	Always		Almost Always		Sometimes		Never	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	80 (1.0)	460 (3.7)	16 (0.8)	474 (4.1)	4 (0.5)	446 (11.6)	0 (0.1)	~ ~
Australia	80 (2.3)	529 (3.5)	12 (1.1)	524 (8.8)	7 (1.3)	521 (13.2)	1 (0.4)	~ ~
Bahrain	66 (1.1)	437 (2.1)	15 (0.7)	460 (3.6)	15 (0.7)	429 (4.0)	4 (0.5)	430 (5.9)
Belgium (Flemish)	77 (1.3)	526 (2.2)	11 (0.6)	506 (6.1)	9 (0.8)	459 (9.2)	4 (0.6)	489 (8.7)
Botswana	5 (0.3)	374 (13.5)	6 (0.4)	412 (10.9)	80 (0.8)	366 (2.5)	9 (0.6)	316 (6.5)
Bulgaria	81 (2.0)	482 (5.4)	10 (0.8)	494 (8.7)	8 (1.4)	445 (11.3)	1 (0.3)	~ ~
Chile	87 (0.7)	416 (2.8)	9 (0.5)	408 (4.8)	4 (0.4)	357 (8.8)	0 (0.1)	~ ~
Chinese Taipei	44 (1.5)	589 (2.9)	36 (1.0)	573 (3.7)	19 (1.2)	532 (6.7)	1 (0.2)	~ ~
Cyprus	79 (0.8)	442 (2.2)	14 (0.6)	452 (3.6)	6 (0.4)	426 (6.7)	2 (0.2)	~ ~
Egypt	61 (1.3)	421 (3.9)	14 (0.8)	444 (6.0)	22 (1.0)	429 (5.3)	3 (0.3)	387 (14.5)
Estonia	90 (0.6)	554 (2.5)	8 (0.4)	546 (4.6)	2 (0.3)	~ ~	1 (0.2)	~ ~
Ghana	23 (1.1)	260 (7.0)	10 (0.7)	279 (10.9)	63 (1.3)	263 (5.8)	5 (0.9)	155 (11.5)
Hong Kong, SAR	77 (0.8)	565 (2.6)	15 (0.6)	535 (5.6)	7 (0.5)	520 (7.6)	1 (0.2)	~ ~
Hungary	95 (0.4)	543 (2.8)	4 (0.4)	548 (9.2)	0 (0.1)	~ ~	0 (0.1)	~ ~
Indonesia	22 (2.0)	421 (6.5)	11 (0.7)	427 (6.8)	57 (2.0)	419 (4.1)	10 (0.8)	417 (6.6)
Iran, Islamic Rep. of	55 (3.2)	463 (2.9)	9 (0.6)	469 (3.9)	21 (1.8)	434 (3.9)	15 (1.9)	438 (4.2)
Israel	79 (1.0)	488 (3.1)	15 (0.7)	505 (5.1)	5 (0.5)	482 (6.9)	1 (0.2)	~ ~
Italy	94 (0.5)	493 (3.0)	3 (0.3)	475 (8.0)	3 (0.3)	428 (8.5)	1 (0.2)	~ ~
Japan	94 (0.4)	554 (1.7)	4 (0.3)	533 (5.8)	1 (0.2)	~ ~	0 (0.1)	~ ~
Jordan	72 (1.2)	472 (3.6)	13 (0.7)	509 (6.4)	11 (0.7)	473 (6.0)	4 (0.5)	457 (16.7)
Korea, Rep. of	71 (0.8)	558 (1.8)	28 (0.8)	562 (2.4)	1 (0.2)	~ ~	0 (0.0)	~ ~
Latvia	77 (1.9)	514 (2.6)	14 (0.9)	519 (3.2)	6 (1.3)	484 (9.5)	2 (0.5)	~ ~
Lebanon	5 (0.5)	396 (11.1)	12 (0.7)	411 (7.0)	68 (1.1)	395 (4.5)	15 (0.8)	374 (7.1)
Lithuania	89 (1.0)	519 (2.3)	9 (0.5)	526 (4.6)	2 (0.4)	~ ~	1 (0.2)	~ ~
Macedonia, Rep. of	89 (1.4)	452 (3.7)	4 (0.4)	449 (9.5)	5 (0.9)	410 (12.8)	2 (0.6)	~ ~
Malaysia	51 (2.1)	502 (3.4)	14 (0.8)	521 (4.3)	28 (1.9)	518 (6.1)	7 (0.8)	523 (9.9)
Moldova, Rep. of	68 (1.6)	474 (3.9)	18 (0.9)	474 (4.5)	13 (1.2)	464 (5.9)	1 (0.2)	~ ~
Morocco	35 (1.8)	389 (4.1)	18 (0.9)	411 (4.0)	39 (1.4)	400 (3.1)	8 (0.8)	400 (7.8)
Netherlands	83 (1.3)	541 (3.1)	12 (1.0)	517 (6.7)	4 (0.5)	488 (11.8)	1 (0.2)	~ ~
New Zealand	80 (1.3)	525 (5.1)	12 (0.8)	508 (6.9)	6 (0.8)	495 (11.7)	1 (0.3)	~ ~
Norway	85 (0.8)	498 (1.9)	10 (0.5)	489 (6.1)	3 (0.4)	435 (10.6)	1 (0.2)	~ ~
Palestinian Nat'l Auth.	73 (1.3)	437 (3.5)	11 (0.6)	452 (6.0)	13 (1.0)	425 (5.6)	2 (0.3)	~ ~
Philippines	2 (0.3)	~ ~	4 (0.3)	385 (12.2)	80 (1.0)	385 (5.8)	14 (0.9)	343 (6.4)
Romania	86 (1.8)	469 (5.1)	8 (0.6)	483 (6.2)	4 (1.0)	451 (17.7)	2 (1.0)	~ ~
Russian Federation	86 (2.0)	514 (3.6)	10 (1.0)	531 (9.5)	4 (1.1)	471 (17.3)	1 (0.3)	~ ~
Saudi Arabia	100 (0.0)	398 (4.0)	0 (0.0)	~ ~	0 (0.0)	~ ~	0 (0.0)	~ ~
Scotland	92 (0.6)	513 (3.3)	5 (0.5)	532 (8.7)	3 (0.3)	464 (10.3)	1 (0.2)	~ ~
Serbia	93 (0.7)	468 (2.6)	5 (0.4)	484 (6.5)	2 (0.4)	~ ~	0 (0.1)	~ ~
Singapore	23 (0.6)	613 (3.9)	19 (0.6)	602 (3.9)	49 (0.8)	557 (5.1)	8 (0.4)	545 (6.7)
Slovak Republic	79 (1.6)	519 (3.3)	12 (0.7)	528 (6.1)	7 (1.0)	479 (7.5)	2 (0.4)	~ ~
Slovenia	80 (1.3)	526 (2.0)	11 (0.7)	504 (3.6)	6 (0.7)	487 (5.3)	2 (0.5)	~ ~
South Africa	18 (1.7)	347 (17.3)	9 (0.7)	310 (13.8)	57 (1.7)	225 (4.3)	15 (1.0)	153 (5.2)
Sweden	84 (1.3)	531 (2.4)	10 (0.8)	507 (5.8)	5 (0.7)	471 (9.2)	1 (0.2)	~ ~
Tunisia	51 (1.7)	399 (2.1)	13 (0.8)	422 (4.9)	28 (1.3)	401 (3.4)	9 (0.9)	409 (4.6)
United States	83 (0.9)	533 (2.9)	10 (0.5)	516 (5.5)	5 (0.4)	472 (7.0)	1 (0.2)	~ ~
‡ England	87 (1.6)	547 (4.5)	10 (1.3)	540 (7.2)	2 (0.6)	~ ~	1 (0.2)	~ ~
International Avg.	68 (0.2)	482 (0.8)	11 (0.1)	483 (1.0)	17 (0.1)	442 (1.5)	4 (0.1)	389 (2.4)
Benchmarking Participants								
Basque Country, Spain	65 (1.6)	489 (3.1)	25 (1.1)	490 (4.7)	8 (0.7)	486 (6.3)	3 (0.5)	477 (9.0)
Indiana State, US	88 (0.9)	534 (4.6)	7 (0.8)	534 (7.9)	4 (0.4)	483 (12.2)	1 (0.2)	~ ~
Ontario Province, Can.	72 (2.0)	536 (2.5)	16 (1.1)	528 (4.7)	9 (0.9)	523 (6.8)	2 (0.3)	~ ~
Quebec Province, Can.	72 (1.8)	536 (2.8)	19 (0.9)	527 (5.4)	7 (0.9)	498 (7.8)	2 (0.4)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by students.

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

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

Exhibit 4.3: Students Speak Language of the Test at Home

SCIENCE
Grade 4

Countries	Always		Almost Always		Sometimes		Never	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	84 (1.0)	440 (4.7)	11 (0.7)	448 (5.9)	4 (0.4)	413 (10.5)	1 (0.2)	~ ~
Australia	80 (1.7)	525 (4.6)	11 (0.9)	525 (4.9)	8 (1.0)	493 (8.5)	1 (0.2)	~ ~
Belgium (Flemish)	68 (1.4)	525 (1.6)	16 (0.9)	520 (2.7)	12 (1.2)	487 (5.4)	4 (0.5)	500 (6.9)
Chinese Taipei	31 (1.2)	568 (2.3)	41 (0.8)	553 (2.0)	26 (1.1)	533 (2.8)	1 (0.1)	~ ~
Cyprus	72 (1.1)	481 (2.4)	14 (0.7)	491 (4.3)	11 (0.6)	469 (5.0)	3 (0.3)	467 (7.0)
England	82 (1.3)	544 (3.7)	12 (0.8)	549 (5.8)	5 (0.7)	484 (7.2)	1 (0.2)	~ ~
Hong Kong, SAR	51 (1.3)	558 (3.5)	24 (0.8)	535 (3.3)	21 (1.0)	523 (3.6)	4 (0.4)	495 (5.4)
Hungary	91 (0.6)	531 (2.9)	8 (0.6)	540 (5.7)	1 (0.2)	~ ~	0 (0.1)	~ ~
Iran, Islamic Rep. of	53 (3.4)	434 (4.7)	6 (0.5)	438 (8.2)	21 (1.9)	407 (5.1)	20 (2.5)	368 (7.3)
Italy	88 (0.7)	520 (3.8)	3 (0.3)	494 (10.3)	6 (0.5)	486 (6.7)	2 (0.3)	~ ~
Japan	91 (0.5)	547 (1.5)	8 (0.5)	526 (5.2)	1 (0.2)	~ ~	0 (0.1)	~ ~
Latvia	78 (1.5)	535 (2.4)	15 (0.8)	537 (4.3)	6 (0.8)	496 (7.7)	2 (0.4)	~ ~
Lithuania	83 (1.0)	514 (2.6)	13 (0.8)	521 (5.2)	3 (0.6)	479 (9.7)	0 (0.1)	~ ~
Moldova, Rep. of	76 (1.8)	500 (5.0)	14 (1.0)	492 (7.4)	9 (1.1)	490 (7.0)	1 (0.3)	~ ~
Morocco	35 (2.3)	306 (8.4)	11 (0.8)	318 (9.7)	28 (1.6)	322 (7.3)	27 (2.5)	296 (11.5)
Netherlands	75 (1.2)	531 (1.8)	17 (0.9)	518 (4.7)	7 (0.8)	485 (5.0)	1 (0.3)	~ ~
New Zealand	76 (1.0)	529 (2.3)	13 (0.6)	533 (5.6)	11 (0.8)	458 (7.8)	1 (0.2)	~ ~
Norway	78 (1.0)	471 (2.6)	15 (0.8)	471 (5.1)	5 (0.5)	409 (8.8)	1 (0.2)	~ ~
Philippines	6 (0.6)	302 (15.1)	8 (0.9)	307 (23.7)	59 (1.8)	363 (10.4)	27 (2.1)	284 (7.5)
Russian Federation	81 (2.3)	526 (4.8)	8 (0.7)	544 (6.7)	8 (1.7)	515 (16.9)	2 (0.5)	~ ~
Scotland	78 (1.3)	506 (3.2)	10 (0.6)	509 (5.3)	9 (0.8)	480 (5.9)	3 (0.4)	450 (10.9)
Singapore	24 (1.2)	592 (6.0)	22 (1.0)	598 (4.5)	47 (1.5)	545 (5.6)	7 (0.6)	512 (8.1)
Slovenia	72 (1.3)	494 (2.7)	18 (1.1)	497 (4.5)	8 (1.0)	474 (6.8)	2 (0.3)	~ ~
Tunisia	43 (2.5)	318 (7.9)	9 (0.8)	313 (13.0)	36 (2.2)	325 (6.6)	12 (1.5)	325 (11.7)
United States	73 (1.1)	546 (2.4)	13 (0.5)	538 (3.8)	12 (0.8)	482 (4.4)	2 (0.1)	~ ~
International Avg.	67 (0.3)	494 (1.1)	14 (0.2)	493 (1.6)	15 (0.2)	462 (1.8)	5 (0.2)	411 (2.8)
Benchmarking Participants								
Indiana State, US	83 (0.9)	556 (3.7)	11 (0.7)	566 (5.9)	5 (0.7)	506 (8.4)	1 (0.2)	~ ~
Ontario Province, Can.	63 (1.7)	546 (3.6)	24 (1.1)	549 (5.9)	13 (1.1)	505 (5.9)	1 (0.2)	~ ~
Quebec Province, Can.	67 (1.3)	500 (2.8)	24 (0.9)	509 (3.5)	8 (0.8)	480 (5.9)	2 (0.3)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by students.

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

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

Earlier IEA studies have shown that students from homes with extensive literacy resources have higher achievement than those from less advantaged backgrounds. For example, TIMSS 1999 has shown a consistent relationship between number of books in the home and student achievement in both mathematics and science at the eighth grade,² and PIRLS 2001 demonstrated a similar relationship with reading literacy at the fourth grade.³ Providing further information on this topic, Exhibit 4.4 shows for each country at both eighth and fourth grades the percentage of students at each of five ranges of number of books in the home in relation to average science achievement. This exhibit reveals a wide range both across and within each country. For example, the percentage of eighth-grade students reporting more than 200 books in their homes exceeded 30 percent in Australia, Estonia, Hungary, and Sweden, whereas in Botswana, Egypt, Ghana, Indonesia, Iran, Morocco, the Philippines, and South Africa, more than 30 percent of students were from homes with 10 books or less. The situation among fourth-grade students was similar.

Across countries, on average, 15 percent of eighth-grade students were from homes with more than 200 books, 13 percent from homes with 101-200 books, 27 percent from homes with 26-100 books, 26 percent from homes with 11-25 books, and 18 percent with 0-10 books. There also was a clear-cut relationship, on average, between number of books in the home and science achievement. Eighth-grade students reporting more than 200 books in their homes had an average score of 506 on the science scale, compared with an average of just 438 for students reporting 10 books or less, a difference of 68 points. The difference at fourth grade was similar.

In addition to literacy resources such as books, TIMSS has found that having study aids such as a computer or a study desk or table at home was associated with higher student achievement. Exhibit 4.5 shows the percentage of eighth- and fourth-grade students in each country that had a computer or study desk or table, together with their average science achievement. About 60 percent

- 2 Mullis, I.V.S., Martin, M.O., Gonzalez, E.J., Gregory, K.D., Garden, R.A., O'Connor, K.M., Chrostowski, S.J., and Smith, T.A. (2000), *TIMSS 1999 International Mathematics Report: Findings from IEA's Repeat of the Third International Mathematics and Science Study at the Eighth Grade*, Chestnut Hill, MA: Boston College; Martin, M.O., Mullis, I.V.S., Gonzalez, E.J., Gregory, K.D., Smith, T.A., Chrostowski, S.J., Garden, R.A., and O'Connor, K.M. (2000), *TIMSS 1999 International Science Report: Findings from IEA's Repeat of the Third International Mathematics and Science Study at the Eighth Grade*, Chestnut Hill, MA: Boston College.
- 3 Mullis, I.V.S., Martin, M.O., Gonzalez, E.J., and Kennedy, A.M. (2003), *PIRLS 2001 International Report: IEA's Study of Reading Literacy Achievement in Primary Schools in 35 Countries*, Chestnut Hill, MA: Boston College.

of eighth-grade students, on average, reported having a computer at home, as did a slightly greater percentage of fourth-grade students (65%). However, there were great differences between countries. For 17 of the participants – Australia, Belgium (Flemish), Chinese Taipei, England, Hong Kong SAR, Israel, Korea, the Netherlands, New Zealand, Norway, Scotland, Singapore, Sweden, the United States, Indiana, Ontario, and Quebec – virtually all eighth-grade students (90% or more) reported having a computer at home. In contrast, less than 20 percent of eighth-grade students in Armenia, Botswana, Egypt, Indonesia, Moldova, and Morocco reported having a computer. The science achievement difference between students with a computer at home and those without was substantial on average – 35 scale score points at eighth grade and 27 points at fourth grade.

Perhaps not surprisingly, somewhat greater percentages of students reported having a study desk or table at home – 83 percent and 80 percent at eighth and fourth grades, respectively. In many countries (20 at eighth grade and 9 at fourth grade), more than 90 percent of students reported having a study desk. Having such a study facility was associated with higher average science achievement at both grades – 34 point difference at eighth grade and a 26 point difference at fourth grade.

Because having a computer at home does not necessarily mean that students have access to it, TIMSS also asked students where they actually use a computer – at home, at school, or some other place. Exhibit 4.6 summarizes these responses, presenting countries in order of the percentage of students that reported using a computer both at home and at school. On average, almost 40% of eighth-grade students reported using a computer both at home and at school. Eighteen percent reported using a computer at home but not at school, 19 percent using one at school but not at home, and 10 percent at some other place. Fourteen percent of eighth-grade students reported that they do not use a computer at all. The percentages for fourth grade were fairly similar.

Exhibit 4.4: Books in the Home



Countries	More than 200 Books		101-200 Books		26-100 Books	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	20 (1.0)	478 (5.1)	13 (0.6)	475 (4.2)	28 (0.7)	467 (3.6)
Australia	31 (1.4)	553 (4.1)	23 (0.8)	540 (3.4)	30 (1.0)	517 (4.8)
Bahrain	17 (0.5)	450 (2.7)	14 (0.6)	457 (3.4)	31 (0.8)	445 (2.1)
Belgium (Flemish)	12 (0.6)	539 (4.0)	15 (0.6)	538 (2.6)	34 (0.9)	524 (2.7)
Botswana	4 (0.5)	407 (14.6)	5 (0.3)	402 (7.4)	13 (0.6)	395 (6.2)
Bulgaria	28 (1.3)	494 (8.2)	18 (0.9)	484 (6.0)	25 (1.1)	481 (5.9)
Chile	5 (0.4)	484 (6.4)	7 (0.4)	458 (5.8)	27 (0.9)	437 (3.5)
Chinese Taipei	15 (1.0)	616 (3.5)	14 (0.6)	602 (3.8)	30 (0.7)	582 (3.2)
Cyprus	11 (0.5)	472 (5.0)	16 (0.7)	458 (3.5)	35 (0.8)	453 (3.0)
Egypt	6 (0.4)	447 (8.9)	6 (0.4)	438 (9.5)	18 (0.7)	440 (5.3)
Estonia	45 (1.2)	567 (2.9)	18 (0.6)	552 (3.6)	23 (0.7)	543 (3.1)
Ghana	10 (0.6)	259 (11.1)	6 (0.4)	276 (13.8)	16 (0.7)	277 (8.2)
Hong Kong, SAR	9 (0.6)	576 (5.6)	8 (0.4)	574 (4.2)	27 (0.6)	565 (3.0)
Hungary	31 (1.2)	578 (3.2)	22 (0.7)	551 (3.5)	29 (1.0)	531 (3.1)
Indonesia	1 (0.2)	~ ~	3 (0.3)	449 (9.6)	19 (0.7)	431 (5.1)
Iran, Islamic Rep. of	7 (0.5)	492 (6.1)	5 (0.3)	483 (5.2)	17 (0.8)	468 (3.5)
Israel	22 (0.9)	511 (4.1)	22 (0.7)	507 (3.9)	33 (0.8)	487 (3.6)
Italy	19 (0.9)	524 (4.2)	14 (0.6)	502 (4.7)	25 (0.7)	497 (3.8)
Japan	17 (0.7)	584 (3.2)	17 (0.5)	567 (2.9)	32 (0.8)	552 (2.3)
Jordan	9 (0.6)	499 (7.9)	8 (0.5)	509 (7.2)	28 (0.9)	496 (4.1)
Korea, Rep. of	19 (0.8)	596 (2.2)	22 (0.7)	572 (2.3)	33 (0.8)	556 (2.2)
Latvia	28 (1.3)	532 (3.6)	25 (0.8)	517 (3.1)	31 (1.1)	504 (3.2)
Lebanon	8 (0.6)	421 (8.9)	8 (0.8)	446 (8.6)	25 (1.0)	423 (5.0)
Lithuania	12 (0.8)	551 (4.5)	15 (0.7)	537 (4.2)	34 (0.9)	525 (2.3)
Macedonia, Rep. of	8 (0.7)	471 (7.8)	8 (0.6)	489 (6.6)	28 (0.9)	476 (3.9)
Malaysia	5 (0.5)	557 (6.4)	9 (0.6)	540 (5.2)	28 (0.8)	524 (3.6)
Moldova, Rep. of	8 (0.8)	507 (5.2)	9 (0.6)	494 (5.9)	23 (1.0)	483 (4.3)
Morocco	5 (0.6)	410 (10.3)	4 (0.3)	403 (8.8)	21 (0.9)	404 (3.6)
Netherlands	21 (1.4)	567 (4.4)	19 (0.9)	556 (3.8)	31 (1.3)	535 (3.2)
New Zealand	25 (1.5)	556 (7.4)	22 (1.1)	537 (4.4)	31 (1.0)	512 (4.5)
Norway	27 (1.2)	515 (2.6)	22 (0.7)	504 (2.8)	33 (0.9)	493 (3.1)
Palestinian Nat'l Auth.	7 (0.5)	446 (7.1)	6 (0.4)	457 (6.8)	24 (0.7)	456 (4.4)
Philippines	3 (0.3)	373 (13.1)	4 (0.3)	423 (12.3)	17 (0.8)	418 (7.8)
Romania	12 (1.2)	516 (7.2)	13 (1.1)	508 (5.3)	29 (1.2)	479 (4.3)
Russian Federation	21 (1.3)	538 (3.5)	26 (0.9)	526 (4.1)	32 (1.4)	512 (4.2)
Saudi Arabia	10 (0.7)	422 (7.4)	9 (0.9)	414 (6.0)	25 (1.0)	410 (4.9)
Scotland	17 (1.0)	564 (4.8)	16 (0.7)	541 (4.3)	29 (0.8)	516 (3.6)
Serbia	6 (0.5)	509 (4.7)	9 (0.5)	518 (5.3)	27 (1.0)	490 (3.8)
Singapore	14 (0.5)	631 (4.1)	16 (0.5)	607 (4.2)	33 (0.7)	589 (3.7)
Slovak Republic	12 (0.8)	564 (4.7)	18 (0.8)	547 (4.1)	41 (0.9)	520 (3.0)
Slovenia	13 (0.7)	545 (4.5)	15 (0.7)	542 (3.2)	38 (0.9)	527 (2.2)
South Africa	6 (0.5)	315 (20.7)	5 (0.4)	316 (22.1)	14 (0.7)	288 (13.6)
Sweden	32 (1.3)	558 (3.2)	21 (0.6)	537 (3.0)	27 (0.9)	511 (3.0)
Tunisia	4 (0.4)	433 (7.8)	6 (0.5)	426 (6.3)	22 (0.9)	415 (3.1)
United States	24 (0.9)	569 (3.6)	18 (0.5)	552 (3.4)	28 (0.6)	527 (2.9)
‡ England	24 (1.1)	588 (5.7)	18 (1.0)	564 (6.5)	27 (1.0)	541 (4.4)
International Avg.	15 (0.1)	506 (1.0)	13 (0.1)	498 (1.0)	27 (0.1)	483 (0.7)
Benchmarking Participants						
Basque Country, Spain	25 (1.4)	514 (4.6)	20 (0.9)	505 (4.6)	36 (1.3)	481 (3.2)
Indiana State, US	19 (1.6)	566 (6.4)	17 (0.9)	552 (5.7)	32 (1.0)	537 (4.4)
Ontario Province, Can.	28 (1.6)	560 (3.1)	21 (0.9)	539 (3.3)	31 (1.1)	523 (3.7)
Quebec Province, Can.	13 (0.8)	553 (4.6)	16 (0.9)	551 (4.9)	33 (0.9)	535 (3.2)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by students.

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

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

Exhibit 4.4: Books in the Home

Countries	11-25 Books		0-10 Books	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	24 (0.9)	453 (4.8)	15 (0.9)	433 (5.2)
Australia	11 (0.8)	493 (5.8)	5 (0.5)	464 (8.7)
Bahrain	26 (0.8)	423 (3.0)	11 (0.5)	420 (5.0)
Belgium (Flemish)	25 (0.8)	503 (4.0)	14 (0.7)	477 (5.7)
Botswana	30 (0.9)	368 (3.4)	48 (1.3)	348 (3.0)
Bulgaria	15 (0.7)	470 (6.3)	14 (1.6)	449 (11.8)
Chile	37 (0.9)	402 (2.6)	23 (1.2)	374 (3.5)
Chinese Taipei	24 (0.9)	552 (3.8)	17 (0.9)	515 (4.2)
Cyprus	27 (0.7)	427 (3.3)	11 (0.5)	391 (4.6)
Egypt	38 (0.8)	424 (4.2)	33 (1.2)	415 (3.8)
Estonia	11 (0.6)	528 (3.8)	3 (0.3)	516 (7.4)
Ghana	34 (1.0)	264 (6.3)	34 (1.5)	246 (6.4)
Hong Kong, SAR	28 (0.7)	555 (3.6)	28 (0.7)	538 (4.2)
Hungary	13 (0.6)	499 (4.5)	5 (0.7)	466 (7.7)
Indonesia	45 (0.9)	416 (4.4)	32 (1.0)	416 (4.3)
Iran, Islamic Rep. of	31 (0.8)	454 (2.6)	39 (1.3)	437 (2.6)
Israel	17 (0.8)	460 (4.2)	6 (0.4)	448 (7.5)
Italy	29 (0.7)	474 (4.0)	13 (0.7)	457 (5.5)
Japan	22 (0.6)	539 (2.4)	13 (0.7)	517 (3.3)
Jordan	33 (0.9)	470 (4.2)	23 (0.8)	449 (4.3)
Korea, Rep. of	10 (0.6)	533 (2.9)	15 (0.7)	514 (3.0)
Latvia	12 (0.7)	491 (4.1)	4 (0.4)	479 (7.0)
Lebanon	36 (1.1)	384 (5.2)	23 (1.4)	353 (5.2)
Lithuania	30 (1.1)	503 (2.7)	10 (0.7)	483 (6.4)
Macedonia, Rep. of	40 (1.2)	443 (3.9)	17 (0.8)	401 (5.9)
Malaysia	40 (1.0)	501 (3.4)	17 (0.9)	482 (4.7)
Moldova, Rep. of	37 (1.2)	467 (4.6)	23 (1.1)	452 (5.1)
Morocco	38 (1.0)	392 (3.4)	33 (1.4)	399 (3.6)
Netherlands	19 (1.2)	508 (5.3)	10 (0.8)	492 (5.7)
New Zealand	14 (0.8)	490 (4.4)	8 (0.7)	453 (7.8)
Norway	11 (0.6)	463 (4.6)	7 (0.4)	441 (7.0)
Palestinian Nat'l Auth.	36 (0.8)	432 (3.6)	27 (1.0)	421 (3.7)
Philippines	34 (0.8)	381 (5.7)	43 (1.0)	356 (5.6)
Romania	27 (1.4)	451 (5.9)	20 (1.7)	435 (9.0)
Russian Federation	17 (1.1)	481 (5.0)	4 (0.5)	458 (9.4)
Saudi Arabia	33 (1.1)	391 (4.5)	23 (1.4)	382 (4.3)
Scotland	21 (1.0)	480 (3.3)	16 (0.9)	460 (4.8)
Serbia	38 (1.0)	458 (2.5)	21 (1.1)	428 (4.0)
Singapore	24 (0.7)	546 (6.1)	12 (0.7)	508 (6.9)
Slovak Republic	24 (1.1)	481 (3.2)	5 (0.5)	440 (7.5)
Slovenia	27 (0.7)	502 (3.5)	8 (0.6)	474 (4.7)
South Africa	31 (0.9)	241 (6.0)	44 (1.3)	218 (4.5)
Sweden	14 (0.7)	481 (4.4)	6 (0.6)	472 (6.2)
Tunisia	44 (1.1)	400 (2.0)	23 (1.1)	392 (2.3)
United States	18 (0.6)	493 (3.3)	13 (0.6)	469 (4.6)
‡ England	17 (0.9)	520 (4.8)	13 (1.1)	487 (5.0)
International Avg.	26 (0.1)	458 (0.7)	18 (0.1)	438 (1.0)
Benchmarking Participants				
Basque Country, Spain	15 (0.8)	462 (4.3)	5 (0.5)	435 (9.3)
Indiana State, US	19 (1.0)	510 (5.8)	14 (1.2)	477 (6.3)
Ontario Province, Can.	14 (0.9)	507 (5.1)	7 (0.6)	497 (5.0)
Quebec Province, Can.	24 (1.1)	519 (3.3)	14 (0.7)	501 (4.3)

Background data provided by students.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

Exhibit 4.4: Books in the Home



Countries	More than 200 Books		101-200 Books		26-100 Books	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	18 (1.0)	459 (5.3)	14 (0.7)	456 (5.7)	29 (1.1)	448 (4.9)
Australia	23 (1.3)	542 (4.5)	23 (1.1)	543 (3.7)	34 (1.1)	519 (4.0)
Belgium (Flemish)	11 (0.7)	532 (4.3)	17 (0.7)	532 (2.8)	42 (1.0)	524 (1.8)
Chinese Taipei	15 (0.8)	580 (3.6)	14 (0.6)	570 (3.1)	30 (0.7)	557 (2.2)
Cyprus	9 (0.7)	490 (4.4)	14 (0.7)	489 (4.3)	38 (1.0)	491 (3.3)
England	19 (1.2)	575 (5.8)	20 (1.0)	561 (4.6)	35 (1.2)	542 (3.3)
Hong Kong, SAR	7 (0.6)	557 (5.0)	10 (0.8)	555 (5.7)	28 (1.0)	548 (3.8)
Hungary	18 (1.1)	560 (4.9)	17 (0.8)	549 (4.3)	35 (1.0)	536 (2.8)
Iran, Islamic Rep. of	5 (0.6)	454 (11.3)	5 (0.5)	436 (9.7)	13 (0.9)	450 (6.1)
Italy	10 (0.8)	525 (4.6)	11 (0.6)	531 (5.2)	27 (0.8)	525 (4.8)
Japan	7 (0.4)	566 (5.6)	14 (0.6)	561 (3.2)	40 (0.9)	553 (2.1)
Latvia	17 (0.9)	548 (3.6)	21 (0.9)	543 (4.2)	38 (1.1)	535 (3.0)
Lithuania	8 (0.6)	527 (3.9)	11 (0.6)	534 (4.6)	36 (1.0)	526 (2.7)
Moldova, Rep. of	6 (0.6)	526 (9.9)	8 (0.7)	524 (7.1)	24 (1.2)	516 (6.1)
Morocco	2 (0.3)	~ ~	3 (0.3)	322 (16.3)	10 (1.0)	336 (13.4)
Netherlands	14 (1.1)	548 (3.9)	18 (1.0)	533 (3.6)	37 (1.2)	529 (2.5)
New Zealand	17 (0.7)	548 (3.8)	21 (0.8)	544 (4.2)	36 (1.0)	526 (3.1)
Norway	17 (0.9)	487 (4.9)	22 (0.8)	483 (3.8)	37 (0.9)	470 (3.1)
Philippines	5 (0.6)	318 (16.8)	6 (0.6)	340 (21.1)	14 (1.1)	388 (19.8)
Russian Federation	13 (0.7)	545 (7.8)	15 (0.8)	537 (6.8)	35 (1.2)	532 (5.1)
Scotland	21 (1.1)	523 (5.0)	18 (0.8)	520 (5.3)	31 (1.0)	508 (3.4)
Singapore	10 (0.6)	609 (6.3)	17 (0.9)	595 (5.8)	40 (0.9)	578 (4.7)
Slovenia	13 (0.9)	502 (6.5)	15 (0.9)	507 (5.0)	36 (0.9)	506 (3.0)
Tunisia	4 (0.6)	357 (16.0)	8 (0.8)	351 (11.8)	18 (1.2)	360 (8.0)
United States	15 (0.7)	563 (3.6)	17 (0.5)	568 (3.0)	34 (0.7)	545 (2.4)
International Avg.	12 (0.2)	518 (1.5)	14 (0.2)	507 (1.5)	31 (0.2)	502 (1.2)
Benchmarking Participants						
Indiana State, US	16 (1.1)	565 (6.3)	19 (1.1)	578 (5.5)	36 (1.1)	560 (3.8)
Ontario Province, Can.	20 (1.4)	566 (5.3)	22 (1.1)	558 (5.5)	35 (1.3)	539 (3.4)
Quebec Province, Can.	7 (0.5)	516 (5.4)	11 (0.7)	518 (3.3)	44 (1.0)	509 (2.9)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

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.

Exhibit 4.4: Books in the Home

Countries	11-25 Books		0-10 Books	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	22 (0.9)	437 (6.4)	17 (1.2)	416 (6.9)
Australia	13 (0.9)	487 (6.8)	6 (0.8)	464 (10.2)
Belgium (Flemish)	23 (0.9)	506 (2.5)	8 (0.5)	484 (5.2)
Chinese Taipei	24 (0.8)	540 (2.2)	17 (0.8)	516 (2.6)
Cyprus	29 (1.0)	476 (2.9)	11 (0.7)	453 (4.8)
England	17 (1.0)	511 (4.5)	8 (0.8)	475 (6.3)
Hong Kong, SAR	30 (0.8)	540 (3.2)	25 (1.4)	533 (4.0)
Hungary	22 (0.9)	506 (4.1)	8 (0.7)	479 (6.2)
Iran, Islamic Rep. of	22 (1.2)	439 (5.4)	55 (2.1)	396 (4.5)
Italy	33 (1.0)	511 (4.3)	18 (0.9)	498 (6.8)
Japan	28 (0.8)	529 (2.4)	12 (0.8)	514 (3.6)
Latvia	18 (0.9)	515 (3.3)	6 (0.7)	491 (6.6)
Lithuania	34 (1.1)	506 (3.2)	13 (0.9)	476 (6.0)
Moldova, Rep. of	31 (1.4)	493 (5.4)	30 (1.4)	475 (6.9)
Morocco	26 (1.5)	320 (7.8)	60 (2.1)	304 (8.1)
Netherlands	21 (1.1)	515 (2.8)	9 (0.8)	486 (5.6)
New Zealand	17 (0.6)	491 (4.9)	9 (0.7)	463 (6.2)
Norway	17 (0.8)	445 (4.4)	7 (0.5)	418 (7.0)
Philippines	27 (1.1)	368 (11.6)	48 (2.1)	299 (7.2)
Russian Federation	27 (1.5)	516 (5.7)	10 (0.7)	499 (8.5)
Scotland	20 (1.1)	481 (3.6)	11 (0.7)	462 (6.3)
Singapore	22 (0.9)	538 (4.8)	11 (0.8)	497 (8.6)
Slovenia	28 (1.1)	475 (3.7)	7 (0.6)	443 (7.3)
Tunisia	29 (1.5)	337 (7.0)	41 (2.3)	290 (7.0)
United States	22 (0.6)	509 (2.5)	13 (0.6)	491 (3.5)
International Avg.	24 (0.2)	480 (1.1)	18 (0.2)	453 (1.4)
Benchmarking Participants				
Indiana State, US	19 (1.2)	535 (4.7)	10 (0.8)	508 (7.0)
Ontario Province, Can.	16 (1.3)	513 (4.4)	7 (0.9)	496 (7.9)
Quebec Province, Can.	27 (0.8)	491 (3.0)	11 (0.7)	473 (4.9)

Background data provided by students.

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

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

Exhibit 4.5: Computer and Study Desk/Table in the Home



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Countries	Have Computer		Do Not Have Computer		Have Study Desk/Table		Do Not Have Study Desk/Table	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	19 (0.7)	461 (4.6)	81 (0.7)	463 (3.6)	64 (1.1)	472 (3.7)	36 (1.1)	444 (4.0)
Australia	96 (0.3)	530 (3.7)	4 (0.3)	480 (7.8)	92 (0.5)	529 (3.9)	8 (0.5)	511 (6.5)
Bahrain	81 (0.6)	443 (1.8)	19 (0.6)	422 (3.6)	80 (0.7)	443 (2.0)	20 (0.7)	424 (3.1)
Belgium (Flemish)	95 (0.5)	519 (2.4)	5 (0.5)	457 (10.0)	95 (0.4)	518 (2.4)	5 (0.4)	485 (6.5)
Botswana	16 (0.8)	374 (8.2)	84 (0.8)	367 (2.5)	68 (0.8)	374 (3.6)	32 (0.8)	354 (3.0)
Bulgaria	37 (1.5)	481 (8.3)	63 (1.5)	480 (5.0)	79 (1.2)	482 (5.7)	21 (1.2)	469 (7.4)
Chile	39 (1.4)	442 (3.6)	61 (1.4)	396 (2.7)	56 (1.0)	427 (3.0)	44 (1.0)	396 (3.2)
Chinese Taipei	91 (0.8)	576 (3.3)	9 (0.8)	523 (5.4)	93 (0.5)	573 (3.4)	7 (0.5)	539 (5.8)
Cyprus	82 (0.6)	450 (2.0)	18 (0.6)	407 (3.6)	95 (0.3)	445 (1.9)	5 (0.3)	386 (7.9)
Egypt	16 (0.8)	458 (5.4)	84 (0.8)	418 (4.0)	80 (1.0)	440 (3.5)	20 (1.0)	367 (5.5)
Estonia	67 (1.1)	563 (2.6)	33 (1.1)	535 (3.0)	93 (0.6)	553 (2.5)	7 (0.6)	555 (5.7)
Ghana	24 (1.1)	239 (7.7)	76 (1.1)	269 (6.2)	60 (1.5)	280 (6.4)	40 (1.5)	236 (6.7)
Hong Kong, SAR	97 (0.3)	557 (2.9)	3 (0.3)	535 (9.2)	75 (0.8)	558 (3.0)	25 (0.8)	553 (4.2)
Hungary	75 (1.0)	554 (2.7)	25 (1.0)	512 (4.4)	98 (0.3)	544 (2.8)	2 (0.3)	~ ~
Indonesia	17 (1.3)	444 (5.7)	83 (1.3)	420 (4.0)	75 (1.2)	427 (3.8)	25 (1.2)	405 (5.5)
Iran, Islamic Rep. of	27 (1.4)	468 (3.6)	73 (1.4)	451 (2.4)	50 (1.6)	466 (2.5)	50 (1.6)	443 (2.6)
Israel	92 (0.7)	494 (3.1)	8 (0.7)	436 (6.0)	97 (0.3)	491 (3.1)	3 (0.3)	450 (8.9)
Italy	84 (0.7)	497 (3.0)	16 (0.7)	463 (6.0)	88 (0.6)	493 (3.1)	12 (0.6)	477 (4.7)
Japan	82 (0.8)	558 (1.7)	18 (0.8)	529 (3.2)	96 (0.3)	554 (1.7)	4 (0.3)	526 (6.5)
Jordan	41 (1.7)	502 (4.7)	59 (1.7)	459 (3.7)	73 (1.3)	487 (3.6)	27 (1.3)	448 (5.8)
Korea, Rep. of	98 (0.3)	560 (1.6)	2 (0.3)	~ ~	97 (0.3)	560 (1.6)	3 (0.3)	513 (8.3)
Latvia	43 (1.6)	526 (2.9)	57 (1.6)	504 (2.7)	94 (0.6)	514 (2.5)	6 (0.6)	497 (6.8)
Lebanon	59 (1.5)	409 (4.9)	41 (1.5)	373 (5.5)	71 (1.2)	403 (4.5)	29 (1.2)	374 (5.1)
Lithuania	48 (1.6)	535 (2.5)	52 (1.6)	506 (2.3)	97 (0.3)	520 (2.2)	3 (0.3)	495 (13.8)
Macedonia, Rep. of	42 (1.6)	466 (4.6)	58 (1.6)	441 (3.7)	87 (0.8)	456 (3.5)	13 (0.8)	415 (6.6)
Malaysia	57 (1.4)	522 (4.4)	43 (1.4)	495 (3.5)	87 (0.6)	512 (3.8)	13 (0.6)	498 (4.5)
Moldova, Rep. of	18 (1.0)	471 (4.7)	82 (1.0)	474 (3.5)	80 (1.2)	476 (3.6)	20 (1.2)	462 (4.8)
Morocco	18 (1.2)	398 (4.9)	82 (1.2)	398 (2.6)	73 (1.4)	401 (3.0)	27 (1.4)	390 (4.9)
Netherlands	98 (0.3)	537 (3.1)	2 (0.3)	~ ~	99 (0.2)	537 (3.2)	1 (0.2)	~ ~
New Zealand	91 (0.7)	524 (5.2)	9 (0.7)	489 (5.8)	87 (0.8)	525 (5.1)	13 (0.8)	489 (7.3)
Norway	96 (0.4)	497 (2.0)	4 (0.4)	445 (8.6)	98 (0.3)	496 (2.0)	2 (0.3)	~ ~
Palestinian Nat'l Auth.	41 (1.2)	455 (4.2)	59 (1.2)	425 (3.1)	77 (1.3)	442 (3.2)	23 (1.3)	420 (4.9)
Philippines	21 (1.1)	396 (8.7)	79 (1.1)	374 (5.8)	75 (1.1)	387 (6.2)	25 (1.1)	356 (6.0)
Romania	32 (1.9)	499 (5.6)	68 (1.9)	460 (5.0)	77 (1.8)	484 (4.6)	23 (1.8)	430 (7.1)
Russian Federation	30 (2.0)	538 (4.3)	70 (2.0)	504 (3.5)	92 (0.5)	516 (3.8)	8 (0.5)	490 (6.4)
Saudi Arabia	57 (1.9)	407 (5.0)	43 (1.9)	388 (3.5)	61 (1.5)	408 (4.3)	39 (1.5)	384 (4.5)
Scotland	91 (0.7)	516 (3.4)	9 (0.7)	475 (5.6)	82 (0.8)	517 (3.4)	18 (0.8)	489 (5.0)
Serbia	44 (1.4)	487 (3.1)	56 (1.4)	455 (2.6)	91 (0.6)	472 (2.5)	9 (0.6)	437 (5.2)
Singapore	94 (0.4)	583 (4.0)	6 (0.4)	498 (9.4)	91 (0.5)	582 (4.1)	9 (0.5)	536 (7.8)
Slovak Republic	67 (1.2)	528 (3.4)	33 (1.2)	496 (3.7)	88 (0.8)	521 (3.2)	12 (0.8)	490 (4.7)
Slovenia	86 (0.9)	525 (1.7)	14 (0.9)	499 (3.9)	97 (0.4)	522 (1.8)	3 (0.4)	484 (11.8)
South Africa	37 (1.3)	277 (12.9)	63 (1.3)	227 (5.4)	58 (1.5)	265 (10.0)	42 (1.5)	220 (5.1)
Sweden	98 (0.3)	526 (2.6)	2 (0.3)	~ ~	98 (0.3)	525 (2.7)	2 (0.3)	~ ~
Tunisia	22 (1.4)	418 (3.9)	78 (1.4)	400 (2.0)	73 (1.2)	409 (2.2)	27 (1.2)	390 (2.8)
United States	93 (0.4)	532 (3.1)	7 (0.4)	471 (5.6)	86 (0.5)	533 (3.1)	14 (0.5)	496 (4.2)
‡ England	94 (0.5)	548 (4.5)	6 (0.5)	509 (7.5)	87 (1.0)	550 (4.4)	13 (1.0)	517 (6.4)
International Avg.	60 (0.2)	484 (0.7)	40 (0.2)	449 (0.9)	83 (0.1)	480 (0.6)	17 (0.1)	446 (1.2)
Benchmarking Participants								
Basque Country, Spain	89 (0.7)	492 (2.7)	11 (0.7)	465 (5.2)	93 (0.6)	491 (2.7)	7 (0.6)	471 (6.4)
Indiana State, US	92 (0.9)	535 (4.6)	8 (0.9)	487 (9.7)	84 (0.9)	535 (4.6)	16 (0.9)	509 (7.3)
Ontario Province, Can.	97 (0.4)	534 (2.6)	3 (0.4)	498 (9.3)	91 (0.7)	535 (2.6)	9 (0.7)	516 (5.5)
Quebec Province, Can.	93 (0.5)	533 (3.2)	7 (0.5)	512 (4.0)	91 (0.6)	533 (3.1)	9 (0.6)	512 (5.8)

Background data provided by students.

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

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

Exhibit 4.5: Computer and Study Desk/Table in the Home

Countries	Have Computer		Do Not Have Computer		Have Study Desk/Table		Do Not Have Study Desk/Table	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	28 (1.2)	446 (5.4)	72 (1.2)	438 (4.6)	60 (1.5)	447 (4.9)	40 (1.5)	430 (5.0)
Australia	92 (0.9)	526 (3.9)	8 (0.9)	478 (8.3)	85 (1.1)	526 (3.5)	15 (1.1)	501 (8.3)
Belgium (Flemish)	90 (0.5)	520 (1.9)	10 (0.5)	505 (3.5)	91 (0.5)	519 (1.9)	9 (0.5)	517 (3.0)
Chinese Taipei	89 (0.7)	555 (1.8)	11 (0.7)	524 (3.2)	87 (0.6)	554 (1.7)	13 (0.6)	539 (3.5)
Cyprus	75 (0.7)	485 (2.6)	25 (0.7)	471 (3.5)	90 (0.5)	485 (2.4)	10 (0.5)	449 (4.3)
England	91 (0.6)	545 (3.6)	9 (0.6)	508 (6.7)	80 (1.1)	544 (3.7)	20 (1.1)	529 (4.4)
Hong Kong, SAR	85 (1.0)	544 (3.0)	15 (1.0)	537 (4.2)	71 (1.1)	541 (3.2)	29 (1.1)	548 (3.4)
Hungary	71 (1.2)	543 (2.9)	29 (1.2)	510 (4.0)	96 (0.5)	533 (2.8)	4 (0.5)	482 (8.9)
Iran, Islamic Rep. of	25 (1.7)	445 (5.2)	75 (1.7)	406 (4.4)	40 (1.8)	448 (4.8)	60 (1.8)	396 (4.4)
Italy	79 (0.7)	519 (3.5)	21 (0.7)	507 (6.1)	72 (0.9)	523 (3.9)	28 (0.9)	501 (4.6)
Japan	77 (0.8)	548 (1.7)	23 (0.8)	532 (2.7)	94 (0.4)	545 (1.5)	6 (0.4)	530 (5.6)
Latvia	42 (1.4)	538 (3.1)	58 (1.4)	529 (2.9)	91 (0.7)	533 (2.5)	9 (0.7)	523 (5.3)
Lithuania	45 (1.4)	521 (3.4)	55 (1.4)	508 (2.7)	97 (0.3)	514 (2.6)	3 (0.3)	489 (10.4)
Moldova, Rep. of	20 (1.1)	499 (6.0)	80 (1.1)	499 (4.5)	81 (1.2)	502 (4.8)	19 (1.2)	478 (6.4)
Morocco	r 20 (1.2)	327 (9.4)	r 80 (1.2)	307 (7.0)	r 52 (1.8)	323 (7.6)	r 48 (1.8)	298 (8.3)
Netherlands	93 (0.6)	527 (1.8)	7 (0.6)	500 (6.8)	94 (0.5)	526 (1.9)	6 (0.5)	516 (6.9)
New Zealand	87 (0.7)	530 (2.2)	13 (0.7)	483 (5.3)	80 (0.7)	529 (2.3)	20 (0.7)	498 (4.2)
Norway	91 (0.5)	471 (2.7)	9 (0.5)	440 (4.5)	92 (0.5)	471 (2.6)	8 (0.5)	428 (6.1)
Philippines	26 (1.7)	382 (19.4)	74 (1.7)	319 (7.3)	69 (1.3)	350 (9.9)	31 (1.3)	303 (10.5)
Russian Federation	23 (1.1)	533 (6.5)	77 (1.1)	525 (5.2)	83 (0.9)	530 (5.3)	17 (0.9)	516 (6.2)
Scotland	89 (0.8)	506 (2.9)	11 (0.8)	488 (5.9)	77 (1.1)	509 (2.9)	23 (1.1)	483 (4.8)
Singapore	89 (0.8)	573 (5.4)	11 (0.8)	511 (5.9)	90 (0.7)	572 (5.3)	10 (0.7)	511 (8.8)
Slovenia	77 (1.0)	501 (3.0)	23 (1.0)	471 (3.4)	91 (0.6)	492 (2.7)	9 (0.6)	480 (7.0)
Tunisia	26 (1.3)	348 (7.7)	74 (1.3)	309 (5.9)	64 (1.8)	334 (6.4)	36 (1.8)	297 (6.8)
United States	92 (0.4)	541 (2.4)	8 (0.4)	492 (3.9)	77 (0.8)	545 (2.3)	23 (0.8)	511 (4.0)
International Avg.	65 (0.2)	499 (1.2)	35 (0.2)	472 (1.1)	80 (0.2)	496 (1.0)	20 (0.2)	470 (1.5)
Benchmarking Participants								
Indiana State, US	90 (0.8)	558 (3.6)	10 (0.8)	520 (6.3)	80 (0.9)	558 (3.8)	20 (0.9)	540 (5.4)
Ontario Province, Can.	92 (0.6)	544 (4.0)	8 (0.6)	506 (6.9)	83 (1.1)	545 (4.0)	17 (1.1)	521 (5.1)
Quebec Province, Can.	89 (0.8)	504 (2.4)	11 (0.8)	477 (5.0)	86 (0.9)	504 (2.4)	14 (0.9)	480 (4.7)

Background data provided by students.

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

Background data provided by students.

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

Exhibit 4.6: Use of Computer

Countries	Use Computer Both at Home and at School		Use Computer at Home but Not at School		Use Computer at School but Not at Home	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Hong Kong, SAR	89 (0.7)	561 (2.7)	9 (0.6)	522 (6.7)	2 (0.2)	~ ~
Chinese Taipei	88 (0.9)	578 (3.2)	2 (0.2)	~ ~	9 (0.8)	519 (5.2)
Australia	83 (0.9)	533 (3.7)	10 (0.9)	524 (6.2)	5 (0.4)	474 (8.2)
Singapore	79 (0.7)	588 (3.9)	14 (0.5)	560 (5.5)	5 (0.4)	494 (9.5)
United States	79 (1.0)	539 (2.9)	11 (0.9)	504 (6.1)	8 (0.4)	471 (5.2)
Netherlands	78 (1.5)	540 (3.1)	19 (1.4)	531 (5.3)	1 (0.2)	~ ~
Sweden	78 (1.3)	530 (2.6)	17 (1.3)	518 (5.0)	3 (0.3)	486 (8.4)
Scotland	77 (1.1)	519 (3.5)	12 (0.9)	501 (5.0)	9 (0.6)	469 (5.0)
Israel	72 (1.8)	499 (3.5)	19 (1.6)	483 (4.3)	6 (0.5)	445 (6.6)
New Zealand	71 (1.4)	530 (5.5)	16 (1.3)	521 (5.5)	10 (0.7)	479 (5.8)
Norway	71 (1.5)	500 (2.2)	22 (1.4)	489 (3.6)	5 (0.5)	469 (6.8)
Cyprus	70 (0.7)	457 (2.0)	7 (0.5)	434 (6.6)	16 (0.6)	406 (3.8)
Belgium (Flemish)	64 (1.9)	522 (2.7)	26 (1.8)	516 (4.4)	4 (0.5)	455 (11.4)
Hungary	61 (1.4)	559 (2.8)	8 (1.0)	552 (7.2)	26 (1.1)	510 (5.1)
Japan	55 (1.3)	563 (2.4)	16 (1.1)	559 (4.6)	26 (0.8)	530 (2.5)
Slovenia	51 (1.5)	531 (2.2)	34 (1.7)	517 (2.7)	8 (0.8)	507 (4.4)
Estonia	41 (1.5)	563 (2.8)	24 (1.3)	564 (4.1)	24 (1.1)	538 (3.0)
Lebanon	39 (1.4)	427 (5.1)	16 (1.4)	379 (7.8)	21 (2.0)	383 (7.9)
Italy	39 (1.9)	505 (3.6)	39 (1.9)	498 (3.8)	9 (0.7)	456 (7.0)
Jordan	35 (1.5)	495 (5.4)	10 (0.8)	477 (6.7)	43 (1.5)	464 (3.9)
Korea, Rep. of	35 (1.6)	570 (2.3)	61 (1.7)	555 (2.1)	1 (0.2)	~ ~
Bahrain	31 (1.4)	449 (2.8)	45 (1.4)	441 (2.2)	8 (0.4)	427 (5.1)
Slovak Republic	26 (1.8)	544 (4.9)	33 (2.0)	526 (3.9)	16 (1.5)	505 (5.2)
Lithuania	26 (1.5)	539 (2.8)	22 (1.4)	533 (3.8)	35 (1.6)	507 (2.9)
Malaysia	26 (1.7)	531 (5.0)	26 (1.8)	524 (6.1)	24 (1.7)	495 (4.4)
Palestinian Nat'l Auth.	26 (1.5)	442 (5.7)	18 (1.3)	452 (5.6)	33 (1.6)	424 (3.4)
Latvia	25 (1.3)	537 (3.2)	16 (1.0)	521 (4.6)	42 (1.8)	508 (3.1)
Chile	22 (1.2)	461 (4.0)	11 (0.8)	435 (6.2)	49 (1.8)	393 (3.3)
Egypt	18 (0.7)	429 (6.2)	5 (0.5)	398 (9.3)	62 (1.4)	420 (4.1)
South Africa	16 (1.2)	270 (21.4)	11 (1.1)	313 (18.3)	18 (1.3)	222 (6.5)
Serbia	15 (1.3)	502 (4.6)	22 (1.6)	490 (4.0)	23 (2.0)	462 (4.4)
Moldova, Rep. of	15 (1.2)	466 (8.2)	4 (0.4)	467 (8.7)	63 (2.1)	473 (3.6)
Morocco	15 (1.1)	378 (5.3)	17 (1.1)	390 (4.5)	21 (1.7)	398 (5.1)
Romania	15 (1.7)	507 (7.0)	16 (1.2)	489 (6.0)	25 (2.1)	470 (7.6)
Macedonia, Rep. of	14 (1.2)	474 (6.4)	22 (1.5)	477 (5.8)	21 (2.0)	448 (5.2)
Russian Federation	12 (1.1)	543 (5.6)	19 (2.3)	534 (4.3)	28 (1.8)	511 (3.8)
Saudi Arabia	12 (1.5)	412 (12.7)	46 (2.0)	402 (4.1)	5 (0.8)	389 (7.6)
Philippines	11 (0.9)	412 (11.9)	7 (0.5)	380 (12.3)	24 (1.7)	402 (8.3)
Ghana	9 (0.7)	209 (10.3)	9 (0.7)	229 (11.8)	21 (1.6)	233 (10.8)
Armenia	7 (0.7)	466 (7.2)	14 (0.8)	460 (4.8)	15 (2.0)	474 (6.0)
Indonesia	7 (1.4)	485 (7.2)	2 (0.4)	~ ~	31 (3.2)	436 (5.1)
Tunisia	5 (0.5)	406 (5.2)	20 (1.4)	414 (4.4)	16 (1.5)	407 (2.7)
Bulgaria	5 (0.8)	504 (13.9)	22 (1.4)	483 (9.7)	8 (1.1)	470 (8.1)
Botswana	5 (0.7)	402 (21.5)	6 (0.5)	384 (9.0)	23 (2.5)	362 (4.8)
Iran, Islamic Rep. of	2 (0.6)	~ ~	17 (1.2)	478 (4.1)	1 (0.3)	~ ~
‡ England	81 (0.8)	553 (4.8)	10 (0.7)	525 (6.5)	7 (0.7)	504 (7.5)
International Avg.	39 (0.2)	490 (1.1)	18 (0.2)	476 (1.0)	19 (0.2)	450 (0.9)
Benchmarking Participants						
Basque Country, Spain	70 (2.1)	496 (3.1)	16 (1.9)	484 (5.0)	11 (0.8)	465 (5.6)
Indiana State, US	81 (1.3)	539 (4.7)	8 (0.9)	515 (8.1)	8 (0.9)	491 (6.8)
Ontario Province, Can.	85 (1.0)	537 (2.7)	11 (1.0)	517 (5.2)	3 (0.5)	501 (9.2)
Quebec Province, Can.	70 (1.9)	539 (3.4)	21 (1.8)	517 (3.8)	6 (0.6)	512 (4.6)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by students.

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

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

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

Exhibit 4.6: Use of Computer

Countries	Use Computer Only at Places Other than Home and School		Do Not Use Computers at All	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Hong Kong, SAR	0 (0.1)	~ ~	0 (0.1)	~ ~
Chinese Taipei	0 (0.1)	~ ~	0 (0.1)	~ ~
Australia	1 (0.1)	~ ~	1 (0.2)	~ ~
Singapore	1 (0.1)	~ ~	1 (0.1)	~ ~
United States	1 (0.1)	~ ~	1 (0.1)	~ ~
Netherlands	0 (0.1)	~ ~	2 (0.3)	~ ~
Sweden	1 (0.2)	~ ~	2 (0.3)	~ ~
Scotland	1 (0.2)	~ ~	1 (0.2)	~ ~
Israel	2 (0.3)	~ ~	1 (0.1)	~ ~
New Zealand	2 (0.3)	~ ~	2 (0.3)	~ ~
Norway	1 (0.2)	~ ~	2 (0.2)	~ ~
Cyprus	2 (0.2)	~ ~	5 (0.4)	401 (7.3)
Belgium (Flemish)	5 (0.3)	501 (7.6)	1 (0.2)	~ ~
Hungary	2 (0.4)	~ ~	3 (0.4)	516 (8.1)
Japan	1 (0.2)	~ ~	2 (0.2)	~ ~
Slovenia	3 (0.4)	482 (6.2)	4 (0.4)	492 (7.1)
Estonia	6 (0.5)	532 (5.4)	4 (0.5)	517 (10.1)
Lebanon	14 (1.2)	356 (7.5)	10 (1.2)	367 (8.4)
Italy	5 (0.4)	457 (8.7)	9 (0.5)	460 (6.2)
Jordan	7 (0.8)	456 (6.8)	4 (0.5)	471 (9.5)
Korea, Rep. of	2 (0.2)	~ ~	0 (0.1)	~ ~
Bahrain	10 (0.6)	420 (5.1)	6 (0.4)	418 (6.9)
Slovak Republic	13 (0.8)	492 (4.9)	12 (1.1)	480 (5.6)
Lithuania	13 (1.0)	502 (3.9)	4 (0.6)	491 (8.3)
Malaysia	14 (1.0)	493 (5.0)	11 (1.1)	493 (4.9)
Palestinian Nat'l Auth.	13 (1.1)	427 (4.4)	10 (0.9)	442 (5.5)
Latvia	12 (0.9)	496 (4.6)	5 (0.7)	472 (7.1)
Chile	10 (0.7)	405 (3.7)	8 (0.6)	381 (3.6)
Egypt	8 (0.6)	413 (6.9)	7 (0.7)	456 (7.0)
South Africa	27 (1.3)	225 (6.8)	28 (2.0)	233 (5.9)
Serbia	19 (1.2)	450 (4.0)	20 (1.1)	445 (4.2)
Moldova, Rep. of	8 (0.8)	470 (6.2)	9 (1.4)	491 (8.1)
Morocco	28 (1.2)	409 (3.5)	20 (1.5)	406 (4.6)
Romania	24 (1.4)	453 (5.6)	20 (1.8)	454 (7.0)
Macedonia, Rep. of	32 (1.8)	444 (4.2)	10 (1.0)	425 (7.2)
Russian Federation	21 (1.1)	511 (5.7)	21 (1.7)	490 (5.1)
Saudi Arabia	12 (0.7)	387 (5.8)	25 (1.9)	394 (5.1)
Philippines	14 (0.9)	400 (8.1)	44 (1.6)	350 (5.6)
Ghana	26 (1.5)	266 (9.4)	34 (2.5)	281 (7.8)
Armenia	18 (1.1)	467 (5.1)	45 (2.1)	458 (4.0)
Indonesia	19 (1.3)	391 (6.5)	40 (2.8)	415 (5.6)
Tunisia	23 (1.1)	407 (2.5)	36 (1.7)	396 (3.0)
Bulgaria	40 (1.8)	474 (5.7)	24 (1.6)	484 (6.8)
Botswana	r 5 (0.4)	377 (7.1)	61 (2.5)	372 (3.0)
Iran, Islamic Rep. of	12 (0.8)	457 (4.9)	68 (1.7)	447 (2.3)
‡ England	1 (0.2)	~ ~	1 (0.2)	~ ~
International Avg.	10 (0.1)	434 (1.1)	14 (0.2)	432 (1.2)
Benchmarking Participants				
Basque Country, Spain	2 (0.5)	~ ~	1 (0.2)	~ ~
Indiana State, US	1 (0.3)	~ ~	1 (0.3)	~ ~
Ontario Province, Can.	0 (0.1)	~ ~	0 (0.1)	~ ~
Quebec Province, Can.	2 (0.2)	~ ~	1 (0.2)	~ ~

Background data provided by students.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

() 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.

Exhibit 4.6: Use of Computer

Countries	Use Computer Both at Home and at School		Use Computer at Home but Not at School		Use Computer at School but Not at Home	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Chinese Taipei	81 (1.5)	557 (1.7)	5 (1.3)	543 (6.5)	12 (0.7)	522 (3.0)
Australia	80 (1.6)	531 (3.4)	7 (0.8)	503 (8.4)	11 (1.1)	475 (10.5)
England	79 (1.0)	547 (3.6)	8 (0.6)	533 (7.7)	11 (0.8)	505 (6.1)
Netherlands	79 (2.0)	528 (2.0)	12 (1.7)	524 (3.3)	4 (0.4)	496 (13.6)
Scotland	78 (1.0)	508 (2.8)	8 (0.7)	482 (6.3)	12 (0.7)	484 (5.2)
Hong Kong, SAR	76 (1.3)	547 (3.1)	9 (0.9)	519 (5.2)	11 (0.9)	541 (4.6)
United States	73 (1.2)	547 (2.3)	12 (0.9)	525 (6.5)	11 (0.6)	491 (4.0)
Singapore	71 (1.4)	578 (5.2)	17 (1.0)	551 (6.3)	8 (0.6)	509 (7.7)
New Zealand	71 (1.1)	533 (2.3)	12 (0.8)	511 (5.7)	13 (0.7)	479 (4.6)
Belgium (Flemish)	66 (1.4)	524 (1.9)	21 (1.5)	513 (2.9)	6 (0.6)	508 (4.9)
Norway	60 (1.7)	473 (2.9)	28 (1.6)	473 (3.7)	5 (0.5)	439 (9.3)
Japan	54 (1.1)	555 (1.9)	9 (0.7)	537 (4.6)	31 (1.0)	531 (2.5)
Cyprus	36 (1.6)	488 (3.7)	27 (1.6)	489 (3.8)	16 (0.9)	470 (4.0)
Slovenia	33 (1.9)	494 (3.7)	46 (2.0)	499 (3.2)	6 (0.7)	484 (8.1)
Italy	30 (1.8)	524 (4.7)	38 (1.9)	520 (4.8)	12 (1.0)	497 (6.3)
Hungary	24 (2.1)	548 (5.0)	43 (2.1)	536 (3.3)	9 (1.0)	503 (8.1)
Morocco	16 (1.2)	301 (10.4)	25 (1.8)	328 (8.3)	7 (0.7)	278 (13.0)
Philippines	16 (2.0)	375 (29.8)	11 (0.8)	373 (12.5)	8 (0.7)	361 (24.2)
Lithuania	11 (1.2)	526 (6.4)	35 (1.5)	521 (3.2)	18 (1.6)	504 (4.9)
Latvia	10 (1.1)	539 (6.3)	27 (1.4)	541 (3.6)	17 (1.8)	535 (5.9)
Moldova, Rep. of	8 (0.8)	453 (12.2)	14 (1.1)	497 (7.0)	10 (1.4)	504 (7.6)
Tunisia	7 (0.8)	312 (12.8)	24 (1.4)	339 (7.6)	7 (1.1)	294 (12.0)
Armenia	6 (0.5)	423 (9.2)	30 (1.2)	435 (5.2)	9 (1.2)	440 (7.4)
Russian Federation	4 (0.6)	506 (14.6)	20 (1.0)	529 (6.7)	11 (1.6)	519 (8.7)
Iran, Islamic Rep. of	2 (0.4)	~ ~	11 (1.4)	469 (6.3)	2 (0.4)	~ ~
International Avg.	43 (0.3)	496 (1.9)	20 (0.3)	492 (1.2)	11 (0.2)	474 (1.9)
Benchmarking Participants						
Indiana State, US	79 (1.3)	561 (3.4)	8 (0.7)	534 (7.4)	10 (0.9)	524 (7.4)
Ontario Province, Can.	78 (2.0)	546 (4.1)	12 (1.6)	533 (9.0)	7 (0.6)	516 (6.5)
Quebec Province, Can.	75 (1.5)	505 (2.6)	12 (1.1)	493 (4.2)	10 (0.7)	487 (5.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

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.

Exhibit 4.6: Use of Computer

Countries	Use Computer Only at Places Other than Home and School		Do Not Use Computers at All	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Chinese Taipei	0 (0.1)	~ ~	1 (0.1)	~ ~
Australia	1 (0.2)	~ ~	1 (0.1)	~ ~
England	1 (0.2)	~ ~	1 (0.2)	~ ~
Netherlands	1 (0.2)	~ ~	5 (0.5)	511 (6.3)
Scotland	1 (0.2)	~ ~	1 (0.2)	~ ~
Hong Kong, SAR	1 (0.2)	~ ~	2 (0.3)	~ ~
United States	2 (0.2)	~ ~	2 (0.1)	~ ~
Singapore	2 (0.2)	~ ~	2 (0.2)	~ ~
New Zealand	3 (0.3)	481 (8.7)	2 (0.3)	~ ~
Belgium (Flemish)	1 (0.2)	~ ~	5 (0.4)	504 (5.4)
Norway	2 (0.3)	~ ~	5 (0.6)	435 (8.0)
Japan	2 (0.3)	~ ~	3 (0.4)	526 (6.2)
Cyprus	8 (0.6)	461 (4.8)	14 (0.7)	475 (3.8)
Slovenia	5 (0.6)	465 (8.0)	12 (0.9)	472 (5.9)
Italy	8 (0.6)	502 (9.0)	12 (0.7)	511 (7.2)
Hungary	12 (0.8)	504 (5.7)	12 (0.8)	528 (4.8)
Morocco ^r	15 (1.2)	312 (9.5)	37 (3.2)	303 (9.3)
Philippines	9 (0.8)	355 (13.2)	56 (2.5)	312 (7.3)
Lithuania	24 (1.1)	508 (3.1)	13 (1.0)	508 (4.8)
Latvia	25 (1.5)	529 (4.2)	22 (1.6)	522 (4.7)
Moldova, Rep. of	25 (1.6)	507 (6.6)	43 (2.5)	502 (6.1)
Tunisia	15 (1.1)	355 (7.7)	46 (2.1)	295 (7.7)
Armenia	24 (1.0)	436 (5.7)	32 (1.5)	446 (6.1)
Russian Federation	30 (1.4)	525 (6.2)	35 (1.6)	531 (5.1)
Iran, Islamic Rep. of	8 (0.9)	436 (7.8)	76 (1.9)	406 (4.3)
International Avg.	9 (0.2)	455 (2.1)	18 (0.3)	458 (1.5)
Benchmarking Participants				
Indiana State, US	1 (0.2)	~ ~	2 (0.3)	~ ~
Ontario Province, Can.	2 (0.4)	~ ~	1 (0.2)	~ ~
Quebec Province, Can.	1 (0.2)	~ ~	2 (0.3)	~ ~

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.

Science achievement was positively related to computer usage, particularly at eighth grade, with average achievement highest among students reporting using computers at home and at school (490 points). Next highest was achievement among students using computers at home but not school (476 points), followed by students using computers at school but not home (450 points). Countries with the greatest percentages of eighth-grade students using computers at home and at school included Hong Kong SAR, Chinese Taipei, Australia, England, and Indiana (80% or more), as well as Singapore, the United States, The Netherlands, Sweden, Scotland, Israel, New Zealand, Norway, and Cyprus (70% or more).

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

One of the major ways that students can consolidate and extend classroom learning is to spend time out of school studying or doing homework in school subjects. Well-chosen homework assignments can reinforce classroom learning, and by providing a challenge can encourage students to extend their understanding of the subject matter. Homework also allows students who are having trouble keeping up with their classmates to review material taught in class.

To summarize the amount of time typically devoted to science homework in each country, TIMSS constructed an index of the time students spend doing science homework (TSH) that assigns students to a high, medium, or low level on the basis of the frequency and amount of science homework they are assigned each week. Students at the high level reported that they were assigned more than 30 minutes of science homework at least 3-4 times per week. Students at the low level were reportedly assigned not more than 30 minutes of science homework, twice per week. The middle level included all other response combinations.

Exhibit 4.7 presents the percentages of eighth- and fourth-grade students at the various levels of this index across countries, and their

average science achievement. Countries are ordered by the percentage of students at the high level of the index. Also, the 17 countries that taught biology, earth science, chemistry, and physics as separate science subjects at eighth grade are presented in separate panels for each subject. Twenty-seven of the countries and all four benchmarking participants at the eighth grade taught science as a single subject. Among these, 13 percent of students were at the high level of the *time spent on science homework* index, 44 percent at the medium level, and 43 percent at the low level. Countries with the greatest emphasis on homework included Ghana, Egypt, the Palestinian National Authority, and Malaysia, where 20 percent or more of the students were at the high level of the index. In these countries, homework seems to be an important part of teachers' instructional strategy. In contrast, there seems to be relatively little emphasis on homework in Australia, Chile, England, Hong Kong SAR, Iran, Japan, Korea, Saudi Arabia, Scotland, and Tunisia, as well as the Canadian provinces of Ontario and Quebec, where less than 10 percent of students were at the high level of the index. Included in this group are several of the countries with the highest achievement levels – Hong Kong SAR, Japan, and Korea.

In countries teaching eighth-grade biology as a separate subject, nine percent of students on average were at the high level of the index, compared with 10 percent for earth science, and 14 percent each for chemistry and physics. Among these separate-science-subject countries, the Russian Federation, Moldova, and Armenia had the greatest percentages of students at the high level of the science homework index. It is noteworthy that there are several high-achieving countries among those at the low level of the homework index, including Belgium (Flemish), Hungary, The Netherlands, the Slovak Republic, and Sweden.

In general, less science homework is assigned at the fourth grade, with six percent of students on average at the high level of the index, 33 percent at the middle level, and 61 percent at the low level.

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



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Index of Time Students Spend Doing Science Homework	Countries	High TSH		Medium TSH		Low TSH		
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Index based on students' reports on the frequency and amount of science homework they are given. High level indicates more than 30 minutes of science homework assigned 3-4 times a week. Low level indicates no more than 30 minutes of science homework no more than twice a week. Medium level includes all other possible combinations of responses.	General/Integrated Science							
	Ghana	25 (1.2)	267 (8.5)	54 (1.0)	262 (6.0)	22 (1.0)	258 (8.1)	
	Egypt	23 (0.7)	416 (4.4)	64 (0.8)	436 (4.0)	13 (0.6)	430 (6.6)	
	Palestinian Nat'l Auth.	21 (1.1)	433 (4.4)	56 (1.3)	442 (3.4)	23 (1.3)	441 (4.8)	
	Malaysia	20 (1.0)	513 (4.4)	49 (0.9)	510 (3.6)	31 (1.3)	510 (4.6)	
	Jordan	19 (0.9)	466 (4.2)	52 (1.2)	478 (3.9)	29 (1.5)	499 (5.0)	
	Singapore	18 (0.7)	595 (4.1)	48 (0.7)	585 (4.4)	34 (0.9)	564 (5.5)	
	^d Philippines	17 (0.7)	381 (7.5)	50 (0.8)	379 (5.7)	33 (1.2)	381 (7.2)	
	South Africa	17 (0.7)	234 (9.6)	52 (0.9)	246 (7.9)	32 (0.9)	263 (7.4)	
	Botswana	14 (0.7)	378 (6.1)	45 (1.0)	368 (3.2)	40 (1.2)	366 (3.6)	
	Italy	14 (1.0)	489 (5.9)	41 (1.1)	487 (3.7)	45 (1.4)	496 (3.7)	
	Morocco ^r	14 (0.7)	391 (5.3)	47 (1.1)	396 (3.4)	39 (1.3)	408 (3.5)	
	Bahrain	13 (0.7)	426 (4.1)	56 (1.3)	441 (2.5)	31 (1.4)	445 (2.6)	
	Norway	13 (0.8)	485 (3.7)	44 (1.2)	493 (3.1)	43 (1.7)	503 (2.3)	
	Israel	13 (0.9)	480 (4.7)	43 (1.6)	485 (4.3)	44 (2.0)	505 (3.4)	
	United States	13 (0.7)	519 (4.3)	43 (1.4)	530 (3.4)	45 (1.7)	531 (3.7)	
	^a Chinese Taipei	12 (1.2)	588 (4.6)	37 (1.3)	581 (4.0)	51 (2.1)	561 (3.5)	
	New Zealand	10 (1.3)	519 (6.2)	41 (1.6)	531 (6.9)	48 (2.0)	518 (5.1)	
	Australia	9 (0.8)	520 (6.4)	35 (1.6)	530 (3.3)	56 (2.0)	530 (4.4)	
	Tunisia	9 (0.6)	398 (4.0)	35 (0.9)	400 (2.8)	56 (1.2)	411 (2.6)	
	Iran, Islamic Rep. of	8 (0.7)	451 (5.6)	42 (1.4)	457 (2.9)	49 (1.7)	452 (2.7)	
	Chile	8 (0.6)	408 (5.2)	38 (0.8)	413 (3.5)	54 (1.1)	415 (3.0)	
	Saudi Arabia	8 (0.7)	382 (6.0)	61 (1.5)	402 (4.6)	31 (1.7)	403 (4.6)	
	Hong Kong, SAR	6 (0.5)	548 (4.6)	43 (1.4)	563 (2.9)	50 (1.4)	554 (3.9)	
	Korea, Rep. of	4 (0.4)	549 (6.3)	26 (1.7)	562 (2.4)	70 (2.0)	559 (1.9)	
	Scotland	3 (0.4)	487 (14.2)	27 (1.4)	508 (5.0)	71 (1.5)	517 (3.4)	
	Japan	2 (0.3)	~ ~	22 (1.4)	549 (3.5)	76 (1.6)	557 (2.0)	
	[‡] England	9 (1.3)	576 (9.6)	38 (1.5)	556 (5.0)	53 (1.8)	537 (5.2)	
	International Avg.	13 (0.2)	458 (1.3)	44 (0.2)	466 (0.9)	43 (0.3)	467 (0.9)	
	Benchmarking Participants							
	Basque Country, Spain	14 (1.1)	485 (4.2)	42 (1.8)	491 (4.0)	44 (2.4)	489 (3.3)	
	Indiana State, US	12 (1.2)	520 (6.3)	50 (2.8)	537 (4.6)	37 (3.0)	529 (7.4)	
	Ontario Province, Can.	8 (0.9)	532 (5.7)	37 (1.8)	534 (3.7)	55 (2.3)	533 (2.8)	
	Quebec Province, Can.	6 (0.6)	524 (6.8)	26 (1.6)	529 (4.6)	68 (1.8)	534 (3.2)	

Background data provided by students.

^a Chinese Taipei: Students were asked about natural science; data pertain to grade 8 physics/chemistry course.

^d Philippines: Students study only biology at grade 8.

[‡] Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

() 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.

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

Countries	High TSH		Medium TSH		Low TSH	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Biology						
Moldova, Rep. of	27 (1.1)	479 (4.4)	54 (1.1)	473 (3.9)	19 (1.1)	475 (5.4)
Russian Federation	23 (1.2)	507 (4.8)	52 (1.0)	515 (4.0)	24 (1.2)	526 (3.6)
Armenia r	17 (1.0)	471 (5.3)	51 (1.2)	466 (4.0)	32 (1.4)	466 (4.3)
^b Lebanon	16 (0.9)	376 (5.9)	45 (1.1)	387 (5.0)	39 (1.5)	417 (5.5)
Indonesia	15 (0.6)	423 (4.4)	52 (0.8)	424 (4.1)	33 (0.9)	427 (4.8)
Latvia	14 (1.0)	505 (4.1)	45 (1.2)	508 (3.2)	41 (1.5)	524 (2.9)
Lithuania	11 (0.8)	504 (5.6)	41 (1.2)	515 (2.7)	47 (1.5)	529 (2.9)
Estonia	10 (0.8)	537 (4.4)	46 (1.3)	547 (2.7)	44 (1.5)	564 (3.1)
Macedonia, Rep. of r	6 (0.6)	417 (11.1)	31 (1.7)	431 (4.9)	63 (1.9)	475 (3.5)
Romania	6 (0.6)	443 (9.1)	24 (1.2)	459 (8.6)	70 (1.5)	483 (4.8)
Bulgaria r	5 (0.5)	478 (9.4)	26 (1.3)	474 (5.8)	69 (1.6)	485 (5.5)
Serbia r	4 (0.4)	427 (8.1)	24 (1.3)	452 (4.9)	72 (1.4)	481 (2.7)
Hungary	4 (0.4)	516 (8.0)	28 (1.3)	524 (4.0)	69 (1.4)	555 (2.8)
Cyprus s	3 (0.4)	426 (8.4)	14 (0.9)	403 (4.1)	83 (1.0)	453 (2.2)
Netherlands	3 (0.3)	528 (10.2)	29 (1.6)	530 (4.9)	68 (1.7)	540 (3.1)
Sweden	2 (0.4)	~ ~	37 (1.2)	520 (4.2)	61 (1.3)	535 (2.4)
Slovak Republic	2 (0.4)	~ ~	18 (1.0)	494 (4.1)	80 (1.1)	524 (3.5)
Slovenia	2 (0.2)	~ ~	15 (1.1)	499 (3.8)	83 (1.2)	528 (1.8)
Belgium (Flemish)	1 (0.2)	~ ~	16 (1.1)	510 (5.1)	83 (1.1)	522 (2.4)
International Avg.	9 (0.2)	469 (1.8)	34 (0.3)	481 (1.2)	57 (0.3)	500 (0.9)
Earth Science						
Moldova, Rep. of	26 (1.0)	479 (4.5)	54 (1.2)	473 (3.7)	20 (1.1)	476 (4.9)
Russian Federation	24 (1.1)	510 (5.5)	50 (0.9)	516 (3.2)	26 (1.3)	522 (4.0)
Armenia r	16 (0.9)	466 (5.0)	44 (1.0)	461 (4.0)	40 (1.4)	471 (4.4)
Lithuania	15 (0.8)	506 (3.7)	42 (1.1)	516 (3.0)	42 (1.3)	531 (2.8)
Romania	15 (1.1)	456 (7.9)	34 (1.2)	468 (6.7)	50 (1.7)	484 (5.0)
Indonesia	12 (0.6)	417 (6.1)	52 (0.8)	424 (4.1)	36 (0.9)	428 (4.3)
Estonia	11 (0.8)	537 (4.3)	44 (1.3)	546 (2.9)	45 (1.6)	566 (2.7)
Cyprus	8 (0.5)	419 (4.7)	45 (1.1)	444 (2.7)	48 (1.2)	453 (2.4)
Macedonia, Rep. of r	7 (0.7)	404 (9.1)	31 (1.7)	434 (5.2)	62 (2.1)	477 (3.7)
Bulgaria r	6 (0.9)	478 (10.8)	26 (1.4)	477 (6.3)	68 (1.8)	486 (5.5)
Hungary	5 (0.5)	512 (7.3)	28 (1.3)	528 (3.4)	67 (1.4)	555 (3.0)
Serbia r	4 (0.5)	426 (8.3)	24 (1.2)	458 (5.0)	72 (1.5)	480 (2.7)
Netherlands	4 (0.5)	531 (6.6)	29 (1.6)	533 (4.4)	67 (1.8)	539 (3.3)
Sweden r	3 (0.4)	487 (9.0)	37 (1.0)	520 (3.8)	60 (1.1)	534 (2.7)
Slovak Republic	2 (0.3)	~ ~	17 (1.0)	499 (4.6)	81 (1.1)	523 (3.3)
Belgium (Flemish)	1 (0.3)	~ ~	20 (1.3)	508 (4.9)	79 (1.4)	522 (2.5)
Latvia	--	--	--	--	--	--
^b Lebanon	--	--	--	--	--	--
Slovenia	--	--	--	--	--	--
International Avg.	10 (0.2)	473 (1.9)	36 (0.3)	488 (1.1)	54 (0.4)	503 (0.9)

Background data provided by students.

^b Lebanon: Data in biology panel pertain to grade 8 life and earth sciences course.

() 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)



Countries	High TSH		Medium TSH		Low TSH	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Chemistry						
Russian Federation	40 (1.2)	516 (4.5)	47 (1.0)	516 (3.5)	13 (0.8)	521 (5.4)
Moldova, Rep. of	31 (1.0)	479 (4.2)	52 (1.0)	473 (3.9)	18 (1.0)	472 (4.9)
Armenia ^r	27 (1.1)	470 (4.8)	52 (1.1)	466 (4.0)	21 (1.0)	464 (4.2)
Lithuania	18 (0.8)	504 (3.8)	45 (1.0)	518 (2.7)	36 (1.2)	533 (3.0)
Latvia	18 (1.1)	500 (4.3)	46 (1.0)	512 (2.9)	36 (1.4)	524 (3.3)
Estonia	16 (1.2)	537 (4.1)	45 (1.0)	546 (2.6)	39 (1.6)	569 (3.1)
Lebanon	16 (1.0)	372 (5.4)	45 (1.3)	389 (5.3)	39 (1.4)	416 (5.2)
Macedonia, Rep. of ^r	11 (0.9)	425 (8.2)	36 (1.3)	440 (4.4)	53 (1.7)	477 (3.9)
Romania	11 (0.9)	454 (6.3)	35 (1.3)	471 (7.2)	55 (1.7)	483 (4.7)
Serbia ^r	10 (0.9)	446 (5.4)	37 (1.1)	465 (4.1)	53 (1.6)	482 (3.1)
Cyprus	10 (0.5)	424 (4.7)	43 (0.9)	442 (2.6)	48 (1.1)	455 (2.3)
Bulgaria ^r	9 (0.8)	468 (8.7)	32 (1.3)	479 (5.7)	60 (1.8)	487 (5.7)
Hungary	8 (0.7)	510 (5.2)	33 (1.2)	532 (3.3)	60 (1.5)	556 (3.2)
Slovenia	5 (0.5)	485 (5.9)	22 (1.2)	502 (3.3)	73 (1.4)	530 (2.0)
Indonesia ^s	4 (0.5)	385 (10.1)	14 (0.9)	389 (7.0)	83 (1.1)	435 (3.9)
Sweden	2 (0.4)	~ ~	38 (1.2)	523 (3.9)	60 (1.3)	533 (2.5)
Slovak Republic	2 (0.2)	~ ~	19 (1.1)	494 (3.9)	79 (1.2)	524 (3.5)
Belgium (Flemish)	--	--	--	--	--	--
^c Netherlands	--	--	--	--	--	--
International Avg.	14 (0.2)	465 (1.4)	38 (0.3)	480 (1.1)	48 (0.3)	498 (0.9)
Physics						
Russian Federation	30 (1.1)	513 (4.5)	49 (1.0)	515 (3.7)	20 (1.1)	523 (5.1)
Armenia ^r	29 (1.0)	473 (4.7)	54 (1.2)	467 (3.8)	17 (1.0)	454 (5.0)
Moldova, Rep. of	26 (1.1)	480 (4.8)	54 (1.1)	472 (3.9)	20 (1.0)	476 (4.0)
Lebanon	17 (0.9)	373 (5.6)	46 (1.1)	391 (5.0)	37 (1.4)	415 (5.6)
Latvia	17 (1.1)	502 (4.0)	45 (1.2)	510 (3.5)	38 (1.4)	525 (2.9)
Indonesia	16 (0.7)	422 (5.1)	58 (1.0)	426 (4.1)	26 (0.8)	420 (4.9)
Lithuania	16 (0.9)	505 (4.2)	45 (1.0)	516 (2.8)	40 (1.4)	531 (2.9)
Cyprus	16 (0.7)	436 (4.1)	48 (1.1)	444 (2.5)	37 (1.2)	454 (3.0)
Estonia	15 (0.9)	536 (4.2)	44 (1.0)	545 (2.7)	41 (1.5)	569 (2.8)
Macedonia, Rep. of ^r	14 (0.9)	430 (6.6)	41 (1.6)	449 (5.4)	45 (2.0)	475 (3.7)
Romania	11 (0.9)	448 (7.2)	34 (1.3)	469 (7.0)	56 (1.8)	484 (4.9)
Bulgaria ^r	9 (0.8)	472 (9.5)	31 (1.8)	475 (5.8)	61 (2.2)	487 (5.7)
Serbia ^r	8 (0.7)	442 (6.2)	38 (1.2)	463 (3.6)	53 (1.5)	483 (3.0)
Slovenia	8 (0.6)	496 (5.0)	35 (1.4)	512 (3.0)	57 (1.5)	533 (2.2)
^c Netherlands	7 (0.8)	514 (8.3)	35 (1.7)	530 (4.4)	58 (2.2)	545 (3.3)
Hungary	6 (0.6)	500 (6.4)	30 (1.0)	530 (3.4)	64 (1.3)	556 (2.9)
Slovak Republic	3 (0.3)	493 (7.7)	23 (1.3)	493 (4.7)	74 (1.4)	526 (3.3)
Sweden	2 (0.4)	~ ~	38 (1.1)	521 (3.9)	60 (1.2)	534 (2.6)
Belgium (Flemish)	x x	x x	x x	x x	x x	x x
International Avg.	14 (0.2)	473 (1.5)	42 (0.3)	485 (1.1)	45 (0.4)	500 (0.9)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by students.

^c Netherlands: Data in physics panel pertain to grade 8 physics/chemistry course.⁽⁾ 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.

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

SCIENCE
Grade 4

Countries	High TSH		Medium TSH		Low TSH	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Philippines	16 (1.0)	307 (8.0)	51 (1.2)	335 (8.4)	33 (1.4)	354 (15.2)
Armenia	r 15 (0.8)	434 (8.4)	50 (1.3)	441 (5.3)	35 (1.6)	453 (4.7)
Tunisia	s 14 (1.8)	337 (10.9)	40 (2.3)	332 (7.7)	46 (2.9)	347 (8.4)
Morocco	s 13 (1.2)	319 (10.2)	45 (2.4)	321 (6.5)	42 (2.9)	320 (10.8)
Singapore	11 (0.8)	555 (6.9)	46 (0.9)	564 (6.0)	43 (1.3)	574 (5.2)
Iran, Islamic Rep. of	10 (1.0)	410 (7.3)	42 (2.1)	412 (5.6)	48 (2.4)	422 (5.9)
Moldova, Rep. of	9 (1.3)	476 (6.5)	45 (1.9)	496 (5.6)	45 (2.1)	511 (5.0)
Italy	8 (0.5)	488 (7.5)	35 (1.1)	508 (5.1)	57 (1.2)	528 (3.5)
Slovenia	7 (0.7)	466 (7.3)	41 (1.6)	487 (3.2)	52 (1.9)	503 (2.8)
Lithuania	7 (0.5)	495 (5.4)	34 (1.2)	509 (3.7)	59 (1.3)	522 (2.4)
Hong Kong, SAR	7 (0.6)	520 (6.8)	52 (2.0)	547 (3.6)	41 (2.2)	545 (2.9)
Russian Federation	6 (0.6)	498 (7.9)	37 (1.3)	516 (5.9)	58 (1.5)	539 (5.2)
Latvia	5 (0.5)	515 (5.7)	32 (1.1)	523 (3.2)	62 (1.2)	542 (2.7)
United States	4 (0.3)	494 (7.4)	24 (0.9)	526 (4.1)	71 (1.1)	547 (2.4)
Cyprus	4 (0.4)	451 (5.8)	26 (1.1)	464 (3.6)	70 (1.3)	493 (2.4)
Hungary	4 (0.4)	487 (11.9)	30 (1.2)	518 (3.9)	66 (1.4)	544 (2.8)
New Zealand	3 (0.4)	478 (10.7)	31 (1.0)	519 (3.3)	66 (1.1)	531 (2.6)
Chinese Taipei	3 (0.2)	506 (7.1)	29 (0.9)	542 (2.7)	68 (1.0)	557 (1.8)
Belgium (Flemish)	2 (0.3)	~ ~	23 (1.3)	507 (2.9)	75 (1.4)	525 (1.8)
Scotland	2 (0.2)	~ ~	16 (1.0)	494 (5.0)	82 (1.1)	508 (3.1)
Australia	2 (0.3)	~ ~	20 (1.2)	522 (7.7)	78 (1.3)	527 (3.9)
Norway	r 2 (0.3)	~ ~	18 (1.1)	457 (4.7)	80 (1.1)	481 (2.8)
England	2 (0.2)	~ ~	26 (1.8)	551 (6.7)	73 (1.9)	544 (3.5)
Japan	1 (0.2)	~ ~	16 (1.1)	534 (3.3)	82 (1.1)	546 (1.7)
Netherlands	1 (0.2)	~ ~	8 (0.9)	506 (5.3)	92 (0.9)	528 (2.1)
International Avg.	6 (0.1)	458 (1.8)	33 (0.3)	485 (1.1)	61 (0.3)	500 (1.1)
Benchmarking Participants						
Indiana State, US	3 (0.4)	510 (11.8)	24 (2.0)	543 (6.2)	73 (2.2)	562 (3.5)
Ontario Province, Can.	5 (0.5)	521 (12.4)	31 (1.3)	539 (5.6)	65 (1.5)	544 (3.2)
Quebec Province, Can.	3 (0.4)	464 (8.9)	18 (0.9)	486 (4.2)	79 (1.1)	508 (2.5)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

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

Exhibit 4.8: How Students Spend Their Leisure Time on a Normal School Day



Countries	Average Hours Spent Each Day*								
	Watch Television and Videos	Play Computer Games	Play or Talk with Friends	Do Jobs at Home	Play Sports	Read a Book for Enjoyment	Use the Internet	Work at a Paid Job	
Armenia	1.8 (0.03)	r 0.9 (0.03)	r 1.6 (0.03)	r 0.4 (0.02)	r 1.2 (0.03)	r 1.6 (0.03)	r 0.7 (0.03)	r 1.0 (0.04)	
Australia	2.0 (0.03)	0.9 (0.02)	1.7 (0.04)	1.0 (0.02)	1.6 (0.03)	0.7 (0.02)	1.3 (0.04)	0.4 (0.03)	
Bahrain	2.0 (0.03)	1.2 (0.02)	1.6 (0.03)	1.2 (0.02)	1.5 (0.03)	0.9 (0.02)	1.4 (0.03)	0.6 (0.02)	
Belgium (Flemish)	2.1 (0.03)	1.0 (0.03)	1.9 (0.03)	0.9 (0.02)	1.6 (0.03)	0.5 (0.01)	1.3 (0.03)	0.2 (0.02)	
Botswana	1.4 (0.03)	0.5 (0.02)	2.1 (0.04)	2.3 (0.03)	1.5 (0.02)	1.8 (0.03)	0.7 (0.02)	0.6 (0.03)	
Bulgaria	2.5 (0.04)	1.1 (0.04)	2.6 (0.05)	1.5 (0.03)	1.2 (0.04)	0.7 (0.03)	1.0 (0.04)	0.3 (0.02)	
Chile	2.2 (0.02)	0.7 (0.02)	2.3 (0.02)	1.5 (0.02)	1.8 (0.03)	0.6 (0.01)	0.7 (0.02)	0.3 (0.02)	
Chinese Taipei	1.7 (0.03)	1.4 (0.04)	1.4 (0.03)	0.7 (0.01)	1.0 (0.02)	1.0 (0.02)	1.4 (0.04)	0.2 (0.01)	
Cyprus	2.1 (0.03)	1.3 (0.02)	2.1 (0.03)	1.0 (0.03)	1.7 (0.03)	0.9 (0.02)	1.2 (0.02)	0.6 (0.02)	
Egypt	0.8 (0.02)	0.7 (0.02)	0.8 (0.02)	1.3 (0.03)	1.1 (0.02)	1.0 (0.02)	0.6 (0.02)	0.6 (0.02)	
Estonia	2.3 (0.03)	1.1 (0.03)	2.8 (0.03)	1.1 (0.02)	1.4 (0.03)	0.7 (0.02)	1.5 (0.04)	0.4 (0.02)	
Ghana	0.7 (0.02)	0.6 (0.02)	1.2 (0.03)	1.5 (0.03)	1.3 (0.02)	1.7 (0.03)	0.8 (0.03)	0.8 (0.03)	
Hong Kong, SAR	2.3 (0.03)	2.0 (0.04)	1.6 (0.03)	0.7 (0.01)	1.0 (0.02)	1.1 (0.02)	2.0 (0.03)	0.1 (0.01)	
Hungary	2.1 (0.03)	1.1 (0.03)	2.2 (0.03)	1.1 (0.02)	1.5 (0.03)	0.8 (0.02)	0.6 (0.03)	0.2 (0.02)	
Indonesia	1.5 (0.03)	0.5 (0.02)	1.3 (0.03)	2.2 (0.03)	1.1 (0.02)	1.1 (0.02)	0.3 (0.02)	0.8 (0.03)	
Iran, Islamic Rep. of	1.6 (0.03)	0.4 (0.02)	1.4 (0.03)	1.5 (0.03)	1.4 (0.04)	1.0 (0.02)	0.2 (0.02)	0.7 (0.05)	
Israel	2.5 (0.04)	1.9 (0.03)	2.3 (0.03)	1.4 (0.03)	1.6 (0.03)	0.9 (0.02)	1.8 (0.04)	0.6 (0.02)	
Italy	1.8 (0.03)	1.0 (0.02)	2.6 (0.03)	1.1 (0.03)	1.8 (0.03)	0.7 (0.02)	0.6 (0.02)	0.9 (0.02)	
Japan	2.7 (0.03)	0.9 (0.02)	1.6 (0.04)	0.6 (0.01)	1.3 (0.03)	0.9 (0.02)	0.6 (0.02)	0.1 (0.01)	
Jordan	1.5 (0.03)	0.9 (0.03)	1.2 (0.03)	1.3 (0.03)	1.2 (0.03)	0.9 (0.02)	0.6 (0.03)	0.6 (0.03)	
Korea, Rep. of	1.7 (0.03)	1.5 (0.03)	1.8 (0.03)	0.7 (0.01)	0.7 (0.02)	0.6 (0.01)	1.7 (0.03)	0.1 (0.01)	
Latvia	2.4 (0.03)	1.0 (0.02)	2.8 (0.03)	1.6 (0.03)	1.3 (0.03)	0.8 (0.03)	0.8 (0.03)	0.5 (0.02)	
Lebanon	1.8 (0.04)	1.3 (0.03)	1.6 (0.04)	1.3 (0.03)	1.6 (0.03)	1.0 (0.02)	1.0 (0.03)	0.8 (0.03)	
Lithuania	2.1 (0.03)	1.1 (0.03)	2.6 (0.04)	1.6 (0.04)	1.1 (0.03)	0.6 (0.02)	0.7 (0.03)	0.3 (0.02)	
Macedonia, Rep. of	2.3 (0.04)	1.3 (0.03)	2.2 (0.03)	1.6 (0.03)	1.8 (0.03)	1.0 (0.02)	0.9 (0.03)	0.7 (0.03)	
Malaysia	2.1 (0.04)	0.8 (0.03)	1.5 (0.03)	1.7 (0.02)	1.1 (0.02)	1.2 (0.02)	0.6 (0.02)	0.3 (0.02)	
Moldova, Rep. of	1.9 (0.04)	0.7 (0.03)	2.0 (0.04)	2.2 (0.06)	1.3 (0.03)	1.1 (0.03)	0.7 (0.03)	0.5 (0.03)	
Morocco	1.3 (0.04)	2.3 (0.06)	1.3 (0.03)	1.8 (0.03)	1.5 (0.03)	r 1.3 (0.03)	r 2.6 (0.06)	r 2.8 (0.06)	
Netherlands	2.1 (0.05)	1.2 (0.04)	2.0 (0.05)	0.8 (0.02)	1.7 (0.04)	0.5 (0.02)	1.5 (0.04)	0.8 (0.05)	
New Zealand	2.1 (0.04)	1.0 (0.04)	1.8 (0.05)	1.0 (0.02)	1.5 (0.03)	0.7 (0.03)	1.3 (0.04)	0.6 (0.03)	
Norway	2.2 (0.03)	1.2 (0.03)	2.7 (0.03)	1.0 (0.03)	1.8 (0.03)	0.6 (0.02)	1.2 (0.03)	0.7 (0.02)	
Palestinian Nat'l Auth.	1.2 (0.02)	0.7 (0.02)	1.3 (0.03)	1.5 (0.03)	1.1 (0.03)	1.0 (0.02)	0.5 (0.02)	0.6 (0.03)	
Philippines	1.6 (0.04)	0.6 (0.02)	1.7 (0.03)	1.9 (0.03)	1.4 (0.02)	1.2 (0.02)	0.5 (0.03)	0.8 (0.04)	
Romania	2.0 (0.04)	0.9 (0.03)	2.1 (0.03)	1.7 (0.05)	1.3 (0.03)	1.0 (0.03)	0.8 (0.04)	0.5 (0.04)	
Russian Federation	2.0 (0.03)	1.0 (0.03)	2.5 (0.04)	1.6 (0.03)	1.3 (0.02)	1.1 (0.03)	0.4 (0.02)	0.2 (0.02)	
Saudi Arabia	1.6 (0.05)	1.1 (0.03)	1.3 (0.03)	1.5 (0.04)	1.2 (0.04)	0.9 (0.02)	0.8 (0.05)	0.8 (0.03)	
Scotland	2.2 (0.03)	1.4 (0.04)	2.7 (0.03)	0.8 (0.02)	1.7 (0.03)	0.6 (0.02)	1.4 (0.03)	0.5 (0.03)	
Serbia	2.1 (0.03)	1.0 (0.03)	2.1 (0.03)	1.3 (0.03)	1.7 (0.03)	0.8 (0.02)	0.6 (0.03)	0.3 (0.02)	
Singapore	2.3 (0.02)	1.4 (0.02)	1.7 (0.02)	0.7 (0.02)	1.4 (0.02)	0.9 (0.02)	1.6 (0.02)	0.2 (0.02)	
Slovak Republic	2.5 (0.03)	1.1 (0.03)	2.8 (0.03)	1.5 (0.03)	1.9 (0.04)	0.9 (0.02)	0.6 (0.03)	0.4 (0.02)	
Slovenia	2.2 (0.03)	1.3 (0.03)	2.0 (0.03)	1.2 (0.03)	1.7 (0.03)	0.8 (0.02)	1.1 (0.03)	0.4 (0.02)	
South Africa	1.5 (0.03)	0.7 (0.02)	2.0 (0.03)	1.8 (0.03)	1.6 (0.02)	1.6 (0.03)	0.8 (0.02)	0.8 (0.02)	
Sweden	2.1 (0.03)	1.1 (0.03)	2.8 (0.03)	1.0 (0.02)	1.6 (0.03)	0.6 (0.02)	1.7 (0.04)	0.4 (0.02)	
Tunisia	1.4 (0.02)	0.8 (0.03)	1.5 (0.02)	1.9 (0.03)	1.5 (0.02)	1.3 (0.02)	0.7 (0.02)	0.6 (0.02)	
United States	2.2 (0.03)	1.1 (0.02)	2.4 (0.03)	1.2 (0.02)	1.8 (0.02)	0.7 (0.01)	1.8 (0.03)	0.6 (0.02)	
‡ England	2.0 (0.04)	1.1 (0.04)	2.4 (0.05)	0.8 (0.03)	1.4 (0.05)	0.5 (0.02)	1.4 (0.04)	0.5 (0.04)	
International Avg.	1.9 (0.00)	1.1 (0.00)	1.9 (0.00)	1.3 (0.00)	1.4 (0.00)	0.9 (0.00)	1.0 (0.00)	0.6 (0.00)	
Benchmarking Participants									
Basque Country, Spain	1.6 (0.04)	0.9 (0.03)	2.4 (0.04)	0.9 (0.03)	1.5 (0.03)	0.7 (0.02)	0.8 (0.03)	0.4 (0.03)	
Indiana State, US	2.2 (0.06)	1.0 (0.04)	2.4 (0.06)	1.2 (0.04)	1.8 (0.04)	0.7 (0.03)	1.7 (0.04)	0.6 (0.05)	
Ontario Province, Can.	2.1 (0.04)	1.2 (0.04)	2.0 (0.04)	0.9 (0.02)	1.7 (0.03)	0.8 (0.02)	1.9 (0.04)	0.6 (0.03)	
Quebec Province, Can.	2.0 (0.03)	1.4 (0.03)	2.0 (0.04)	0.9 (0.02)	1.7 (0.04)	0.6 (0.02)	1.5 (0.04)	0.6 (0.02)	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by students.

* Number of hours based on: No time = 0; Less than 1 hour = 0.5; 1-2 hours = 1.5; More than 2 but less than 4 hours = 3; 4 or more hours = 4.5. Activities are not necessarily exclusive; students may have reported engaging in more than one activity at the same time.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

() 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 4.8: How Students Spend Their Leisure Time on a Normal School Day

Countries	Average Hours Spent Each Day*						
	Watch Television and Videos	Play Computer Games	Play or Talk with Friends	Do Jobs at Home	Play Sports	Read a Book for Enjoyment	Use the Internet
Armenia	r 1.6 (0.04)	r 1.0 (0.04)	r 1.3 (0.03)	s 0.5 (0.05)	r 1.4 (0.03)	r 1.9 (0.04)	s 0.5 (0.04)
Australia	1.9 (0.04)	1.1 (0.03)	1.8 (0.04)	1.3 (0.03)	1.8 (0.04)	1.2 (0.03)	0.9 (0.04)
Belgium (Flemish)	1.8 (0.03)	1.0 (0.02)	2.0 (0.03)	1.2 (0.02)	1.6 (0.03)	0.9 (0.02)	0.8 (0.02)
Chinese Taipei	1.3 (0.03)	1.0 (0.03)	1.0 (0.02)	0.9 (0.02)	1.3 (0.02)	1.1 (0.02)	1.0 (0.03)
Cyprus	1.9 (0.03)	1.1 (0.03)	2.1 (0.03)	1.3 (0.03)	1.7 (0.03)	1.2 (0.02)	0.6 (0.02)
England	2.0 (0.04)	1.5 (0.04)	2.1 (0.04)	1.0 (0.03)	1.9 (0.03)	1.0 (0.03)	1.0 (0.03)
Hong Kong, SAR	1.9 (0.03)	1.2 (0.03)	1.2 (0.03)	0.9 (0.02)	1.1 (0.02)	1.0 (0.02)	0.9 (0.03)
Hungary	1.9 (0.03)	1.2 (0.03)	2.2 (0.03)	1.3 (0.03)	1.7 (0.03)	1.0 (0.02)	0.4 (0.02)
Iran, Islamic Rep. of	1.1 (0.04)	0.3 (0.03)	1.2 (0.05)	1.6 (0.05)	1.4 (0.04)	1.3 (0.04)	0.2 (0.02)
Italy	1.4 (0.03)	0.8 (0.02)	1.9 (0.03)	1.3 (0.03)	1.6 (0.02)	0.9 (0.02)	0.4 (0.02)
Japan	2.0 (0.03)	0.9 (0.02)	1.9 (0.03)	0.8 (0.02)	1.3 (0.02)	0.8 (0.02)	0.4 (0.01)
Latvia	2.0 (0.04)	0.9 (0.03)	2.6 (0.04)	1.7 (0.04)	1.5 (0.03)	1.1 (0.03)	0.5 (0.03)
Lithuania	1.7 (0.04)	1.1 (0.03)	2.7 (0.03)	1.8 (0.04)	1.2 (0.03)	1.1 (0.02)	0.5 (0.02)
Moldova, Rep. of	1.6 (0.04)	r 0.6 (0.03)	1.8 (0.05)	1.9 (0.05)	1.2 (0.03)	1.2 (0.03)	r 0.4 (0.03)
Morocco	r 1.0 (0.05)	r 0.8 (0.05)	r 1.2 (0.05)	r 1.3 (0.04)	r 1.2 (0.04)	r 1.1 (0.05)	r 0.8 (0.04)
Netherlands	1.6 (0.04)	1.2 (0.03)	2.4 (0.05)	0.9 (0.03)	1.7 (0.04)	0.8 (0.03)	0.8 (0.04)
New Zealand	1.9 (0.03)	1.1 (0.03)	1.8 (0.03)	1.3 (0.03)	1.6 (0.03)	1.3 (0.03)	1.0 (0.02)
Norway	1.5 (0.02)	1.0 (0.02)	2.4 (0.04)	1.1 (0.02)	1.5 (0.03)	1.0 (0.03)	0.6 (0.02)
Philippines	1.2 (0.04)	0.8 (0.03)	1.3 (0.03)	1.5 (0.05)	1.4 (0.04)	1.4 (0.04)	0.7 (0.04)
Russian Federation	1.5 (0.03)	0.8 (0.03)	2.2 (0.04)	1.5 (0.03)	1.2 (0.03)	1.2 (0.02)	0.3 (0.02)
Scotland	2.0 (0.04)	1.6 (0.04)	2.1 (0.04)	1.1 (0.03)	2.0 (0.04)	1.0 (0.02)	1.1 (0.03)
Singapore	2.0 (0.02)	1.2 (0.02)	1.2 (0.02)	1.0 (0.03)	1.5 (0.03)	1.3 (0.02)	0.9 (0.02)
Slovenia	1.6 (0.05)	1.3 (0.04)	1.7 (0.04)	1.5 (0.04)	1.9 (0.04)	1.2 (0.03)	0.6 (0.02)
Tunisia	r 0.8 (0.03)	r 0.8 (0.04)	r 0.9 (0.04)	r 1.5 (0.04)	r 1.4 (0.04)	r 1.3 (0.05)	r 0.8 (0.05)
United States	2.1 (0.03)	1.1 (0.02)	2.0 (0.02)	1.2 (0.01)	1.9 (0.02)	1.2 (0.02)	1.2 (0.02)
International Avg.	1.7 (0.01)	1.0 (0.01)	1.8 (0.01)	1.3 (0.01)	1.5 (0.01)	1.1 (0.01)	0.7 (0.01)
Benchmarking Participants							
Indiana State, US	2.0 (0.04)	1.1 (0.03)	2.2 (0.03)	1.1 (0.03)	2.0 (0.03)	1.1 (0.03)	1.2 (0.04)
Ontario Province, Can.	2.0 (0.04)	1.2 (0.04)	1.8 (0.05)	1.2 (0.02)	1.7 (0.04)	1.2 (0.03)	1.2 (0.03)
Quebec Province, Can.	1.8 (0.03)	1.2 (0.03)	2.0 (0.04)	1.4 (0.03)	2.2 (0.03)	1.0 (0.02)	1.2 (0.03)

Background data provided by students.

* Number of hours based on: No time = 0; Less than 1 hour = 0.5; 1-2 hours = 1.5; More than 2 but less than 4 hours = 3; 4 or more hours = 4.5. Activities are not necessarily exclusive; students may have reported engaging in more than one activity at the same time.

() 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.

With the exception of Singapore, the countries assigning most science homework are not among those with the highest achievement levels.

On average, internationally, spending a lot of time studying was not associated with higher achievement. Particularly among separate-science-subject countries, students at the high level of the index had the lowest average achievement. This pattern is also apparent at fourth grade, and suggests that, compared with their higher-achieving counterparts, the lower-performing students may be assigned more homework as a remedial strategy in an effort to keep up academically.

To provide a fuller picture of how students spend their out-of-school time on a school day, Exhibit 4.8 gives students' reports on how they spend their daily leisure time. The two most popular activities were watching television or videos and playing or talking with friends (each about two hours per day at eighth grade and a little less at fourth grade). Students reported spending more than one hour per day playing sports and working at jobs at home, and about one hour playing computer games and using the internet.

How Confident Are Students in Their Ability to Learn Science?

To investigate how students think of their abilities in science, TIMSS created an index of students' self-confidence in learning science (SCS). This index is based on students' responses to four statements about their science ability:

- I usually do well in science;
- Science is more difficult for me than for many of my classmates;*
- Science is not one of my strengths;
- I learn things quickly in science.*

In countries where the sciences are taught as separate subjects, students were asked about each subject separately.

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

Students who agreed a little or agreed a lot with all four statements on average were assigned to the high level of the index, while students who disagreed a little or disagreed a lot with all four on average were assigned to the low level. The medium level includes all other possible combinations of responses. The percentages of students at each level of this index, and their average science achievement, are presented in Exhibit 4.9 for both eighth and fourth grades. This four-page display summarizes the data in one panel for the countries that teach science as a single subject at the eighth grade, and in separate panels for earth science, biology, physics, and chemistry for countries that teach the sciences separately. There is a single panel also displaying the fourth-grade data.

On average, internationally, almost half (48 percent) of the eighth-grade students in the single-science countries had high self-confidence in learning science. The percentages ranged from a high of 69 percent in Tunisia to a low of 20 percent in Japan. Although there was a clear positive association between self-confidence in learning science and science achievement internationally and in every country, at the country level the relationship was more complex. It is noteworthy that the four countries with lowest percentages of students in the high self-confidence category – Chinese Taipei, Hong Kong SAR, Japan, and Korea – all had high average science achievement. Since all of these are Asian Pacific countries, they may share cultural traditions that encourage modest self-confidence.

In countries teaching the sciences as separate subjects at the eighth grade, the percentage of students at the high level of the self-confidence in learning science index was greatest for biology and earth science, with 59 percent and 56 percent of students in the high category on average for these subjects, respectively. The percentage was lower for physics and chemistry (40 percent each). Although there was some variation, generally countries with high percentages of students in the high category for one subject had high percentages in the other subjects also. Serbia had the highest percentages in the high category for

Exhibit 4.9: Index of Students' Self-Confidence in Learning Science (SCS)



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Index of Students' Self-Confidence in Learning Science	Countries	High SCS		Medium SCS		Low SCS	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
<p>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.</p> <p>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.</p>	General/Integrated Science						
	Tunisia	69 (1.1)	412 (2.0)	26 (0.9)	389 (3.4)	5 (0.4)	383 (5.0)
	Egypt	64 (1.1)	452 (3.3)	33 (1.0)	389 (4.4)	4 (0.3)	354 (8.9)
	Norway	60 (1.3)	512 (2.2)	30 (0.9)	475 (2.5)	10 (0.7)	456 (4.5)
	Israel	59 (1.0)	515 (2.9)	31 (0.9)	458 (4.1)	9 (0.6)	452 (6.1)
	Scotland	59 (1.5)	539 (3.3)	28 (1.1)	481 (3.5)	14 (0.9)	459 (3.9)
	Saudi Arabia	58 (1.7)	418 (4.3)	36 (1.3)	378 (4.4)	6 (0.7)	366 (7.3)
	Jordan	57 (1.0)	503 (3.3)	36 (1.0)	447 (4.4)	6 (0.5)	434 (10.2)
	Italy	57 (1.1)	509 (3.2)	32 (1.0)	471 (4.1)	11 (0.6)	459 (5.2)
	Ghana	57 (1.4)	294 (6.1)	36 (1.2)	224 (6.2)	7 (0.6)	173 (11.7)
	Palestinian Nat'l Auth.	56 (1.1)	462 (3.3)	37 (0.9)	409 (3.8)	7 (0.5)	384 (6.5)
	Bahrain	56 (1.0)	456 (1.9)	36 (0.9)	419 (2.3)	8 (0.5)	413 (5.3)
	United States	56 (0.9)	548 (3.4)	31 (0.7)	507 (3.4)	13 (0.6)	495 (3.4)
	Australia	49 (1.4)	550 (4.0)	34 (1.1)	513 (3.6)	17 (0.9)	499 (4.8)
	Morocco	48 (1.6)	416 (2.9)	42 (1.7)	386 (3.5)	10 (0.9)	379 (6.9)
	Iran, Islamic Rep. of	47 (1.1)	473 (2.5)	45 (0.9)	438 (2.7)	8 (0.5)	429 (3.5)
	Botswana	46 (1.0)	391 (2.9)	44 (0.8)	353 (3.4)	10 (0.6)	337 (5.3)
	Chile	46 (1.0)	434 (3.0)	44 (0.7)	393 (3.4)	10 (0.6)	407 (4.9)
	Singapore	45 (0.8)	601 (4.4)	37 (0.6)	562 (4.9)	18 (0.6)	553 (5.0)
	South Africa	45 (1.1)	282 (8.3)	46 (1.0)	215 (5.7)	9 (0.4)	207 (10.2)
	^d Philippines	43 (1.1)	408 (6.1)	52 (0.9)	359 (5.5)	5 (0.4)	334 (10.3)
	New Zealand	41 (1.4)	548 (5.7)	41 (0.9)	509 (5.2)	19 (1.2)	489 (5.4)
	Malaysia	38 (1.2)	530 (3.9)	48 (1.0)	500 (3.5)	14 (0.6)	496 (4.7)
	Hong Kong, SAR	32 (1.1)	582 (3.3)	47 (0.8)	546 (3.6)	21 (1.0)	540 (2.9)
	^a Chinese Taipei	28 (1.0)	616 (3.3)	38 (0.7)	560 (4.3)	34 (1.1)	548 (3.3)
	Korea, Rep. of	20 (0.7)	612 (2.2)	42 (0.7)	556 (2.0)	38 (0.9)	533 (2.1)
	Japan	20 (0.9)	595 (2.7)	46 (0.8)	551 (1.8)	34 (1.0)	529 (2.3)
[‡] England	53 (1.5)	569 (4.9)	32 (1.3)	525 (5.2)	15 (0.9)	513 (6.3)	
International Avg.	48 (0.2)	490 (0.8)	38 (0.2)	445 (0.9)	13 (0.1)	430 (1.2)	
Benchmarking Participants							
Basque Country, Spain	50 (1.8)	513 (3.5)	34 (1.2)	469 (3.4)	16 (1.2)	455 (4.6)	
Indiana State, US	53 (1.8)	554 (5.0)	31 (1.0)	512 (5.1)	16 (1.3)	495 (5.9)	
Ontario Province, Can.	52 (1.5)	553 (2.8)	34 (1.1)	517 (2.9)	15 (1.0)	497 (4.7)	
Quebec Province, Can.	50 (1.7)	551 (3.4)	31 (1.1)	518 (3.7)	19 (1.2)	503 (3.2)	

Background data provided by students.

^a Chinese Taipei: Students were asked about natural science; data pertain to grade 8 physics/chemistry course.^d Philippines: Students study only biology at grade 8.[‡] Did not satisfy guidelines for sample participation rates (see Exhibit A.9).^() Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Exhibit 4.9: Index of Students' Self-Confidence in Learning Science (SCS) (Continued...)

Countries	High SCS		Medium SCS		Low SCS	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Biology						
Serbia	74 (1.1)	480 (2.9)	18 (0.8)	444 (3.8)	7 (0.6)	436 (5.8)
Estonia	71 (1.1)	558 (2.6)	24 (1.0)	542 (3.1)	5 (0.5)	536 (5.9)
Russian Federation	70 (2.1)	526 (3.4)	23 (1.5)	492 (4.0)	7 (0.7)	478 (6.6)
Macedonia, Rep. of	68 (1.1)	473 (3.6)	27 (0.9)	411 (4.9)	5 (0.5)	417 (8.4)
Lithuania	63 (1.3)	531 (2.5)	29 (1.1)	499 (2.8)	7 (0.5)	497 (5.4)
Slovenia	63 (1.2)	530 (2.1)	30 (0.9)	505 (2.6)	7 (0.6)	505 (4.2)
Slovak Republic	63 (1.5)	530 (3.4)	31 (1.1)	495 (3.6)	7 (0.7)	496 (5.1)
Belgium (Flemish)	60 (1.5)	537 (2.4)	28 (0.9)	514 (3.6)	12 (0.8)	493 (5.0)
Latvia	60 (1.2)	522 (2.5)	30 (0.9)	502 (3.9)	10 (0.7)	493 (4.8)
Hungary	60 (1.4)	556 (2.9)	30 (1.0)	524 (3.9)	10 (0.7)	522 (6.3)
Bulgaria	60 (1.5)	496 (5.3)	34 (1.3)	460 (5.5)	7 (0.8)	451 (9.5)
Sweden	58 (1.1)	543 (2.7)	33 (1.0)	510 (3.5)	8 (0.5)	481 (6.1)
Armenia	57 (1.2)	479 (3.6)	36 (1.1)	448 (4.3)	7 (0.5)	437 (6.8)
Netherlands	54 (1.7)	546 (4.0)	34 (1.2)	522 (3.9)	13 (0.9)	518 (4.8)
^b Lebanon	49 (1.3)	422 (5.1)	43 (1.1)	369 (4.3)	8 (0.6)	365 (7.5)
Moldova, Rep. of	49 (1.3)	489 (3.7)	45 (1.2)	462 (3.5)	6 (0.5)	433 (7.8)
Romania	46 (1.3)	491 (4.5)	45 (1.3)	456 (6.0)	9 (0.6)	459 (8.3)
Indonesia	40 (1.3)	418 (4.4)	53 (1.2)	421 (3.9)	7 (0.5)	442 (5.8)
Cyprus	x x	x x	x x	x x	x x	x x
International Avg.	59 (0.3)	507 (0.9)	33 (0.3)	477 (1.0)	8 (0.1)	470 (1.5)
Earth Science						
Serbia	70 (1.2)	483 (2.8)	21 (0.9)	444 (3.9)	9 (0.6)	435 (5.5)
Macedonia, Rep. of	63 (1.2)	475 (3.5)	31 (1.1)	415 (5.0)	5 (0.4)	423 (7.2)
Sweden	63 (1.3)	539 (2.7)	30 (1.0)	506 (4.1)	7 (0.5)	488 (6.4)
Lithuania	63 (1.1)	530 (2.5)	30 (0.9)	502 (3.0)	6 (0.5)	495 (5.1)
Slovak Republic	62 (1.5)	530 (3.4)	30 (1.1)	495 (4.0)	8 (0.6)	502 (5.8)
Cyprus	59 (0.9)	464 (1.9)	31 (0.9)	414 (3.2)	10 (0.5)	408 (4.8)
Russian Federation	58 (1.8)	529 (3.8)	32 (1.3)	498 (3.5)	10 (0.7)	484 (5.7)
Estonia	58 (1.2)	564 (2.6)	33 (1.0)	538 (3.0)	9 (0.6)	538 (4.4)
Bulgaria	57 (1.4)	498 (4.8)	36 (1.2)	463 (5.6)	7 (0.5)	427 (9.4)
Hungary	55 (1.4)	555 (3.2)	31 (1.0)	531 (3.8)	14 (0.8)	525 (4.0)
Armenia	54 (1.2)	479 (3.9)	40 (1.1)	449 (4.1)	6 (0.4)	431 (7.2)
Netherlands	49 (1.7)	543 (3.3)	38 (1.2)	530 (3.8)	13 (1.0)	527 (5.5)
Belgium (Flemish)	49 (1.6)	534 (2.8)	33 (0.8)	516 (3.5)	18 (1.3)	508 (4.1)
Moldova, Rep. of	45 (1.5)	490 (3.5)	48 (1.4)	464 (4.0)	7 (0.5)	441 (5.7)
Romania	41 (1.3)	498 (4.6)	46 (1.3)	455 (5.5)	12 (0.8)	450 (7.4)
Indonesia	--	--	--	--	--	--
Latvia	--	--	--	--	--	--
^b Lebanon	--	--	--	--	--	--
Slovenia	--	--	--	--	--	--
International Avg.	56 (0.4)	514 (0.9)	34 (0.3)	481 (1.2)	9 (0.2)	472 (1.6)

Background data provided by students.

Does not include students who report that they do not study the content area.

^b Lebanon: Data in biology panel pertain to grade 8 life and earth sciences course.⁽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.

An "x" indicates data are available for less than 50% of the students.

Exhibit 4.9: Index of Students' Self-Confidence in Learning Science (SCS) (...Continued)



Countries	High SCS		Medium SCS		Low SCS	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Chemistry						
Slovak Republic	49 (1.4)	535 (3.5)	38 (1.1)	499 (3.4)	12 (0.8)	499 (4.9)
Lebanon	48 (1.3)	420 (5.2)	45 (1.3)	372 (4.7)	7 (0.6)	365 (9.6)
Sweden	47 (1.1)	549 (2.9)	38 (1.0)	513 (3.4)	14 (0.8)	496 (5.1)
Cyprus	46 (0.8)	473 (2.4)	39 (0.8)	420 (3.1)	15 (0.6)	413 (3.4)
Slovenia	46 (1.1)	541 (2.3)	39 (1.0)	505 (2.8)	15 (0.8)	502 (2.7)
Russian Federation	41 (1.4)	540 (3.7)	36 (1.0)	503 (3.5)	22 (1.0)	492 (3.7)
Serbia	40 (1.3)	490 (3.7)	32 (0.8)	453 (3.1)	27 (1.3)	460 (3.1)
Macedonia, Rep. of	40 (1.3)	475 (4.3)	44 (1.2)	436 (4.5)	16 (0.8)	452 (5.1)
Lithuania	39 (1.2)	542 (3.2)	39 (0.9)	505 (2.4)	22 (0.8)	504 (3.1)
Estonia	38 (1.3)	572 (3.0)	37 (0.9)	542 (2.8)	25 (1.1)	542 (2.9)
Armenia	36 (1.3)	482 (4.8)	49 (1.2)	454 (3.9)	14 (0.7)	457 (4.6)
Bulgaria	36 (1.6)	502 (5.2)	45 (1.5)	467 (5.2)	19 (1.0)	474 (6.2)
Latvia	35 (1.4)	536 (3.4)	40 (1.0)	506 (2.7)	25 (1.1)	493 (3.4)
Hungary	34 (1.2)	570 (3.6)	35 (0.9)	532 (3.4)	31 (1.3)	527 (3.2)
Moldova, Rep. of	30 (1.1)	490 (4.9)	54 (1.0)	468 (3.4)	16 (0.7)	464 (4.8)
Romania	26 (1.1)	497 (5.1)	53 (1.1)	461 (5.5)	21 (1.0)	472 (6.6)
Belgium (Flemish)	--	--	--	--	--	--
Indonesia	--	--	--	--	--	--
^c Netherlands	--	--	--	--	--	--
International Avg.	40 (0.3)	513 (1.0)	42 (0.3)	477 (1.0)	19 (0.2)	476 (1.2)
Physics						
Russian Federation	51 (1.4)	536 (3.5)	35 (0.9)	497 (4.0)	15 (0.8)	485 (5.1)
Serbia	50 (1.4)	490 (2.7)	32 (0.9)	449 (3.3)	19 (1.0)	450 (3.7)
Armenia	48 (1.4)	483 (4.1)	45 (1.2)	450 (3.9)	7 (0.4)	438 (6.2)
Sweden	47 (1.3)	552 (2.7)	39 (0.9)	510 (3.3)	14 (0.8)	493 (5.0)
Macedonia, Rep. of	47 (1.5)	476 (4.2)	41 (1.2)	434 (4.5)	12 (0.9)	447 (6.6)
Hungary	46 (1.2)	568 (3.0)	35 (1.0)	525 (3.6)	19 (0.9)	518 (3.7)
Lebanon	44 (1.3)	425 (5.5)	50 (1.1)	371 (4.3)	7 (0.5)	383 (7.6)
Cyprus	43 (0.8)	477 (2.2)	43 (0.8)	421 (2.8)	14 (0.6)	414 (3.9)
Slovak Republic	43 (1.2)	541 (3.3)	39 (0.9)	499 (3.5)	18 (1.0)	502 (4.6)
Bulgaria	43 (1.9)	503 (4.8)	46 (1.5)	467 (5.8)	12 (0.8)	454 (8.2)
^c Netherlands	40 (1.6)	554 (3.4)	40 (1.4)	528 (3.7)	19 (1.2)	521 (5.0)
Estonia	38 (1.4)	573 (3.0)	40 (0.9)	545 (2.8)	22 (1.3)	535 (3.2)
Lithuania	36 (1.3)	545 (2.9)	42 (0.9)	506 (2.5)	22 (1.0)	503 (3.5)
Latvia	36 (1.4)	535 (3.1)	44 (1.0)	504 (2.7)	20 (1.1)	495 (4.0)
Moldova, Rep. of	34 (1.1)	493 (4.1)	53 (1.0)	464 (3.6)	13 (0.9)	462 (5.2)
Slovenia	34 (1.0)	546 (2.9)	43 (1.0)	510 (2.5)	23 (1.0)	506 (2.3)
Indonesia	27 (1.1)	415 (5.3)	58 (0.8)	418 (4.0)	15 (0.9)	446 (4.0)
Romania	24 (0.9)	503 (5.4)	56 (1.1)	461 (5.4)	20 (0.9)	467 (6.4)
Belgium (Flemish)	x x	x x	x x	x x	x x	x x
International Avg.	40 (0.3)	512 (0.9)	43 (0.2)	475 (1.0)	16 (0.2)	473 (1.2)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by students.

Does not include students who report that they do not study the content area.

^c Netherlands: Data in physics panel pertain to grade 8 physics/chemistry course.

() 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 "x" indicates data are available for less than 50% of the students.

Exhibit 4.9: Index of Students' Self-Confidence in Learning Science (SCS)

Countries	High SCS		Medium SCS		Low SCS	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Slovenia	78 (1.0)	503 (2.6)	18 (0.8)	454 (4.4)	4 (0.5)	461 (8.4)
Netherlands	71 (1.2)	535 (2.1)	22 (0.8)	507 (2.7)	7 (0.6)	496 (4.6)
Cyprus	71 (1.0)	492 (2.6)	24 (0.8)	457 (3.5)	5 (0.5)	441 (5.7)
Hungary	70 (1.1)	546 (2.7)	23 (0.9)	496 (4.6)	7 (0.6)	498 (6.5)
Lithuania	69 (0.8)	524 (2.6)	26 (0.9)	490 (4.1)	5 (0.4)	497 (7.4)
Italy	69 (1.1)	529 (3.8)	26 (1.0)	493 (4.6)	5 (0.4)	481 (7.5)
Australia	66 (1.2)	535 (3.8)	27 (1.1)	501 (6.2)	7 (0.5)	491 (5.8)
United States	66 (0.9)	553 (2.5)	25 (0.7)	512 (3.3)	9 (0.4)	501 (3.6)
Norway	64 (1.2)	482 (2.9)	29 (1.0)	451 (3.8)	7 (0.5)	430 (5.4)
Russian Federation	63 (1.3)	542 (5.7)	27 (1.2)	506 (5.8)	10 (0.8)	499 (6.3)
Tunisia	60 (1.6)	349 (5.7)	33 (1.4)	287 (7.3)	7 (0.6)	240 (12.5)
Hong Kong, SAR	60 (1.4)	556 (2.9)	32 (1.1)	523 (3.3)	8 (0.5)	525 (5.2)
Armenia ^s	59 (1.2)	467 (4.0)	34 (1.0)	425 (5.9)	7 (0.6)	399 (10.5)
Moldova, Rep. of	58 (1.6)	519 (4.7)	35 (1.3)	471 (5.0)	6 (0.6)	456 (9.8)
Belgium (Flemish)	58 (1.0)	530 (1.7)	30 (0.9)	507 (2.7)	12 (0.7)	492 (3.1)
Scotland	58 (1.3)	514 (3.3)	30 (1.1)	490 (3.7)	12 (0.6)	480 (4.6)
Latvia	56 (1.3)	547 (2.8)	34 (1.0)	514 (3.1)	11 (0.8)	512 (5.1)
England	54 (1.1)	560 (3.8)	32 (0.9)	522 (4.6)	14 (0.7)	514 (5.0)
Morocco ^r	53 (2.0)	335 (9.0)	39 (1.8)	289 (7.4)	8 (1.2)	290 (18.8)
Iran, Islamic Rep. of	52 (1.6)	436 (4.8)	42 (1.4)	394 (4.8)	5 (0.6)	380 (11.3)
New Zealand	51 (1.0)	545 (2.5)	40 (0.9)	499 (3.3)	9 (0.5)	493 (5.0)
Chinese Taipei	50 (1.0)	568 (2.2)	37 (0.8)	534 (2.2)	13 (0.8)	540 (3.9)
Japan	46 (1.0)	562 (1.9)	41 (0.9)	531 (2.0)	13 (0.7)	529 (3.7)
Philippines	39 (1.4)	382 (12.4)	51 (1.1)	314 (8.6)	10 (0.7)	271 (9.0)
Singapore	32 (0.9)	592 (5.3)	41 (0.8)	554 (6.2)	27 (0.8)	552 (5.8)
International Avg.	59 (0.2)	508 (1.0)	32 (0.2)	469 (1.1)	9 (0.1)	459 (1.5)
Benchmarking Participants						
Indiana State, US	66 (1.8)	567 (3.8)	25 (1.2)	532 (4.5)	9 (1.0)	522 (6.4)
Ontario Province, Can.	67 (1.3)	556 (4.4)	24 (1.1)	513 (4.1)	9 (0.7)	506 (5.3)
Quebec Province, Can.	69 (1.2)	513 (2.4)	23 (1.0)	479 (3.3)	8 (0.5)	468 (5.8)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by students.

() 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.

biology and earth science, while the Slovak Republic had the highest in chemistry and the Russian Federation in physics. Romania had the lowest percentage in the high category for earth science, chemistry, and physics. The positive association between self-confidence in learning science and science achievement that was found for science as a single subject was also evident in each of the science subject areas.

At fourth grade, 59 percent of students were at the high level of the self-confidence in learning science index, compared with 32 percent at the medium and just nine percent at the low. The countries with the greatest percentages included Slovenia, The Netherlands, Cyprus, and Hungary, each with 70 percent or more. Countries with relatively lower percentages included Japan, the Philippines, and Singapore, each with less than 50 percent at the high level. Again, there was a positive relationship, on average, between self-confidence in learning science and science achievement.

What Value Do Students Place on Science?

Students' motivation to learn science can be affected by whether they find the subject enjoyable, place value on the subject, and think it is important for success in school and for future career aspirations. In addition, developing such positive attitudes towards science among students is an important goal of science education in many countries. To gain some understanding about the value eighth- and fourth-grade students place on science, TIMSS created an index of students valuing science (SVS). Students were asked to state their agreement with the following seven statements about science:

- I would like to take more science in school;
- I enjoy learning 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 would like a job that involved using science;
- I need to do well in science to get the job I want.

In countries where the sciences are taught as separate subjects, students were asked about each subject area separately.

Students who agreed a little or agreed a lot, on average, with all seven statements were assigned to the high level of the index, while students who, on average, disagreed a little or disagreed a lot with all seven were assigned to the low level. Students between these extremes were placed in the medium category. The percentages of students at each level of this index, and their average science achievement, are presented in Exhibit 4.10 for both eighth and fourth grades. This three-page display summarizes the data in one panel for the countries that teach science as a single subject at the eighth grade, and in separate panels for earth science, biology, physics, and chemistry for countries that teach the sciences separately.

In countries where eighth-grade science is taught as a single subject, students generally placed a high value on science, with 57 percent on average across countries in the high category, and a further 31 percent in the medium category. Only 12 percent of students were in the low category. Countries with large percentages of students at the high level included Botswana, Egypt, Ghana, Jordan, Tunisia, the Palestinian National Authority, and Morocco, with 80 percent or more in this category. Among countries placing less value on science were Chinese Taipei, Japan, and Korea. Since these are countries with high average science achievement, it may be that the students follow a demanding science curriculum, one that leads to high achievement but little enthusiasm for the subject matter. Within almost all the single-science-subject countries at the eighth grade, there was a positive association between valuing science and average science achievement. However,

Exhibit 4.10: Index of Students' Valuing Science (SVS)

Index of Students' Valuing Science	Countries	High SVS		Medium SVS		Low SVS		
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
<p>Index based on students' responses to seven statements about science: 1) I would like to take more science in school; 2) I enjoy learning science; 3) I think learning science will help me in my daily life; 4) I need science to learn other school subjects; 5) I need to do well in science to get into the university of my choice; 6) I would like a job that involved using science; 7) I need to do well in science to get the job I want. Average is computed across the seven items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot.</p> <p>Students agreeing a little or a lot on average across the seven 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.</p>	General/Integrated Science							
	Botswana	85 (0.6)	379 (2.7)	13 (0.6)	315 (6.6)	2 (0.2)	~ ~	
	Egypt	83 (0.9)	438 (3.6)	16 (0.9)	384 (6.1)	1 (0.2)	~ ~	
	Ghana	83 (1.1)	279 (5.5)	16 (1.0)	173 (8.4)	1 (0.2)	~ ~	
	Jordan	83 (0.9)	484 (3.3)	15 (0.8)	450 (6.9)	3 (0.3)	450 (17.1)	
	Tunisia	80 (0.9)	406 (2.1)	16 (0.7)	400 (3.5)	4 (0.3)	396 (6.3)	
	Palestinian Nat'l Auth.	80 (0.9)	448 (3.0)	17 (0.8)	395 (5.4)	3 (0.3)	385 (11.1)	
	Morocco	80 (1.3)	400 (3.0)	17 (1.2)	397 (4.8)	3 (0.4)	405 (11.0)	
	South Africa	76 (0.9)	242 (6.1)	19 (0.7)	246 (11.6)	5 (0.4)	270 (16.0)	
	^d Philippines	75 (0.9)	390 (5.8)	22 (0.9)	342 (7.2)	2 (0.2)	~ ~	
	Malaysia	73 (1.2)	520 (3.5)	25 (1.1)	488 (4.2)	2 (0.2)	~ ~	
	Saudi Arabia	71 (1.1)	403 (4.1)	23 (0.8)	393 (4.7)	7 (0.6)	394 (7.9)	
	Bahrain	70 (0.9)	442 (2.0)	23 (0.7)	433 (2.9)	7 (0.5)	431 (4.4)	
	Singapore	62 (1.0)	599 (3.9)	33 (0.9)	551 (4.6)	6 (0.4)	505 (7.3)	
	Iran, Islamic Rep. of	60 (1.1)	452 (2.7)	31 (0.7)	457 (2.6)	9 (0.5)	455 (3.7)	
	Chile	53 (0.9)	409 (3.6)	34 (0.7)	414 (3.1)	13 (0.6)	427 (4.0)	
	Scotland	49 (1.0)	528 (3.5)	33 (0.9)	506 (3.8)	17 (0.9)	479 (5.0)	
	United States	47 (0.8)	543 (3.6)	37 (0.6)	520 (3.2)	16 (0.6)	503 (3.8)	
	Israel	42 (1.3)	499 (3.7)	32 (0.9)	489 (4.1)	26 (1.1)	480 (4.7)	
	New Zealand	40 (1.5)	535 (6.5)	40 (1.1)	517 (5.0)	21 (1.0)	502 (4.4)	
	Hong Kong, SAR	40 (0.9)	574 (3.1)	51 (0.8)	549 (3.3)	9 (0.5)	523 (4.9)	
	Australia	36 (1.2)	551 (3.7)	37 (1.0)	522 (4.1)	27 (1.0)	506 (5.0)	
	Norway	35 (1.2)	506 (3.4)	43 (0.8)	496 (2.5)	22 (1.0)	478 (2.7)	
	Italy	29 (0.9)	507 (4.0)	55 (0.8)	488 (3.5)	16 (0.7)	473 (4.2)	
	^a Chinese Taipei	26 (1.0)	600 (4.5)	49 (0.8)	571 (3.6)	25 (1.0)	544 (3.8)	
	Korea, Rep. of	19 (0.7)	600 (2.1)	55 (0.7)	559 (1.8)	26 (0.8)	529 (2.6)	
	Japan	17 (0.8)	586 (3.3)	56 (0.8)	555 (1.8)	27 (1.0)	526 (2.8)	
	[‡] England	38 (1.5)	562 (6.3)	41 (1.1)	544 (5.0)	22 (1.4)	522 (4.8)	
	International Avg.	57 (0.2)	477 (0.8)	31 (0.2)	450 (1.0)	12 (0.1)	463 (1.6)	
	Benchmarking Participants							
	Basque Country, Spain	36 (1.3)	495 (3.5)	36 (1.0)	493 (3.8)	27 (1.4)	476 (3.2)	
	Indiana State, US	45 (1.7)	544 (5.4)	37 (1.1)	528 (4.9)	19 (1.4)	506 (4.7)	
	Ontario Province, Can.	50 (1.5)	546 (3.0)	35 (1.1)	523 (2.8)	15 (0.9)	514 (4.4)	
Quebec Province, Can.	30 (1.5)	550 (4.5)	48 (1.1)	528 (2.9)	23 (1.2)	514 (3.4)		

Background data provided by students.

^a Chinese Taipei: Students were asked about natural science; data pertain to grade 8 physics/chemistry course.^d Philippines: Students study only biology at grade 8.[‡] Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

() 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.

Exhibit 4.10: Index of Students' Valuing Science (SVS) (Continued...)

Countries	High SVS		Medium SVS		Low SVS	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Biology						
Indonesia	66 (1.3)	415 (4.1)	33 (1.3)	434 (4.1)	1 (0.2)	~ ~
^b Lebanon	65 (1.1)	403 (4.6)	27 (1.0)	382 (5.6)	8 (0.6)	375 (8.8)
Macedonia, Rep. of	61 (1.2)	446 (4.0)	29 (0.9)	466 (4.3)	10 (0.7)	468 (6.8)
Armenia	51 (1.2)	461 (4.4)	35 (0.8)	470 (3.9)	14 (0.9)	464 (4.7)
Moldova, Rep. of	49 (1.4)	474 (3.8)	46 (1.4)	474 (3.8)	5 (0.5)	469 (7.9)
Bulgaria	45 (1.5)	477 (5.8)	38 (1.1)	481 (4.8)	17 (1.1)	492 (7.5)
Russian Federation	38 (0.9)	511 (5.8)	47 (1.0)	517 (3.3)	15 (0.7)	516 (3.9)
Romania	36 (1.4)	466 (6.7)	41 (1.0)	473 (4.9)	23 (1.2)	479 (6.0)
Lithuania	33 (1.2)	519 (2.9)	43 (1.0)	518 (2.7)	24 (1.0)	521 (3.4)
Serbia	33 (1.3)	465 (4.0)	38 (1.1)	468 (2.8)	29 (1.3)	478 (3.3)
Slovenia	27 (1.0)	519 (3.5)	51 (0.9)	521 (2.4)	22 (1.2)	522 (3.0)
Hungary	26 (1.1)	540 (4.1)	44 (1.2)	537 (3.2)	30 (1.5)	554 (3.4)
Latvia	25 (1.2)	508 (3.2)	47 (1.2)	513 (3.1)	27 (1.3)	518 (3.4)
Slovak Republic	25 (1.3)	511 (4.3)	42 (1.2)	516 (3.7)	33 (1.5)	523 (3.6)
Estonia	21 (0.9)	546 (3.7)	51 (0.8)	553 (2.7)	27 (1.1)	559 (3.0)
Sweden	19 (1.0)	534 (4.0)	58 (1.1)	529 (3.1)	23 (1.0)	515 (3.9)
Netherlands	18 (1.2)	528 (6.2)	52 (1.3)	538 (3.5)	30 (1.3)	531 (4.1)
Belgium (Flemish)	18 (0.8)	532 (3.4)	41 (1.0)	529 (3.3)	41 (1.5)	519 (2.9)
Cyprus	x x	x x	x x	x x	x x	x x
International Avg.	37 (0.3)	492 (1.1)	42 (0.3)	496 (0.9)	21 (0.3)	500 (1.2)
Earth Science						
Macedonia, Rep. of	54 (1.3)	437 (4.4)	32 (1.0)	472 (4.0)	14 (0.8)	472 (5.2)
Romania	44 (1.5)	471 (5.5)	37 (0.9)	473 (5.4)	20 (1.0)	474 (6.1)
Armenia	43 (1.6)	463 (3.6)	38 (1.1)	465 (4.2)	18 (0.9)	466 (6.0)
Moldova, Rep. of	43 (1.5)	472 (4.1)	51 (1.4)	476 (3.8)	6 (0.5)	470 (6.4)
Lithuania	38 (1.1)	522 (3.0)	43 (1.0)	518 (2.4)	19 (0.9)	516 (3.5)
Bulgaria	36 (1.3)	476 (5.8)	42 (1.3)	484 (5.0)	22 (1.3)	481 (6.7)
Russian Federation	30 (1.0)	512 (5.7)	49 (1.0)	517 (3.8)	21 (1.0)	513 (3.6)
Serbia	26 (1.2)	457 (4.0)	36 (1.0)	474 (3.0)	38 (1.4)	475 (3.0)
Cyprus	23 (0.8)	436 (3.0)	44 (0.9)	446 (2.6)	32 (0.9)	444 (3.3)
Slovak Republic	23 (1.1)	508 (4.5)	45 (0.9)	518 (3.8)	32 (1.3)	522 (3.2)
Sweden	22 (1.1)	529 (4.6)	61 (1.3)	530 (3.1)	17 (1.0)	508 (4.2)
Hungary	19 (0.8)	538 (4.5)	47 (1.1)	541 (3.0)	34 (1.3)	549 (3.5)
Estonia	18 (0.8)	556 (3.9)	50 (1.0)	554 (2.9)	32 (1.2)	551 (2.8)
Netherlands	7 (0.6)	521 (7.8)	50 (1.4)	541 (3.1)	43 (1.4)	532 (3.6)
Belgium (Flemish)	6 (0.5)	509 (9.2)	34 (1.3)	526 (3.9)	59 (1.5)	523 (2.6)
Indonesia	--	--	--	--	--	--
Latvia	--	--	--	--	--	--
^b Lebanon	--	--	--	--	--	--
Slovenia	--	--	--	--	--	--
International Avg.	29 (0.3)	494 (1.4)	44 (0.3)	502 (1.0)	27 (0.3)	500 (1.2)

Background data provided by students.

Does not include students who report that they do not study the content area.

^b Lebanon: Data in biology panel pertain to grade 8 life and earth sciences course.

() 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 "x" indicates data are not available for less than 50% of the students.

Exhibit 4.10: Index of Students' Valuing Science (SVS) (...Continued)



Countries	High SVS		Medium SVS		Low SVS	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Chemistry						
Lebanon	62 (1.4)	396 (4.3)	30 (1.1)	388 (6.2)	8 (0.6)	403 (9.4)
Macedonia, Rep. of	48 (1.4)	440 (4.6)	29 (0.9)	466 (4.3)	23 (1.0)	470 (4.4)
Moldova, Rep. of	39 (1.3)	476 (4.0)	48 (1.0)	475 (4.2)	13 (0.8)	463 (4.7)
Armenia	38 (1.4)	464 (5.0)	35 (0.9)	464 (3.8)	28 (1.2)	467 (3.6)
Russian Federation	35 (0.9)	521 (5.4)	44 (0.8)	514 (3.4)	21 (0.9)	509 (3.6)
Bulgaria	29 (1.6)	473 (6.5)	36 (1.1)	484 (5.3)	35 (1.7)	483 (5.5)
Latvia	29 (1.1)	516 (3.5)	47 (0.9)	515 (3.0)	25 (1.1)	506 (3.6)
Lithuania	27 (1.1)	524 (3.7)	42 (1.0)	519 (2.7)	31 (1.0)	515 (2.8)
Cyprus	27 (0.7)	452 (3.4)	37 (0.8)	445 (2.8)	37 (0.7)	436 (3.0)
Romania	26 (1.2)	467 (6.3)	36 (1.0)	473 (5.8)	38 (1.6)	476 (5.2)
Slovenia	22 (0.9)	529 (3.7)	48 (1.0)	521 (2.3)	31 (1.2)	516 (2.4)
Serbia	21 (1.0)	461 (4.6)	28 (0.8)	467 (3.5)	51 (1.4)	475 (2.7)
Slovak Republic	21 (1.0)	511 (4.1)	41 (0.9)	516 (4.0)	37 (1.3)	522 (3.4)
Estonia	17 (0.9)	555 (3.9)	42 (1.0)	558 (2.8)	41 (1.3)	548 (2.8)
Sweden	15 (0.9)	541 (5.4)	52 (1.0)	532 (3.3)	33 (1.1)	515 (3.2)
Hungary	15 (0.8)	543 (4.8)	38 (1.1)	539 (3.5)	47 (1.3)	546 (3.1)
Belgium (Flemish)	--	--	--	--	--	--
Indonesia	--	--	--	--	--	--
^c Netherlands	--	--	--	--	--	--
International Avg.	29 (0.3)	492 (1.2)	40 (0.2)	492 (1.1)	31 (0.3)	491 (1.1)
Physics						
Lebanon	57 (1.1)	401 (4.4)	33 (0.9)	385 (5.7)	10 (0.7)	401 (8.4)
Indonesia	56 (1.5)	413 (4.3)	41 (1.4)	432 (3.7)	3 (0.3)	440 (8.3)
Macedonia, Rep. of	50 (1.3)	443 (4.4)	28 (0.9)	465 (3.9)	22 (1.2)	468 (5.2)
Armenia	48 (1.4)	468 (4.3)	34 (0.9)	462 (4.0)	18 (1.1)	463 (4.1)
Moldova, Rep. of	40 (1.2)	474 (3.8)	49 (1.2)	475 (4.3)	11 (0.8)	465 (5.3)
Russian Federation	37 (0.9)	522 (4.9)	46 (0.8)	513 (3.6)	17 (0.7)	502 (4.1)
Bulgaria	35 (1.6)	481 (6.1)	38 (1.1)	480 (5.5)	27 (1.7)	481 (6.7)
Cyprus	33 (0.9)	457 (2.7)	38 (0.8)	440 (2.4)	29 (0.9)	435 (3.3)
Latvia	31 (1.2)	518 (3.6)	46 (1.1)	515 (2.8)	23 (1.1)	505 (3.5)
Romania	27 (1.2)	471 (7.0)	37 (1.0)	472 (5.4)	35 (1.5)	473 (5.3)
Lithuania	25 (1.1)	525 (3.2)	43 (0.9)	521 (2.7)	31 (1.1)	512 (2.9)
Slovak Republic	21 (1.2)	524 (4.7)	40 (1.0)	513 (3.8)	39 (1.3)	517 (3.9)
Serbia	21 (0.9)	464 (4.3)	29 (0.8)	469 (3.2)	50 (1.2)	472 (2.9)
Hungary	19 (0.9)	558 (4.4)	41 (1.1)	541 (3.2)	40 (1.4)	540 (3.4)
Estonia	18 (0.9)	558 (3.8)	43 (0.9)	559 (3.0)	39 (1.1)	545 (2.5)
Slovenia	16 (0.9)	526 (3.8)	45 (1.1)	524 (2.7)	38 (1.3)	516 (2.3)
Sweden	16 (0.9)	548 (5.4)	51 (0.9)	534 (2.8)	33 (1.0)	508 (3.4)
^c Netherlands	12 (1.0)	547 (5.6)	48 (1.2)	542 (3.2)	39 (1.5)	527 (3.6)
Belgium (Flemish)	x x	x x	x x	x x	x x	x x
International Avg.	31 (0.3)	494 (1.1)	41 (0.2)	491 (0.9)	28 (0.3)	487 (1.1)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by students.

Does not include students who report that they do not study the content area.

^c Netherlands: Data in physics panel pertain to grade 8 physics/chemistry course.

() 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 "x" indicates data are not available for less than 50% of the students.

the relationship averaged across countries appears curvilinear, primarily because the countries with the highest percentages of students in the high index category had low average achievement, and those with the lowest percentages had high achievement.

Eighth-grade students in the separate-science countries appear to place less value on the individual sciences. Greater percentages of students were in the high index category for biology (37 percent, on average) and physics (31 percent), and lower percentages for earth science and chemistry (29 percent each). Countries with relatively large percentages of students at the high level in all subject areas included Armenia, Macedonia, Moldova, and Indonesia and Lebanon where applicable. The relationship between valuing science and science achievement was even less consistent for the separate science subject areas than for science as a single subject, partly because relatively high-achieving countries such as Belgium (Flemish), Estonia, Hungary, the Netherlands, and Sweden had low percentages of students in the high index category. Only for physics was there a positive relationship between valuing physics and science achievement.

To provide more information on changes from 1995 and 1999 in an important component of the *students valuing science index*, Exhibit 4.11 displays the percentages of eighth-grade students in 2003, 1999, and 1995 that “agree a lot,” “agree a little,” or “disagree” that they enjoy learning science. This four-page display summarizes the data in one panel for the countries that teach science as a single subject at the eighth grade, and in separate panels for earth science, biology, physics, and chemistry for countries that teach the sciences separately. Comparable data at fourth grade are shown in a single panel for 2003 and 1995 only.

Among countries where eighth-grade science is taught as a single subject, there has been an increase from 1995 and 1999 in the average percentage of students agreeing a lot that they enjoy learning science, from 23 percent in 1995 to 32 percent in 1999 to 44 percent in 2003. Countries showing a significant increase in 2003 over either 1995

Exhibit 4.11: Trends in "I Enjoy Learning Science"

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Countries	Agree A Lot			Agree A Little			Disagree		
	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students
General/ Integrated Science									
Australia	29 (1.2)	--	16 (0.6) ▲	38 (0.9)	--	50 (0.9) ▼	33 (1.2)	--	35 (0.9)
Bahrain	54 (1.1)	◇ ◇	◇ ◇	30 (0.8)	◇ ◇	◇ ◇	17 (0.9)	◇ ◇	◇ ◇
Botswana	72 (1.0)	◇ ◇	◇ ◇	17 (0.8)	◇ ◇	◇ ◇	11 (0.5)	◇ ◇	◇ ◇
Chile	46 (1.1)	41 (1.2) ▲	◇ ◇	32 (0.7)	47 (0.9) ▼	◇ ◇	22 (0.8)	12 (0.7) ▲	◇ ◇
^a Chinese Taipei	16 (0.8)	18 (0.7)	◇ ◇	34 (0.8)	53 (0.7) ▼	◇ ◇	49 (1.2)	29 (0.9) ▲	◇ ◇
Egypt	68 (1.1)	◇ ◇	◇ ◇	22 (0.9)	◇ ◇	◇ ◇	10 (0.5)	◇ ◇	◇ ◇
Ghana	65 (1.2)	◇ ◇	◇ ◇	21 (0.9)	◇ ◇	◇ ◇	13 (0.8)	◇ ◇	◇ ◇
Hong Kong, SAR	21 (0.8)	17 (0.7) ▲	15 (0.8) ▲	48 (1.0)	56 (0.9) ▼	53 (1.0) ▼	31 (1.1)	27 (1.2) ▲	32 (1.3)
Iran, Islamic Rep. of	59 (1.1)	50 (1.1) ▲	53 (1.4) ▲	28 (0.8)	42 (1.0) ▼	41 (1.3) ▼	13 (0.7)	8 (0.5) ▲	7 (0.7) ▲
Israel	34 (1.4)	28 (1.2) ▲	--	30 (0.9)	42 (1.0) ▼	--	36 (1.3)	30 (1.3) ▲	--
Italy	23 (0.9)	22 (1.0)	--	50 (1.0)	52 (0.9)	--	27 (1.0)	26 (1.1)	--
Japan	19 (1.0)	8 (0.4) ▲	8 (0.5) ▲	40 (0.8)	42 (1.2)	45 (1.0) ▼	41 (1.4)	49 (1.3) ▼	47 (1.2) ▼
Jordan	59 (1.4)	49 (1.6) ▲	◇ ◇	28 (1.0)	39 (1.1) ▼	◇ ◇	13 (0.8)	12 (0.9)	◇ ◇
Korea, Rep. of	9 (0.5)	5 (0.4) ▲	6 (0.5) ▲	29 (0.8)	28 (0.9)	34 (1.1) ▼	62 (0.9)	67 (1.1) ▼	60 (1.3)
Malaysia	42 (1.1)	43 (1.2)	◇ ◇	44 (0.8)	51 (1.0) ▼	◇ ◇	13 (0.8)	5 (0.5) ▲	◇ ◇
Morocco	63 (1.4)	--	◇ ◇	23 (0.9)	--	◇ ◇	14 (0.9)	--	◇ ◇
New Zealand	33 (1.5)	22 (1.0) ▲	21 (1.1) ▲	38 (1.3)	50 (0.9) ▼	51 (0.9) ▼	29 (1.3)	27 (1.2)	29 (1.1)
Norway	38 (1.4)	◇ ◇	21 (1.0) ▲	39 (0.9)	◇ ◇	54 (1.1) ▼	23 (1.2)	◇ ◇	25 (1.4)
Palestinian Nat'l Auth.	59 (1.2)	◇ ◇	◇ ◇	27 (0.7)	◇ ◇	◇ ◇	14 (0.7)	◇ ◇	◇ ◇
^d Philippines	54 (1.2)	52 (1.1)	◇ ◇	35 (0.9)	42 (1.0) ▼	◇ ◇	12 (0.8)	6 (0.5) ▲	◇ ◇
Saudi Arabia	54 (1.7)	◇ ◇	◇ ◇	29 (1.2)	◇ ◇	◇ ◇	17 (1.0)	◇ ◇	◇ ◇
Scotland	37 (1.0)	◇ ◇	30 (1.2) ▲	37 (0.8)	◇ ◇	51 (1.0) ▼	26 (1.0)	◇ ◇	19 (1.1) ▲
Singapore	42 (0.9)	33 (1.1) ▲	31 (1.4) ▲	41 (0.7)	54 (0.9) ▼	59 (1.1) ▼	17 (0.6)	13 (1.1) ▲	10 (0.8) ▲
South Africa	64 (1.0)	54 (1.6) ▲	--	22 (0.8)	32 (1.2) ▼	--	15 (0.6)	14 (1.6)	--
Tunisia	66 (1.1)	51 (1.2) ▲	◇ ◇	23 (0.7)	41 (0.9) ▼	◇ ◇	10 (0.6)	8 (0.6) ▲	◇ ◇
United States	35 (0.8)	25 (0.8) ▲	24 (1.0) ▲	37 (0.6)	50 (0.8) ▼	50 (0.8) ▼	27 (0.9)	25 (0.8)	27 (1.2)
[‡] England	28 (1.4)	29 (1.1)	27 (1.3)	41 (1.1)	56 (1.0) ▼	55 (1.4) ▼	32 (1.5)	15 (0.8) ▲	18 (1.1) ▲
International Avg.	44 (0.2)	32 (0.2) ▲	23 (0.3) ▲	33 (0.2)	47 (0.2) ▼	49 (0.3) ▼	23 (0.2)	21 (0.2) ▲	28 (0.3) ▼
Benchmarking Participants									
Basque Country, Spain	26 (1.6)	◇ ◇	◇ ◇	33 (1.1)	◇ ◇	◇ ◇	41 (1.9)	◇ ◇	◇ ◇
Indiana State, US	34 (1.7)	24 (1.7) ▲	◇ ◇	36 (1.1)	50 (1.5) ▼	◇ ◇	31 (1.7)	26 (1.8) ▲	◇ ◇
Ontario Province, Can.	36 (1.5)	23 (1.2) ▲	19 (1.1) ▲	38 (1.2)	50 (1.1) ▼	55 (1.2) ▼	26 (1.3)	27 (1.5)	26 (1.5)
Quebec Province, Can.	23 (1.3)	14 (1.5) ▲	19 (1.6) ▲	41 (1.0)	41 (4.4)	47 (2.9)	36 (1.7)	45 (5.3)	34 (3.0)

▲ 2003 significantly higher

▼ 2003 significantly lower

Background data provided by students.

^a Chinese Taipei: Students were asked about natural science; data pertain to grade 8 physics/chemistry course.^d Philippines: Students study only biology at grade 8.[‡] Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

Trend notes: Because of differences in population coverage, 1999 data are not shown for Australia, Latvia, Morocco, and Slovenia, and 1995 data are not shown for Israel, Italy, Latvia, and South Africa. Korea tested later in 2003 than in 1999 and 1995, at the beginning of the next school year. Similarly, Lithuania tested later in 1999 than in 2003 and 1995.

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



Exhibit 4.11: Trends in "I Enjoy Learning Science" (Continued...)

Countries	Agree A Lot			Agree A Little			Disagree		
	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students
Biology									
Armenia	60 (1.2)	◇ ◇	◇ ◇	23 (0.8)	◇ ◇	◇ ◇	17 (0.9)	◇ ◇	◇ ◇
Belgium (Flemish)	27 (1.2)	14 (0.8) ▲	20 (1.1) ▲	38 (0.9)	46 (1.0) ▼	47 (1.6) ▼	35 (1.4)	40 (1.2) ▼	34 (2.0)
Bulgaria	52 (1.8)	37 (1.5) ▲	--	33 (1.2)	44 (1.5) ▼	--	15 (1.0)	19 (1.1) ▼	--
Cyprus	x x	--	--	x x	--	--	x x	--	--
Estonia	27 (1.0)	◇ ◇	◇ ◇	43 (0.9)	◇ ◇	◇ ◇	30 (1.3)	◇ ◇	◇ ◇
Hungary	29 (1.2)	16 (0.9) ▲	15 (0.9) ▲	37 (1.1)	47 (1.2) ▼	52 (1.4) ▼	34 (1.5)	37 (1.4)	33 (1.7)
Indonesia	33 (1.4)	--	◇ ◇	58 (1.1)	--	◇ ◇	8 (0.7)	--	◇ ◇
Latvia	28 (1.4)	--	--	39 (1.1)	--	--	33 (1.6)	--	--
^b Lebanon	52 (1.2)	◇ ◇	◇ ◇	27 (1.0)	◇ ◇	◇ ◇	21 (0.9)	◇ ◇	◇ ◇
Lithuania	32 (1.4)	19 (1.0) ▲	25 (1.3) ▲	37 (0.9)	54 (1.2) ▼	52 (1.1) ▼	31 (1.2)	27 (1.4) ▲	23 (1.4) ▲
Macedonia, Rep. of	67 (1.2)	49 (1.3) ▲	◇ ◇	22 (0.9)	41 (1.1) ▼	◇ ◇	11 (0.6)	10 (0.6)	◇ ◇
Moldova, Rep. of	33 (1.2)	32 (1.5)	◇ ◇	52 (1.1)	57 (1.4) ▼	◇ ◇	16 (0.8)	11 (0.8) ▲	◇ ◇
Netherlands ^r	9 (0.9)	22 (2.3) ▼	20 (1.4) ▼	31 (1.4)	53 (2.0) ▼	55 (1.4) ▼	60 (1.9)	25 (2.1) ▲	25 (1.7) ▲
Romania	34 (1.2)	27 (1.2) ▲	31 (1.2) ▲	38 (0.9)	55 (1.1) ▼	52 (1.1) ▼	28 (1.2)	18 (1.3) ▲	17 (1.1) ▲
Russian Federation	36 (1.3)	28 (1.6) ▲	26 (1.0) ▲	43 (1.1)	51 (1.5) ▼	51 (0.9) ▼	21 (1.0)	21 (1.1)	23 (1.2)
Serbia	41 (1.5)	◇ ◇	◇ ◇	30 (0.9)	◇ ◇	◇ ◇	29 (1.3)	◇ ◇	◇ ◇
Slovak Republic	26 (1.5)	12 (0.8) ▲	11 (0.7) ▲	42 (1.0)	55 (1.3) ▼	61 (1.1) ▼	32 (1.5)	32 (1.3)	28 (1.3) ▲
Slovenia	22 (1.1)	--	21 (1.2)	39 (1.2)	--	47 (1.2) ▼	39 (1.5)	--	32 (1.7) ▲
Sweden	17 (1.0)	◇ ◇	20 (1.5)	52 (0.9)	◇ ◇	57 (1.3) ▼	31 (1.1)	◇ ◇	23 (1.6) ▲
International Avg.	35 (0.3)	28 (0.4) ▲	21 (0.4) ▲	38 (0.2)	49 (0.4) ▼	53 (0.4) ▼	27 (0.3)	23 (0.4) ▲	26 (0.5)
Earth Science									
Armenia	55 (1.3)	◇ ◇	◇ ◇	24 (0.8)	◇ ◇	◇ ◇	20 (1.0)	◇ ◇	◇ ◇
Belgium (Flemish)	12 (0.8)	9 (0.6) ▲	11 (0.9)	29 (1.1)	35 (1.1) ▼	39 (1.4) ▼	59 (1.6)	57 (1.5)	50 (1.9) ▲
Bulgaria	43 (1.3)	30 (1.5) ▲	--	36 (1.0)	43 (2.1) ▼	--	21 (1.3)	27 (2.5) ▲	--
Cyprus	41 (1.0)	--	--	33 (0.7)	--	--	25 (0.9)	--	--
Estonia	20 (1.0)	◇ ◇	◇ ◇	39 (1.1)	◇ ◇	◇ ◇	42 (1.4)	◇ ◇	◇ ◇
Hungary	23 (1.0)	11 (0.6) ▲	12 (0.8) ▲	34 (1.0)	40 (1.1) ▼	38 (1.4) ▼	43 (1.3)	49 (1.4) ▲	50 (1.7) ▼
Indonesia	--	--	◇ ◇	--	--	◇ ◇	--	--	◇ ◇
Latvia	--	--	--	--	--	--	--	--	--
^b Lebanon	--	◇ ◇	◇ ◇	--	◇ ◇	◇ ◇	--	◇ ◇	◇ ◇
Lithuania	35 (1.5)	--	24 (1.5) ▲	37 (0.9)	--	51 (1.2) ▼	28 (1.2)	--	24 (1.3) ▲
Macedonia, Rep. of	60 (1.3)	49 (1.7) ▲	◇ ◇	24 (1.0)	40 (1.2) ▼	◇ ◇	16 (0.8)	12 (1.0) ▼	◇ ◇
Moldova, Rep. of	28 (1.4)	37 (1.4) ▼	◇ ◇	53 (1.3)	51 (1.2)	◇ ◇	20 (1.2)	12 (0.8) ▼	◇ ◇
Netherlands	5 (0.6)	14 (1.4) ▼	10 (1.0) ▼	23 (1.4)	50 (1.8) ▼	46 (2.4) ▼	71 (1.6)	37 (2.2) ▼	44 (2.9) ▲
Romania	40 (1.3)	33 (1.4) ▲	31 (1.2) ▲	33 (0.9)	53 (1.2) ▼	48 (1.2) ▼	28 (1.3)	14 (1.3) ▼	21 (1.0) ▲
Russian Federation	27 (1.1)	19 (1.4) ▲	16 (0.8) ▲	42 (1.1)	47 (1.2) ▼	45 (1.1) ▼	32 (1.5)	34 (1.7)	39 (1.3) ▼
Serbia	37 (1.3)	◇ ◇	◇ ◇	27 (0.8)	◇ ◇	◇ ◇	35 (1.3)	◇ ◇	◇ ◇
Slovak Republic	25 (1.3)	18 (1.0) ▲	17 (1.1) ▲	39 (1.2)	53 (1.6) ▼	56 (1.2) ▼	36 (1.7)	29 (2.0) ▼	27 (1.4) ▲
Slovenia	--	--	--	--	--	--	--	--	--
Sweden ^r	19 (0.9)	◇ ◇	22 (1.2)	52 (1.0)	◇ ◇	56 (1.4)	29 (1.2)	◇ ◇	23 (1.4) ▲
International Avg.	31 (0.3)	24 (0.4) ▲	18 (0.4) ▲	35 (0.3)	46 (0.5) ▼	47 (0.5) ▼	34 (0.3)	30 (0.6) ▼	35 (0.6)

▲ 2003 significantly higher
▼ 2003 significantly lower

Background data provided by students.

Does not include students who report that they do not study the content area.

^b Lebanon: Data in biology panel pertain to grade 8 life and earth sciences course.

Trend notes: Because of differences in population coverage, 1999 data are not shown for Australia, Latvia, Morocco, and Slovenia, and 1995 data are not shown for Israel, Italy, Latvia, and South Africa. Korea tested later in 2003 than in 1999 and 1995, at the beginning of the next school year. Similarly, Lithuania tested later in 1999 than in 2003 and 1995.

() 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 "x" indicates data are available for less than 50% of the students.

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

Exhibit 4.11: Trends in "I Enjoy Learning Science" (...Continued)



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Countries	Agree A Lot			Agree A Little			Disagree		
	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students
Chemistry									
Armenia	36 (1.3)	◇ ◇	◇ ◇	27 (0.9)	◇ ◇	◇ ◇	37 (1.3)	◇ ◇	◇ ◇
Belgium (Flemish)	--	--	--	--	--	--	--	--	--
Bulgaria	27 (1.6)	21 (1.0) ▲	--	31 (1.1)	38 (1.7) ▼	--	41 (1.9)	41 (2.0)	--
Cyprus	36 (0.8)	--	--	29 (0.8)	--	--	34 (0.8)	--	--
Estonia	17 (0.9)	◇ ◇	◇ ◇	31 (1.0)	◇ ◇	◇ ◇	53 (1.6)	◇ ◇	◇ ◇
Hungary	13 (0.9)	7 (0.6) ▲	10 (0.9) ▲	25 (1.0)	28 (1.4) ▼	30 (1.4) ▼	63 (1.5)	64 (1.5)	60 (1.7)
Indonesia	--	--	◇ ◇	--	--	◇ ◇	--	--	◇ ◇
Latvia	23 (1.1)	--	--	36 (0.7)	--	--	41 (1.3)	--	--
Lebanon	51 (1.6)	◇ ◇	◇ ◇	29 (1.1)	◇ ◇	◇ ◇	20 (1.2)	◇ ◇	◇ ◇
Lithuania	22 (1.2)	7 (0.7) ▲	12 (0.8) ▲	30 (1.0)	34 (1.3) ▼	40 (1.4) ▼	48 (1.4)	59 (1.4) ▼	48 (1.6)
Macedonia, Rep. of	43 (1.4)	32 (1.7) ▲	◇ ◇	29 (0.9)	43 (1.1) ▼	◇ ◇	28 (1.2)	25 (1.4)	◇ ◇
Moldova, Rep. of	22 (1.1)	23 (1.3)	◇ ◇	46 (1.0)	47 (1.3)	◇ ◇	33 (1.2)	30 (1.5)	◇ ◇
^c Netherlands	--	--	--	--	--	--	--	--	--
Romania	19 (1.0)	18 (0.9)	23 (1.0) ▼	32 (1.2)	44 (1.3) ▼	47 (1.3) ▼	49 (1.6)	38 (1.5) ▲	30 (1.3) ▲
Russian Federation	27 (1.1)	17 (0.7) ▲	14 (0.8) ▲	37 (1.0)	42 (1.3) ▼	41 (1.1) ▼	36 (1.1)	41 (1.7) ▼	45 (1.4) ▼
Serbia	21 (1.2)	◇ ◇	◇ ◇	23 (0.8)	◇ ◇	◇ ◇	56 (1.5)	◇ ◇	◇ ◇
Slovak Republic	22 (1.2)	16 (1.1) ▲	7 (0.6) ▲	35 (1.0)	47 (1.4) ▼	41 (1.4) ▼	43 (1.5)	37 (1.9) ▲	51 (1.6) ▼
Slovenia	16 (0.8)	--	15 (0.9)	32 (1.0)	--	38 (1.4) ▼	52 (1.3)	--	47 (1.7) ▲
Sweden	15 (0.8)	◇ ◇	20 (1.4) ▼	44 (1.1)	◇ ◇	47 (1.6) ▼	42 (1.4)	◇ ◇	33 (1.6) ▲
International Avg.	26 (0.3)	18 (0.4) ▲	15 (0.4) ▲	32 (0.2)	40 (0.5) ▼	41 (0.5) ▼	42 (0.3)	42 (0.6)	45 (0.6) ▼
Physics									
Armenia	48 (1.3)	◇ ◇	◇ ◇	26 (0.9)	◇ ◇	◇ ◇	26 (1.0)	◇ ◇	◇ ◇
Belgium (Flemish)	x x	x x	x x	x x	x x	x x	x x	x x	x x
Bulgaria	31 (2.0)	29 (1.6)	--	35 (1.4)	39 (1.3) ▼	--	34 (2.0)	32 (1.8)	--
Cyprus	33 (1.0)	--	--	31 (0.7)	--	--	36 (0.9)	--	--
Estonia	11 (0.6)	◇ ◇	◇ ◇	30 (0.9)	◇ ◇	◇ ◇	59 (1.2)	◇ ◇	◇ ◇
Hungary	15 (0.8)	9 (0.6) ▲	8 (0.6) ▲	27 (1.0)	30 (1.3) ▼	28 (1.3)	58 (1.3)	61 (1.5)	65 (1.6) ▼
Indonesia	21 (1.1)	--	◇ ◇	61 (0.9)	--	◇ ◇	19 (1.1)	--	◇ ◇
Latvia	19 (1.0)	--	--	38 (1.1)	--	--	44 (1.5)	--	--
Lebanon	44 (1.4)	◇ ◇	◇ ◇	32 (1.0)	◇ ◇	◇ ◇	25 (1.1)	◇ ◇	◇ ◇
Lithuania	15 (0.8)	10 (0.8) ▲	12 (1.0) ▲	28 (1.0)	41 (1.4) ▼	37 (1.5) ▼	57 (1.5)	49 (1.6) ▲	51 (1.7) ▲
Macedonia, Rep. of	44 (1.5)	36 (1.4) ▲	◇ ◇	29 (0.9)	40 (1.2) ▼	◇ ◇	27 (1.3)	24 (1.2)	◇ ◇
Moldova, Rep. of	21 (1.0)	23 (1.3)	◇ ◇	48 (1.1)	49 (1.3)	◇ ◇	31 (1.1)	28 (1.5)	◇ ◇
^c Netherlands	6 (0.7)	13 (1.1) ▼	13 (1.3) ▼	25 (1.4)	44 (1.6) ▼	45 (1.9) ▼	69 (1.9)	42 (1.9) ▲	42 (2.5) ▲
Romania	17 (0.9)	15 (0.9)	22 (1.1) ▼	32 (1.0)	44 (1.2) ▼	45 (1.2) ▼	51 (1.5)	41 (1.7) ▲	33 (1.6) ▲
Russian Federation	23 (1.0)	18 (0.9) ▲	18 (0.9) ▲	41 (0.9)	46 (1.1) ▼	42 (1.1)	36 (1.1)	36 (1.3)	40 (1.4) ▼
Serbia	19 (1.0)	◇ ◇	◇ ◇	24 (1.0)	◇ ◇	◇ ◇	57 (1.3)	◇ ◇	◇ ◇
Slovak Republic	14 (0.7)	10 (0.7) ▲	10 (0.6) ▲	33 (1.2)	37 (1.2) ▼	41 (1.4) ▼	53 (1.4)	53 (1.5)	50 (1.7)
Slovenia	9 (0.7)	--	11 (0.7)	24 (1.1)	--	33 (1.5) ▼	66 (1.3)	--	56 (1.8) ▲
Sweden	12 (0.8)	◇ ◇	16 (1.1) ▼	40 (1.1)	◇ ◇	44 (1.3) ▼	48 (1.4)	◇ ◇	40 (1.8) ▲
International Avg.	22 (0.3)	23 (0.4) ▼	14 (0.3) ▲	33 (0.2)	40 (0.4) ▼	39 (0.5) ▼	44 (0.3)	37 (0.5) ▲	47 (0.6) ▼

▲ 2003 significantly higher

▼ 2003 significantly lower

Background data provided by students.

Does not include students who report that they do not study the content area.

^c Netherlands: Data in physics panel pertain to grade 8 physics/chemistry course.

Trend notes: Because of differences in population coverage, 1999 data are not shown for Australia, Latvia, Morocco, and Slovenia, and 1995 data are not shown for Israel, Italy, Latvia, and South Africa. Korea tested later in 2003 than in 1999 and 1995, at the beginning of the next school year. Similarly, Lithuania tested later in 1999 than in 2003 and 1995.

() 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 "x" indicates data are available for less than 50% of the students.

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

Exhibit 4.11: Trends in "I Enjoy Learning Science"

Countries	Agree A Lot		Agree A Little		Disagree	
	2003 Percent of Students	1995 Percent of Students	2003 Percent of Students	1995 Percent of Students	2003 Percent of Students	1995 Percent of Students
Armenia	72 (1.4)	◇ ◇	15 (0.7)	◇ ◇	13 (1.0)	◇ ◇
Australia	64 (1.3)	39 (1.2) ▲	23 (0.9)	42 (1.0) ▼	14 (0.9)	19 (0.9) ▼
Belgium (Flemish)	31 (1.1)	◇ ◇	38 (0.9)	◇ ◇	31 (1.2)	◇ ◇
Chinese Taipei	49 (1.3)	◇ ◇	29 (0.8)	◇ ◇	21 (0.9)	◇ ◇
Cyprus	59 (1.2)	56 (1.5)	22 (0.7)	32 (1.3) ▼	19 (1.1)	12 (0.9) ▲
England	39 (1.4)	41 (1.1)	29 (1.1)	39 (1.1) ▼	32 (1.2)	21 (1.0) ▲
Hong Kong, SAR	50 (1.2)	43 (1.4) ▲	36 (0.9)	44 (1.3) ▼	14 (0.9)	13 (1.6)
Hungary	54 (1.2)	36 (1.3) ▲	26 (0.9)	41 (1.1) ▼	20 (0.9)	24 (1.4) ▼
Iran, Islamic Rep. of	81 (1.3)	70 (1.4) ▲	11 (0.8)	22 (1.3) ▼	8 (0.8)	7 (0.8)
Italy	50 (1.0)	--	37 (0.9)	--	13 (0.8)	--
Japan	45 (1.2)	38 (1.1) ▲	36 (0.8)	50 (0.9) ▼	19 (1.0)	12 (0.8) ▲
Latvia	57 (1.5)	--	28 (1.0)	--	15 (1.0)	--
Lithuania	62 (1.2)	◇ ◇	24 (0.9)	◇ ◇	14 (0.8)	◇ ◇
Moldova, Rep. of	48 (1.2)	◇ ◇	39 (1.2)	◇ ◇	13 (0.8)	◇ ◇
Morocco	68 (1.6)	◇ ◇	18 (1.1)	◇ ◇	14 (1.0)	◇ ◇
Netherlands	40 (1.5)	29 (1.4) ▲	37 (1.1)	42 (1.3) ▼	23 (1.3)	29 (1.4) ▼
New Zealand	60 (1.0)	47 (1.4) ▲	26 (0.8)	36 (1.5) ▼	14 (0.7)	17 (1.1) ▼
Norway	53 (1.3)	42 (1.6) ▲	28 (1.0)	38 (1.2) ▼	19 (0.8)	20 (1.3)
Philippines	51 (1.6)	◇ ◇	30 (1.0)	◇ ◇	20 (1.2)	◇ ◇
Russian Federation	57 (1.2)	◇ ◇	27 (1.0)	◇ ◇	16 (0.9)	◇ ◇
Scotland	57 (1.6)	--	24 (1.1)	--	19 (1.0)	--
Singapore	51 (0.9)	41 (1.3) ▲	28 (0.6)	47 (1.1) ▼	21 (0.7)	12 (0.6) ▲
Slovenia	46 (1.3)	49 (1.5)	30 (1.2)	36 (1.2) ▼	23 (1.4)	15 (1.2) ▲
Tunisia	69 (1.7)	◇ ◇	18 (1.5)	◇ ◇	13 (0.8)	◇ ◇
United States	62 (0.9)	48 (1.0) ▲	21 (0.6)	35 (0.8) ▼	16 (0.7)	17 (0.9)
International Avg.	55 (0.3)	44 (0.4) ▲	27 (0.2)	39 (0.3) ▼	18 (0.2)	17 (0.3) ▲
Benchmarking Participants						
Indiana State, US	60 (1.5)	◇ ◇	25 (1.3)	◇ ◇	15 (1.3)	◇ ◇
Ontario Province, Can.	55 (1.5)	38 (1.3) ▲	28 (1.1)	44 (1.0) ▼	18 (1.1)	19 (1.0)
Quebec Province, Can.	57 (1.2)	40 (3.2) ▲	28 (0.9)	40 (2.2) ▼	14 (0.8)	20 (3.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by students.

Trend notes: Because of differences between 1995 and 2003 in population coverage, 1995 data are not shown for Italy and Latvia. 1995 data for New Zealand in this exhibit include students in English medium instruction only (>98% of the estimated population).

() 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.

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

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

or 1999 included Australia, Chile, Hong Kong SAR, Iran, Israel, Japan, Jordan, Korea, New Zealand, Norway, Scotland, Singapore, South Africa, Tunisia, the United States, Indiana, Ontario, and Quebec. A similar trend was apparent among separate-science countries in biology, earth science, and chemistry, with greater percentages of students in 2003 than in 1995 or 1999 agreeing a lot that they enjoy learning the subject. For physics, the percentage of students in this category in 2003 was greater than in 1995 but slightly less than in 1999.

At fourth grade, the average percentage of students agreeing a lot that they enjoy learning science increased from 44 percent in 1995 to 55 percent in 2003. Participants showing a significant increase included Australia, Hong Kong SAR, Hungary, Iran, Japan, the Netherlands, New Zealand, Norway, Singapore, the United States, Ontario, and Quebec.

