

Chapter 4

STUDENTS' BACKGROUNDS AND ATTITUDES TOWARD THE SCIENCES

To provide an educational context for interpreting the science achievement results, TIMSS collected a full range of descriptive information from students about their backgrounds as well as their activities in and out of school. This chapter presents eighth-grade students' responses to a selected subset of these questions. In an effort to explore the degree to which the students' home and social environment fostered academic development, some of the questions presented herein address the availability of educational resources in the home. Another group of questions is provided to help examine whether or not students typically spend their out-of-school time in ways that support their in-school academic performance. Because students' attitudes and opinions about science reflect what happens in school and their perceptions of the value of science in broader social contexts, results also are described for several questions from the affective domain. More specifically, these questions asked students to express their opinions about the abilities necessary for success in science, provide information about what motivates them to do well in science, and indicate their attitudes towards science.

Student and teacher questionnaire data for two countries are unavailable for this report and thus do not appear in this chapter – Bulgaria and South Africa. Bulgaria had complications with data entry, and South Africa joined the study later than the other countries.

WHAT EDUCATIONAL RESOURCES DO STUDENTS HAVE IN THEIR HOMES?

Students specifically were asked about the availability at home of three types of educational resources – a dictionary, a study desk or table for their own use, and a computer. Table 4.1 reveals that in most countries, eighth-grade students with all three of these educational study aids had higher science achievement than students who did not have ready access to these study aids. In almost all the countries, nearly all students reported having a dictionary in their homes. There was more variation among countries in the percentages of students reporting their own study desk or table. Of the three study aids, the most variation was in the number of eighth-grade students reporting having a home computer. In several countries, more than 70% of students reported having a computer in the home, including the more than 85% who so reported in England, the Netherlands, and Scotland. For these three countries, it is likely that these high percentages include computers used for entertainment purposes, such as computer games.

The number of books in the home can be an indicator of a home environment that values literacy, the acquisition of knowledge, and general academic support. Table 4.2 presents eighth-grade students' reports about the number of books in their homes in relation to their achievement on the TIMSS science test. In most countries, the

Table 4.1**Students' Reports on Educational Aids in the Home: Dictionary, Study Desk/Table and Computer - Science - Upper Grade (Eighth Grade*)**

Country	Have All Three Educational Aids		Do Not Have All Three Educational Aids		Have Dictionary	Have Study Desk/Table for Own Use	Have Computer
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Percent of Students	Percent of Students
<i>Australia</i>	66 (1.2)	557 (4.3)	34 (1.2)	524 (4.2)	88 (0.7)	97 (0.4)	73 (1.2)
<i>Austria</i>	56 (1.5)	566 (4.1)	44 (1.5)	547 (4.5)	98 (0.3)	93 (0.8)	59 (1.5)
Belgium (Fl)	64 (1.3)	559 (3.9)	36 (1.3)	536 (5.2)	99 (0.5)	96 (0.5)	67 (1.3)
<i>Belgium (Fr)</i>	58 (1.4)	483 (3.1)	42 (1.4)	456 (3.6)	97 (0.5)	96 (0.5)	60 (1.4)
Canada	57 (1.4)	545 (2.5)	43 (1.4)	514 (3.0)	97 (0.4)	89 (0.6)	61 (1.3)
<i>Colombia</i>	10 (1.2)	431 (10.3)	90 (1.2)	410 (3.9)	96 (0.5)	84 (1.0)	11 (1.2)
Cyprus	37 (0.9)	475 (3.0)	63 (0.9)	458 (2.5)	97 (0.3)	96 (0.5)	39 (0.9)
Czech Republic	33 (1.3)	596 (6.6)	67 (1.3)	563 (3.3)	94 (0.6)	90 (0.6)	36 (1.2)
<i>Denmark</i>	66 (1.5)	487 (3.2)	34 (1.5)	465 (4.4)	85 (1.1)	98 (0.3)	76 (1.2)
England	80 (1.0)	558 (3.8)	20 (1.0)	534 (5.3)	98 (0.4)	90 (0.8)	89 (0.8)
France	49 (1.3)	505 (2.9)	51 (1.3)	492 (3.1)	99 (0.2)	96 (0.4)	50 (1.3)
<i>Germany</i>	66 (1.1)	542 (4.3)	34 (1.1)	514 (6.5)	98 (0.4)	93 (0.6)	71 (1.0)
<i>Greece</i>	28 (1.0)	513 (4.3)	72 (1.0)	493 (2.2)	97 (0.3)	93 (0.5)	29 (1.0)
Hong Kong	33 (1.8)	540 (5.2)	67 (1.8)	516 (4.8)	99 (0.1)	80 (1.1)	39 (1.9)
Hungary	32 (1.2)	586 (3.3)	68 (1.2)	540 (3.1)	77 (1.2)	92 (0.7)	37 (1.2)
Iceland	72 (1.6)	495 (5.1)	28 (1.6)	488 (2.9)	95 (0.5)	96 (0.6)	77 (1.4)
Iran, Islamic Rep.	1 (0.3)	~ ~	99 (0.3)	472 (2.3)	54 (1.5)	40 (2.0)	4 (0.4)
Ireland	67 (1.2)	548 (4.4)	33 (1.2)	522 (6.1)	99 (0.3)	86 (0.9)	78 (1.1)
<i>Israel</i>	75 (2.1)	540 (5.9)	25 (2.1)	495 (4.7)	100 (0.2)	98 (0.4)	76 (2.1)
Japan	- -	- -	- -	- -	- -	- -	- -
Korea	38 (1.2)	585 (2.7)	62 (1.2)	553 (2.2)	98 (0.2)	95 (0.4)	39 (1.2)
<i>Kuwait</i>	38 (2.0)	434 (6.9)	62 (2.0)	429 (3.4)	84 (1.1)	73 (2.0)	53 (2.1)
Latvia (LSS)	13 (0.8)	487 (5.4)	87 (0.8)	486 (2.6)	94 (0.6)	98 (0.3)	13 (0.9)
Lithuania	35 (1.3)	481 (4.3)	65 (1.3)	474 (3.9)	88 (1.0)	95 (0.6)	42 (1.4)
<i>Netherlands</i>	83 (1.3)	563 (6.4)	17 (1.3)	548 (6.1)	100 (0.1)	99 (0.2)	85 (1.2)
New Zealand	56 (1.4)	541 (4.9)	44 (1.4)	509 (4.9)	99 (0.2)	91 (0.6)	60 (1.3)
Norway	63 (1.1)	535 (2.3)	37 (1.1)	516 (3.0)	97 (0.3)	98 (0.2)	64 (1.1)
Portugal	35 (1.8)	496 (3.1)	65 (1.8)	471 (2.1)	98 (0.4)	84 (0.9)	39 (1.8)
<i>Romania</i>	8 (1.0)	534 (9.5)	92 (1.0)	483 (4.7)	60 (1.6)	69 (1.3)	19 (1.2)
Russian Federation	30 (1.4)	545 (4.9)	70 (1.4)	536 (4.3)	88 (1.1)	95 (0.7)	35 (1.5)
<i>Scotland</i>	74 (1.2)	527 (5.4)	26 (1.2)	494 (6.5)	96 (0.5)	84 (1.2)	90 (0.6)
Singapore	47 (1.5)	627 (6.1)	53 (1.5)	591 (5.5)	99 (0.1)	92 (0.5)	49 (1.5)
Slovak Republic	27 (1.2)	567 (4.0)	73 (1.2)	536 (3.5)	96 (0.5)	86 (0.9)	31 (1.2)
<i>Slovenia</i>	43 (1.4)	581 (3.2)	57 (1.4)	544 (2.8)	94 (0.5)	93 (0.6)	47 (1.3)
Spain	40 (1.3)	529 (2.7)	60 (1.3)	509 (2.0)	99 (0.1)	93 (0.5)	42 (1.2)
Sweden	58 (1.3)	549 (2.9)	42 (1.3)	518 (3.7)	94 (0.4)	100 (0.1)	60 (1.3)
Switzerland	63 (1.2)	532 (2.8)	37 (1.2)	507 (3.1)	97 (0.4)	95 (0.4)	66 (1.2)
<i>Thailand</i>	4 (0.8)	545 (11.0)	96 (0.8)	525 (3.7)	68 (2.1)	66 (2.1)	4 (0.9)
United States	56 (1.7)	559 (4.1)	44 (1.7)	505 (5.2)	97 (0.4)	90 (0.7)	59 (1.7)

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

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

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

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

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Table 4.2**Students' Reports on the Number of Books in the Home
Science - Upper Grade (Eighth Grade*)**

Country	None or Very Few (0-10 Books)		About One Shelf (11– 25 Books)		About One Bookcase (26-100 Books)		About Two Bookcases (101-200 Books)		Three or More Bookcases (More than 200 Books)	
	Percent of Students	Mean Achieve- ment	Percent of Students	Mean Achieve- ment	Percent of Students	Mean Achieve- ment	Percent of Students	Mean Achieve- ment	Percent of Students	Mean Achieve- ment
<i>Australia</i>	3 (0.3)	460 (7.8)	7 (0.6)	492 (7.5)	24 (0.8)	524 (4.3)	25 (0.6)	549 (3.8)	42 (1.4)	573 (4.2)
<i>Austria</i>	11 (1.0)	509 (6.5)	17 (1.1)	528 (7.5)	31 (1.2)	554 (5.1)	17 (0.9)	582 (4.9)	24 (1.4)	590 (4.7)
Belgium (Fl)	11 (1.2)	515 (6.5)	18 (0.8)	537 (6.0)	33 (1.0)	552 (5.2)	18 (1.0)	566 (4.9)	21 (0.9)	563 (5.0)
<i>Belgium (Fr)</i>	7 (0.7)	408 (11.0)	10 (0.7)	433 (4.5)	28 (1.1)	462 (4.7)	21 (0.9)	482 (4.0)	34 (1.5)	497 (3.3)
Canada	4 (0.3)	482 (8.0)	10 (0.7)	493 (4.0)	28 (1.0)	522 (3.5)	25 (0.8)	542 (3.5)	33 (1.4)	550 (3.6)
<i>Colombia</i>	26 (1.5)	397 (4.5)	31 (1.1)	404 (5.3)	27 (1.3)	424 (4.4)	9 (0.7)	426 (8.4)	7 (1.0)	434 (9.9)
Cyprus	6 (0.6)	425 (6.5)	18 (0.8)	438 (3.7)	34 (0.8)	465 (3.4)	23 (0.8)	486 (3.6)	20 (0.8)	480 (4.5)
Czech Republic	1 (0.2)	~ ~	4 (0.5)	520 (7.1)	30 (1.5)	552 (3.9)	32 (0.9)	577 (4.3)	34 (1.8)	597 (6.6)
<i>Denmark</i>	3 (0.6)	425 (12.6)	9 (0.8)	446 (8.6)	30 (1.2)	467 (4.1)	21 (0.9)	484 (3.9)	37 (1.5)	499 (4.0)
England	6 (0.6)	472 (8.9)	13 (1.0)	502 (4.4)	27 (1.3)	536 (5.3)	22 (0.8)	564 (6.2)	32 (1.5)	596 (4.6)
France	5 (0.5)	460 (8.6)	17 (1.0)	477 (4.0)	36 (1.1)	497 (3.8)	21 (1.0)	514 (3.9)	20 (1.2)	511 (4.5)
<i>Germany</i>	8 (0.8)	456 (7.4)	14 (1.1)	483 (6.9)	26 (1.0)	519 (4.4)	19 (0.9)	555 (6.8)	33 (1.7)	569 (5.1)
<i>Greece</i>	5 (0.4)	467 (6.1)	22 (0.9)	475 (2.9)	43 (0.9)	499 (2.5)	18 (0.7)	515 (4.8)	12 (0.7)	525 (4.8)
Hong Kong	21 (1.2)	500 (6.7)	29 (1.0)	525 (4.5)	29 (0.9)	529 (5.2)	10 (0.7)	542 (6.8)	10 (0.9)	536 (7.0)
<i>Hungary</i>	4 (0.6)	487 (12.8)	8 (0.7)	510 (5.8)	25 (1.0)	534 (3.8)	21 (1.0)	559 (4.2)	42 (1.4)	579 (3.0)
Iceland	1 (0.2)	~ ~	5 (0.8)	463 (10.9)	29 (1.4)	482 (4.8)	28 (1.2)	491 (5.1)	37 (1.7)	510 (6.7)
Iran, Islamic Rep.	37 (1.8)	457 (3.5)	32 (0.9)	475 (3.3)	17 (0.9)	478 (5.9)	6 (0.5)	481 (10.1)	7 (0.7)	487 (6.7)
Ireland	7 (0.6)	471 (7.4)	16 (0.8)	504 (5.2)	34 (1.0)	538 (4.5)	21 (0.7)	560 (4.5)	22 (1.2)	568 (5.9)
<i>Israel</i>	4 (0.6)	487 (12.5)	13 (1.6)	495 (8.3)	31 (1.9)	517 (7.2)	26 (1.4)	541 (6.4)	25 (2.0)	555 (7.7)
Japan	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Korea	10 (0.6)	510 (5.2)	12 (0.8)	531 (3.9)	33 (0.9)	562 (2.9)	23 (0.8)	581 (2.8)	21 (0.9)	597 (4.1)
<i>Kuwait</i>	22 (1.4)	424 (5.3)	27 (1.5)	428 (4.8)	28 (1.6)	443 (4.3)	10 (1.0)	443 (6.9)	13 (0.9)	428 (6.0)
Latvia (LSS)	1 (0.3)	~ ~	4 (0.6)	434 (7.3)	17 (1.0)	474 (4.1)	21 (1.1)	477 (4.7)	57 (1.4)	496 (3.0)
Lithuania	3 (0.4)	429 (9.9)	17 (0.9)	451 (5.6)	35 (1.2)	469 (4.0)	21 (0.9)	491 (4.5)	24 (1.1)	501 (4.4)
<i>Netherlands</i>	8 (1.0)	523 (8.5)	16 (1.3)	533 (8.9)	34 (1.3)	553 (5.8)	19 (0.9)	580 (5.9)	22 (1.7)	591 (5.9)
New Zealand	3 (0.4)	441 (9.8)	7 (0.6)	466 (6.4)	24 (0.8)	506 (4.9)	25 (0.7)	533 (4.7)	41 (1.4)	551 (4.6)
Norway	2 (0.3)	~ ~	6 (0.4)	490 (7.7)	25 (0.9)	511 (2.9)	22 (0.7)	524 (3.4)	45 (1.2)	547 (2.4)
Portugal	10 (0.8)	456 (3.8)	26 (1.3)	464 (2.9)	32 (1.0)	479 (2.7)	15 (0.8)	493 (4.0)	17 (1.4)	508 (3.9)
<i>Romania</i>	24 (1.3)	467 (8.3)	22 (1.3)	476 (7.1)	19 (1.0)	483 (5.5)	11 (0.7)	503 (7.9)	24 (1.7)	518 (5.9)
Russian Federation	2 (0.3)	~ ~	11 (0.8)	508 (10.1)	36 (1.3)	527 (4.5)	24 (0.8)	550 (4.1)	26 (1.3)	561 (5.0)
<i>Scotland</i>	11 (1.2)	453 (5.5)	17 (1.1)	483 (4.2)	28 (1.0)	507 (4.2)	19 (1.0)	546 (4.7)	25 (2.0)	567 (7.8)
Singapore	11 (0.8)	567 (5.3)	22 (0.9)	583 (5.3)	41 (0.8)	610 (5.5)	14 (0.7)	640 (6.5)	12 (1.0)	648 (7.0)
Slovak Republic	2 (0.3)	~ ~	11 (0.6)	506 (5.3)	45 (1.1)	536 (3.5)	23 (0.9)	562 (3.9)	18 (1.0)	573 (5.1)
<i>Slovenia</i>	2 (0.4)	~ ~	15 (0.9)	522 (4.3)	38 (1.2)	555 (2.9)	22 (0.9)	574 (4.3)	22 (1.1)	587 (4.4)
Spain	4 (0.4)	487 (8.1)	18 (1.1)	490 (2.5)	33 (1.0)	511 (2.1)	20 (0.8)	528 (3.3)	26 (1.2)	540 (2.8)
Sweden	3 (0.3)	473 (9.9)	8 (0.7)	482 (5.6)	24 (1.0)	517 (4.3)	24 (0.8)	540 (3.6)	41 (1.5)	560 (3.5)
Switzerland	8 (1.0)	456 (8.1)	16 (0.9)	485 (6.1)	30 (1.0)	516 (3.4)	20 (0.9)	546 (3.7)	26 (1.2)	557 (4.2)
<i>Thailand</i>	19 (1.2)	514 (3.3)	30 (1.0)	519 (3.4)	33 (1.2)	529 (4.0)	9 (0.6)	538 (6.8)	9 (1.0)	546 (7.2)
United States	8 (0.8)	459 (6.2)	13 (0.8)	489 (5.0)	28 (0.9)	527 (4.2)	21 (0.6)	554 (4.3)	31 (1.5)	570 (5.2)

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each

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

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

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

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

more books students reported in the home, the higher their science achievement. Although the main purpose of the question was to gain some information about the relative importance of academic pursuits in the students' home environments rather than to determine the actual number of books in students' homes, there was a substantial amount of variation from country to country in eighth-grade students' reports about the number of books in their homes. In Colombia, Hong Kong, Iran, Kuwait, Romania, and Thailand, 40% or more of the students reported 25 or fewer books in the home. Conversely, 40% or more of the students in Australia, Hungary, Latvia (LSS), New Zealand, Norway, and Sweden reported more than 200 books in their homes.

Information about their parents' educational levels was gathered by asking students to indicate the highest level of education completed by their fathers and mothers. Table 4.3 presents the relationship between eighth-grade students' science achievement and their reports of the highest level of education of either parent. Results are presented at three educational levels: finished university, finished upper secondary school but not university, and finished primary school but not upper secondary school. These three educational levels are based on internationally-defined categories, which may not be strictly comparable across countries due to differences in national education systems. Although the majority of countries translated and defined the educational categories used in their questionnaires to be comparable to the internationally-defined levels, some countries used modified response options to conform to their national education systems. Also, for a few countries, the percentages of students responding to this question fell below 85%. When this happened, the percentages shown in the table are annotated with an "r" for a response rate of 70% to 84% or an "s" if the response rate was from 50% to 69%.

Despite the different educational approaches, structures, and organizations across the TIMSS countries, it is clear from the data in Table 4.3 that parents' education is positively related to students' science achievement. In every country, the pattern was for those eighth-grade students whose parents had more education to also be those who have higher achievement in science. Once again, the purpose of this question was not to ascertain precisely the educational levels of students' parents, but to gain further understanding about the relative importance of schooling in their home environments. As indicated by the results, there was variation among countries in the percentages of students reporting that they did not know their parents' educational levels, as well as in the percentages of students reporting that their parents had completed successively higher educational levels. For example, in Canada, Israel, Lithuania, the Russian Federation, and the United States, more than 30% of the students reported that at least one of their parents had finished university, and only relatively small percentages (fewer than 12%) reported that they did not know the educational levels of their parents. In contrast, almost all students (90% or more) in Hong Kong, Iran, Kuwait, Portugal, and Thailand also reported knowing their parents' educational levels, but for these countries fewer than 10% of students reported that either parent had finished university.

Figure 4.1 shows the definitions of the educational categories used by TIMSS and the modifications made to them by some countries. In several countries, the finished primary school but not upper secondary school category included only a single level

Table 4.3**Students' Reports on the Highest Level of Education of Either Parent¹
Science - Upper Grade (Eighth Grade*)**

Country	Finished University ²		Finished Upper Secondary School But Not University ³		Finished Primary School But Not Upper Secondary School ⁴		Do Not Know	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
<i>Australia</i>	28 (1.4)	587 (4.5)	37 (0.9)	544 (4.1)	24 (0.9)	527 (4.4)	11 (0.6)	499 (5.3)
<i>Austria</i>	10 (0.7)	588 (7.7)	70 (1.1)	566 (4.1)	8 (0.9)	508 (8.3)	12 (0.9)	530 (6.0)
Belgium (Fl)	20 (1.6)	574 (4.5)	34 (1.3)	554 (5.0)	21 (2.4)	532 (9.1)	25 (1.4)	535 (3.7)
<i>Belgium (Fr)</i>	27 (1.6)	497 (4.3)	34 (1.3)	481 (4.1)	11 (1.3)	434 (5.3)	27 (1.6)	450 (5.8)
Canada	37 (1.3)	549 (3.9)	39 (1.2)	532 (3.0)	13 (0.9)	501 (4.4)	10 (0.5)	517 (4.0)
<i>Colombia</i>	15 (1.6)	441 (7.9)	28 (1.6)	425 (4.2)	47 (2.3)	402 (3.7)	10 (0.9)	393 (6.3)
<i>Cyprus</i>	r 15 (0.9)	504 (6.3)	29 (1.1)	486 (3.6)	52 (1.4)	448 (2.7)	4 (0.5)	438 (10.5)
Czech Republic	21 (1.7)	606 (7.2)	47 (1.5)	579 (4.1)	25 (1.5)	550 (3.9)	7 (0.8)	536 (7.3)
<i>Denmark</i>	13 (1.0)	509 (6.0)	46 (1.5)	489 (3.8)	8 (0.7)	458 (8.6)	33 (1.7)	470 (4.6)
England	- -	- -	- -	- -	- -	- -	- -	- -
France	r 13 (1.2)	524 (6.6)	36 (1.3)	505 (3.5)	19 (1.2)	493 (3.3)	31 (1.3)	488 (3.5)
<i>Germany</i>	r 11 (1.0)	573 (8.6)	32 (1.3)	550 (4.7)	38 (1.6)	529 (4.2)	19 (1.3)	502 (7.7)
<i>Greece</i>	18 (1.1)	536 (4.8)	39 (1.3)	506 (3.1)	40 (1.8)	479 (2.3)	3 (0.3)	463 (7.8)
Hong Kong	7 (1.0)	547 (8.6)	30 (1.2)	537 (5.1)	55 (1.8)	519 (4.7)	7 (0.7)	498 (8.5)
<i>Hungary</i>	r 24 (1.8)	603 (4.1)	66 (1.7)	554 (3.0)	11 (0.9)	505 (6.0)	- -	- -
Iceland	25 (2.8)	513 (8.4)	44 (2.0)	499 (3.9)	15 (1.4)	477 (8.1)	15 (1.0)	475 (8.1)
<i>Iran, Islamic Rep.</i>	r 3 (0.6)	505 (8.4)	21 (1.8)	488 (4.4)	68 (2.2)	469 (3.0)	7 (1.0)	453 (6.7)
Ireland	17 (1.3)	573 (6.3)	46 (1.0)	546 (4.4)	26 (1.2)	522 (5.2)	10 (0.7)	506 (6.1)
<i>Israel</i>	37 (2.5)	560 (7.9)	45 (2.2)	523 (5.5)	10 (1.3)	485 (7.4)	8 (0.9)	508 (8.4)
Japan	- -	- -	- -	- -	- -	- -	- -	- -
Korea	22 (1.3)	593 (3.9)	47 (1.3)	566 (2.4)	26 (1.1)	546 (3.4)	5 (0.5)	529 (7.1)
<i>Kuwait</i>	s 3 (1.2)	459 (11.1)	3 (0.9)	425 (13.9)	92 (2.1)	427 (4.8)	1 (0.7)	- -
Latvia (LSS)	r 27 (1.5)	515 (5.0)	49 (1.4)	488 (3.0)	13 (1.0)	466 (5.7)	11 (1.0)	463 (6.8)
Lithuania	s 37 (1.6)	500 (4.7)	44 (1.6)	474 (4.4)	7 (1.0)	449 (8.6)	12 (1.2)	475 (6.5)
<i>Netherlands</i>	12 (1.4)	586 (8.2)	55 (1.8)	567 (6.4)	10 (0.7)	547 (8.0)	23 (1.4)	542 (5.6)
New Zealand	25 (1.3)	560 (5.5)	38 (1.1)	530 (4.4)	15 (0.8)	503 (6.0)	21 (1.1)	505 (5.8)
Norway	25 (1.2)	544 (4.2)	38 (1.1)	532 (2.4)	9 (0.6)	505 (4.5)	27 (1.2)	520 (3.3)
Portugal	9 (1.2)	525 (4.6)	13 (1.0)	498 (4.1)	73 (2.0)	472 (2.1)	5 (0.4)	469 (5.6)
<i>Romania</i>	10 (1.3)	522 (9.7)	47 (1.5)	498 (5.0)	33 (1.9)	477 (7.7)	10 (0.9)	463 (10.0)
Russian Federation	34 (1.8)	567 (3.7)	54 (1.6)	528 (4.9)	5 (0.5)	493 (8.7)	6 (0.8)	522 (11.3)
<i>Scotland</i>	14 (1.4)	579 (7.1)	33 (1.4)	521 (5.4)	14 (0.8)	501 (5.1)	39 (1.3)	507 (6.2)
Singapore	8 (1.0)	661 (8.4)	69 (1.0)	612 (5.5)	23 (1.2)	578 (5.1)	- -	- -
Slovak Republic	20 (1.4)	580 (4.9)	50 (1.1)	549 (3.2)	23 (1.2)	519 (4.8)	6 (0.5)	513 (7.5)
<i>Slovenia</i>	19 (1.1)	600 (4.2)	59 (1.4)	558 (2.6)	18 (1.3)	533 (3.7)	4 (0.4)	545 (8.9)
Spain	15 (1.2)	547 (3.9)	21 (0.9)	531 (2.9)	54 (1.8)	509 (2.1)	10 (0.8)	504 (3.9)
Sweden	22 (1.2)	561 (4.2)	34 (1.1)	541 (3.3)	9 (0.6)	517 (5.0)	35 (1.1)	527 (3.4)
Switzerland	11 (0.8)	559 (6.4)	61 (1.3)	531 (2.7)	13 (0.9)	493 (3.9)	15 (1.0)	506 (4.5)
<i>Thailand</i>	9 (1.4)	557 (6.7)	14 (1.4)	540 (5.9)	73 (2.6)	519 (2.9)	3 (0.5)	522 (10.2)
United States	33 (1.4)	562 (5.9)	54 (1.3)	530 (4.1)	7 (0.8)	483 (5.7)	5 (0.4)	512 (8.1)

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

¹The response categories were defined by each country to conform to their own educational system and may not be strictly comparable across countries. See Figure 4.1 for country modifications to the definitions of educational levels. Also, no response category was provided for students whose parents had no formal education or did not finish primary school, except in France where a small percentage of students in this category are included in the missing responses.

²In most countries, defined as completion of at least a 4-year degree program at a university or an equivalent institute of higher education.

³Finished upper secondary school with or without some tertiary education not equivalent to a university degree. In most countries, finished secondary corresponds to completion of an upper-secondary track terminating after 11 to 13 years of schooling.

⁴Finished primary school or some secondary school not equivalent to completion of upper secondary.

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

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

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

An "r" indicates a 70-84% student response rate. An "s" indicates a 50-69% student response rate.

Data for Singapore not obtained from students; entered at ministry level.

Figure 4.1 Country Modifications to the Definitions of Educational Levels for Parents' Highest Level of Education¹

Finished Primary School But Not Upper Secondary School	
Internationally-Defined Levels:	<i>Finished Primary School or Finished Some Secondary School</i>
Countries with Modified Nationally-Defined Levels:	
Austria:	<i>Compulsory (Pflichtschulabschluss; 9 grades)</i>
Denmark:	<i>Basic school (Folkeskolen, Realeksamen; 9 or 10 grades)</i>
France:	<i>Lower Secondary (Collège, CAP)</i>
Germany:	<i>Lower secondary (Hauptschulabschluss; 9 or 10 grades) or Medium secondary (Fachoberschulreife, Realschulabschluss or Polytechnische Oberschule; 10 grades)</i>
Hungary:	<i>Some or all of general school (8 grades)</i>
Norway:	<i>Compulsory (9 grades) or some upper secondary</i>
Scotland:	<i>Some secondary school</i>
Singapore:	<i>Primary school</i>
Sweden:	<i>Compulsory (9 grades) or started upper secondary</i>
Switzerland:	<i>Compulsory (9 grades)</i>

Finished Upper Secondary School ² But Not University	
Internationally-Defined Levels:	<i>Finished Secondary School or Some Vocational/Technical Education After Secondary School or Some University</i>
Countries with Modified Nationally-Defined Levels:	
Austria:	<i>Upper-secondary tracks: apprenticeship (Berufsschul-/Lehrabschluss), medium vocational (Handelsschule, Fachschule), higher vocational (HAK, HTL, etc.), or higher academic (Gymnasium, Realgymnasium)</i>
Cyprus:	<i>Upper-secondary tracks: academic or vocational/technical or Post-Secondary: Finished college</i>
Denmark:	<i>Upper-secondary tracks: academic or general/vocational (gymnasium, hf, htx, hhx) vocational training (erhvervsfaglig uddannelse) Post-Secondary: Medium-cycle higher education (mellemlang uddannelse)</i>
France:	<i>Upper-secondary tracks: BEP (11 grades) or baccalauréat (général, technologique or professionnel; 12 or 13 grades) Post-Secondary: 2 or 3 years study after baccalauréat (BTS, DUT, Licence)</i>
Germany:	<i>Upper-secondary tracks: general/academic or apprenticeship/vocational training (Lehrabschluss, Berufsfachschule) Post-Secondary: Higher vocational schools (Fachhochschulabschluss)</i>
Hungary:	<i>Upper-secondary tracks: apprenticeship (general + 3 years) or final exam in secondary (general + 4 years)</i>
Sweden:	<i>Upper-secondary tracks: academic or vocational (gymnasieutbildning or yrkesinriktad utbildning) Post-Secondary: Less than 3 years of university studies</i>
Switzerland:	<i>Upper-secondary tracks: occupational (apprentissage, école professionnelle), academic (gymnase, baccalauréat, maturité cantonale), or teacher training (école normale, formation d'enseignant) Post-Secondary: Applied science university (haute école professionnelle ou commerciale)</i>

Finished University	
Internationally-Defined Level:	<i>Finished University</i>
Countries with Modified Nationally-Defined Levels:	
Austria:	<i>University (master's degree)</i>
Canada:	<i>University or college</i>
Cyprus:	<i>University degree or post-graduate studies</i>
France:	<i>4 years of study after baccalauréat</i>
Germany:	<i>University, Technical University or Pedagogical Institute</i>
Hungary:	<i>University or college diploma</i>
New Zealand:	<i>University or Teachers' College</i>
Norway:	<i>University or college</i>
Portugal:	<i>University or polytechnic</i>
Sweden:	<i>3 years university studies or more</i>
Switzerland:	<i>University or insitute of technology</i>
United States:	<i>Bachelor's degree at college or university</i>

¹Educational levels were translated and defined in most countries to be comparable to the internationally-defined levels. Countries that used modified response options to conform to their national education systems are indicated to aid in the interpretation of the reporting categories presented in Table 4.3.

²Upper-secondary corresponds to ISCED level 3 tracks terminating after 11 to 13 years in most countries. (Education at a Glance, OECD, 1995)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

corresponding to finishing compulsory education (8 to 10 grades) and did not include finishing only primary school. In addition, in Germany, the completion of medium secondary education was considered part of this category, while in Austria, which has an educational system similar to Germany's, the medium-level vocational education was included in the second category reporting upper-secondary education.

The second reporting category (finished upper secondary school but not university) was complicated because, in many countries, particularly in Europe, there are several upper-secondary tracks leading to university or other tertiary institutions as well as vocational/apprenticeship programs. In most countries, finishing upper secondary means completion of 11 to 13 years of education. In some systems, however, the general secondary education may be completed after 9 or 10 years, followed by 2 to 4 years of full- or part-time vocational/apprenticeship training that may be either included as part of the secondary educational system or considered as post-secondary. All of the upper-secondary tracks and any upper-secondary or post-secondary vocational education programs included as response options are combined in the second reporting category.

Several countries also differed in their interpretation of what is included in the category of finished university. For example, degrees obtained from technical institutes and other non-university institutions of higher education are considered equivalent to a university degree in some countries but not in others. Therefore, completion of a degree at one of these institutions may have been included in either the finished university or the finished upper secondary school but not university categories. In countries such as Canada, New Zealand, Portugal, and the United States, the finished university category includes the completion of the equivalent of a bachelor's degree at either a university, college or polytechnic, while in Austria and France, this category corresponds to the equivalent of a master's degree received at a university.

WHAT ARE THE ACADEMIC EXPECTATIONS OF STUDENTS, THEIR FAMILIES, AND THEIR FRIENDS?

Tables 4.4, 4.5, and 4.6 present eighth-grade students' reports about how they themselves, their mothers, and their friends feel about the importance of doing well in various academic and non-academic activities. The first three questions asked about the degree of agreement with the importance of doing well in the academic subjects of science, mathematics, and language, respectively. For most of the countries, from 80% to 95% of the students agreed or strongly agreed that it was important to do well in science. Countries with very high percentages of students agreeing that it was important to do well included Colombia (99%), England (96%), Iran (98%), Kuwait (96%), Portugal (97%), Singapore (99%), Spain (99%), and the United States (96%). Countries with fewer than 80% of the students agreeing that it was important to do well in science included Germany (72%), Lithuania (78%), and Switzerland (68%). Compared to science, somewhat more students agreed or strongly agreed that it was important to do well in mathematics and language. In part, however, the lower percentages in science may be because students in many countries, including most of the European countries, take separate science subjects in the middle school years. Therefore, the general term of "science" may not be clearly or uniformly interpreted by students across all countries.

For the most part, eighth-grade students indicated that their mothers' opinions about the importance of these academic activities corresponded very closely to their own feelings. In contrast, however, students reported that their friends were not in as much agreement about the importance of academic success, particularly in science.

Students' reports of their friends' opinions about the importance of doing well in science varied substantially across countries, ranging from as low as 35% in Germany to as high as 96% in Singapore. Countries where fewer than two-thirds of eighth-graders reported that their friends agreed or strongly agreed it was important to do well in science included Australia (64%), Austria (45%), the Czech Republic (61%), France (53%), Germany (35%), Hungary (66%), Iceland (65%), Ireland (59%), Israel (56%), Latvia (LSS) (53%), Lithuania (55%), New Zealand (66%), the Slovak Republic (60%), Slovenia (56%), Sweden (61%), and Switzerland (40%).

Although students' friends reportedly were in general agreement about the importance of doing well in mathematics, the percentages were generally in the 80s, rather than the 90s as for the students themselves. According to students, their friends were in the lowest degree of agreement about doing well in mathematics in Germany and Sweden (70% for both countries).

As with the students' reports about their own feelings and those of their mothers, students indicated a close alignment in their friends' degree of agreement about the importance of academic success in mathematics and that in language. Apparently, even though the relative importance varies from group to group, students, their mothers, and their friends find it very nearly equally important to do well in mathematics and language. According to students in some countries, however, their friends do not have nearly the same positive feeling about the importance of doing well in science.

For purposes of comparison, eighth-grade students also were asked about the importance of two non-academic activities – having time to have fun and being good at sports. In most countries, very high percentages of the students (more than 95%) felt it was important to have time to have fun. The percentages in agreement were similar to those agreeing that it was important to do well in mathematics and language. Generally, there was less agreement about the importance of being good at sports, which was rather similar to the level of agreement about the importance of doing well in science. It needs to be emphasized, however, that the relative rankings given to the five activities by students varied from country to country.

In nearly all countries, 80% or more of the eighth-grade students reported that their mothers agreed that it was important to have time to have fun. The exceptions were Hong Kong (74%), Iran (79%), Korea (58%), Kuwait (63%), and Singapore (79%), where students reported from 8% to 29% lower agreement for their mothers than for themselves. According to students, their mothers give a moderate to high degree of support to the importance of being good at sports. In nearly all countries the percentages of students' reporting such agreement were in the 70s, 80s, and 90s, except in Austria (56%), Germany (48%), Kuwait (69%), the Netherlands (63%), and Switzerland (59%).

As might be anticipated, students reported that most of their friends agreed that it was important to have fun – more than 90% in all countries except Iran (87%), Korea (88%), Kuwait (77%), and Romania (86%). Internationally, eighth-graders reported that their friends generally were in moderate agreement that it was important to do well in sports. The percentages of their friends' agreement as reported by students ranged from a low of 64% in Germany to a high of 96% in Colombia.

Table 4.4**Students' Reports on Whether They Agree or Strongly Agree That It Is Important to Do Various Activities - Science - Upper Grade (Eighth Grade*)**

Country	Percent of Students				
	Do Well in Science	Do Well in Mathematics	Do Well in Language	Have Time to Have Fun	Be Good at Sports
<i>Australia</i>	89 (0.6)	96 (0.4)	95 (0.4)	98 (0.2)	85 (0.6)
<i>Austria</i>	82 (1.2)	94 (0.5)	93 (0.6)	98 (0.3)	82 (0.9)
Belgium (Fl)	93 (0.6)	98 (0.3)	98 (0.4)	98 (0.3)	80 (1.0)
<i>Belgium (Fr)</i>	94 (0.7)	98 (0.3)	98 (0.3)	98 (0.4)	87 (0.8)
Canada	94 (0.7)	98 (0.2)	97 (0.3)	99 (0.2)	86 (0.6)
<i>Colombia</i>	99 (0.2)	99 (0.2)	99 (0.2)	98 (0.3)	97 (0.3)
Cyprus	86 (1.0)	94 (0.5)	94 (0.6)	94 (0.5)	85 (1.0)
Czech Republic	88 (1.0)	98 (0.5)	98 (0.3)	98 (0.3)	84 (0.9)
<i>Denmark</i>	87 (1.0)	97 (0.4)	97 (0.4)	99 (0.3)	83 (0.8)
England	96 (0.5)	99 (0.2)	99 (0.3)	99 (0.3)	80 (1.1)
France	83 (1.2)	97 (0.4)	97 (0.5)	97 (0.4)	80 (0.8)
<i>Germany</i>	72 (1.0)	93 (0.6)	91 (0.6)	97 (0.4)	72 (1.1)
<i>Greece</i>	93 (0.5)	96 (0.4)	96 (0.4)	96 (0.4)	91 (0.6)
Hong Kong	90 (0.9)	96 (0.5)	96 (0.5)	94 (0.5)	83 (0.9)
Hungary	86 (0.8)	95 (0.5)	95 (0.5)	96 (0.5)	78 (0.9)
Iceland	90 (1.2)	97 (1.0)	97 (1.0)	98 (0.4)	90 (1.6)
Iran, Islamic Rep.	98 (0.4)	97 (0.4)	96 (0.6)	87 (1.1)	95 (0.7)
Ireland	86 (1.1)	97 (0.3)	96 (0.4)	99 (0.2)	85 (0.8)
<i>Israel</i>	85 (1.0)	98 (0.5)	89 (1.5)	98 (0.5)	84 (1.3)
Japan	87 (0.6)	92 (0.4)	91 (0.5)	99 (0.1)	83 (0.7)
Korea	91 (0.6)	94 (0.5)	93 (0.6)	87 (0.8)	86 (0.8)
<i>Kuwait</i>	96 (0.6)	96 (0.6)	96 (0.5)	85 (2.0)	81 (1.2)
Latvia (LSS)	84 (1.0)	97 (0.4)	97 (0.3)	97 (0.4)	87 (0.8)
Lithuania	78 (1.1)	93 (0.6)	96 (0.4)	94 (0.6)	93 (0.5)
<i>Netherlands</i>	95 (0.7)	97 (0.6)	99 (0.3)	98 (0.6)	78 (1.2)
New Zealand	92 (0.6)	97 (0.3)	96 (0.5)	99 (0.3)	86 (0.7)
Norway	92 (0.6)	96 (0.5)	96 (0.5)	99 (0.1)	79 (0.9)
Portugal	97 (0.3)	97 (0.3)	99 (0.2)	93 (0.5)	94 (0.5)
<i>Romania</i>	86 (0.8)	88 (0.8)	88 (0.8)	86 (1.0)	80 (1.1)
Russian Federation	95 (0.6)	97 (0.4)	97 (0.5)	98 (0.4)	88 (0.9)
<i>Scotland</i>	92 (0.7)	98 (0.4)	98 (0.3)	98 (0.3)	82 (0.9)
Singapore	99 (0.2)	99 (0.2)	100 (0.1)	96 (0.3)	89 (0.6)
Slovak Republic	86 (0.8)	96 (0.4)	96 (0.4)	98 (0.2)	91 (0.5)
<i>Slovenia</i>	86 (0.9)	96 (0.5)	96 (0.4)	95 (0.5)	87 (0.7)
Spain	99 (0.2)	99 (0.2)	99 (0.2)	99 (0.1)	95 (0.3)
Sweden	84 (0.8)	92 (0.6)	90 (0.6)	99 (0.2)	84 (0.7)
Switzerland	68 (1.1)	96 (0.4)	94 (0.4)	95 (0.6)	78 (0.9)
<i>Thailand</i>	94 (0.5)	93 (0.5)	96 (0.4)	95 (0.3)	91 (0.5)
United States	96 (0.5)	97 (0.3)	96 (0.3)	99 (0.2)	88 (0.6)

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

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

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Table 4.5**Students' Reports on Whether Their Mothers Agree or Strongly Agree That It Is Important to Do Various Activities - Science - Upper Grade (Eighth Grade*)**

Country	Percent of Students				
	Do Well in Science	Do Well in Mathematics	Do Well in Language	Have Time to Have Fun	Be Good at Sports
<i>Australia</i>	94 (0.4)	98 (0.2)	98 (0.2)	94 (0.4)	83 (0.7)
<i>Austria</i>	81 (1.0)	96 (0.4)	95 (0.5)	90 (0.7)	56 (1.1)
Belgium (Fl)	93 (0.8)	97 (0.4)	98 (0.4)	94 (0.5)	73 (1.2)
<i>Belgium (Fr)</i>	98 (0.3)	99 (0.3)	99 (0.3)	95 (0.6)	85 (0.7)
Canada	98 (0.3)	99 (0.1)	99 (0.1)	96 (0.4)	83 (0.7)
<i>Colombia</i>	99 (0.3)	99 (0.4)	99 (0.2)	93 (0.6)	94 (1.0)
Cyprus	89 (0.8)	95 (0.4)	95 (0.5)	91 (0.6)	80 (0.8)
Czech Republic	93 (0.8)	99 (0.2)	98 (0.3)	90 (0.7)	74 (1.1)
<i>Denmark</i>	95 (0.6)	99 (0.3)	99 (0.3)	98 (0.3)	81 (1.0)
England	96 (0.5)	99 (0.3)	99 (0.3)	94 (0.6)	74 (1.2)
France	88 (0.9)	98 (0.3)	99 (0.3)	91 (0.7)	74 (1.0)
<i>Germany</i>	71 (1.4)	94 (0.8)	93 (0.7)	88 (0.7)	48 (1.2)
<i>Greece</i>	94 (0.5)	96 (0.3)	96 (0.4)	89 (0.6)	83 (0.7)
Hong Kong	86 (0.7)	93 (0.6)	93 (0.6)	74 (0.9)	71 (1.3)
Hungary	85 (0.8)	96 (0.4)	96 (0.4)	96 (0.4)	73 (1.1)
Iceland	95 (1.3)	97 (0.8)	98 (0.5)	95 (0.7)	87 (1.6)
Iran, Islamic Rep.	96 (0.5)	96 (0.5)	95 (0.5)	79 (1.8)	90 (1.5)
Ireland	89 (1.0)	98 (0.3)	98 (0.2)	94 (0.5)	83 (0.8)
<i>Israel</i>	89 (0.9)	99 (0.4)	93 (0.6)	95 (0.7)	79 (1.4)
Japan	- -	- -	- -	- -	- -
Korea	92 (0.5)	96 (0.4)	94 (0.5)	58 (1.1)	72 (0.9)
<i>Kuwait</i>	r 91 (0.9)	91 (1.0)	r 91 (0.8)	r 63 (2.2)	r 69 (2.0)
Latvia (LSS)	85 (1.1)	97 (0.4)	97 (0.5)	90 (0.8)	82 (0.9)
Lithuania	77 (1.1)	91 (0.6)	95 (0.5)	86 (0.8)	87 (0.9)
<i>Netherlands</i>	94 (0.7)	96 (0.5)	97 (0.4)	96 (0.4)	63 (1.4)
New Zealand	95 (0.4)	98 (0.3)	97 (0.3)	95 (0.5)	86 (0.8)
Norway	95 (0.5)	97 (0.4)	97 (0.4)	97 (0.3)	71 (1.1)
Portugal	98 (0.3)	96 (0.4)	98 (0.3)	87 (0.7)	91 (0.6)
<i>Romania</i>	94 (0.6)	93 (0.5)	90 (0.7)	83 (1.0)	76 (1.0)
Russian Federation	95 (0.4)	96 (0.3)	97 (0.4)	92 (0.6)	84 (0.7)
<i>Scotland</i>	93 (0.6)	98 (0.3)	99 (0.2)	94 (0.5)	77 (1.0)
Singapore	99 (0.2)	99 (0.2)	99 (0.1)	79 (0.8)	84 (0.8)
Slovak Republic	94 (0.5)	99 (0.2)	99 (0.2)	95 (0.4)	88 (0.6)
<i>Slovenia</i>	85 (0.7)	91 (0.7)	92 (0.6)	88 (0.7)	81 (0.9)
Spain	99 (0.2)	99 (0.2)	99 (0.2)	96 (0.4)	93 (0.5)
Sweden	92 (0.5)	96 (0.4)	95 (0.4)	97 (0.3)	83 (0.7)
Switzerland	69 (1.0)	96 (0.3)	95 (0.4)	83 (0.9)	59 (1.1)
<i>Thailand</i>	95 (0.4)	94 (0.5)	96 (0.4)	84 (0.9)	90 (0.5)
United States	97 (0.2)	98 (0.2)	98 (0.2)	93 (0.4)	81 (0.8)

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

Data are reported as percent of students.

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

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

A dash (-) indicates data are not available.

An "r" indicates a 70-84% student response rate.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Table 4.6**Students' Reports on Whether Their Friends Agree or Strongly Agree That It Is Important to Do Various Activities - Science - Upper Grade (Eighth Grade*)**

Country	Percent of Students				
	Do Well in Science	Do Well in Mathematics	Do Well in Language	Have Time to Have Fun	Be Good at Sports
<i>Australia</i>	64 (1.0)	78 (0.8)	76 (0.8)	98 (0.2)	83 (0.8)
<i>Austria</i>	45 (1.8)	77 (1.2)	74 (1.1)	97 (0.4)	79 (1.2)
Belgium (Fl)	70 (1.6)	84 (1.7)	83 (1.8)	98 (0.4)	76 (1.5)
<i>Belgium (Fr)</i>	78 (1.3)	86 (1.1)	87 (0.9)	97 (0.4)	84 (1.2)
Canada	68 (1.3)	80 (0.8)	78 (0.8)	99 (0.2)	87 (0.6)
<i>Colombia</i>	93 (0.6)	95 (0.5)	95 (0.5)	97 (0.4)	96 (0.4)
Cyprus	71 (1.1)	85 (0.8)	85 (0.9)	91 (0.6)	82 (1.0)
Czech Republic	61 (1.5)	84 (1.3)	84 (1.2)	98 (0.3)	82 (1.1)
<i>Denmark</i>	82 (1.0)	94 (0.6)	95 (0.6)	99 (0.2)	92 (0.7)
England	80 (1.1)	88 (0.9)	88 (0.9)	99 (0.3)	79 (1.2)
France	53 (1.5)	85 (1.3)	88 (1.1)	97 (0.4)	80 (1.0)
<i>Germany</i>	35 (1.4)	70 (1.3)	68 (1.3)	94 (0.5)	64 (1.3)
<i>Greece</i>	82 (0.8)	87 (0.7)	89 (0.6)	96 (0.3)	85 (0.8)
Hong Kong	74 (1.3)	86 (0.9)	87 (0.9)	93 (0.5)	76 (1.0)
Hungary	66 (1.2)	81 (0.9)	83 (0.8)	94 (0.5)	74 (1.1)
Iceland	65 (2.0)	85 (1.4)	85 (1.1)	98 (0.4)	89 (1.2)
Iran, Islamic Rep.	95 (0.9)	95 (0.5)	93 (0.6)	87 (1.3)	93 (0.9)
Ireland	59 (1.4)	80 (0.9)	78 (0.8)	99 (0.2)	85 (0.7)
<i>Israel</i>	56 (2.5)	93 (1.1)	75 (2.0)	98 (0.5)	79 (1.9)
Japan	83 (0.7)	90 (0.5)	88 (0.6)	99 (0.2)	81 (0.7)
Korea	79 (0.9)	86 (0.8)	81 (0.8)	88 (0.7)	78 (1.0)
<i>Kuwait</i>	90 (0.6)	90 (0.8)	86 (0.9)	77 (2.4)	78 (1.5)
Latvia (LSS)	53 (1.3)	86 (0.9)	87 (1.0)	97 (0.4)	87 (0.8)
Lithuania	55 (1.3)	83 (0.9)	88 (0.9)	95 (0.5)	90 (0.7)
<i>Netherlands</i>	82 (1.2)	87 (0.9)	90 (0.7)	97 (0.6)	66 (1.2)
New Zealand	66 (1.2)	77 (1.0)	76 (1.0)	98 (0.3)	87 (0.8)
Norway	72 (1.2)	84 (0.8)	83 (0.9)	99 (0.2)	83 (1.0)
Portugal	88 (0.8)	89 (0.7)	93 (0.4)	92 (0.6)	94 (0.5)
<i>Romania</i>	80 (1.0)	87 (0.8)	88 (0.8)	86 (1.0)	81 (1.0)
Russian Federation	81 (0.8)	88 (0.8)	88 (0.8)	97 (0.4)	84 (0.8)
<i>Scotland</i>	70 (1.3)	81 (1.2)	82 (1.0)	98 (0.3)	84 (0.8)
Singapore	96 (0.5)	97 (0.4)	98 (0.2)	96 (0.3)	86 (0.8)
Slovak Republic	60 (1.3)	83 (0.7)	84 (0.7)	98 (0.2)	92 (0.5)
<i>Slovenia</i>	56 (1.6)	77 (1.2)	78 (1.1)	95 (0.5)	81 (0.9)
Spain	89 (0.7)	91 (0.6)	91 (0.5)	99 (0.2)	94 (0.4)
Sweden	61 (1.4)	70 (1.2)	68 (1.2)	97 (0.3)	75 (0.8)
Switzerland	40 (1.4)	85 (0.8)	82 (1.0)	93 (0.8)	75 (1.1)
<i>Thailand</i>	94 (0.5)	93 (0.6)	95 (0.4)	95 (0.4)	91 (0.4)
United States	69 (1.2)	75 (1.0)	73 (0.9)	98 (0.2)	90 (0.7)

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

Data are reported as percent of students.

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

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

HOW DO STUDENTS SPEND THEIR OUT-OF-SCHOOL TIME DURING THE SCHOOL WEEK?

Even though education may be thought to be the dominant activity of school-aged children, young people actually spend much more of their time outside of school. Some of this out-of-school time is spent at furthering academic development – for example, in studying or doing homework in school subjects. Table 4.7 presents eighth-grade students' reports about the average number of hours per day they spend studying or doing homework in science, mathematics, and other subjects. Students in most countries reported spending between half an hour and an hour per day studying science. Eighth-graders in Australia, Denmark, and Scotland were at the lower end of the range, reporting an average of about one-half hour or less per day (.3 to .5 of an hour). Those in Colombia, Greece, Hungary, Iran, Kuwait, Romania, and Singapore reported more than one hour of science homework per day, on average, with Iran at nearly two hours (1.9). On average, students in nearly all countries reported spending somewhat more time studying mathematics, roughly an hour per day in many countries.

Participating countries showed some variation in the amount of time students spent doing homework each day across all school subjects. The most common response about the amount of homework done, reported by eighth-graders in about half the countries, was an average of two to three hours per day, but there was a range. Students in Iran and Kuwait reported spending the most time on homework, more than five hours per day. Students in the Czech Republic, Denmark, and Scotland reported spending the least amount of time per day on homework, less than two hours.

The students also were asked about a variety of other ways they could spend their time out of school. Eighth-graders were asked about watching television, playing computer games, playing or talking with friends, doing jobs at home, playing sports, and reading books for enjoyment. Their reports about the amount of time spent daily in each of these activities are shown in Table 4.8. Granted, some television programming and some computer games are targeted at developing children's academic abilities, and leisure reading also can be related to higher academic achievement. Still, much fare on television is not educationally related, and eighth-grade students in many countries reported spending nearly as much time each day watching television – an average of two to three hours per day – as they did doing homework. Eighth-graders in many countries also appear to spend several hours per day playing or talking with friends, and nearly two hours playing sports. The time spent on leisure activities is not additive, because students often do these activities simultaneously (e.g., talk with friends and watch television). Nevertheless, it does appear that in most countries at least as much time is spent in these largely non-academic activities as in studying and doing homework, and probably more time.

Table 4.9 shows the relationship between time spent doing homework in all subjects and students' average science achievement. The relationship was curvilinear in many countries, with the highest achievement being associated with a moderate amount of homework per day (one to three hours). This pattern suggests that, compared

Table 4.7**Students' Reports on How They Spend Their Daily Out-of School Study Time¹
Science - Upper Grade (Eighth Grade*)**

Country	Average Hours Each Day Studying Science or Doing Science Homework After School	Average Hours Each Day Studying Mathematics or Doing Mathematics Homework After School	Average Hours Each Day Studying or Doing Homework in Other School Subjects	Total Hours Each Day on Average
<i>Australia</i>	0.5 (0.01)	0.7 (0.02)	0.9 (0.02)	2.0 (0.04)
<i>Austria</i>	0.7 (0.03)	0.8 (0.02)	0.8 (0.02)	2.4 (0.07)
Belgium (Fl)	0.8 (0.02)	1.1 (0.03)	1.5 (0.03)	3.4 (0.07)
<i>Belgium (Fr)</i>	0.8 (0.02)	1.0 (0.02)	1.2 (0.03)	3.0 (0.07)
Canada	0.6 (0.02)	0.7 (0.02)	0.9 (0.03)	2.2 (0.07)
<i>Colombia</i>	1.2 (0.06)	1.3 (0.06)	2.0 (0.07)	4.6 (0.15)
Cyprus	0.9 (0.02)	1.2 (0.02)	1.5 (0.03)	3.6 (0.06)
Czech Republic	0.6 (0.02)	0.6 (0.02)	0.6 (0.02)	1.8 (0.05)
<i>Denmark</i>	0.3 (0.02)	0.5 (0.02)	0.5 (0.02)	1.4 (0.05)
England	- -	- -	- -	- -
France	0.6 (0.01)	0.9 (0.02)	1.2 (0.03)	2.7 (0.05)
<i>Germany</i>	0.6 (0.02)	0.6 (0.02)	0.8 (0.02)	2.0 (0.05)
<i>Greece</i>	1.2 (0.03)	1.2 (0.03)	2.0 (0.05)	4.4 (0.08)
Hong Kong	0.6 (0.02)	0.9 (0.02)	1.1 (0.03)	2.5 (0.06)
Hungary	1.1 (0.02)	0.8 (0.02)	1.2 (0.03)	3.1 (0.06)
Iceland	0.6 (0.03)	0.9 (0.03)	0.9 (0.03)	2.4 (0.07)
Iran, Islamic Rep.	1.9 (0.05)	2.0 (0.05)	2.5 (0.05)	6.4 (0.13)
Ireland	0.6 (0.01)	0.7 (0.02)	1.4 (0.03)	2.7 (0.05)
<i>Israel</i>	0.6 (0.03)	1.0 (0.04)	1.2 (0.05)	2.8 (0.10)
Japan	0.6 (0.01)	0.8 (0.01)	1.0 (0.02)	2.3 (0.04)
Korea	0.6 (0.02)	0.8 (0.02)	1.1 (0.02)	2.5 (0.05)
<i>Kuwait</i>	1.5 (0.05)	1.6 (0.04)	2.3 (0.07)	5.3 (0.12)
Latvia (LSS)	0.6 (0.02)	0.9 (0.02)	1.2 (0.03)	2.7 (0.05)
Lithuania	0.7 (0.02)	0.8 (0.02)	1.2 (0.04)	2.7 (0.06)
<i>Netherlands</i>	0.6 (0.01)	0.6 (0.01)	1.0 (0.03)	2.2 (0.04)
New Zealand	0.6 (0.01)	0.7 (0.02)	0.9 (0.02)	2.1 (0.05)
Norway	0.6 (0.01)	0.7 (0.02)	1.0 (0.02)	2.3 (0.04)
Portugal	0.9 (0.02)	1.0 (0.02)	1.1 (0.02)	3.0 (0.05)
<i>Romania</i>	1.6 (0.06)	1.8 (0.07)	1.6 (0.06)	5.0 (0.18)
Russian Federation	1.0 (0.02)	0.9 (0.02)	1.0 (0.02)	2.9 (0.05)
<i>Scotland</i>	0.5 (0.01)	0.6 (0.02)	0.7 (0.02)	1.8 (0.04)
Singapore	1.3 (0.02)	1.4 (0.02)	1.9 (0.03)	4.6 (0.04)
Slovak Republic	0.8 (0.02)	0.7 (0.01)	0.9 (0.02)	2.4 (0.04)
<i>Slovenia</i>	1.0 (0.02)	0.9 (0.02)	0.9 (0.02)	2.9 (0.05)
Spain	1.0 (0.02)	1.2 (0.02)	1.4 (0.03)	3.6 (0.06)
Sweden	0.7 (0.01)	0.7 (0.01)	0.9 (0.02)	2.3 (0.04)
Switzerland	0.7 (0.01)	0.9 (0.02)	1.0 (0.02)	2.7 (0.04)
<i>Thailand</i>	1.0 (0.02)	1.2 (0.03)	1.3 (0.02)	3.5 (0.06)
United States	0.6 (0.01)	0.8 (0.02)	0.9 (0.02)	2.3 (0.04)

¹Average hours based on: No Time = 0; Less Than 1 Hour = .5; 1-2 Hours = 1.5; 3-5 Hours = 4; More Than 5 Hours = 7.

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

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

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

A dash (-) indicates data are not available.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Table 4.8**Students' Reports on How They Spend Their Daily Leisure Time ¹
Science - Upper Grade (Eighth Grade*)**

Country	Average Hours Each Day Watching Television or Videos	Average Hours Each Day Playing Computer Games	Average Hours Each Day Playing or Talking with Friends	Average Hours Each Day Doing Jobs at Home	Average Hours Each Day Playing Sports	Average Hours Each Day Reading a Book for Enjoyment
<i>Australia</i>	2.4 (0.05)	0.6 (0.02)	1.4 (0.03)	0.9 (0.02)	1.6 (0.03)	0.6 (0.02)
<i>Austria</i>	1.9 (0.06)	0.6 (0.03)	2.9 (0.08)	0.8 (0.03)	1.9 (0.07)	0.8 (0.03)
Belgium (Fl)	2.0 (0.05)	0.5 (0.06)	1.6 (0.05)	1.1 (0.03)	1.8 (0.07)	0.7 (0.03)
<i>Belgium (Fr)</i>	1.9 (0.08)	0.7 (0.03)	1.7 (0.10)	0.8 (0.03)	1.8 (0.04)	0.8 (0.03)
Canada	2.3 (0.04)	0.5 (0.02)	2.2 (0.05)	1.0 (0.02)	1.9 (0.03)	0.8 (0.02)
<i>Colombia</i>	2.2 (0.07)	r 0.4 (0.06)	1.9 (0.06)	2.3 (0.07)	1.9 (0.06)	0.9 (0.05)
Cyprus	2.3 (0.04)	0.8 (0.03)	1.7 (0.04)	1.0 (0.03)	1.4 (0.04)	0.8 (0.02)
Czech Republic	2.6 (0.05)	0.6 (0.03)	2.9 (0.09)	1.3 (0.04)	1.9 (0.06)	1.0 (0.03)
<i>Denmark</i>	2.2 (0.06)	0.7 (0.03)	2.8 (0.07)	1.1 (0.04)	1.7 (0.06)	0.7 (0.03)
England	2.7 (0.07)	0.9 (0.05)	2.5 (0.06)	0.8 (0.03)	1.5 (0.05)	0.7 (0.03)
France	1.5 (0.04)	0.5 (0.02)	1.5 (0.05)	0.9 (0.03)	1.7 (0.04)	0.8 (0.03)
<i>Germany</i>	1.9 (0.04)	0.8 (0.04)	3.5 (0.07)	0.9 (0.02)	1.7 (0.04)	0.7 (0.02)
<i>Greece</i>	2.1 (0.04)	0.7 (0.03)	1.5 (0.04)	0.9 (0.03)	1.8 (0.04)	1.0 (0.03)
Hong Kong	2.6 (0.05)	0.8 (0.03)	1.2 (0.04)	0.7 (0.02)	0.9 (0.03)	0.9 (0.02)
Hungary	3.0 (0.06)	0.7 (0.03)	2.3 (0.05)	2.0 (0.04)	1.7 (0.04)	1.2 (0.04)
Iceland	2.2 (0.05)	0.7 (0.06)	3.1 (0.06)	0.8 (0.03)	1.8 (0.06)	0.9 (0.06)
Iran, Islamic Rep.	1.8 (0.06)	r 0.2 (0.02)	1.2 (0.04)	1.8 (0.06)	1.2 (0.09)	1.1 (0.04)
Ireland	2.1 (0.03)	0.5 (0.03)	1.5 (0.06)	0.9 (0.03)	1.4 (0.05)	0.6 (0.02)
<i>Israel</i>	3.3 (0.10)	0.9 (0.04)	2.4 (0.08)	1.2 (0.05)	1.9 (0.09)	1.0 (0.04)
Japan	2.6 (0.04)	0.6 (0.02)	1.9 (0.04)	0.6 (0.01)	1.3 (0.03)	0.9 (0.02)
Korea	2.0 (0.04)	0.3 (0.02)	0.9 (0.03)	0.5 (0.02)	0.5 (0.02)	0.8 (0.03)
<i>Kuwait</i>	1.9 (0.07)	0.7 (0.05)	1.5 (0.11)	1.2 (0.08)	1.5 (0.10)	1.0 (0.04)
Latvia (LSS)	2.6 (0.05)	0.7 (0.04)	2.1 (0.06)	1.5 (0.04)	1.2 (0.04)	1.1 (0.03)
Lithuania	2.8 (0.05)	0.9 (0.04)	2.7 (0.06)	1.2 (0.03)	1.2 (0.04)	1.0 (0.03)
<i>Netherlands</i>	2.5 (0.09)	0.7 (0.04)	2.8 (0.08)	0.9 (0.04)	1.8 (0.06)	0.6 (0.03)
New Zealand	2.5 (0.05)	0.7 (0.03)	1.5 (0.04)	0.9 (0.02)	1.5 (0.04)	0.8 (0.02)
Norway	2.5 (0.04)	0.8 (0.03)	3.2 (0.06)	1.1 (0.03)	1.9 (0.05)	0.7 (0.02)
Portugal	2.0 (0.04)	0.7 (0.03)	1.7 (0.05)	1.0 (0.04)	1.7 (0.04)	0.7 (0.02)
<i>Romania</i>	1.9 (0.06)	0.6 (0.05)	1.5 (0.06)	1.9 (0.08)	1.3 (0.05)	1.3 (0.07)
Russian Federation	2.9 (0.05)	1.0 (0.04)	2.9 (0.05)	1.5 (0.03)	1.0 (0.03)	1.3 (0.04)
<i>Scotland</i>	2.7 (0.05)	1.0 (0.04)	2.8 (0.08)	0.7 (0.02)	1.9 (0.05)	0.7 (0.02)
Singapore	2.7 (0.05)	0.6 (0.03)	1.5 (0.04)	1.0 (0.03)	0.7 (0.03)	1.1 (0.02)
Slovak Republic	2.7 (0.05)	0.6 (0.03)	2.9 (0.07)	1.5 (0.05)	1.8 (0.04)	1.0 (0.03)
<i>Slovenia</i>	2.0 (0.04)	0.6 (0.02)	1.7 (0.05)	1.6 (0.05)	1.6 (0.03)	0.9 (0.02)
Spain	1.8 (0.05)	0.3 (0.02)	1.8 (0.06)	1.1 (0.03)	1.7 (0.04)	0.6 (0.02)
Sweden	2.3 (0.04)	0.6 (0.02)	2.3 (0.05)	0.9 (0.02)	1.6 (0.04)	0.7 (0.02)
Switzerland	1.3 (0.03)	0.4 (0.02)	2.4 (0.05)	1.0 (0.03)	1.8 (0.03)	0.8 (0.02)
<i>Thailand</i>	2.1 (0.07)	0.3 (0.02)	1.2 (0.03)	1.6 (0.03)	1.1 (0.02)	1.0 (0.02)
United States	2.6 (0.07)	0.7 (0.03)	2.5 (0.06)	1.2 (0.04)	2.2 (0.05)	0.7 (0.02)

¹Average hours based on: No Time = 0; Less Than 1 Hour = .5; 1-2 Hours = 1.5; 3-5 Hours = 4; More Than 5 Hours = 7.

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

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

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom

sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

An "r" indicates a 70 - 84% student response rate.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Table 4.9
**Students' Reports on Total Amount of Daily Out-of-School Study Time¹
 Science - Upper Grade (Eighth Grade*)**

Country	Less than 1 Hour		1 to < 2 Hours		2 to 3 Hours		More than 3 Hours	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
<i>Australia</i>	15 (0.9)	505 (6.9)	46 (1.0)	556 (4.1)	22 (0.6)	557 (4.9)	17 (0.7)	546 (5.0)
<i>Austria</i>	9 (0.8)	551 (9.9)	46 (1.3)	563 (4.8)	21 (0.9)	561 (5.0)	24 (1.2)	553 (4.8)
Belgium (Fl)	2 (0.4)	~ ~	25 (1.3)	545 (5.0)	28 (1.1)	562 (5.9)	45 (1.6)	547 (3.6)
<i>Belgium (Fr)</i>	7 (0.8)	428 (6.9)	32 (1.0)	481 (4.7)	21 (1.3)	481 (4.5)	40 (1.5)	467 (4.0)
Canada	14 (1.2)	524 (6.1)	47 (1.1)	541 (2.8)	18 (0.7)	531 (3.9)	21 (1.1)	517 (3.6)
<i>Colombia</i>	2 (0.4)	~ ~	17 (1.1)	421 (5.3)	20 (1.2)	422 (4.9)	61 (1.9)	413 (5.8)
Cyprus	9 (0.5)	430 (7.0)	19 (0.7)	468 (4.4)	26 (0.8)	475 (3.4)	46 (0.9)	466 (2.9)
Czech Republic	13 (1.1)	558 (9.0)	57 (1.1)	579 (3.9)	17 (0.9)	582 (7.2)	13 (0.8)	560 (6.4)
<i>Denmark</i>	39 (1.6)	494 (4.4)	39 (1.4)	479 (4.1)	13 (0.8)	459 (5.5)	9 (0.7)	457 (6.8)
England	- -	- -	- -	- -	- -	- -	- -	- -
France	8 (0.7)	481 (6.8)	33 (1.2)	497 (3.3)	28 (1.0)	506 (4.0)	31 (1.2)	499 (3.4)
<i>Germany</i>	14 (1.1)	505 (8.2)	51 (1.2)	541 (4.6)	18 (1.0)	544 (7.0)	17 (0.9)	525 (6.5)
<i>Greece</i>	6 (0.6)	473 (4.8)	14 (0.7)	497 (5.0)	21 (0.7)	500 (3.1)	59 (1.2)	502 (2.5)
Hong Kong	13 (1.0)	489 (7.3)	32 (0.9)	519 (4.7)	25 (0.9)	534 (4.8)	30 (1.1)	534 (5.2)
Hungary	4 (0.4)	519 (10.0)	33 (1.1)	553 (4.4)	22 (0.9)	557 (5.6)	41 (1.3)	557 (3.0)
Iceland	5 (1.0)	470 (8.7)	46 (1.7)	505 (5.6)	25 (1.3)	493 (4.5)	23 (1.4)	488 (7.5)
Iran, Islamic Rep.	1 (0.2)	~ ~	5 (0.5)	476 (6.0)	12 (1.0)	479 (5.2)	82 (1.3)	471 (2.7)
Ireland	5 (0.6)	475 (9.0)	29 (1.0)	529 (5.4)	40 (1.1)	550 (4.7)	26 (1.2)	550 (4.9)
<i>Israel</i>	5 (0.6)	532 (13.5)	36 (2.2)	555 (7.7)	26 (1.5)	523 (6.9)	33 (2.1)	505 (5.2)
Japan	13 (0.8)	551 (4.4)	39 (0.8)	573 (2.2)	20 (0.6)	572 (3.0)	28 (1.0)	577 (2.4)
Korea	15 (0.9)	544 (5.0)	32 (1.1)	564 (2.9)	25 (0.8)	562 (3.1)	29 (1.2)	581 (3.7)
<i>Kuwait</i>	3 (0.6)	400 (10.4)	13 (1.5)	436 (7.8)	19 (1.3)	432 (7.1)	65 (1.8)	431 (3.4)
Latvia (LSS)	4 (0.5)	468 (8.5)	35 (1.1)	492 (4.1)	32 (1.2)	490 (4.1)	29 (1.2)	481 (3.0)
Lithuania	5 (0.6)	457 (9.1)	39 (1.4)	484 (4.5)	28 (1.0)	483 (3.8)	28 (1.4)	472 (4.7)
<i>Netherlands</i>	3 (0.9)	519 (17.1)	54 (1.7)	559 (6.1)	27 (1.7)	578 (5.4)	16 (0.8)	545 (5.7)
New Zealand	12 (0.9)	488 (7.6)	51 (1.2)	536 (4.6)	21 (1.0)	537 (5.7)	17 (0.9)	516 (5.7)
Norway	6 (0.5)	501 (7.3)	50 (1.2)	533 (2.5)	24 (0.9)	536 (3.4)	21 (0.9)	516 (3.7)
Portugal	3 (0.3)	465 (8.8)	41 (1.1)	488 (2.9)	18 (0.7)	478 (4.1)	38 (1.2)	474 (2.8)
<i>Romania</i>	9 (0.7)	460 (11.7)	16 (1.0)	468 (7.0)	15 (0.7)	487 (5.7)	60 (1.6)	499 (5.2)
Russian Federation	4 (0.5)	511 (10.1)	33 (1.1)	542 (4.4)	25 (1.0)	538 (4.4)	38 (1.4)	543 (4.6)
<i>Scotland</i>	17 (1.4)	470 (5.3)	54 (1.2)	526 (5.1)	17 (1.0)	537 (8.5)	12 (0.8)	532 (6.5)
Singapore	2 (0.3)	~ ~	7 (0.4)	604 (8.4)	13 (0.6)	617 (7.3)	78 (0.9)	607 (5.4)
Slovak Republic	6 (0.5)	551 (7.1)	46 (0.9)	552 (3.7)	25 (0.7)	541 (3.8)	23 (1.0)	536 (4.7)
<i>Slovenia</i>	5 (0.5)	559 (9.2)	36 (1.0)	580 (3.5)	21 (0.8)	557 (3.2)	37 (1.1)	544 (3.3)
Spain	3 (0.4)	482 (7.9)	26 (1.0)	522 (2.8)	18 (0.9)	522 (3.5)	53 (1.3)	516 (2.2)
Sweden	7 (0.6)	520 (6.0)	55 (1.2)	544 (3.2)	17 (0.8)	539 (4.9)	21 (0.9)	523 (4.9)
Switzerland	4 (0.3)	500 (8.3)	44 (1.2)	530 (3.1)	19 (0.8)	526 (6.2)	33 (1.1)	514 (3.5)
<i>Thailand</i>	3 (0.3)	510 (8.8)	26 (1.0)	520 (4.0)	18 (0.7)	519 (4.3)	54 (1.5)	532 (4.1)
United States	17 (1.1)	507 (9.5)	42 (0.9)	548 (4.1)	17 (0.7)	541 (5.2)	24 (0.8)	533 (5.7)

¹Sum of time reported spent studying or doing homework in science, mathematics, and other subjects.

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

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

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

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

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

to their higher-achieving counterparts, the lower-performing students may do less homework, either because they do not do it or because their teachers do not assign it, or more homework, perhaps because they need to spend the extra time to keep up academically. In some countries, students doing one hour a day of homework or more had higher average science achievement than students doing less than one hour a day (e.g., Greece, Hungary, Japan, Kuwait, and the Russian Federation), although in these countries there was little difference in achievement as the time spent increased from at least one hour to more than three hours. A more direct positive relationship between time spent doing homework and science achievement was found in other countries, such as Hong Kong, Korea, and Romania. The only inverse relationship was noted for Denmark. Clearly, different countries have different policies and practices about assigning homework.

The relationship between science achievement and amount of time spent watching television each day was more consistent across countries than that spent doing homework (see Table 4.10). In about half the TIMSS countries, the highest science achievement was associated with watching from one to two hours of television per day. This was the most common response, reflecting from 33% to 54% of the students for all countries. That watching less than one hour of television per day generally was associated with lower average science achievement than watching one to two hours in many countries most likely has little to do with the influence of television viewing on science achievement. For these students, low television viewing may be a surrogate socio-economic indicator, suggesting something about children's access to television sets across countries. Because students with fewer socio-economic advantages generally perform less well than their counterparts academically, it may be that students' who reported less than one hour watching television each day simply do not have television sets in their homes, or come from homes with only one television set where they have less opportunity to spend a lot of time watching their choice of programming.

In general, beyond one to two hours of television viewing per day, the more television eighth-graders reported watching, the lower their science achievement, although there were several countries where students watching three to five hours of television did not have lower achievement than those watching one to two hours. In all countries, however, students watching more than five hours of television per day had the lowest average science achievement. Countries where 10% or more of the students reported watching more than five hours of television each day included Colombia, England, Hong Kong, Hungary, Israel, Latvia (LSS), Lithuania, New Zealand, the Russian Federation, Scotland, the Slovak Republic, and the United States.

Table 4.10**Students' Reports on the Hours Spent Each Day Watching Television and Videos
Science - Upper Grade (Eighth Grade*)**

Country	Less than 1 Hour		1 to 2 Hours		3 to 5 Hours		More than 5 Hours	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
<i>Australia</i>	24 (0.9)	556 (5.3)	41 (0.8)	554 (3.7)	27 (0.8)	541 (4.5)	9 (0.6)	502 (5.7)
<i>Austria</i>	25 (1.4)	562 (5.7)	53 (1.1)	561 (4.8)	17 (1.0)	558 (4.7)	5 (0.6)	522 (9.7)
Belgium (Fl)	24 (1.2)	563 (4.5)	52 (1.2)	556 (4.8)	19 (1.0)	526 (6.3)	5 (0.5)	517 (8.8)
<i>Belgium (Fr)</i>	33 (1.3)	480 (3.6)	44 (1.8)	476 (4.3)	17 (1.3)	467 (5.2)	6 (1.0)	413 (8.7)
Canada	22 (0.7)	528 (3.5)	46 (0.8)	536 (3.2)	25 (0.7)	535 (3.2)	7 (0.6)	508 (6.1)
<i>Colombia</i>	31 (1.5)	411 (4.3)	39 (1.2)	419 (4.5)	20 (1.2)	417 (7.3)	11 (1.0)	412 (6.2)
Cyprus	25 (1.1)	453 (3.6)	45 (1.1)	474 (2.4)	21 (0.8)	469 (4.0)	9 (0.7)	440 (5.1)
Czech Republic	15 (0.8)	578 (6.2)	45 (1.2)	581 (4.7)	31 (1.2)	571 (4.8)	9 (0.8)	546 (8.7)
<i>Denmark</i>	28 (1.1)	476 (3.9)	42 (1.2)	484 (4.3)	22 (1.0)	484 (4.9)	8 (0.7)	464 (7.8)
England	20 (1.3)	545 (9.8)	37 (1.2)	565 (4.9)	31 (1.2)	558 (4.2)	11 (0.9)	530 (7.5)
France	42 (1.3)	503 (3.6)	45 (1.1)	498 (2.9)	9 (0.7)	493 (4.9)	4 (0.5)	467 (7.3)
<i>Germany</i>	31 (1.0)	533 (6.0)	47 (1.1)	542 (4.9)	16 (0.8)	530 (6.5)	6 (0.6)	477 (9.2)
<i>Greece</i>	32 (0.9)	499 (2.7)	42 (0.7)	502 (3.1)	17 (0.7)	496 (3.6)	9 (0.5)	488 (4.9)
Hong Kong	22 (0.9)	520 (5.3)	39 (0.9)	529 (5.5)	28 (1.0)	526 (4.7)	11 (0.8)	506 (7.0)
Hungary	11 (0.7)	569 (5.9)	41 (1.1)	564 (3.6)	33 (0.9)	552 (3.7)	15 (1.0)	522 (5.0)
Iceland	24 (1.3)	485 (8.9)	47 (1.3)	496 (3.5)	22 (1.2)	504 (5.0)	7 (0.8)	492 (8.4)
Iran, Islamic Rep.	32 (1.3)	463 (3.4)	46 (0.9)	473 (2.9)	17 (0.9)	485 (6.1)	5 (0.6)	474 (6.7)
Ireland	20 (0.8)	530 (5.6)	51 (1.1)	546 (4.3)	23 (0.8)	546 (5.2)	5 (0.5)	501 (9.0)
<i>Israel</i>	9 (1.4)	507 (19.9)	33 (2.1)	538 (6.8)	44 (1.7)	532 (5.0)	14 (1.2)	513 (9.4)
Japan	9 (0.5)	579 (4.9)	53 (0.9)	578 (2.3)	30 (0.8)	564 (2.3)	9 (0.5)	547 (4.8)
Korea	32 (1.0)	574 (3.2)	40 (1.0)	569 (2.6)	20 (0.8)	555 (4.5)	7 (0.6)	534 (6.1)
<i>Kuwait</i>	39 (1.7)	425 (4.3)	38 (1.3)	435 (4.5)	14 (1.2)	441 (7.2)	9 (0.8)	420 (8.1)
Latvia (LSS)	16 (1.0)	473 (5.0)	44 (1.1)	487 (3.4)	29 (1.2)	497 (3.9)	10 (0.7)	477 (5.0)
Lithuania	12 (0.7)	469 (7.2)	44 (1.3)	485 (3.8)	32 (1.2)	476 (4.1)	12 (0.9)	467 (5.8)
<i>Netherlands</i>	17 (1.8)	562 (11.5)	47 (1.7)	572 (4.7)	27 (1.5)	550 (6.2)	9 (0.9)	527 (6.1)
New Zealand	24 (1.0)	530 (5.8)	38 (0.9)	538 (4.8)	26 (0.9)	525 (5.1)	12 (0.8)	489 (5.5)
Norway	15 (0.7)	536 (4.7)	48 (1.0)	534 (2.2)	30 (1.0)	523 (3.5)	7 (0.4)	496 (6.1)
Portugal	27 (1.0)	474 (3.6)	48 (0.9)	481 (2.8)	20 (0.8)	488 (3.0)	5 (0.5)	471 (5.8)
<i>Romania</i>	38 (1.4)	479 (7.2)	39 (1.2)	493 (5.6)	16 (0.9)	503 (6.0)	8 (0.7)	475 (7.3)
Russian Federation	12 (1.0)	526 (6.7)	42 (1.4)	540 (4.4)	32 (1.0)	544 (4.2)	14 (0.9)	538 (6.2)
<i>Scotland</i>	15 (0.7)	509 (8.1)	43 (1.0)	525 (6.4)	31 (1.0)	525 (5.4)	11 (0.7)	491 (5.4)
Singapore	7 (0.6)	633 (8.5)	50 (1.1)	615 (6.2)	37 (1.2)	597 (5.4)	6 (0.5)	582 (6.5)
Slovak Republic	14 (0.7)	558 (6.4)	47 (1.0)	548 (3.5)	28 (0.9)	545 (4.5)	11 (0.8)	521 (5.5)
<i>Slovenia</i>	23 (1.1)	568 (3.9)	54 (1.1)	559 (2.9)	19 (0.9)	558 (3.5)	4 (0.4)	547 (8.7)
Spain	33 (1.2)	514 (2.8)	46 (1.0)	522 (2.2)	17 (0.8)	517 (3.6)	4 (0.5)	496 (6.0)
Sweden	16 (0.7)	540 (5.2)	51 (0.9)	543 (3.1)	27 (0.8)	531 (4.1)	6 (0.5)	490 (5.5)
Switzerland	45 (1.5)	534 (3.9)	44 (1.3)	518 (3.2)	9 (0.7)	502 (5.2)	2 (0.2)	~ ~
<i>Thailand</i>	28 (1.4)	518 (3.8)	46 (1.0)	527 (4.0)	19 (1.1)	534 (4.7)	8 (0.7)	524 (5.9)
United States	22 (0.8)	542 (6.0)	40 (0.9)	548 (4.3)	25 (0.6)	533 (5.4)	13 (1.0)	493 (5.9)

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

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

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

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

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

HOW DO STUDENTS PERCEIVE SUCCESS IN THE SCIENCES?

Table 4.11 presents eighth-grade students' perceptions about doing well in the sciences. The results for each country are reported for either integrated science or separately for the science subject areas of biological science, earth science and physical science, depending on the form of the student questionnaire used. In all but three countries (Hong Kong, Japan, and Korea), the majority of students agreed or strongly agreed that they did well in either integrated science or in all of the science subject areas. Interestingly, two of these three countries where fewer than half of students thought they did well in science, Japan (45%) and Korea (35%), were among the highest performing countries on the TIMSS science test.

In several countries, more than 85% of students reported doing well in integrated science, including Colombia (91%), England (88%), Iran (95%), Kuwait (89%), and the United States (86%). Corresponding student reports for the separate sciences included Lithuania (85% in biological science), Slovak Republic (89% in biological science and 91% in earth science), and Slovenia (86% in biological science). For most separate-subject countries, more students reported doing well in biological science than in physical science.

Figure 4.2 indicates that for most countries, both boys and girls tended to agree that they did well in the sciences – a perception that did not always coincide with their achievement on the TIMSS science test. Among the countries that administered the integrated science form of the questionnaire, eighth-grade girls in England, Hong Kong, Japan, New Zealand, Norway, Scotland, Singapore, and Switzerland reported significantly lower self-perceptions than boys about doing well in science.

Among countries that asked about the separate science subject areas, fewer differences between girls' and boys' self-perceptions about doing well in the sciences were reported, but the differences that did exist indicated higher self-perceptions for boys. More than half of the countries had no or very small gender differences in self-perception about doing well in any of the subject areas, while in seven countries, boys had higher self-perceptions than girls in at least one of the subject areas (Austria, Flemish-speaking Belgium, Denmark, France, Germany, the Netherlands, and Sweden). Only in the Netherlands did boys have higher self-perceptions about doing well in all three subject areas.

The gender differences in self-perceptions differed across subject areas, with the physical sciences having the largest number of countries where boys reported higher self-perceptions than girls. In the biological sciences, there was very little difference across all countries between boys and girls in their self-perceptions about doing well. These differences in the self-perceptions of boys and girls across science subject areas correspond to the higher performance of boys on the physics and chemistry content areas of the TIMSS science test (Table 2.4).

Students were asked about the necessity of various attributes or activities to do well in science (see Table 4.12). There was enormous variation from country to country in the percentage of eighth-grade students agreeing that natural talent or ability were

Table 4.11**Students' Reports on Their Self-Perceptions About Usually Doing Well in the Sciences¹ - Upper Grade (Eighth Grade*)**

Country	Percent of Students Responding Agree or Strongly Agree			
	Science (Integrated)	Science Subject Areas		
		Biological Science	Earth Science	Physical Science
<i>Australia</i>	77 (1.0)	. .	. .	. .
<i>Austria</i>	. .	84 (1.2)	76 (1.4)	70 (1.5)
Belgium (Fl)	. .	71 (2.4)	65 (2.7)	s 56 (3.8)
<i>Belgium (Fr)</i>	s 85 (1.9)	. .	. .	. .
Canada	82 (1.2)	. .	. .	. .
<i>Colombia</i>	91 (0.8)	. .	. .	. .
Cyprus	76 (1.2)	. .	. .	. .
Czech Republic	. .	82 (2.0)	84 (1.1)	69 (2.0)
<i>Denmark</i>	. .	79 (1.0)	78 (1.3)	72 (1.3)
England	88 (1.0)	. .	. .	. .
² France	. .	71 (1.5)	. .	74 (1.7)
<i>Germany</i>	. .	79 (1.1)	70 (1.3)	63 (1.6)
<i>Greece</i>	. .	. .	. .	81 (0.9)
Hong Kong	43 (1.6)	. .	. .	. .
Hungary	. .	82 (1.2)	76 (1.3)	63 (1.5)
Iceland	. .	81 (1.6)	s 60 (1.8)	72 (1.5)
Iran, Islamic Rep.	95 (0.5)	. .	. .	. .
Ireland	74 (1.6)	. .	. .	. .
<i>Israel</i>	84 (1.3)	. .	. .	. .
Japan	45 (0.9)	. .	. .	. .
Korea	35 (1.1)	. .	. .	. .
<i>Kuwait</i>	89 (1.0)	. .	. .	. .
Latvia (LSS)	. .	74 (1.2)	. .	72 (1.4)
Lithuania	. .	85 (1.0)	61 (1.7)	60 (1.8)
<i>Netherlands</i>	. .	r 83 (1.4)	81 (1.7)	83 (1.6)
New Zealand	80 (0.9)	. .	. .	. .
Norway	80 (1.1)	. .	. .	. .
³ Portugal	. .	72 (1.3)	. .	68 (1.5)
<i>Romania</i>	. .	77 (1.1)	77 (1.3)	69 (1.3)
Russian Federation	. .	84 (1.4)	74 (1.6)	70 (1.3)
Scotland	84 (0.9)	. .	. .	. .
Singapore	73 (1.2)	. .	. .	. .
Slovak Republic	. .	89 (0.8)	91 (0.7)	78 (1.2)
<i>Slovenia</i>	. .	86 (1.2)	. .	82 (1.1)
Spain	80 (1.2)	. .	. .	. .
Sweden	. .	82 (0.9)	83 (0.8)	77 (1.1)
Switzerland	76 (1.2)	. .	. .	. .
<i>Thailand</i>	67 (1.4)	. .	. .	. .
United States	86 (0.7)	. .	. .	. .

¹Countries administered either an integrated science or separate subject area form of the questionnaire. A dot (.) denotes questions not administered by design. Percentages for separate science subject areas are based only on those students taking each subject.

²Biological science data for France are for students taking biology/geology classes.

³Biological science data for Portugal are for students taking natural science classes.

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

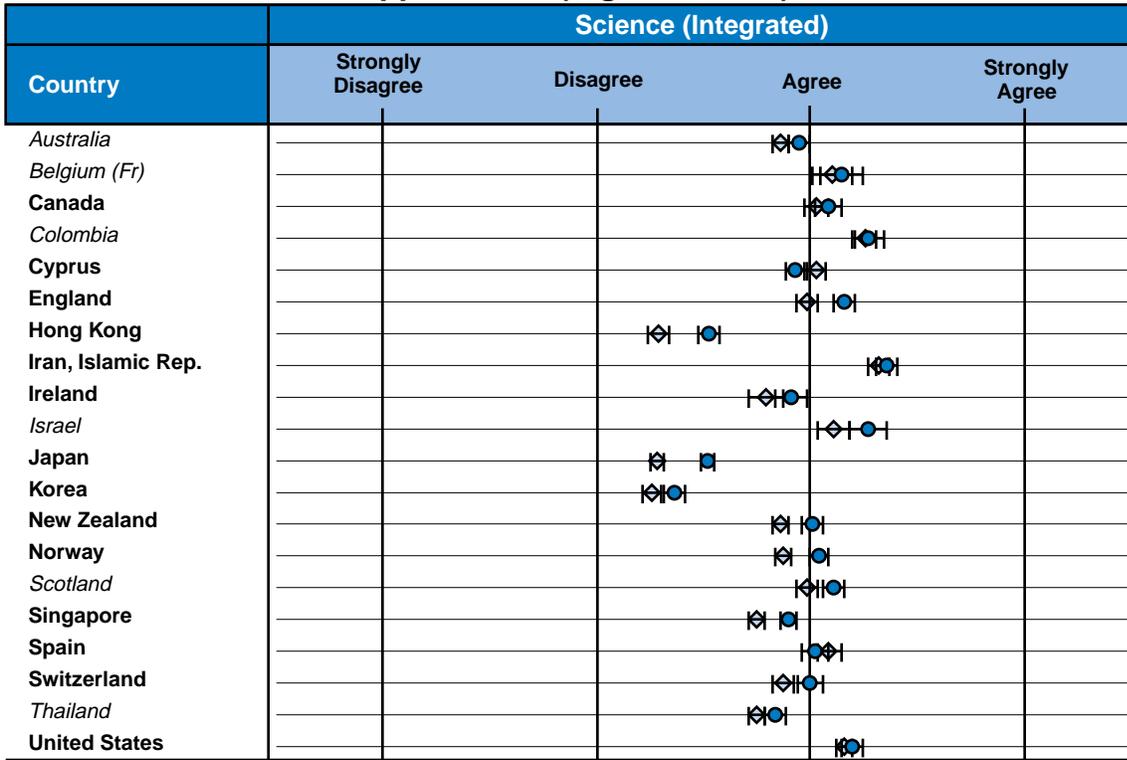
(.) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

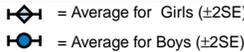
An "r" indicates a 70-84% student response rate. An "s" indicates a 50-69% student response rate.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Figure 4.2

Gender Differences in Students' Self-Perceptions About Usually Doing Well in the Sciences¹ - Upper Grade (Eighth Grade*)





 = Average for Girls (±2SE)

 = Average for Boys (±2SE)

¹Countries administered either an integrated science or separate subject area form of the questionnaire. Percentages for separate science subject areas are based only on those students taking each subject.

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

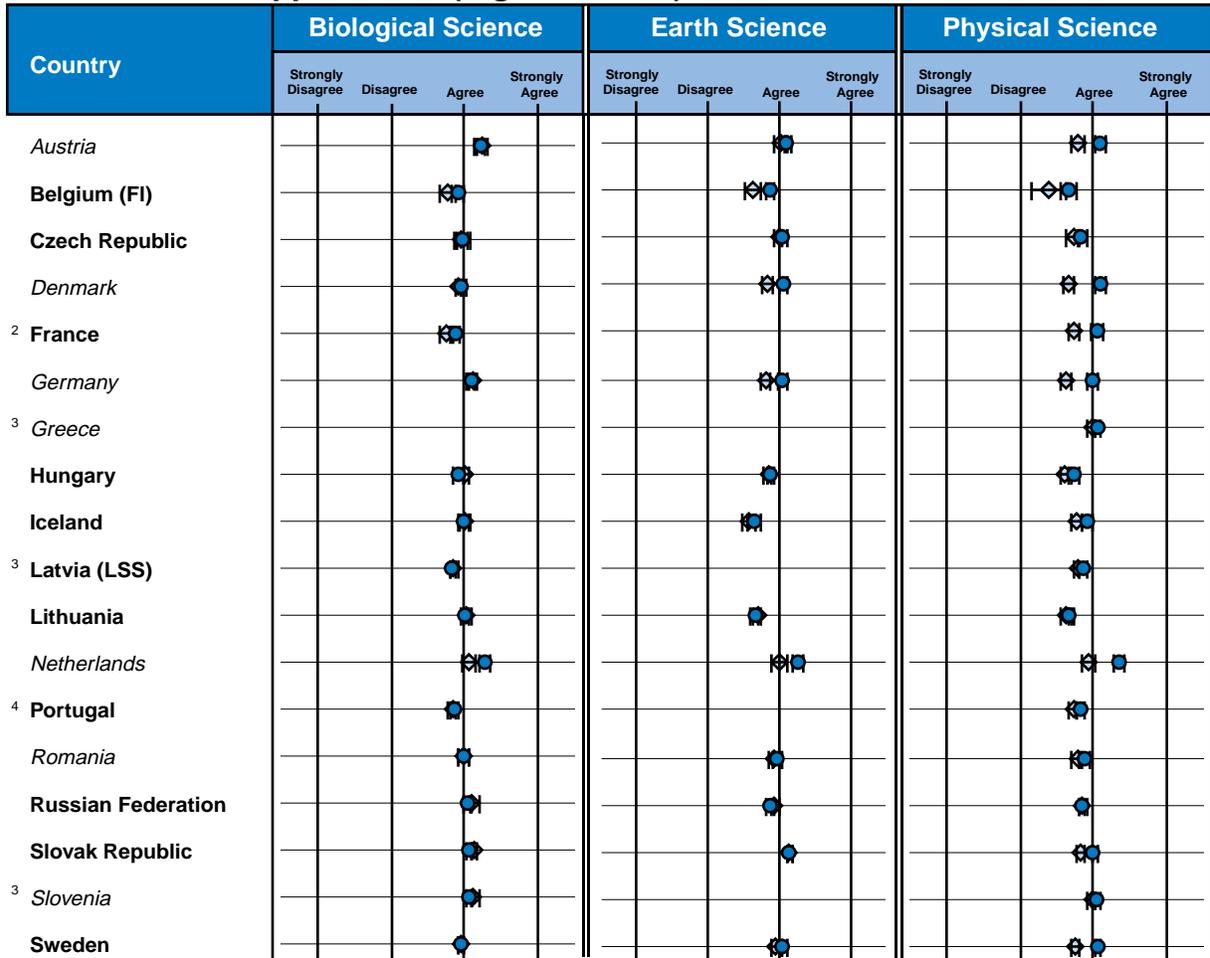
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

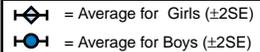
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Figure 4.2 (Continued)

Gender Differences in Students' Self-Perceptions About Usually Doing Well in the Sciences¹ - Upper Grade (Eighth Grade*)





 ◆ = Average for Girls (±2SE)

 ● = Average for Boys (±2SE)

¹Countries administered either an integrated science or separate subject area form of the questionnaire. Percentages for separate science subject areas are based only on those students taking each subject.

²Biological science data for France are for students taking biology/geology classes.

³Greece, Latvia, and Slovenia did not ask about all three science subjects.

⁴Biological science data for Portugal are for students taking natural science classes.

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

important to do well in science. Fewer than 50% of the students agreed in the Czech Republic, England, France, Iceland, the Netherlands, and Sweden compared to 90% or more in Colombia, Iran, and Kuwait. Internationally, relatively few students agreed that good luck was important to do well. The countries where more than 50% of the eighth-graders agreed that good luck was needed to do well in science included Colombia, the Czech Republic, Hungary, Iran, Japan, Korea, Kuwait, Latvia (LSS), Lithuania, Romania, the Russian Federation, and the Slovak Republic.

Internationally, there was a high degree of agreement among students that lots of hard work studying at home was necessary in order to do well in science. Percentages of agreement were in the 80s and 90s for most countries and in the 70s for Austria, Hungary, Lithuania, and Switzerland. The variation was substantial from country to country regarding students' agreement with the necessity of memorizing the textbook or notes. In Belgium (French), France, Iceland, Iran, Japan, Korea, Kuwait, and Thailand, 90% or more of the eighth-grade students agreed or strongly agreed that memorization was important to doing well in science. In contrast, fewer than 50% agreed in Latvia (LSS), Lithuania, and Sweden.

Students also were asked about why they need to do well in the sciences. Depending on which questionnaire each country used, the results are reported for either integrated science or the separate science subject areas of biology, chemistry, earth science, and physics. Students could agree with any or all of three areas of possible motivation presented in Table 4.13 (to get their desired job), in Table 4.14 (to get into their preferred university or secondary school) and in Table 4.15 (to please their parents). There were substantial differences from country to country in students' responses for the three motivational factors.

As indicated in Table 4.13, the majority of eighth-grade students in many countries asked about integrated science either agreed or strongly agreed that getting their desired job was a motivating factor, although there were several countries where only slightly more than half of the students agreed. Eighty-five percent or more of students agreed in Iran (90%), Kuwait (85%), and Thailand (94%), compared to fewer than half of the students in Austria (38%), Japan (40%), Korea (44%), Norway (47%), and Switzerland (33%).

Compared to the integrated-science students, in general, fewer students in the countries asking about separate science subject areas agreed with the need to do well to get their desired job. Fewer than 60% of students in nearly all of these countries (primarily in Europe) agreed for any of the science subject areas that this was a reason to do well. In particular, fewer than 30% of students in Belgium (Flemish) and Hungary agreed for any subject, and only in Greece, Latvia (LSS), Lithuania, and Romania, did 50% or more of students agree for all subject areas. At the eighth grade, it appears that many students in these countries do not make a connection between getting a job they want and their performance in specific science subject areas. While this may be due to fewer students in these countries desiring jobs that use a particular science, it is also very likely that many students in this age group do not yet have a clear conception of either the type of job they want to pursue or the specific science education requirements for different jobs.

In the majority of countries, pleasing their parents and getting into their preferred university or secondary school were both stronger motivators than getting their desired job for eighth-grade students in either integrated science or separate science subject areas. However, 40% or fewer students in Denmark, Iceland, Japan, Lithuania (biology and chemistry), and Slovenia agreed that doing well was important in order to please their parents.

Table 4.12
**Students' Reports on Things Necessary to Do Well in the Sciences
Upper Grade (Eighth Grade*)**

Country	Percent of Students Responding Agree or Strongly Agree			
	Natural Talent/Ability	Good Luck	Lots of Hard Work Studying at Home	Memorize the Textbook or Notes
<i>Australia</i>	66 (0.8)	33 (0.8)	91 (0.5)	71 (0.9)
<i>Austria</i>	61 (1.5)	31 (1.3)	78 (1.4)	65 (1.2)
Belgium (Fl)	53 (1.5)	24 (1.8)	85 (0.9)	63 (1.9)
<i>Belgium (Fr)</i>	67 (1.2)	25 (1.1)	94 (0.7)	94 (0.6)
Canada	61 (1.0)	30 (1.0)	89 (0.7)	52 (1.0)
<i>Colombia</i>	91 (0.7)	64 (1.5)	97 (0.4)	79 (1.2)
Cyprus	51 (1.0)	34 (0.9)	93 (0.6)	76 (0.9)
Czech Republic	45 (1.0)	55 (1.2)	82 (1.2)	59 (1.4)
<i>Denmark</i>	89 (0.6)	35 (1.3)	82 (1.2)	65 (1.4)
England	47 (1.4)	25 (1.0)	93 (0.6)	56 (1.0)
France	38 (1.3)	23 (1.1)	88 (0.8)	95 (0.8)
<i>Germany</i>	57 (1.5)	28 (1.2)	82 (1.1)	70 (1.0)
<i>Greece</i>	58 (1.0)	27 (0.9)	96 (0.4)	87 (0.6)
Hong Kong	74 (0.9)	38 (1.0)	96 (0.5)	84 (0.7)
Hungary	88 (0.7)	56 (1.1)	79 (0.9)	57 (1.3)
Iceland	36 (1.4)	26 (1.6)	90 (0.9)	95 (0.8)
Iran, Islamic Rep.	95 (0.7)	51 (2.3)	97 (0.4)	91 (0.7)
Ireland	70 (1.0)	32 (1.1)	95 (0.6)	78 (0.9)
<i>Israel</i>	53 (1.9)	19 (1.8)	95 (0.9)	54 (2.1)
Japan	82 (0.6)	60 (1.0)	97 (0.3)	97 (0.3)
Korea	85 (0.7)	62 (1.0)	98 (0.2)	94 (0.4)
<i>Kuwait</i>	90 (1.4)	78 (1.7)	83 (1.3)	92 (0.7)
Latvia (LSS)	50 (1.2)	61 (1.2)	87 (0.8)	42 (1.3)
Lithuania	76 (1.0)	68 (1.1)	76 (1.1)	31 (1.2)
<i>Netherlands</i>	46 (1.4)	25 (1.6)	93 (0.8)	67 (1.2)
New Zealand	63 (1.1)	29 (1.2)	92 (0.5)	75 (1.0)
Norway	84 (0.7)	22 (0.9)	92 (0.6)	81 (0.9)
Portugal	72 (1.1)	39 (1.3)	98 (0.2)	66 (1.3)
<i>Romania</i>	64 (1.1)	59 (1.3)	86 (0.9)	78 (1.1)
Russian Federation	77 (0.7)	53 (1.7)	87 (0.9)	66 (1.8)
<i>Scotland</i>	- -	- -	- -	- -
Singapore	86 (0.7)	40 (0.9)	98 (0.3)	87 (0.8)
Slovak Republic	61 (1.1)	52 (1.1)	92 (0.6)	55 (1.2)
<i>Slovenia</i>	75 (1.0)	41 (1.4)	90 (0.6)	- -
Spain	66 (1.1)	35 (1.0)	96 (0.4)	79 (1.0)
Sweden	45 (1.0)	26 (1.1)	87 (0.6)	42 (1.0)
Switzerland	56 (1.2)	25 (0.7)	75 (1.1)	58 (1.5)
<i>Thailand</i>	69 (1.1)	35 (1.3)	80 (0.8)	97 (0.3)
United States	51 (0.8)	34 (1.3)	90 (0.6)	66 (1.0)

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

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

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom

sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

A dash (-) indicates data are not available.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Table 4.13**Students' Perceptions About the Need to Do Well in the Sciences to Get Their Desired Job¹ - Upper Grade (Eighth Grade*)**

Country	Percent of Students Responding Agree or Strongly Agree				
	Science (Integrated)	Science Subject Areas			
		Biology	Chemistry	Earth Science	Physics
<i>Australia</i>	52 (1.0)	. .	. .	. .	. .
<i>Austria</i>	38 (1.4)	. .	. .	. .	. .
Belgium (Fl)	. .	28 (1.4)	. .	18 (0.8)	x x
² <i>Belgium (Fr)</i>	s 53 (2.3)	x x	. .	. .	x x
Canada	63 (1.2)	. .	. .	. .	. .
<i>Colombia</i>	74 (1.3)	. .	. .	. .	. .
Cyprus	57 (1.3)	. .	. .	. .	. .
Czech Republic	. .	36 (1.0)	40 (1.3)	42 (1.2)	48 (1.5)
³ <i>Denmark</i>	. .	31 (1.3)	. .	r 32 (1.4)	37 (1.1)
England	62 (1.5)	. .	. .	. .	. .
⁴ France	. .	36 (1.1)	. .	. .	39 (1.3)
<i>Germany</i>	. .	33 (1.1)	s 32 (1.8)	. .	34 (1.2)
<i>Greece</i>	. .	. .	60 (0.8)	54 (0.9)	70 (0.8)
Hong Kong	55 (1.0)	. .	. .	. .	. .
Hungary	. .	26 (1.1)	20 (0.9)	19 (0.9)	25 (0.9)
Iceland	. .	44 (1.6)	x x	x x	s 46 (1.7)
Iran, Islamic Rep.	90 (1.0)	. .	. .	. .	. .
Ireland	50 (1.2)	. .	. .	. .	. .
<i>Israel</i>	51 (1.9)	. .	. .	. .	. .
Japan	40 (0.7)	. .	. .	. .	. .
Korea	44 (1.0)	. .	. .	. .	. .
<i>Kuwait</i>	85 (1.3)	. .	. .	. .	. .
Latvia (LSS)	. .	50 (1.3)	54 (1.2)	. .	61 (1.3)
Lithuania	. .	52 (1.5)	53 (1.3)	55 (1.3)	59 (1.2)
⁵ <i>Netherlands</i>	. .	r 39 (1.9)	. .	22 (1.4)	36 (1.7)
New Zealand	55 (1.1)	. .	. .	. .	. .
Norway	47 (1.1)	. .	. .	. .	. .
⁶ Portugal	. .	55 (1.2)	. .	. .	49 (1.1)
<i>Romania</i>	. .	59 (1.3)	55 (1.4)	57 (1.4)	57 (1.2)
Russian Federation	. .	45 (1.1)	46 (0.9)	44 (1.2)	55 (0.9)
<i>Scotland</i>	65 (1.1)	. .	. .	. .	. .
Singapore	71 (1.4)	. .	. .	. .	. .
Slovak Republic	. .	36 (1.2)	31 (1.0)	34 (1.0)	42 (1.2)
<i>Slovenia</i>	. .	37 (1.4)	38 (1.4)	. .	45 (1.4)
Spain	65 (1.0)	. .	. .	. .	. .
Sweden	. .	36 (1.2)	s 38 (1.5)	r 47 (1.1)	r 45 (1.1)
Switzerland	33 (0.9)	. .	. .	. .	. .
<i>Thailand</i>	94 (0.5)	. .	. .	. .	. .
United States	65 (0.9)	. .	. .	. .	. .

¹Countries administered either an integrated science or separate subject area form of the questionnaire. A dot (.) denotes questions not administered by design. Percentages for separate science subject areas are based only on those students taking each subject.

²Data for Belgium (Fr) are reported for students in both integrated science classes and separate biology and physics classes.

³Physics data for Denmark are for students taking physics/chemistry classes.

⁴Biology data for France are for students taking biology/geology classes; physics data are for students taking physics/chemistry classes.

⁵Physics data for the Netherlands include students in both physics classes and physics/chemistry classes.

⁶Biology data for Portugal are for students taking natural science classes; physics data are for students taking physical science classes.

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

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

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom

sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

An "r" indicates a 70-84% student response rate. An "s" indicates a 50-69% student response rate. An "x" indicates a <50% student response rate.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Table 4.14**Students' Perceptions About the Need to Do Well in the Sciences to Get Into Their Preferred University or Secondary School¹ - Upper Grade (Eighth Grade*)**

Country	Percent of Students Responding Agree or Strongly Agree				
	Science (Integrated)	Science Subject Areas			
		Biology	Chemistry	Earth Science	Physics
<i>Australia</i>	59 (1.0)	. .	. .	. .	. .
<i>Austria</i>	48 (1.5)	. .	. .	. .	. .
Belgium (Fl)	. .	38 (1.5)	. .	28 (1.2)	x x
² <i>Belgium (Fr)</i>	s 59 (2.6)	x x	. .	. .	x x
Canada	81 (0.9)	. .	. .	. .	. .
<i>Colombia</i>	87 (0.8)	. .	. .	. .	. .
Cyprus	68 (1.1)	. .	. .	. .	. .
Czech Republic	. .	57 (1.1)	57 (1.3)	55 (1.2)	61 (1.5)
³ <i>Denmark</i>	. .	49 (1.4)	. .	r 55 (1.5)	59 (1.5)
England	75 (1.2)	. .	. .	. .	. .
⁴ France	. .	57 (1.1)	. .	. .	59 (1.1)
<i>Germany</i>	. .	36 (1.4)	s 35 (1.8)	. .	35 (1.3)
<i>Greece</i>	. .	. .	77 (1.1)	67 (0.9)	77 (0.6)
Hong Kong	74 (0.9)	. .	. .	. .	. .
Hungary	. .	63 (1.2)	61 (1.3)	61 (1.2)	63 (1.4)
Iceland	. .	76 (1.6)	x x	x x	s 70 (1.7)
Iran, Islamic Rep.	93 (0.5)	. .	. .	. .	. .
Ireland	66 (1.3)	. .	. .	. .	. .
<i>Israel</i>	83 (1.2)	. .	. .	. .	. .
Japan	86 (0.8)	. .	. .	. .	. .
Korea	80 (0.8)	. .	. .	. .	. .
<i>Kuwait</i>	86 (1.1)	. .	. .	. .	. .
Latvia (LSS)	. .	69 (1.2)	70 (1.2)	. .	71 (1.1)
Lithuania	. .	57 (1.2)	57 (1.3)	59 (1.0)	61 (1.3)
⁵ <i>Netherlands</i>	. .	r 47 (1.5)	. .	29 (1.4)	42 (1.9)
New Zealand	60 (1.0)	. .	. .	. .	. .
Norway	64 (1.0)	. .	. .	. .	. .
⁶ Portugal	. .	71 (1.0)	. .	. .	65 (1.2)
<i>Romania</i>	. .	64 (1.2)	61 (1.2)	61 (1.3)	60 (1.2)
Russian Federation	. .	62 (1.1)	64 (1.0)	59 (1.1)	67 (0.9)
<i>Scotland</i>	71 (1.2)	. .	. .	. .	. .
Singapore	93 (0.5)	. .	. .	. .	. .
Slovak Republic	. .	49 (1.2)	44 (1.2)	43 (1.1)	52 (1.0)
<i>Slovenia</i>	. .	55 (1.3)	54 (1.5)	. .	58 (1.3)
Spain	78 (0.8)	. .	. .	. .	. .
Sweden	. .	54 (1.1)	s 53 (1.1)	r 58 (0.9)	r 56 (0.9)
Switzerland	43 (0.9)	. .	. .	. .	. .
<i>Thailand</i>	97 (0.4)	. .	. .	. .	. .
United States	89 (0.6)	. .	. .	. .	. .

¹Countries administered either an integrated science or separate subject area form of the questionnaire. A dot (.) denotes questions not administered by design. Percentages for separate science subject areas are based only on those students taking each subject.

²Data for Belgium (Fr) are reported for students in both integrated science classes and separate biology and physics classes.

³Physics data for Denmark are for students taking physics/chemistry classes.

⁴Biology data for France are for students taking biology/geology classes; physics data are for students taking physics/chemistry classes.

⁵Physics data for the Netherlands include students in both physics classes and physics/chemistry classes.

⁶Biology data for Portugal are for students taking natural science classes; physics data are for students taking physical science classes.

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

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

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

An "r" indicates a 70-84% student response rate. An "s" indicates a 50-69% student response rate. An "x" indicates a <50% student response rate.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Table 4.15**Students' Perceptions About the Need to Do Well in the Sciences to Please Their Parents¹ - Upper Grade (Eighth Grade*)**

Country	Percent of Students Responding Agree or Strongly Agree				
	Science (Integrated)	Science Subject Areas			
		Biology	Chemistry	Earth Science	Physics
<i>Australia</i>	66 (0.8)	. .	. .	. .	. .
<i>Austria</i>	48 (1.3)	. .	. .	. .	. .
Belgium (Fl)	. .	66 (1.0)	. .	67 (1.1)	x x
² <i>Belgium (Fr)</i>	s 73 (2.1)	x x	. .	. .	x x
Canada	63 (1.3)	. .	. .	. .	. .
<i>Colombia</i>	75 (1.4)	. .	. .	. .	. .
Cyprus	65 (1.1)	. .	. .	. .	. .
Czech Republic	. .	80 (1.1)	81 (1.1)	82 (1.1)	83 (1.0)
³ <i>Denmark</i>	. .	27 (1.4)	. .	30 (1.5)	30 (1.4)
England	63 (1.4)	. .	. .	. .	. .
⁴ France	. .	48 (1.3)	. .	. .	52 (1.3)
<i>Germany</i>	. .	41 (1.3)	s 48 (1.5)	. .	46 (1.2)
<i>Greece</i>	. .	. .	73 (0.9)	74 (0.9)	76 (0.8)
Hong Kong	56 (1.0)	. .	. .	. .	. .
Hungary	. .	41 (1.1)	41 (1.1)	43 (1.2)	46 (1.2)
Iceland	. .	37 (1.7)	x x	x x	s 38 (1.9)
Iran, Islamic Rep.	95 (0.6)	. .	. .	. .	. .
Ireland	56 (1.0)	. .	. .	. .	. .
<i>Israel</i>	47 (2.1)	. .	. .	. .	. .
Japan	33 (0.8)	. .	. .	. .	. .
Korea	53 (1.2)	. .	. .	. .	. .
<i>Kuwait</i>	93 (0.9)	. .	. .	. .	. .
Latvia (LSS)	. .	71 (1.3)	77 (1.1)	. .	77 (1.2)
Lithuania	. .	36 (1.4)	39 (1.3)	41 (1.2)	45 (1.4)
⁵ <i>Netherlands</i>	. .	r 49 (2.0)	. .	50 (1.7)	52 (1.8)
New Zealand	61 (0.9)	. .	. .	. .	. .
Norway	48 (1.1)	. .	. .	. .	. .
⁶ Portugal	. .	64 (1.2)	. .	. .	63 (1.2)
<i>Romania</i>	. .	61 (1.4)	62 (1.4)	62 (1.3)	63 (1.2)
Russian Federation	. .	62 (1.1)	63 (1.3)	64 (1.3)	67 (1.4)
<i>Scotland</i>	60 (1.2)	. .	. .	. .	. .
Singapore	68 (1.0)	. .	. .	. .	. .
Slovak Republic	. .	64 (1.2)	64 (1.1)	68 (1.2)	68 (1.2)
<i>Slovenia</i>	. .	33 (1.3)	33 (1.4)	. .	37 (1.3)
Spain	83 (0.9)	. .	. .	. .	. .
Sweden	. .	40 (1.2)	s 42 (1.4)	r 46 (1.3)	r 44 (1.2)
Switzerland	42 (1.1)	. .	. .	. .	. .
<i>Thailand</i>	98 (0.2)	. .	. .	. .	. .
United States	79 (0.7)	. .	. .	. .	. .

¹Countries administered either an integrated science or separate subject area form of the questionnaire. A dot (.) denotes questions not administered by design. Percentages for separate science subject areas are based only on those students taking each subject.

²Data for Belgium (Fr) are reported for students in both integrated science classes and separate biology and physics classes.

³Physics data for Denmark are for students taking physics/chemistry classes.

⁴Biology data for France are for students taking biology/geology classes; physics data are for students taking physics/chemistry classes.

⁵Physics data for the Netherlands include students in both physics classes and physics/chemistry classes.

⁶Biology data for Portugal are for students taking natural science classes; physics data are for students taking physical science classes.

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

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

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

An "r" indicates a 70-84% student response rate. An "s" indicates a 50-69% student response rate. An "x" indicates a <50% student response rate.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

WHAT ARE STUDENTS' ATTITUDES TOWARDS THE SCIENCES?

To collect information on eighth-grade students' perceptions of the sciences, TIMSS asked them a series of questions about the utility, importance, and enjoyability of science and science subject areas. Students' perceptions about the value of learning the sciences may be considered as both an input and outcome variable, because their attitudes towards science subjects can be related to educational achievement in ways that reinforce higher or lower performance. That is, students who do well in the sciences generally have more positive attitudes towards the science subjects, and those who have more positive attitudes tend to perform better.

Table 4.16 summarizes students' responses to the questions about how much they like or dislike science or the separate science subject areas of biological science, earth science, and physical science. Even though the majority of eighth-graders in nearly every country indicated they liked science or liked science a lot, clearly not all students feel equally positive about these subject areas. For example, 60% or fewer of students reported that they liked integrated science in Australia (60%), Israel (59%), Japan (56%), and Korea (59%). For biology, this was the case only in Denmark (52%). Fewer than 60% of the students reported liking earth science in 7 out of 13 countries. For physics, the figures fell below 60% in 10 out of 18 countries. More than 80% of students reported liking science (integrated) in several countries, including Colombia, Iran, Kuwait, Singapore, and Thailand. Similarly, more than 80% of the students in Latvia (LSS), Portugal, and the Russian Federation reported liking biology. More eighth-grade students internationally reported liking biological science than either earth science or physical science. For example, the percent of students agreeing or strongly agreeing that they liked biological science ranged from 52% in Denmark to 90% in Portugal, whereas the range in physical science was from 44% in the Czech Republic to 81% in Portugal. In Denmark, fewer than 60% of students reported liking any of the three science subject areas.

The data in Figure 4.3 reveal that, on average, in the majority of countries eighth-graders of both genders were relatively neutral about liking the sciences. There was, however, more variation in the average response across countries asking about integrated science than across those asking about the separate science subject areas. Boys reported liking science (integrated) more than did girls in England, Hong Kong, Japan, New Zealand, Norway, and Singapore.

Across the separate science subject areas, the greatest number of statistically significant gender differences were found in physical science, with boys liking physical science more than girls did. In contrast, in all countries, girls reported liking biological science at least as much as did boys. In fact, the only statistically significant gender differences in liking biological science favored girls in Austria, Hungary, and Slovenia. These differences in students' reports of liking science subjects correspond with the relative performance of boys and girls on the life science and physical science content areas on the TIMSS test, with the majority of statistically significant gender differences in performance favoring boys on the physics and chemistry items (Table 2.4).

Table 4.16**Students' Reports About Liking the Sciences¹
Upper Grade (Eighth Grade*)**

Country	Percent of Students Responding Like or Like a Lot			
	Science (Integrated)	Science Subject Areas		
		Biological Science	Earth Science	Physical Science
<i>Australia</i>	60 (1.2)	. .	. .	. .
<i>Austria</i>	. .	70 (1.7)	55 (2.0)	49 (2.0)
Belgium (Fl)	. .	68 (2.0)	53 (2.2)	s 54 (2.3)
Belgium (Fr)	s 71 (2.2)	. .	. .	. .
Canada	68 (1.3)	. .	. .	. .
<i>Colombia</i>	87 (0.9)	. .	. .	. .
Cyprus	70 (1.3)	. .	. .	. .
Czech Republic	. .	65 (2.4)	65 (2.3)	44 (1.6)
<i>Denmark</i>	. .	52 (2.1)	51 (1.9)	56 (1.7)
England	78 (1.1)	. .	. .	. .
² France	. .	67 (1.7)	. .	65 (2.1)
<i>Germany</i>	. .	65 (1.5)	55 (1.5)	49 (1.5)
<i>Greece</i>	. .	. .	. .	76 (1.0)
Hong Kong	69 (1.5)	. .	. .	. .
Hungary	. .	73 (1.4)	63 (1.5)	49 (1.3)
Iceland	. .	72 (2.8)	r 53 (2.2)	59 (2.3)
Iran, Islamic Rep.	93 (0.8)	. .	. .	. .
Ireland	67 (1.6)	. .	. .	. .
<i>Israel</i>	59 (2.0)	. .	. .	. .
Japan	56 (1.1)	. .	. .	. .
Korea	59 (1.5)	. .	. .	. .
<i>Kuwait</i>	89 (1.2)	. .	. .	. .
Latvia (LSS)	. .	81 (1.3)	. .	74 (1.3)
Lithuania	. .	77 (1.2)	56 (1.4)	55 (1.6)
<i>Netherlands</i>	. .	r 72 (1.9)	55 (2.6)	57 (2.2)
New Zealand	68 (1.2)	. .	. .	. .
Norway	67 (1.6)	. .	. .	. .
³ Portugal	. .	90 (0.8)	. .	81 (1.3)
<i>Romania</i>	. .	76 (1.2)	75 (1.1)	65 (1.4)
Russian Federation	. .	85 (1.0)	70 (1.3)	71 (1.4)
Scotland	78 (1.3)	. .	. .	. .
Singapore	92 (0.6)	. .	. .	. .
Slovak Republic	. .	69 (1.4)	72 (1.4)	51 (1.7)
<i>Slovenia</i>	. .	74 (1.7)	. .	66 (1.4)
Spain	73 (1.3)	. .	. .	. .
Sweden	. .	61 (1.4)	66 (1.3)	63 (1.3)
Switzerland	67 (1.5)	. .	. .	. .
<i>Thailand</i>	90 (0.7)	. .	. .	. .
United States	71 (1.1)	. .	. .	. .

¹Countries administered either an integrated science or separate subject area form of the questionnaire. A dot (.) denotes questions not administered by design. Percentages for separate science subject areas are based only on those students taking each subject.

²Biological science data for France are for students taking biology/geology classes.

³Biological science data for Portugal are for students taking natural science classes.

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

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

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

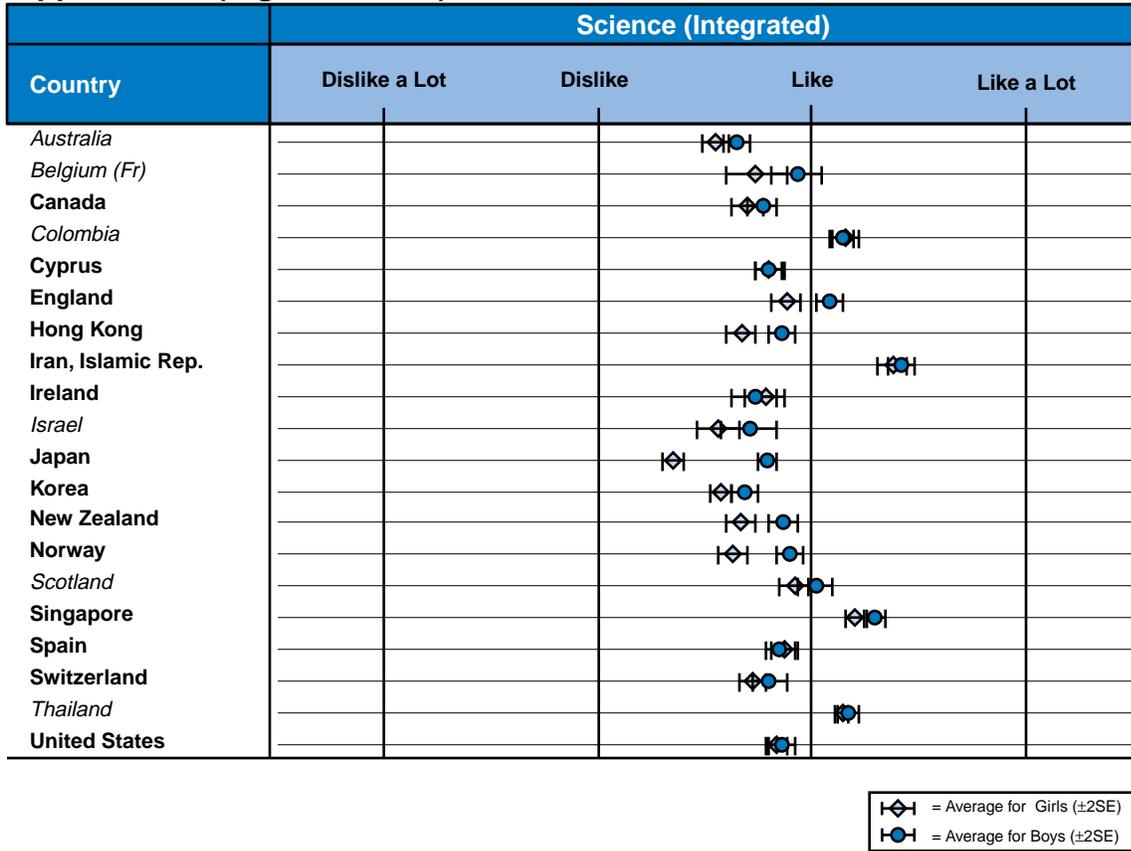
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

An "r" indicates a 70-84% student response rate. An "s" indicates a 50-69% student response rate.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Figure 4.3

**Gender Differences in Liking the Sciences¹
Upper Grade (Eighth Grade*)**



¹Countries administered either an integrated science or separate subject area form of the questionnaire. Percentages for separate science subject areas are based only on those students taking each subject.

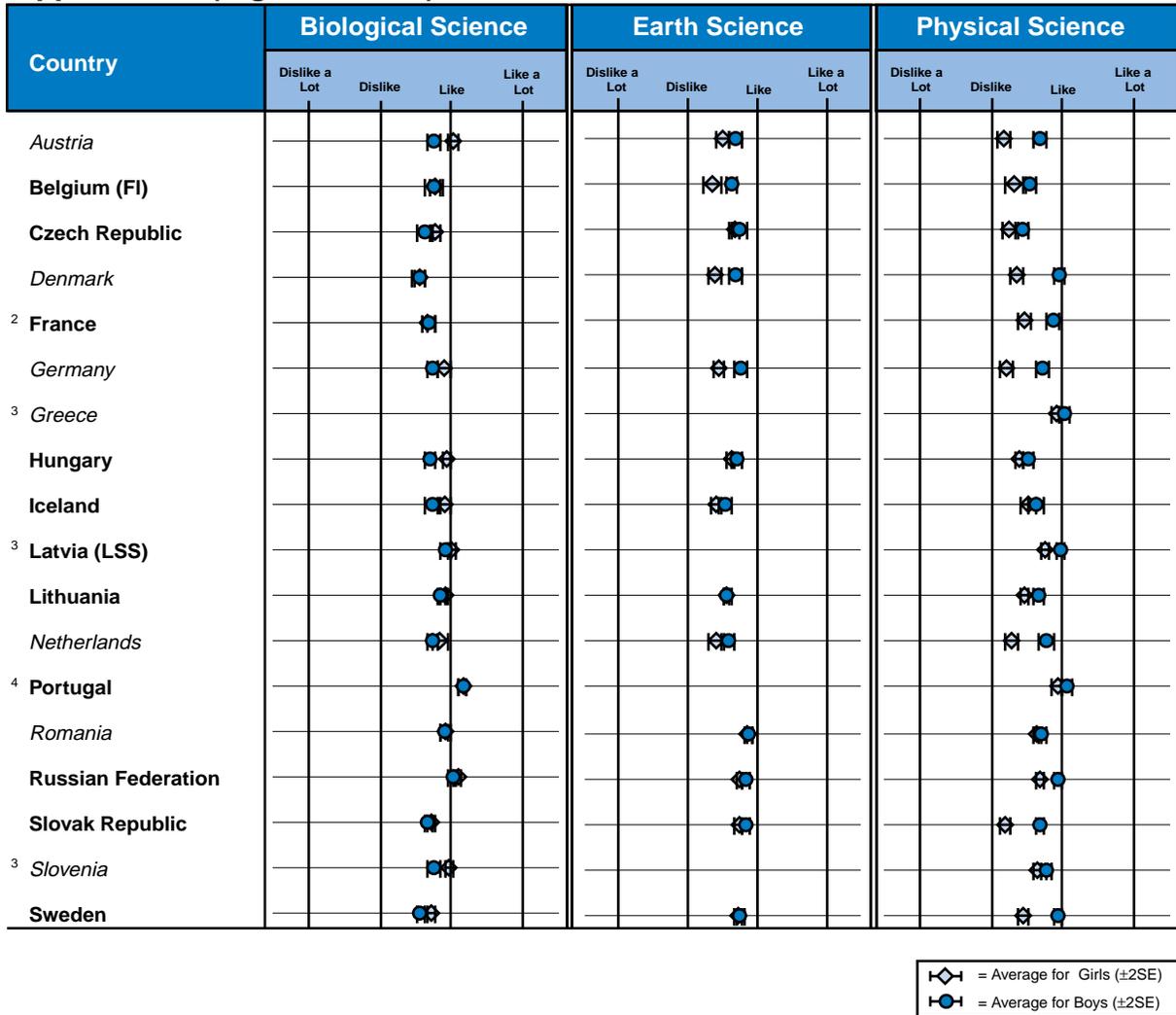
*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Figure 4.3 (Continued)
Gender Differences in Liking the Sciences¹
Upper Grade (Eighth Grade*)



¹Countries administered either an integrated science or separate subject area form of the questionnaire. Percentages for separate science subject areas are based only on those students taking each subject.

²Biological science data for France are for students taking biology/geology classes.

³Greece, Latvia, and Slovenia did not ask about all three science subjects.

⁴Biological science data for Portugal are for students taking natural science classes.

*Eighth grade in most countries; see Table 2 for more information about the grades tested in each country.

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3). Background data for Bulgaria and South Africa are unavailable.

Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.