

# Chapter 4

## STUDENTS' BACKGROUNDS AND ATTITUDES TOWARDS 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 fourth-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. Specifically, these questions asked students to express their opinions about the abilities necessary for success in science and indicate their attitudes towards the subject.

### 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, fourth-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 most countries, a high percentage (80% or more) of 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. For the three study aids, the greatest variation was in the number of fourth-grade students reporting having a home computer. In more than one-third of the countries, the majority of students reported having a computer in the home, including the 80% or more who so reported in England, Iceland, the Netherlands, and Scotland. It is possible that these percentages include computers used for entertainment purposes, such as computer games. In most countries, however, including these four, the reports of fourth graders were quite consistent with those of their eighth-grade counterparts in TIMSS.<sup>1</sup>

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

<sup>1</sup> Beaton, A.E., Martin, M.O., Mullis, I.V.S., Gonzalez, E.J., Smith, T.A., and Kelly, D.L. (1996). *Science Achievement in the Middle School Years: The IEA's Third International Mathematics and Science Study (TIMSS)*. Chestnut Hill, MA: Boston College.

**Table 4.1****Students' Reports on Educational Aids in the Home: Dictionary, Study Desk/Table and Computer - Science - Upper Grade (Fourth 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>	50 (1.0)	578 (3.1)	50 (1.0)	547 (3.8)	78 (1.0)	93 (0.6)	63 (1.1)
<i>Austria</i>	50 (1.4)	565 (3.3)	50 (1.4)	565 (4.0)	95 (0.6)	82 (1.2)	61 (1.5)
<b>Canada</b>	41 (1.2)	574 (3.7)	59 (1.2)	532 (3.0)	85 (0.8)	78 (1.0)	52 (1.1)
<b>Cyprus</b>	29 (1.0)	487 (3.7)	71 (1.0)	474 (3.5)	84 (0.8)	89 (0.7)	35 (1.0)
<b>Czech Republic</b>	25 (1.2)	580 (4.8)	75 (1.2)	550 (2.9)	82 (1.0)	78 (0.9)	33 (1.3)
<b>England</b>	68 (1.3)	564 (3.5)	32 (1.3)	525 (4.3)	93 (0.6)	80 (1.0)	88 (0.9)
<b>Greece</b>	20 (1.0)	510 (4.5)	80 (1.0)	500 (3.7)	90 (0.9)	88 (1.0)	23 (1.1)
<b>Hong Kong</b>	31 (1.1)	541 (4.1)	69 (1.1)	530 (4.0)	98 (0.3)	75 (1.2)	37 (1.2)
<i>Hungary</i>	28 (1.4)	564 (4.3)	72 (1.4)	520 (3.3)	69 (1.3)	87 (0.8)	37 (1.4)
<b>Iceland</b>	60 (1.6)	517 (3.8)	40 (1.6)	492 (3.9)	79 (1.3)	92 (0.6)	81 (1.1)
<b>Iran, Islamic Rep.</b>	r 3 (0.5)	422 (9.4)	97 (0.5)	425 (4.1)	r 39 (2.0)	r 34 (2.1)	r 8 (0.8)
<b>Ireland</b>	58 (1.2)	552 (3.4)	42 (1.2)	525 (4.1)	95 (0.5)	74 (1.1)	79 (0.9)
<i>Israel</i>	r 67 (2.0)	512 (4.3)	33 (2.0)	499 (5.6)	r 97 (0.6)	r 95 (0.6)	r 70 (1.9)
<b>Japan</b>	- -	- -	- -	- -	- -	- -	- -
<b>Korea</b>	22 (1.0)	612 (3.2)	78 (1.0)	593 (1.9)	93 (0.6)	91 (0.7)	23 (1.0)
<i>Kuwait</i>	40 (1.6)	420 (3.7)	60 (1.6)	392 (3.2)	70 (1.2)	75 (1.4)	66 (1.3)
<i>Latvia (LSS)</i>	18 (1.2)	513 (7.2)	82 (1.2)	513 (5.4)	84 (1.0)	95 (0.6)	21 (1.3)
<i>Netherlands</i>	69 (1.3)	568 (3.3)	31 (1.3)	540 (4.0)	88 (0.8)	95 (0.7)	80 (1.2)
<b>New Zealand</b>	43 (1.3)	555 (4.1)	57 (1.3)	517 (6.2)	93 (0.7)	78 (1.4)	53 (1.5)
<b>Norway</b>	44 (1.4)	550 (3.7)	56 (1.4)	518 (3.8)	76 (1.2)	92 (0.8)	56 (1.3)
<b>Portugal</b>	26 (1.4)	502 (4.4)	74 (1.4)	474 (4.4)	89 (1.1)	64 (1.5)	34 (1.7)
<b>Scotland</b>	64 (1.1)	549 (4.0)	36 (1.1)	516 (4.8)	91 (0.9)	75 (1.1)	89 (0.6)
<b>Singapore</b>	40 (1.3)	575 (5.9)	60 (1.3)	528 (4.2)	96 (0.3)	89 (0.5)	44 (1.3)
<i>Slovenia</i>	36 (1.4)	561 (3.7)	64 (1.4)	538 (3.7)	82 (1.0)	87 (0.9)	43 (1.3)
<i>Thailand</i>	1 (0.5)	~ ~	99 (0.5)	471 (4.6)	35 (2.6)	33 (2.2)	3 (0.6)
<b>United States</b>	49 (1.5)	587 (3.5)	51 (1.5)	546 (3.5)	93 (0.5)	85 (0.7)	56 (1.6)

\*Fourth 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).

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.

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

the 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 fourth-grade students' reports about the number of books in their homes. In Hong Kong, Iran, Kuwait, Portugal, 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 and Latvia (LSS) reported more than 200 books in their homes. The number of books in the home reported by fourth-grade students in most countries agreed well with the number reported by their compatriots in eighth grade,<sup>2</sup> although there was a tendency for fourth-grade students to report a lower number than eighth-grade students in some countries, notably Iran, Portugal, and Thailand.

Students who speak a language at home that is different from the language of the school may sometimes be at a disadvantage in learning situations, particularly in the early grades of school. Table 4.3 presents fourth-grade students' reports of the frequency with which they speak the language of the TIMSS science test at home. In almost all of the countries, with the exception of Iran, Kuwait, Singapore, and Thailand, most students reported that they always or almost always speak the language of the test at home. Most certainly, these relatively high percentages reflect the effort expended by the participating countries to test in more than one language when necessary. However, in some countries, such as Iran, Kuwait, and Thailand, testing in all possible dialects and languages was prohibitive. Interestingly, all students in Singapore were tested in English, even though for most them, English is only sometimes (71%) or never (9%) spoken in the home. In most of the countries, students tested in the language almost always spoken in the home had higher science achievement than their counterparts who reported speaking the language of the test only sometimes or never.

Table 4.4 presents information about whether students' parents were born in the country. In about half the participating countries, 80% or more of the fourth graders reported that both their parents were born in that country. In Australia, Canada, Hong Kong, Israel, New Zealand, and Singapore, 30% or more of the students reported that at least one parent not born in the country. The patterns in relation to achievement varied substantially from country to country. In several countries, there was no relationship between the number of the students' parents born in the country and science achievement (e.g., Hong Kong, Israel, and Singapore). In about one-quarter of the countries, students having both parents born in the country had the highest achievement and, in turn, those with one parent born in the country outperformed their counterparts with neither parent born in the country (e.g., Austria, Canada, Cyprus, England, Greece, and the United States).

<sup>2</sup> Beaton, A.E., Martin, M.O., Mullis, I.V.S., Gonzalez, E.J., Smith, T.A., and Kelly, D.L. (1996). *Science Achievement in the Middle School Years: The IEA's Third International Mathematics and Science Study (TIMSS)*. Chestnut Hill, MA: Boston College.

**Table 4.2****Students' Reports on the Number of Books in the Home Science - Upper Grade (Fourth 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 Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
<i>Australia</i>	3 (0.4)	476 (10.2)	7 (0.4)	512 (6.3)	23 (0.7)	556 (3.2)	24 (0.6)	567 (3.9)	44 (1.0)	581 (3.0)
<i>Austria</i>	9 (0.8)	506 (7.0)	17 (0.9)	538 (4.9)	35 (1.7)	570 (6.1)	18 (1.2)	583 (4.5)	21 (1.5)	595 (3.7)
<b>Canada</b>	5 (0.6)	470 (8.7)	13 (1.0)	524 (7.8)	29 (0.9)	549 (3.5)	20 (0.6)	568 (3.5)	33 (1.3)	565 (3.2)
<b>Cyprus</b>	11 (0.7)	453 (5.3)	26 (1.2)	472 (3.9)	28 (1.2)	490 (4.1)	16 (0.9)	496 (4.3)	19 (1.0)	495 (4.4)
<b>Czech Republic</b>	2 (0.3)	~ ~	10 (0.7)	520 (5.5)	38 (1.3)	547 (3.1)	25 (1.0)	566 (3.7)	25 (1.2)	587 (5.2)
<b>England</b>	7 (0.6)	474 (5.8)	13 (0.9)	505 (5.7)	26 (1.0)	542 (3.8)	23 (1.0)	569 (5.0)	31 (1.2)	586 (4.1)
<b>Greece</b>	r 11 (1.2)	465 (7.7)	27 (1.2)	496 (4.5)	36 (1.3)	521 (2.9)	15 (1.0)	529 (8.0)	12 (0.8)	532 (8.4)
<b>Hong Kong</b>	23 (1.2)	511 (4.5)	27 (0.9)	530 (3.9)	28 (1.2)	550 (3.8)	11 (0.7)	548 (4.8)	11 (1.0)	548 (5.1)
<i>Hungary</i>	5 (0.6)	484 (9.2)	11 (0.7)	492 (5.8)	30 (1.3)	525 (3.4)	19 (0.8)	547 (4.7)	35 (1.6)	562 (3.6)
<b>Iceland</b>	2 (0.4)	~ ~	12 (0.9)	476 (6.7)	30 (1.1)	502 (4.8)	24 (1.3)	513 (3.9)	33 (1.0)	524 (4.6)
<b>Iran, Islamic Rep.</b>	54 (2.4)	405 (3.8)	24 (1.6)	440 (3.8)	11 (1.1)	442 (8.4)	3 (0.4)	450 (8.3)	7 (0.8)	454 (9.4)
<b>Ireland</b>	9 (0.8)	477 (6.5)	19 (1.1)	515 (4.8)	30 (0.9)	545 (4.0)	20 (1.0)	567 (4.2)	23 (1.2)	568 (4.2)
<b>Israel</b>	r 6 (0.6)	491 (10.1)	18 (1.5)	498 (6.3)	36 (1.2)	511 (4.4)	19 (1.2)	517 (5.8)	20 (1.3)	510 (6.4)
<b>Japan</b>	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
<b>Korea</b>	11 (0.6)	558 (4.4)	11 (0.6)	572 (3.7)	32 (1.0)	595 (2.5)	25 (0.8)	608 (3.0)	22 (0.9)	620 (2.8)
<i>Kuwait</i>	27 (1.4)	385 (2.7)	24 (1.0)	399 (3.4)	22 (1.2)	411 (4.7)	9 (0.6)	430 (4.9)	17 (1.2)	434 (5.8)
<i>Latvia (LSS)</i>	4 (0.4)	461 (9.0)	8 (0.7)	491 (7.7)	25 (1.3)	518 (8.9)	21 (1.0)	525 (6.2)	42 (1.7)	524 (4.6)
<i>Netherlands</i>	6 (0.8)	506 (9.3)	13 (0.9)	532 (4.4)	33 (1.3)	553 (3.3)	23 (1.2)	574 (3.7)	25 (1.6)	578 (4.2)
<b>New Zealand</b>	7 (0.8)	438 (10.7)	9 (0.7)	476 (6.9)	22 (1.2)	532 (6.3)	23 (1.0)	554 (4.6)	39 (1.7)	558 (4.6)
<b>Norway</b>	3 (0.5)	469 (10.7)	10 (0.7)	486 (6.1)	27 (1.0)	522 (4.0)	23 (0.9)	540 (3.7)	37 (1.2)	555 (4.5)
<b>Portugal</b>	28 (1.9)	449 (5.8)	29 (1.3)	486 (3.7)	25 (1.3)	507 (3.4)	9 (0.8)	520 (4.9)	9 (1.1)	520 (6.9)
<b>Scotland</b>	10 (1.0)	459 (5.9)	15 (1.0)	501 (5.2)	25 (1.0)	536 (4.7)	20 (0.9)	556 (4.6)	31 (1.5)	575 (4.4)
<b>Singapore</b>	9 (0.6)	478 (4.0)	21 (0.9)	503 (5.1)	36 (0.8)	552 (4.0)	18 (0.8)	582 (6.0)	16 (1.1)	598 (7.4)
<i>Slovenia</i>	6 (0.8)	487 (10.5)	20 (1.2)	517 (4.1)	37 (1.2)	550 (3.0)	18 (0.9)	567 (4.4)	18 (1.3)	574 (5.2)
<i>Thailand</i>	47 (2.1)	456 (4.5)	28 (1.1)	474 (5.2)	17 (1.1)	494 (5.4)	4 (0.6)	513 (11.5)	4 (0.5)	506 (15.9)
<b>United States</b>	8 (0.6)	483 (5.9)	13 (0.7)	519 (4.3)	24 (0.7)	561 (3.2)	22 (0.6)	584 (3.3)	34 (1.2)	596 (3.5)

\*Fourth 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).

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

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

**Table 4.3****Students' Reports on Frequency with Which They Speak the Language of the Test at Home - Science - Upper Grade (Fourth Grade\*)**

Country	Never		Sometimes		Always or Almost Always	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
<i>Australia</i>	1 (0.2)	~ ~	9 (0.9)	518 (7.9)	89 (1.0)	568 (2.6)
<i>Austria</i>	3 (0.6)	520 (15.2)	14 (1.2)	491 (7.7)	83 (1.5)	575 (4.5)
<i>Canada</i>	1 (0.2)	~ ~	13 (1.2)	501 (5.1)	86 (1.2)	559 (2.7)
<i>Cyprus</i>	3 (0.4)	449 (9.5)	9 (0.8)	477 (6.2)	88 (0.9)	480 (3.1)
<i>Czech Republic</i>	1 (0.2)	~ ~	3 (0.5)	533 (11.0)	96 (0.5)	558 (3.2)
<b>England</b>	1 (0.2)	~ ~	6 (0.8)	503 (9.9)	93 (0.8)	554 (3.6)
<b>Greece</b>	r 2 (0.4)	~ ~	7 (0.7)	459 (8.8)	90 (0.9)	505 (3.5)
<b>Hong Kong</b>	- -	- -	- -	- -	- -	- -
<i>Hungary</i>	x x	x x	x x	x x	x x	x x
<i>Iceland</i>	1 (0.3)	~ ~	10 (0.9)	491 (8.7)	89 (1.0)	509 (3.4)
<b>Iran, Islamic Rep.</b>	23 (2.2)	383 (4.9)	22 (1.7)	409 (6.3)	54 (2.8)	437 (5.0)
<b>Ireland</b>	3 (0.3)	447 (6.5)	5 (0.6)	490 (8.8)	92 (0.8)	546 (3.2)
<i>Israel</i>	r 2 (0.3)	~ ~	15 (1.2)	504 (7.2)	83 (1.2)	509 (4.2)
<b>Japan</b>	- -	- -	- -	- -	- -	- -
<b>Korea</b>	1 (0.1)	~ ~	10 (0.7)	586 (4.2)	89 (0.7)	599 (2.0)
<i>Kuwait</i>	13 (1.5)	402 (4.8)	37 (2.2)	412 (4.2)	50 (2.4)	398 (4.9)
<i>Latvia (LSS)</i>	1 (0.3)	~ ~	7 (0.8)	478 (7.9)	92 (0.8)	516 (5.1)
<i>Netherlands</i>	5 (0.9)	546 (7.5)	11 (1.4)	524 (8.5)	84 (1.7)	565 (2.9)
<b>New Zealand</b>	2 (0.2)	~ ~	11 (1.0)	461 (7.7)	87 (1.1)	544 (4.8)
<b>Norway</b>	r 2 (0.3)	~ ~	8 (0.9)	485 (11.0)	90 (1.0)	535 (3.4)
<b>Portugal</b>	r 2 (0.3)	~ ~	4 (0.5)	476 (10.1)	94 (0.5)	482 (4.0)
<b>Scotland</b>	- -	- -	- -	- -	- -	- -
<b>Singapore</b>	9 (0.6)	486 (5.2)	71 (1.3)	538 (4.2)	20 (1.5)	607 (7.3)
<i>Slovenia</i>	1 (0.2)	~ ~	9 (0.9)	504 (5.4)	90 (1.0)	551 (3.6)
<i>Thailand</i>	11 (1.6)	439 (12.3)	29 (2.4)	464 (5.2)	60 (2.9)	482 (5.4)
<b>United States</b>	2 (0.2)	~ ~	13 (1.1)	513 (5.7)	85 (1.1)	576 (3.1)

\*Fourth 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).

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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 "x" indicates data available for <50% students.

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

**Table 4.4****Students' Reports on Whether or Not Their Parents Were Born in the Country - Science - Upper Grade (Fourth Grade\*)**

Country	Neither Parent Born in Country		One Parent Born in Country		Both Parents Born in Country	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
<i>Australia</i>	19 (1.2)	550 (5.9)	20 (0.9)	565 (4.6)	61 (1.1)	568 (2.7)
<i>Austria</i>	11 (0.9)	502 (10.1)	9 (0.7)	556 (6.5)	80 (1.2)	574 (2.8)
<b>Canada</b>	17 (1.5)	523 (5.3)	14 (0.5)	543 (4.7)	69 (1.6)	559 (3.1)
<b>Cyprus</b>	3 (0.4)	444 (9.2)	11 (0.8)	468 (5.7)	85 (0.9)	480 (3.3)
<b>Czech Republic</b>	2 (0.3)	~ ~	8 (0.6)	541 (5.7)	89 (0.7)	560 (3.1)
<b>England</b>	r 9 (1.2)	517 (8.4)	15 (0.9)	545 (5.9)	76 (1.8)	560 (3.7)
<b>Greece</b>	5 (0.6)	453 (8.9)	10 (0.9)	483 (9.3)	85 (1.0)	506 (3.4)
<b>Hong Kong</b>	38 (1.8)	535 (4.4)	21 (0.9)	537 (4.2)	41 (1.8)	531 (4.1)
<i>Hungary</i>	2 (0.3)	~ ~	3 (0.3)	515 (11.8)	95 (0.4)	534 (3.4)
<b>Iceland</b>	1 (0.2)	~ ~	6 (0.6)	512 (9.9)	93 (0.7)	507 (3.3)
<b>Iran, Islamic Rep.</b>	r 5 (0.7)	421 (5.7)	4 (0.4)	400 (7.1)	91 (0.8)	424 (4.2)
<b>Ireland</b>	2 (0.3)	~ ~	10 (0.7)	532 (6.0)	88 (0.8)	541 (3.3)
<i>Israel</i>	r 32 (2.2)	504 (5.2)	24 (1.2)	507 (5.8)	44 (1.9)	510 (4.5)
<b>Japan</b>	- -	- -	- -	- -	- -	- -
<b>Korea</b>	0 (0.1)	~ ~	1 (0.2)	~ ~	99 (0.2)	598 (1.8)
<i>Kuwait</i>	10 (0.7)	423 (8.1)	16 (0.7)	401 (3.6)	74 (1.1)	401 (3.2)
<i>Latvia (LSS)</i>	2 (0.3)	~ ~	16 (0.9)	503 (5.8)	82 (0.9)	516 (5.1)
<i>Netherlands</i>	r 8 (1.7)	500 (8.6)	6 (0.6)	552 (6.9)	86 (1.6)	565 (2.8)
<b>New Zealand</b>	11 (0.9)	512 (6.2)	21 (1.0)	538 (5.7)	68 (1.4)	534 (5.5)
<b>Norway</b>	4 (0.7)	476 (10.6)	7 (0.5)	528 (7.4)	89 (1.0)	534 (3.3)
<b>Portugal</b>	5 (0.6)	458 (10.8)	8 (0.6)	487 (7.1)	86 (0.9)	481 (3.9)
<b>Scotland</b>	9 (0.9)	564 (8.2)	19 (0.9)	540 (5.2)	72 (1.4)	533 (4.4)
<b>Singapore</b>	12 (0.6)	554 (5.4)	21 (0.5)	544 (5.7)	68 (0.7)	547 (5.2)
<i>Slovenia</i>	12 (1.2)	514 (4.3)	9 (0.6)	548 (6.2)	79 (1.4)	551 (3.7)
<i>Thailand</i>	2 (0.4)	~ ~	3 (0.3)	411 (11.4)	96 (0.6)	475 (4.5)
<b>United States</b>	12 (1.2)	514 (6.2)	10 (0.7)	544 (5.0)	78 (1.3)	577 (3.1)

\*Fourth 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).

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.

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

As shown in Table 4.5, most of the students reported having been born in the country in which they were tested. The largest percentages of students reporting that they had not been born in the country (from 10% to 18%) were in Cyprus, Hong Kong, Iceland, Israel, Kuwait, the Netherlands, New Zealand, and Scotland. For about half the countries, those students born elsewhere had lower average science achievement than their classmates born in the country.

**Table 4.5****Students' Reports on Whether or Not They Were Born in the Country  
Science - Upper Grade (Fourth Grade\*)**

Country	Yes		No	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
<i>Australia</i>	91 (0.9)	564 (2.9)	9 (0.9)	553 (6.2)
<i>Austria</i>	91 (1.3)	569 (2.7)	9 (1.3)	522 (23.0)
<b>Canada</b>	93 (0.7)	554 (2.8)	7 (0.7)	503 (8.4)
<b>Cyprus</b>	88 (0.9)	477 (3.1)	12 (0.9)	477 (6.1)
<b>Czech Republic</b>	98 (0.2)	557 (3.1)	2 (0.2)	~ ~
<b>England</b>	93 (0.7)	555 (3.3)	7 (0.7)	507 (8.7)
<b>Greece</b>	92 (0.6)	503 (3.4)	8 (0.6)	463 (6.9)
<b>Hong Kong</b>	82 (2.0)	536 (3.8)	18 (2.0)	521 (5.4)
<i>Hungary</i>	98 (0.3)	534 (3.4)	2 (0.3)	~ ~
<b>Iceland</b>	87 (2.3)	506 (2.9)	13 (2.3)	508 (11.0)
<b>Iran, Islamic Rep.</b>	92 (0.8)	422 (4.1)	8 (0.8)	378 (4.8)
<b>Ireland</b>	96 (0.5)	540 (3.4)	4 (0.5)	546 (10.0)
<i>Israel</i>	84 (1.5)	508 (4.1)	16 (1.5)	505 (7.0)
<b>Japan</b>	- -	- -	- -	- -
<b>Korea</b>	99 (0.2)	597 (1.8)	1 (0.2)	~ ~
<i>Kuwait</i>	87 (1.0)	402 (3.1)	13 (1.0)	399 (6.6)
<i>Latvia (LSS)</i>	97 (0.5)	515 (5.0)	3 (0.5)	461 (10.3)
<i>Netherlands</i>	89 (0.9)	564 (3.1)	11 (0.9)	521 (6.2)
<b>New Zealand</b>	90 (0.7)	533 (5.0)	10 (0.7)	519 (9.2)
<b>Norway</b>	96 (0.5)	532 (3.4)	4 (0.5)	492 (13.9)
<b>Portugal</b>	94 (0.6)	483 (3.6)	6 (0.6)	445 (13.8)
<b>Scotland</b>	90 (0.8)	535 (4.2)	10 (0.8)	549 (8.9)
<b>Singapore</b>	93 (0.6)	547 (5.1)	7 (0.6)	554 (6.6)
<i>Slovenia</i>	96 (0.5)	548 (3.4)	4 (0.5)	499 (8.6)
<i>Thailand</i>	100 (0.0)	472 (4.8)	0 (0.0)	~ ~
<b>United States</b>	93 (0.5)	571 (3.0)	7 (0.5)	502 (6.3)

\*Fourth 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).

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.

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



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

Tables 4.6, 4.7, and 4.8 present fourth-grade students' reports about how they themselves, their mothers, and their friends feel about the importance of doing well in mathematics and science in comparison with non-academic activities. 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 the Czech Republic (96%), Greece (96%), Hungary (97%), Iran (97%), and the United States (97%). Only Japan, Korea, and Thailand had less than 80% of students agreeing that it was important to do well in science. Compared with science, somewhat more students agreed or strongly agreed that it was important to do well in mathematics.

For the most part, fourth-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 a low of 62% in Japan to a high of 91% in Portugal. Countries where less than two-thirds of fourth graders reported that their friends agreed or strongly agreed it was important to do well in science included Israel (65%), Japan (62%), Korea (58%), and the Netherlands (54%).

Although students' friends reportedly were in general agreement about the importance of doing well in mathematics, the percentages were generally in the 70s and 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 Korea (59%).

For purposes of comparison, fourth-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, high percentages of the students (more than 90%) 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 science in many countries. Generally, there was less agreement about the importance of being good at sports. It needs to be emphasized, however, that the relative rankings given to the four activities by students varied from country to country. Interestingly, in both Hong Kong and Singapore there was much less agreement about the importance of having time to have fun than in other countries (58% and 57%, respectively). In Hong Kong and Thailand, only about two-thirds of students reported that they think it is important to do well in sports, compared with percentages in the 80s and 90s in most other countries.

In nearly all countries, 80% or more of the fourth-grade students reported that their mothers agreed that it was important to have time to have fun. The exceptions were Greece (75%), Hong Kong (31%), Iran (76%), Korea (66%), Kuwait (71%), Singapore (46%), and Thailand (76%), where students reported from 4% to 27% 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 Hong Kong (36%), Korea (67%), Thailand (57%), and the United States (69%).

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 Cyprus (79%), Greece (82%), Hong Kong (65%), Iran (76%), Israel (76%), Korea (78%), Kuwait (75%), Thailand (84%), and Singapore (65%). Internationally, fourth graders reported that their friends generally were in moderate agreement that it was important to do well in sports.

**Table 4.6****Students' Reports on Whether They Think It Is Important to Do Various Activities - Science - Upper Grade (Fourth Grade\*)**

Country	Percent of Students Responding Yes			
	Do Well in Science	Do Well in Mathematics	Have Time to Have Fun	Be Good at Sports
<i>Australia</i>	91 (0.8)	95 (0.4)	95 (0.4)	88 (0.6)
<i>Austria</i>	94 (0.6)	95 (0.6)	92 (0.7)	87 (1.1)
<b>Canada</b>	95 (0.5)	97 (0.3)	96 (0.5)	83 (0.7)
<b>Cyprus</b>	93 (0.6)	97 (0.4)	85 (1.1)	88 (1.0)
<b>Czech Republic</b>	96 (0.4)	96 (0.4)	94 (0.5)	88 (0.8)
<b>England</b>	94 (0.6)	97 (0.4)	93 (0.5)	90 (0.7)
<b>Greece</b>	96 (0.6)	97 (0.4)	80 (1.2)	80 (1.0)
<b>Hong Kong</b>	90 (0.9)	96 (0.4)	58 (1.3)	63 (1.3)
<i>Hungary</i>	97 (0.3)	98 (0.3)	98 (0.3)	86 (0.8)
<b>Iceland</b>	87 (1.6)	96 (0.5)	91 (0.8)	93 (0.7)
<b>Iran, Islamic Rep.</b>	97 (0.5)	96 (0.5)	r 80 (1.7)	r 91 (1.1)
<b>Ireland</b>	90 (0.8)	97 (0.4)	96 (0.3)	90 (0.7)
<i>Israel</i>	r 94 (0.6)	r 97 (0.5)	r 94 (0.8)	r 92 (0.8)
<b>Japan</b>	72 (0.9)	75 (0.8)	94 (0.4)	75 (0.7)
<b>Korea</b>	69 (1.0)	72 (1.0)	73 (1.0)	73 (1.0)
<i>Kuwait</i>	95 (0.5)	96 (0.5)	75 (1.2)	80 (1.3)
<i>Latvia (LSS)</i>	93 (0.6)	96 (0.4)	92 (0.7)	88 (1.0)
<i>Netherlands</i>	84 (1.2)	93 (0.7)	r 93 (0.8)	86 (1.1)
<b>New Zealand</b>	90 (0.7)	96 (0.5)	95 (0.7)	91 (0.6)
<b>Norway</b>	91 (1.0)	94 (0.6)	97 (0.4)	80 (0.9)
<b>Portugal</b>	94 (0.7)	94 (0.6)	90 (0.9)	89 (1.0)
<b>Scotland</b>	93 (0.6)	97 (0.3)	94 (0.5)	92 (0.5)
<b>Singapore</b>	94 (0.4)	98 (0.2)	57 (1.6)	81 (0.9)
<i>Slovenia</i>	94 (0.6)	94 (0.6)	89 (0.7)	92 (0.6)
<i>Thailand</i>	79 (1.3)	80 (1.3)	81 (1.1)	67 (1.4)
<b>United States</b>	97 (0.3)	98 (0.3)	94 (0.4)	82 (0.8)

\*Fourth 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).

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 4.7**

**Students' Reports on Whether Their Mothers Think It Is Important to Do Various Activities - Science - Upper Grade (Fourth Grade\*)**

Country	Percent of Students Responding Yes			
	Do Well in Science	Do Well in Mathematics	Have Time to Have Fun	Be Good at Sports
<i>Australia</i>	91 (0.8)	96 (0.3)	92 (0.6)	82 (0.7)
<i>Austria</i>	93 (0.5)	96 (0.5)	88 (0.9)	74 (1.5)
<b>Canada</b>	95 (0.3)	98 (0.3)	92 (0.7)	74 (0.9)
<b>Cyprus</b>	91 (0.7)	96 (0.5)	80 (1.5)	80 (1.1)
<b>Czech Republic</b>	95 (0.5)	96 (0.5)	91 (0.7)	81 (0.9)
<b>England</b>	94 (0.6)	98 (0.3)	90 (0.8)	87 (0.9)
<b>Greece</b>	96 (0.4)	96 (0.5)	75 (1.4)	72 (1.3)
<b>Hong Kong</b>	80 (0.9)	95 (0.4)	31 (1.0)	36 (1.2)
<i>Hungary</i>	96 (0.4)	97 (0.4)	99 (0.2)	77 (1.0)
<b>Iceland</b>	88 (1.4)	98 (0.4)	83 (1.3)	90 (0.8)
<b>Iran, Islamic Rep.</b>	r 96 (0.6)	r 96 (0.7)	r 76 (1.7)	r 85 (1.3)
<b>Ireland</b>	91 (0.8)	98 (0.3)	95 (0.5)	84 (0.8)
<i>Israel</i>	r 93 (0.7)	r 97 (0.5)	r 88 (1.0)	r 76 (1.4)
<b>Japan</b>	- -	- -	- -	- -
<b>Korea</b>	64 (1.2)	70 (1.1)	66 (1.3)	67 (0.9)
<i>Kuwait</i>	94 (0.7)	94 (0.5)	71 (1.5)	71 (1.4)
<i>Latvia (LSS)</i>	92 (0.5)	95 (0.6)	85 (1.2)	80 (1.0)
<i>Netherlands</i>	78 (1.3)	92 (0.6)	85 (1.4)	72 (1.3)
<b>New Zealand</b>	90 (0.8)	95 (0.5)	92 (0.8)	87 (1.2)
<b>Norway</b>	94 (0.6)	96 (0.5)	96 (0.6)	73 (1.2)
<b>Portugal</b>	93 (0.8)	93 (0.6)	87 (1.0)	82 (1.1)
<b>Scotland</b>	93 (0.6)	98 (0.3)	93 (0.5)	87 (0.8)
<b>Singapore</b>	91 (0.6)	96 (0.4)	46 (1.4)	70 (1.1)
<i>Slovenia</i>	88 (0.9)	89 (0.8)	83 (0.9)	86 (0.9)
<i>Thailand</i>	79 (1.3)	79 (1.2)	76 (1.2)	57 (1.8)
<b>United States</b>	98 (0.2)	98 (0.2)	88 (0.8)	69 (0.8)

\*Fourth 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).

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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 4.8****Students' Reports on Whether Their Friends Think That It Is Important to Do Various Activities - Science - Upper Grade (Fourth Grade\*)**

Country	Percent of Students Responding Yes			
	Do Well in Science	Do Well in Mathematics	Have Time to Have Fun	Be Good at Sports
<i>Australia</i>	68 (0.9)	76 (0.8)	95 (0.4)	86 (0.5)
<i>Austria</i>	76 (1.6)	83 (1.4)	91 (0.8)	82 (1.2)
<b>Canada</b>	73 (1.0)	81 (0.8)	96 (0.4)	82 (0.7)
<b>Cyprus</b>	75 (1.4)	85 (0.8)	79 (1.1)	83 (0.9)
<b>Czech Republic</b>	85 (1.1)	88 (0.9)	93 (0.6)	84 (1.0)
<b>England</b>	71 (1.3)	78 (1.2)	93 (0.6)	88 (0.7)
<b>Greece</b>	90 (0.8)	93 (0.6)	82 (1.1)	76 (1.1)
<b>Hong Kong</b>	73 (1.2)	84 (1.2)	65 (1.0)	59 (1.0)
<i>Hungary</i>	80 (1.0)	84 (0.9)	94 (0.6)	80 (1.1)
<b>Iceland</b>	75 (1.9)	87 (1.0)	92 (0.9)	88 (0.9)
<b>Iran, Islamic Rep.</b>	87 (1.7)	r 87 (1.7)	r 76 (1.9)	r 83 (1.6)
<b>Ireland</b>	68 (1.6)	r 79 (1.2)	r 96 (0.4)	r 90 (0.6)
<i>Israel</i>	r 65 (1.5)	r 70 (1.5)	r 76 (1.2)	r 78 (0.9)
<b>Japan</b>	62 (0.9)	70 (0.7)	92 (0.4)	75 (0.7)
<b>Korea</b>	58 (1.0)	59 (1.1)	78 (1.1)	64 (0.9)
<i>Kuwait</i>	86 (1.2)	88 (1.0)	75 (1.4)	76 (1.2)
<i>Latvia (LSS)</i>	78 (1.2)	88 (1.0)	92 (0.6)	82 (1.2)
<i>Netherlands</i>	54 (2.1)	65 (2.0)	92 (0.7)	72 (1.5)
<b>New Zealand</b>	67 (1.3)	76 (1.2)	96 (0.6)	88 (0.9)
<b>Norway</b>	77 (1.4)	83 (1.3)	97 (0.5)	82 (1.0)
<b>Portugal</b>	91 (0.8)	91 (0.8)	93 (0.6)	88 (1.0)
<b>Scotland</b>	68 (1.2)	78 (1.0)	95 (0.5)	89 (0.8)
<b>Singapore</b>	87 (0.7)	94 (0.4)	65 (1.6)	81 (1.0)
<i>Slovenia</i>	86 (0.9)	89 (0.8)	90 (0.6)	91 (0.8)
<i>Thailand</i>	74 (1.5)	76 (1.4)	84 (1.1)	63 (1.4)
<b>United States</b>	69 (0.8)	72 (0.9)	95 (0.4)	83 (0.9)

\*Fourth 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).

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

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 4.9 presents fourth-grade students' reports about the amount of time they spend studying science or doing homework in science on a normal school day. Students in most countries reported spending between half an hour and an hour per day studying science. Fourth-graders in Australia, Iceland, Ireland, Japan, the Netherlands, New Zealand, Norway, and Scotland were at the lower end of the range, reporting an average of about one half hour or less per day (0.3 to 0.5 of an hour). Those in Greece, Hungary, Iran, Kuwait, Portugal, Singapore, and Slovenia reported one hour or more of science homework per day, on average, with Iran at more than two hours. More than half the students in Australia, Iceland, the Netherlands, New Zealand, Norway, and Scotland reported spending no time at all on science homework.

The relationship between time spent doing science homework and students' average science achievement was curvilinear in many countries, with the highest achievement being associated with a moderate amount of homework per day (up to one hour). This pattern suggests that, compared with 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 many countries, students doing up to one hour a day of homework had higher average science achievement than students spending no time on homework. The greatest differences were in Latvia(LSS), and Portugal. Students reporting more than one hour of homework had lower average science achievement in most countries. Only in Iran, Japan, and Korea did students reporting more than one hour of homework have average science achievement as high as those reporting less than one hour.

The students also were asked about a variety of other ways they could spend their time out of school. Fourth 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 4.10. 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 fourth-grade students in many countries reported spending nearly as much time each day watching television – an average of about two hours per day – as they did doing homework. Fourth graders in many countries also appear to spend about two 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

**Table 4.9**

**Students' Reports on the Amount of Out-of-School Time Spent Studying Science or Doing Science Homework on a Normal School Day**  
**Science - Upper Grade (Fourth Grade\*)**

Country	No Time		Less than 1 Hour		1 Hour or More		Average Hours <sup>1</sup>
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	
<i>Australia</i>	55 (1.3)	566 (3.3)	33 (1.3)	570 (3.5)	12 (0.8)	536 (7.1)	0.4 (0.02)
<i>Austria</i>	11 (1.8)	563 (6.7)	56 (1.8)	573 (4.4)	33 (1.7)	553 (4.1)	0.9 (0.03)
<b>Canada</b>	38 (1.7)	552 (3.7)	46 (1.3)	559 (3.6)	16 (1.1)	533 (4.9)	0.6 (0.03)
<b>Cyprus</b>	21 (1.2)	469 (4.9)	51 (1.9)	489 (3.4)	28 (1.5)	466 (3.7)	0.8 (0.03)
<b>Czech Republic</b>	15 (0.9)	555 (5.6)	68 (1.2)	562 (3.3)	17 (1.0)	549 (3.8)	0.6 (0.02)
<b>England</b>	--	--	--	--	--	--	--
<b>Greece</b>	8 (0.9)	475 (13.5)	46 (1.6)	510 (3.7)	47 (1.5)	499 (3.3)	1.3 (0.03)
<b>Hong Kong</b>	9 (1.0)	506 (4.9)	63 (1.7)	542 (3.5)	28 (1.1)	524 (4.7)	0.9 (0.02)
<i>Hungary</i>	10 (0.8)	504 (6.0)	51 (1.3)	543 (3.9)	39 (1.4)	529 (3.6)	1.0 (0.03)
<b>Iceland</b>	61 (2.0)	513 (4.3)	30 (1.6)	507 (4.9)	9 (0.8)	484 (9.1)	0.3 (0.02)
<b>Iran, Islamic Rep.</b>	5 (0.7)	392 (7.9)	23 (1.5)	430 (7.3)	72 (1.5)	429 (4.2)	2.1 (0.06)
<b>Ireland</b>	46 (2.1)	544 (3.5)	45 (2.0)	552 (4.3)	9 (0.6)	490 (5.8)	0.4 (0.02)
<sup>2</sup> <i>Israel</i>	r 23 (1.6)	507 (5.4)	47 (1.9)	515 (5.3)	30 (1.9)	492 (4.7)	r 0.9 (0.04)
<b>Japan</b>	41 (1.8)	566 (2.3)	48 (1.5)	580 (2.0)	11 (0.6)	584 (3.4)	0.4 (0.02)
<b>Korea</b>	26 (0.9)	589 (3.6)	46 (0.9)	600 (2.4)	28 (1.0)	604 (2.8)	0.8 (0.02)
<i>Kuwait</i>	6 (0.9)	376 (9.8)	38 (1.3)	414 (3.3)	57 (1.4)	400 (3.8)	1.8 (0.05)
<sup>2</sup> <i>Latvia (LSS)</i>	11 (1.0)	487 (6.5)	69 (1.6)	529 (6.1)	20 (1.3)	496 (5.8)	0.8 (0.03)
<i>Netherlands</i>	r 56 (3.3)	563 (3.5)	34 (2.7)	563 (4.2)	10 (1.3)	535 (6.0)	r 0.4 (0.03)
<b>New Zealand</b>	55 (1.7)	534 (6.5)	32 (1.6)	546 (5.2)	13 (0.9)	511 (6.9)	0.5 (0.02)
<b>Norway</b>	51 (1.8)	535 (3.7)	41 (1.7)	540 (4.6)	8 (0.8)	523 (7.4)	0.4 (0.02)
<b>Portugal</b>	4 (0.5)	428 (13.2)	53 (1.7)	493 (4.3)	43 (1.6)	475 (4.2)	1.3 (0.03)
<b>Scotland</b>	62 (1.8)	541 (4.8)	31 (1.8)	540 (4.8)	7 (0.7)	494 (10.3)	0.3 (0.02)
<b>Singapore</b>	--	--	--	--	--	--	--
<i>Slovenia</i>	4 (0.6)	510 (12.6)	56 (1.5)	553 (3.2)	40 (1.6)	545 (4.0)	1.0 (0.03)
<i>Thailand</i>	46 (1.9)	480 (4.1)	29 (1.3)	471 (5.7)	24 (1.6)	458 (8.2)	0.7 (0.03)
<b>United States</b>	23 (1.2)	558 (4.1)	54 (1.2)	582 (3.3)	24 (1.2)	542 (3.4)	0.8 (0.02)

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

<sup>1</sup> Average hours based on: No time = 0; Less than 1 hour = .5; 1-2 hours = 1.5; 3-4 hours = 3.5; More than 4 hours = 5.

<sup>2</sup> Modified response categories for Israel and Latvia: 3-5 hours = 4; More than 5 hours = 7.

( ) 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).

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 4.10****Students' Reports on How They Spend Their Leisure Time on a Normal School Day<sup>1</sup> - Science - Upper Grade (Fourth Grade\*)**

Country	Average Hours Watching Television or Videos	Average Hours Playing Computer Games	Average Hours Playing or Talking with Friends	Average Hours Doing Jobs at Home	Average Hours Playing Sports	Average Hours Reading a Book for Enjoyment
<i>Australia</i>	2.0 (0.05)	0.8 (0.02)	1.2 (0.03)	1.1 (0.02)	1.6 (0.03)	0.9 (0.02)
<i>Austria</i>	1.4 (0.04)	0.7 (0.03)	2.9 (0.06)	1.0 (0.04)	1.9 (0.05)	1.3 (0.05)
<b>Canada</b>	1.9 (0.04)	0.6 (0.02)	1.5 (0.04)	1.1 (0.03)	1.8 (0.03)	1.1 (0.03)
<b>Cyprus</b>	1.8 (0.05)	0.6 (0.03)	1.6 (0.05)	1.4 (0.04)	0.9 (0.04)	1.3 (0.04)
<b>Czech Republic</b>	1.7 (0.04)	0.6 (0.03)	2.4 (0.05)	1.2 (0.03)	1.6 (0.04)	1.0 (0.02)
<b>England</b>	2.2 (0.04)	1.2 (0.04)	1.5 (0.04)	0.9 (0.03)	1.7 (0.04)	1.0 (0.03)
<b>Greece</b>	1.3 (0.04)	0.7 (0.03)	1.2 (0.03)	1.3 (0.04)	1.8 (0.04)	1.6 (0.05)
<b>Hong Kong</b>	1.5 (0.04)	0.6 (0.03)	0.7 (0.03)	0.9 (0.02)	0.8 (0.02)	1.0 (0.02)
<i>Hungary</i>	2.3 (0.05)	0.9 (0.03)	1.9 (0.04)	1.8 (0.05)	1.7 (0.03)	1.3 (0.04)
<b>Iceland</b>	1.2 (0.04)	0.7 (0.03)	1.5 (0.06)	0.8 (0.04)	1.3 (0.04)	1.0 (0.03)
<b>Iran, Islamic Rep.</b>	r 1.3 (0.05)	0.3 (0.03)	r 1.1 (0.04)	r 1.7 (0.06)	r 1.2 (0.04)	r 1.3 (0.06)
<b>Ireland</b>	1.9 (0.05)	0.9 (0.04)	1.1 (0.04)	1.1 (0.03)	1.8 (0.04)	1.1 (0.03)
<sup>2</sup> <i>Israel</i>	r 2.5 (0.06)	r 1.1 (0.07)	r 1.8 (0.07)	r 1.3 (0.04)	r 2.1 (0.07)	r 1.4 (0.06)
<b>Japan</b>	1.9 (0.03)	0.8 (0.02)	1.4 (0.03)	0.8 (0.02)	1.3 (0.03)	0.9 (0.02)
<b>Korea</b>	1.5 (0.03)	0.3 (0.02)	1.0 (0.03)	0.7 (0.02)	0.7 (0.02)	1.0 (0.02)
<i>Kuwait</i>	1.4 (0.03)	1.1 (0.04)	1.0 (0.03)	1.4 (0.05)	1.7 (0.04)	1.3 (0.03)
<sup>2</sup> <i>Latvia (LSS)</i>	2.3 (0.07)	r 0.8 (0.06)	1.9 (0.06)	1.3 (0.05)	1.2 (0.05)	1.3 (0.05)
<i>Netherlands</i>	1.7 (0.06)	0.9 (0.03)	3.0 (0.06)	0.9 (0.03)	1.6 (0.05)	0.9 (0.03)
<b>New Zealand</b>	2.0 (0.06)	0.9 (0.04)	1.3 (0.04)	1.0 (0.03)	1.5 (0.04)	1.0 (0.03)
<b>Norway</b>	1.7 (0.04)	0.7 (0.03)	2.9 (0.05)	1.0 (0.03)	1.5 (0.04)	0.8 (0.03)
<b>Portugal</b>	1.5 (0.05)	0.7 (0.04)	1.2 (0.04)	0.9 (0.03)	1.4 (0.05)	1.1 (0.03)
<b>Scotland</b>	1.9 (0.06)	1.0 (0.04)	1.6 (0.05)	0.9 (0.03)	1.9 (0.04)	1.0 (0.03)
<b>Singapore</b>	- -	- -	- -	- -	- -	- -
<i>Slovenia</i>	1.5 (0.04)	0.7 (0.03)	1.2 (0.04)	1.7 (0.05)	1.8 (0.04)	1.3 (0.03)
<i>Thailand</i>	1.1 (0.09)	0.2 (0.02)	1.0 (0.06)	1.2 (0.03)	1.0 (0.03)	0.9 (0.03)
<b>United States</b>	2.0 (0.04)	0.8 (0.03)	1.5 (0.04)	1.2 (0.02)	2.0 (0.03)	1.2 (0.03)

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

<sup>1</sup> Average hours based on: No time = 0; Less than 1 hour = .5; 1-2 hours = 1.5; 3-4 hours = 3.5; More than 4 hours = 5.

<sup>2</sup> Modified response categories for Israel and Latvia: 3-5 hours = 4; More than 5 hours = 7.

( ) 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).

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.



simultaneously (e.g., talk with friends and watch television). Nevertheless, it does appear that in most countries at least as much time is spent on some of these largely non-academic activities as on studying and doing science homework.

The relationship between science achievement and amount of time spent watching television on a normal school day was similar across countries to that between achievement and time spent doing homework (see Table 4.11). In more than 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 23% to 46% 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 fourth graders reported watching, the lower their science achievement, although there were several countries where students watching three to four hours of television did not have lower achievement than those watching one to two hours. In most countries, however, students watching more than four hours of television per day had the lowest average science achievement. In more than half of the countries, 10% or more of the students reported watching more than four hours of television each day. The countries with the highest percentages of such students included Australia (15%), England (18%), Hungary (20%), New Zealand (19%), and the United States (17%).

**Table 4.11****Students' Reports on the Hours Spent Watching Television and Videos on a Normal School Day - Science - Upper Grade (Fourth Grade\*)**

Country	Less than 1 Hour		1 to 2 Hours		3 to 4 Hours		More than 4 Hours	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
<i>Australia</i>	32 (1.0)	565 (4.4)	36 (0.8)	572 (2.7)	17 (0.7)	565 (2.9)	15 (1.0)	536 (6.3)
<i>Austria</i>	41 (1.7)	559 (3.5)	43 (1.7)	574 (5.1)	9 (0.8)	574 (5.6)	7 (0.7)	531 (8.7)
<b>Canada</b>	36 (1.0)	554 (4.4)	37 (0.9)	559 (2.9)	14 (0.7)	546 (4.3)	13 (0.9)	529 (4.8)
<b>Cyprus</b>	34 (1.7)	476 (4.0)	41 (1.4)	481 (3.8)	15 (0.9)	478 (4.3)	10 (0.8)	470 (4.9)
<b>Czech Republic</b>	32 (1.4)	551 (4.2)	44 (1.3)	565 (3.6)	15 (0.8)	560 (3.8)	9 (0.8)	549 (5.0)
<b>England</b>	28 (1.3)	544 (4.6)	38 (1.0)	570 (4.1)	16 (0.9)	571 (4.8)	18 (0.9)	533 (4.8)
<b>Greece</b>	53 (1.4)	501 (3.7)	32 (1.5)	511 (3.9)	8 (0.7)	496 (8.6)	7 (0.6)	472 (10.9)
<b>Hong Kong</b>	48 (1.4)	531 (3.5)	31 (0.9)	543 (3.8)	12 (0.7)	537 (5.1)	9 (0.6)	510 (9.1)
<i>Hungary</i>	21 (1.2)	541 (4.9)	42 (1.2)	542 (3.4)	17 (0.8)	534 (4.7)	20 (1.2)	504 (4.8)
<b>Iceland</b>	53 (1.6)	510 (4.5)	33 (1.4)	510 (4.3)	9 (0.8)	489 (8.2)	5 (0.6)	486 (7.9)
<b>Iran, Islamic Rep.</b>	r 52 (2.1)	414 (4.4)	35 (1.7)	440 (5.8)	7 (0.7)	433 (6.4)	6 (0.7)	433 (8.7)
<b>Ireland</b>	33 (1.3)	529 (3.9)	37 (1.1)	550 (4.2)	16 (1.0)	556 (4.6)	14 (0.9)	529 (5.7)
<sup>1</sup> <i>Israel</i>	r 23 (1.3)	504 (5.6)	40 (1.3)	509 (4.3)	25 (1.2)	506 (5.8)	12 (0.9)	501 (7.9)
<b>Japan</b>	33 (0.8)	561 (2.0)	36 (0.9)	584 (2.5)	20 (0.6)	579 (3.0)	11 (0.6)	580 (4.3)
<b>Korea</b>	43 (1.0)	592 (2.5)	35 (0.9)	605 (2.4)	16 (0.8)	602 (3.6)	7 (0.5)	590 (5.8)
<i>Kuwait</i>	59 (1.1)	404 (3.0)	23 (1.0)	409 (3.7)	9 (0.5)	397 (4.7)	10 (0.5)	388 (6.5)
<sup>1</sup> <i>Latvia (LSS)</i>	32 (1.3)	502 (5.9)	37 (1.5)	536 (7.3)	19 (1.1)	522 (6.6)	12 (1.0)	486 (6.2)
<i>Netherlands</i>	36 (1.4)	556 (4.2)	39 (1.2)	562 (4.1)	15 (0.9)	572 (3.4)	9 (1.0)	536 (4.8)
<b>New Zealand</b>	36 (1.5)	538 (6.3)	31 (1.4)	554 (4.6)	15 (0.9)	537 (8.6)	19 (1.2)	487 (8.3)
<b>Norway</b>	33 (1.4)	523 (4.8)	46 (1.3)	538 (3.8)	14 (0.8)	555 (6.0)	8 (0.7)	528 (7.1)
<b>Portugal</b>	48 (1.8)	478 (4.7)	35 (1.5)	490 (4.0)	9 (0.7)	486 (8.2)	9 (0.9)	467 (6.5)
<b>Scotland</b>	37 (1.3)	535 (4.8)	36 (1.1)	546 (4.7)	13 (0.7)	543 (6.6)	14 (1.2)	515 (6.1)
<b>Singapore</b>	- -	- -	- -	- -	- -	- -	- -	- -
<i>Slovenia</i>	41 (1.6)	541 (4.3)	40 (1.3)	552 (3.5)	12 (0.9)	557 (5.9)	6 (0.7)	541 (7.3)
<i>Thailand</i>	65 (2.2)	470 (4.6)	23 (1.3)	483 (5.8)	5 (0.6)	483 (8.2)	6 (1.7)	445 (10.4)
<b>United States</b>	32 (0.9)	565 (3.9)	36 (0.7)	580 (3.9)	15 (0.8)	580 (3.8)	17 (0.7)	531 (3.8)

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

<sup>1</sup> Modified response categories for Israel and Latvia: 3-5 hours; More than 5 hours.

( ) 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).

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.

## HOW DO STUDENTS PERCEIVE SUCCESS IN SCIENCE?

Table 4.12 presents fourth-grade students' perceptions about doing well in science. In every country the majority of students agreed or strongly agreed that they did well in science, and these perceptions were supported by the science achievement results: those who agreed that they usually do well performed better, on average, than those who disagreed. Interestingly, in several countries, notably New Zealand, Norway, and Scotland, the fourth graders who strongly agreed that they usually do well had lower average achievement than those who merely agreed.

Figure 4.1 indicates that in all countries, both boys and girls agreed that they did well in the sciences – a perception that did not always coincide with their achievement on the TIMSS science test. Only in Ireland was there a significant difference between boys and girls, with girls having higher perceptions of success than boys. It is interesting that the lower self-perceptions reported by eighth-grade girls<sup>3</sup> in England, Hong Kong, Japan, New Zealand, Norway, Scotland, and Singapore about doing well in science were not in evidence among their fourth-grade compatriots.

Students were asked about the necessity of various attributes or activities for doing well in science (see Table 4.13). There was considerable variation from country to country in the percentage of fourth-grade students agreeing that natural talent or ability were important to doing well in science, although the majority of students in every country were in agreement. The percentage agreeing ranged from 57% in the Czech republic to 90% or more in Hungary, Iran, Korea, and Kuwait. Internationally, relatively fewer students agreed that good luck was important to doing well, although the majority were of that opinion in more than half of the countries. The countries where more than 70% of the fourth-graders agreed that good luck was needed to do well in science included Hungary, Iran, Kuwait, and Latvia (LSS).

Internationally, there was a high degree of agreement among students that a lot 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 the Netherlands and Thailand. The variation was substantial from country to country regarding students' agreement with the need to memorize the textbook or notes. In Iceland, Iran, Japan, and Kuwait, 90% or more of the fourth-grade students agreed or strongly agreed that memorization was important to doing well in science. In contrast, fewer than 50% agreed in the Netherlands.

<sup>3</sup> Beaton, A.E., Martin, M.O., Mullis, I.V.S., Gonzalez, E.J., Smith, T.A., and Kelly, D.L. (1996). *Science Achievement in the Middle School Years: The IEA's Third International Mathematics and Science Study (TIMSS)*. Chestnut Hill, MA: Boston College.

**Table 4.12****Students' Reports on Their Self-Perceptions About Usually Doing Well in the Sciences - Upper Grade (Fourth Grade\*)**

Country	Strongly Disagree		Disagree		Agree		Strongly Agree	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
<i>Australia</i>	4 (0.4)	503 (10.0)	11 (0.8)	531 (6.4)	63 (1.0)	571 (2.5)	22 (0.9)	578 (4.6)
<i>Austria</i>	2 (0.4)	~ ~	12 (1.1)	520 (6.3)	36 (1.3)	554 (3.9)	49 (1.8)	587 (4.5)
<b>Canada</b>	3 (0.4)	499 (8.5)	10 (0.6)	514 (5.2)	59 (1.3)	554 (3.3)	29 (1.2)	564 (5.2)
<b>Cyprus</b>	2 (0.3)	~ ~	6 (0.6)	456 (8.9)	42 (1.3)	481 (4.0)	51 (1.5)	482 (3.1)
<b>Czech Republic</b>	3 (0.3)	490 (8.0)	16 (1.0)	517 (4.6)	55 (1.1)	563 (3.4)	27 (1.0)	578 (4.3)
<b>England</b>	5 (0.5)	497 (7.5)	13 (0.7)	536 (5.2)	61 (1.0)	563 (3.7)	21 (0.9)	553 (4.8)
<b>Greece</b>	1 (0.2)	~ ~	4 (0.5)	458 (12.3)	35 (1.4)	500 (3.8)	60 (1.4)	507 (3.6)
<b>Hong Kong</b>	3 (0.3)	457 (11.0)	13 (0.8)	512 (5.9)	55 (1.0)	537 (3.3)	29 (1.3)	545 (4.7)
<i>Hungary</i>	2 (0.2)	~ ~	12 (0.8)	496 (5.3)	54 (1.3)	532 (3.5)	33 (1.3)	549 (4.3)
<b>Iceland</b>	9 (1.4)	503 (8.1)	11 (1.1)	492 (6.5)	50 (1.4)	515 (4.6)	30 (1.6)	505 (4.7)
<b>Iran, Islamic Rep.</b>	r 2 (0.3)	~ ~	3 (0.4)	384 (8.4)	36 (1.8)	424 (5.2)	60 (1.8)	426 (4.5)
<b>Ireland</b>	7 (0.7)	507 (7.7)	10 (0.8)	520 (5.1)	58 (1.3)	548 (3.1)	25 (1.3)	544 (5.4)
<i>Israel</i>	r 3 (0.4)	470 (12.1)	7 (0.7)	501 (9.4)	39 (1.7)	512 (4.1)	51 (1.8)	509 (4.6)
<b>Japan</b>	2 (0.2)	~ ~	21 (0.8)	541 (2.5)	67 (0.9)	579 (1.8)	11 (0.7)	619 (3.5)
<b>Korea</b>	- -	- -	- -	- -	- -	- -	- -	- -
<i>Kuwait</i>	5 (0.6)	400 (8.5)	8 (0.6)	378 (5.3)	36 (1.0)	399 (2.7)	52 (1.4)	412 (3.4)
<i>Latvia (LSS)</i>	2 (0.4)	~ ~	20 (1.3)	504 (9.1)	53 (1.5)	521 (5.0)	24 (1.6)	513 (6.0)
<i>Netherlands</i>	3 (0.4)	527 (10.9)	15 (0.8)	545 (5.9)	62 (1.1)	560 (3.5)	20 (1.2)	573 (4.7)
<b>New Zealand</b>	6 (0.7)	492 (9.8)	13 (0.9)	511 (6.7)	57 (1.3)	547 (4.0)	24 (1.3)	526 (9.9)
<b>Norway</b>	4 (0.5)	506 (10.5)	11 (0.8)	525 (6.3)	58 (1.5)	542 (3.4)	27 (1.6)	527 (5.2)
<b>Portugal</b>	3 (0.5)	421 (10.0)	9 (0.8)	453 (7.6)	53 (1.2)	490 (4.0)	35 (1.3)	486 (5.0)
<b>Scotland</b>	5 (0.5)	505 (9.9)	14 (0.7)	523 (6.0)	63 (1.2)	549 (3.9)	18 (1.0)	525 (6.7)
<b>Singapore</b>	4 (0.4)	460 (7.5)	25 (1.0)	528 (6.2)	58 (1.0)	562 (5.0)	13 (0.7)	568 (6.5)
<i>Slovenia</i>	1 (0.3)	~ ~	12 (0.7)	514 (4.1)	53 (1.3)	544 (3.5)	33 (1.3)	566 (5.0)
<i>Thailand</i>	5 (0.6)	442 (9.5)	22 (1.1)	465 (4.6)	43 (1.5)	483 (5.4)	29 (1.3)	466 (6.0)
<b>United States</b>	2 (0.2)	~ ~	7 (0.5)	512 (5.2)	52 (0.9)	565 (2.7)	39 (0.9)	585 (4.0)

\*Fourth 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).

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

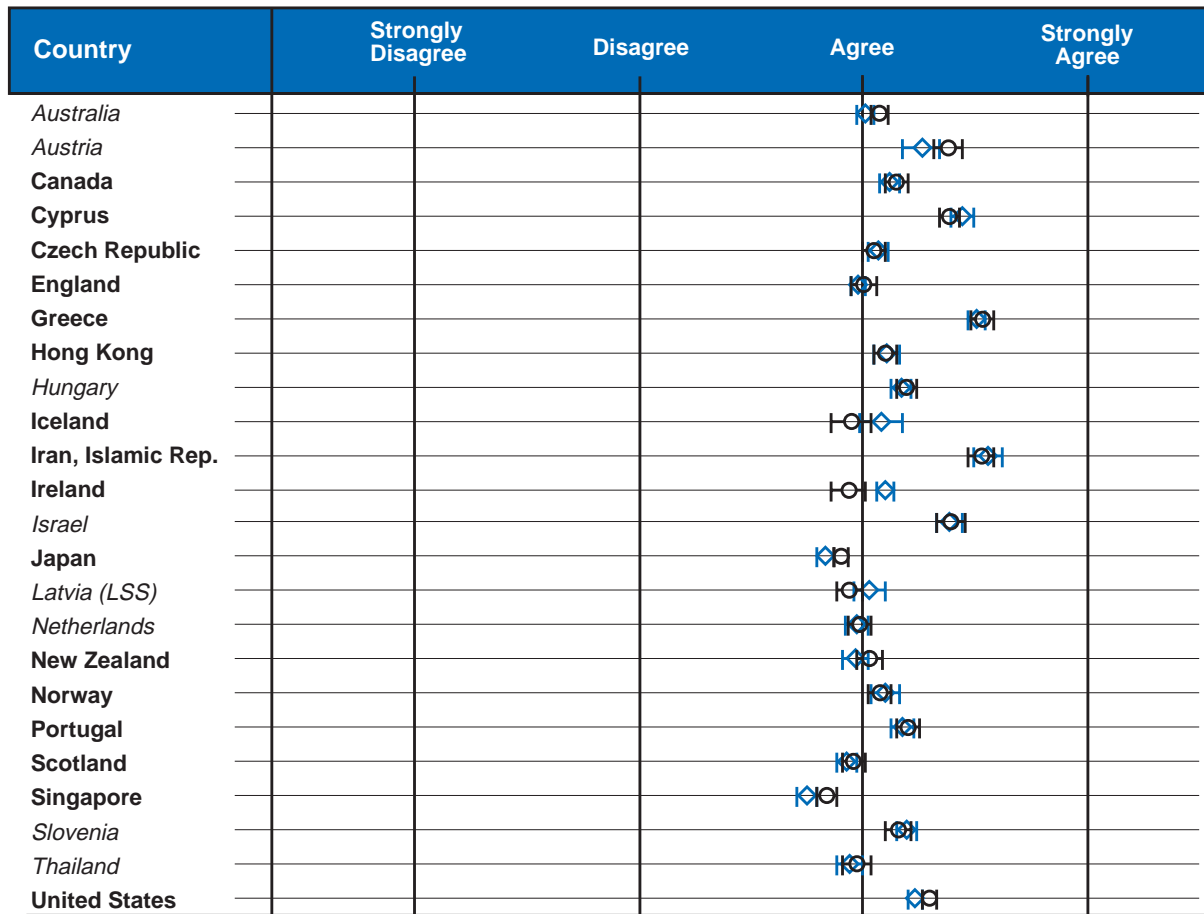
A dash (-) indicates data are not available. A tilde (~) indicates insufficient data to report achievement.

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

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

**Figure 4.1**

**Gender Differences in Students' Self-Perceptions About Usually Doing Well in the Sciences - Upper Grade (Fourth Grade\*)**



= Average for Girls ( $\pm 2SE$ )  
 = Average for Boys ( $\pm 2SE$ )

\*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country. Data for Korea are not available. 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). Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools.

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

**Table 4.13****Students' Reports on Things Necessary to Do Well in the Sciences  
Upper Grade (Fourth 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>	84 (0.8)	59 (1.3)	82 (0.9)	67 (1.1)
<i>Austria</i>	72 (1.9)	54 (1.7)	84 (1.3)	69 (1.8)
<b>Canada</b>	82 (0.8)	50 (1.4)	89 (0.7)	64 (1.3)
<b>Cyprus</b>	69 (1.8)	58 (2.3)	96 (0.4)	75 (1.8)
<b>Czech Republic</b>	57 (1.6)	65 (1.4)	87 (0.7)	68 (1.6)
<b>England</b>	--	--	--	--
<b>Greece</b>	63 (1.3)	46 (1.5)	87 (0.9)	74 (1.7)
<b>Hong Kong</b>	72 (1.2)	19 (0.8)	96 (0.3)	69 (2.1)
<i>Hungary</i>	95 (0.4)	75 (1.1)	89 (0.7)	85 (0.9)
<b>Iceland</b>	78 (1.4)	61 (1.6)	88 (1.2)	90 (1.0)
<b>Iran, Islamic Rep.</b>	r 96 (0.5)	r 75 (2.4)	r 93 (0.6)	r 90 (1.0)
<b>Ireland</b>	87 (0.9)	65 (1.4)	89 (0.8)	74 (1.4)
<i>Israel</i>	r 69 (1.6)	r 44 (1.8)	r 96 (0.5)	r 67 (1.6)
<b>Japan</b>	79 (0.9)	53 (1.2)	88 (0.6)	93 (0.5)
<b>Korea</b>	90 (0.6)	61 (1.0)	94 (0.5)	84 (0.8)
<i>Kuwait</i>	92 (0.5)	78 (1.4)	88 (0.8)	90 (0.8)
<i>Latvia (LSS)</i>	75 (1.7)	84 (1.3)	91 (0.9)	61 (2.2)
<i>Netherlands</i>	65 (1.6)	r 28 (1.8)	r 73 (1.8)	r 30 (2.3)
<b>New Zealand</b>	84 (1.1)	65 (1.3)	86 (1.0)	72 (1.4)
<b>Norway</b>	93 (0.6)	59 (1.6)	88 (0.9)	82 (1.0)
<b>Portugal</b>	85 (1.3)	67 (2.1)	96 (0.4)	85 (1.1)
<b>Scotland</b>	--	--	--	--
<b>Singapore</b>	88 (0.8)	37 (1.5)	94 (0.4)	76 (1.2)
<i>Slovenia</i>	81 (1.5)	62 (2.1)	93 (0.7)	52 (2.0)
<i>Thailand</i>	77 (1.3)	63 (1.7)	70 (1.9)	87 (1.0)
<b>United States</b>	62 (1.0)	46 (1.2)	93 (0.3)	71 (1.0)

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

( ) Standard errors appear in parentheses.

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).

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.

## WHAT ARE STUDENTS' ATTITUDES TOWARDS SCIENCE?

To collect information on fourth-grade students' perceptions of science, TIMSS asked them a series of questions about the 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 thus tend to perform better.

Table 4.14 summarizes students' responses to the questions about how much they like or dislike science. In more than one-third of the countries, a positive relationship was observed between a stronger liking of science and higher achievement. Even though the pattern was not uniform across countries, the students who reported either liking science or liking it a lot generally had higher achievement than students who reported disliking it to some degree. Four-fifths or more of the fourth-graders in every country except the Netherlands indicated they liked science or liked science a lot. In the Netherlands, a third of the students reported that they disliked science.

The data in Figure 4.2 reveal that, on average, in the majority of the countries there was no significant difference between boys and girls in their degree of liking for the sciences. However, a greater percentage of boys reported liking science in Austria, Japan, and Korea, and a greater percentage of girls in Iceland and Ireland.

Three statements reflecting student attitudes to science ("I like science," "I enjoy learning science," and "science is boring") were combined to form an index of overall attitude to science. Table 4.15 characterizes student attitudes in terms of this index. Not surprisingly, the results are very similar to those in Table 4.14, with the majority of students in every country expressing positive or strongly positive attitudes. Table 4.15 does reveal a strong positive relationship between attitude to science and science achievement in many countries. Figure 4.3 confirms that in most countries, attitude to science is not related to gender, although boys had more positive attitudes in Austria, Japan, and Korea, while girls had more positive attitudes in Iceland, Ireland, and Latvia (LSS).

**Table 4.14****Students' Reports on How Much They Like Science  
Upper Grade (Fourth Grade\*)**

Country	Dislike a Lot		Dislike		Like		Like a Lot	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
<i>Australia</i>	8 (0.6)	535 (6.1)	10 (0.6)	562 (5.0)	43 (0.8)	566 (2.8)	39 (1.1)	573 (3.6)
<i>Austria</i>	8 (0.8)	542 (6.0)	12 (0.7)	550 (5.1)	30 (1.2)	557 (3.6)	49 (1.4)	578 (4.6)
<b>Canada</b>	7 (0.8)	536 (5.5)	13 (0.8)	542 (3.6)	46 (1.0)	551 (3.8)	34 (1.2)	557 (4.1)
<b>Cyprus</b>	4 (0.5)	467 (6.9)	6 (0.7)	458 (9.1)	36 (1.5)	483 (3.8)	54 (1.8)	479 (3.4)
<b>Czech Republic</b>	5 (0.5)	541 (7.5)	12 (0.8)	545 (5.7)	46 (1.0)	556 (3.2)	37 (1.4)	565 (3.7)
<b>England</b>	9 (0.8)	534 (6.3)	10 (0.5)	551 (7.3)	45 (1.2)	559 (3.7)	36 (1.2)	553 (4.3)
<b>Greece</b>	2 (0.3)	~ ~	3 (0.3)	497 (8.4)	29 (1.3)	499 (4.1)	66 (1.4)	504 (3.4)
<b>Hong Kong</b>	4 (0.9)	504 (15.4)	6 (0.7)	509 (7.4)	45 (1.2)	533 (3.9)	45 (1.7)	541 (4.3)
<i>Hungary</i>	5 (0.7)	514 (8.7)	11 (0.8)	522 (5.4)	46 (1.2)	530 (3.7)	38 (1.5)	544 (4.4)
<b>Iceland</b>	7 (1.1)	501 (8.9)	7 (0.8)	496 (9.4)	45 (1.6)	507 (5.0)	41 (1.5)	515 (4.2)
<b>Iran, Islamic Rep.</b>	r 1 (0.4)	~ ~	2 (0.4)	~ ~	22 (1.3)	424 (4.0)	75 (1.5)	423 (4.7)
<b>Ireland</b>	9 (0.9)	523 (6.8)	13 (0.9)	532 (4.7)	44 (1.0)	544 (3.8)	34 (1.3)	548 (4.2)
<i>Israel</i>	r 7 (0.8)	513 (8.2)	11 (1.0)	516 (6.8)	39 (1.6)	507 (5.3)	43 (2.2)	506 (4.6)
<b>Japan</b>	2 (0.2)	~ ~	12 (0.9)	553 (3.6)	49 (0.9)	571 (2.2)	36 (1.0)	587 (2.0)
<b>Korea</b>	2 (0.2)	~ ~	10 (0.7)	582 (3.9)	46 (1.2)	594 (2.3)	42 (1.3)	607 (2.3)
<i>Kuwait</i>	4 (0.5)	397 (9.1)	4 (0.4)	379 (8.1)	21 (1.1)	396 (4.7)	71 (1.6)	408 (2.8)
<i>Latvia (LSS)</i>	7 (0.7)	480 (7.3)	14 (1.0)	512 (7.3)	48 (1.4)	514 (6.4)	31 (1.5)	523 (6.0)
<i>Netherlands</i>	10 (1.0)	547 (5.8)	23 (1.3)	552 (4.2)	39 (1.2)	561 (3.9)	28 (1.6)	566 (4.5)
<b>New Zealand</b>	9 (0.8)	512 (11.0)	8 (0.8)	524 (8.3)	37 (1.5)	544 (5.6)	46 (1.5)	530 (6.1)
<b>Norway</b>	8 (0.7)	522 (6.4)	14 (1.0)	539 (6.0)	42 (1.0)	535 (3.9)	36 (1.6)	536 (4.5)
<b>Portugal</b>	1 (0.2)	~ ~	4 (0.4)	444 (10.1)	38 (1.1)	477 (4.7)	58 (1.2)	488 (3.8)
<b>Scotland</b>	8 (0.6)	513 (7.4)	10 (0.6)	530 (7.0)	40 (1.1)	544 (4.5)	42 (1.3)	541 (5.0)
<b>Singapore</b>	3 (0.2)	481 (10.2)	7 (0.5)	515 (9.2)	47 (1.0)	540 (4.5)	44 (1.2)	566 (5.8)
<i>Slovenia</i>	3 (0.4)	527 (8.6)	8 (0.7)	542 (6.5)	42 (1.4)	547 (3.5)	47 (1.7)	548 (4.5)
<i>Thailand</i>	2 (0.3)	~ ~	12 (1.1)	455 (6.4)	46 (1.4)	476 (4.6)	40 (1.7)	474 (6.0)
<b>United States</b>	6 (0.4)	529 (6.2)	9 (0.6)	548 (5.8)	38 (0.9)	570 (3.8)	47 (1.2)	573 (3.5)

\*Fourth 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).

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

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

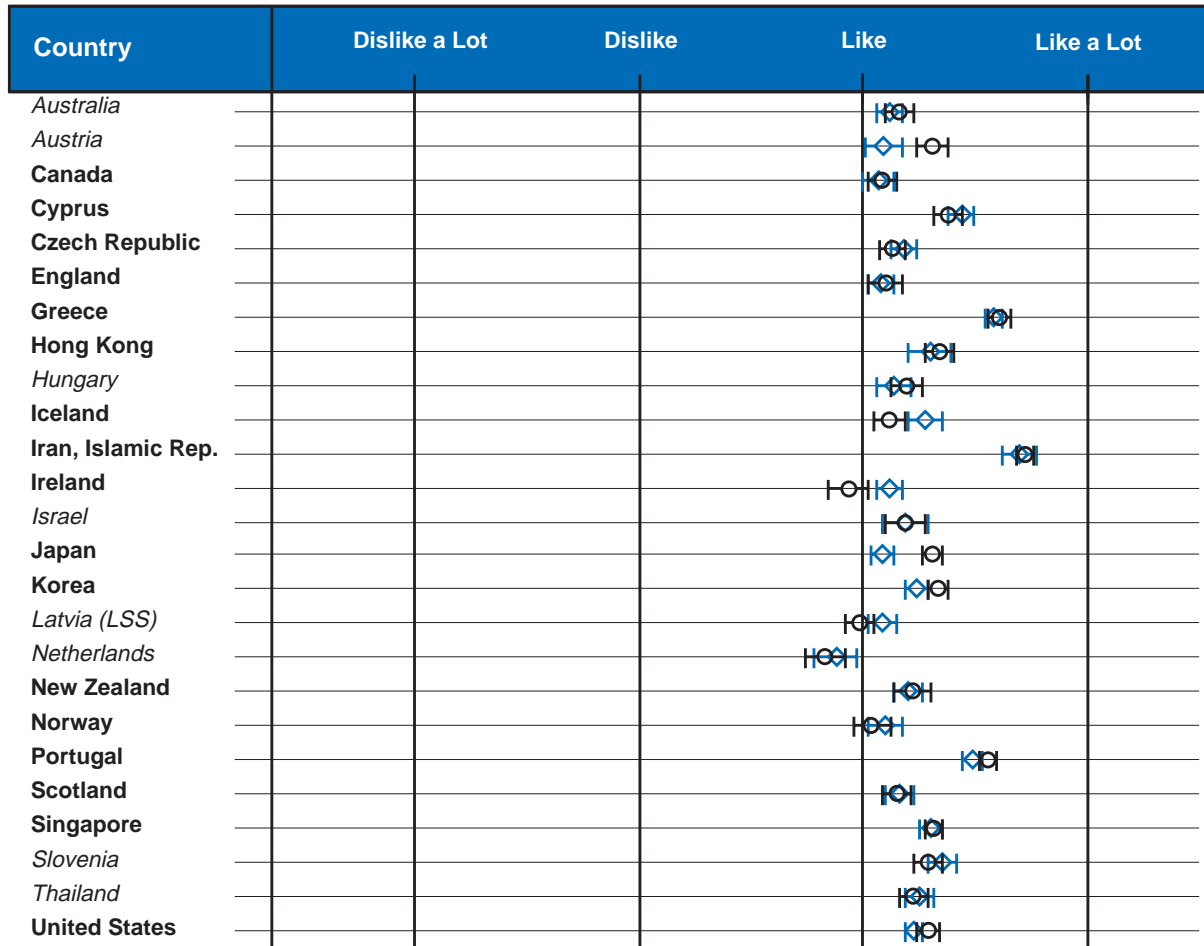
An "r" indicates a 70-84% student response rate.

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



**Figure 4.2**

**Gender Differences in Liking the Sciences  
Upper Grade (Fourth Grade\*)**



= Average for Girls (±2SE)  
 = Average for Boys (±2SE)

\*Fourth 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). Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools.

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

**Table 4.15****Students' Overall Attitudes<sup>1</sup> Towards Science  
Upper Grade (Fourth Grade\*)**

Country	Strongly Negative		Negative		Positive		Strongly Positive	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
<i>Australia</i>	5 (0.4)	546 (6.9)	14 (0.8)	548 (5.1)	46 (0.8)	559 (2.8)	36 (1.0)	582 (3.5)
<i>Austria</i>	5 (0.6)	556 (7.5)	16 (1.0)	547 (3.7)	34 (1.2)	556 (3.7)	45 (1.6)	579 (4.9)
<b>Canada</b>	5 (0.6)	543 (6.1)	15 (0.9)	538 (4.0)	46 (0.9)	545 (4.3)	34 (1.1)	564 (4.1)
<b>Cyprus</b>	1 (0.2)	~ ~	10 (0.8)	454 (6.9)	42 (1.3)	470 (3.8)	47 (1.6)	491 (3.2)
<b>Czech Republic</b>	2 (0.3)	~ ~	16 (0.9)	541 (4.3)	54 (0.9)	552 (3.3)	28 (1.2)	576 (4.2)
<b>England</b>	6 (0.6)	551 (8.5)	14 (0.9)	538 (5.7)	44 (1.1)	549 (3.9)	36 (1.2)	563 (3.7)
<b>Greece</b>	1 (0.2)	~ ~	4 (0.5)	490 (8.8)	34 (1.4)	485 (4.7)	61 (1.3)	512 (3.0)
<b>Hong Kong</b>	2 (0.4)	~ ~	9 (1.4)	506 (6.8)	50 (1.4)	525 (4.0)	39 (1.6)	551 (3.8)
<i>Hungary</i>	3 (0.5)	523 (10.6)	16 (1.0)	518 (4.2)	49 (1.1)	525 (3.7)	32 (1.2)	553 (4.6)
<b>Iceland</b>	6 (0.8)	498 (8.9)	13 (1.0)	500 (6.6)	42 (1.4)	503 (5.1)	40 (1.9)	518 (4.2)
<b>Iran, Islamic Rep.</b>	1 (0.2)	~ ~	5 (0.5)	404 (6.7)	49 (1.6)	405 (3.8)	46 (1.8)	440 (4.9)
<b>Ireland</b>	4 (0.5)	531 (9.3)	17 (1.0)	522 (4.4)	48 (1.1)	539 (3.8)	30 (1.3)	556 (4.5)
<i>Israel</i>	4 (0.6)	516 (8.3)	13 (1.1)	513 (7.0)	43 (1.3)	504 (4.3)	39 (2.0)	510 (4.8)
<b>Japan</b>	1 (0.2)	~ ~	11 (0.8)	550 (3.8)	53 (0.9)	569 (2.1)	35 (1.1)	590 (2.0)
<b>Korea</b>	1 (0.2)	~ ~	11 (0.7)	573 (5.0)	48 (1.1)	590 (2.2)	40 (1.3)	613 (2.3)
<i>Kuwait</i>	1 (0.2)	~ ~	8 (0.8)	381 (6.2)	40 (1.0)	380 (4.4)	50 (1.4)	425 (2.6)
<i>Latvia (LSS)</i>	2 (0.4)	~ ~	19 (1.1)	500 (7.1)	55 (1.3)	514 (6.1)	24 (1.2)	522 (5.3)
<i>Netherlands</i>	8 (0.7)	561 (6.2)	21 (1.3)	553 (4.4)	44 (1.2)	556 (4.0)	28 (1.5)	568 (4.2)
<b>New Zealand</b>	4 (0.5)	514 (14.4)	12 (1.0)	513 (8.1)	43 (1.5)	526 (6.2)	41 (1.6)	547 (5.1)
<b>Norway</b>	4 (0.5)	526 (11.0)	17 (1.1)	528 (6.1)	43 (1.0)	530 (3.9)	36 (1.6)	543 (4.4)
<b>Portugal</b>	0 (0.1)	~ ~	4 (0.4)	431 (13.3)	41 (1.2)	462 (5.3)	54 (1.4)	500 (3.4)
<b>Scotland</b>	- -	- -	- -	- -	- -	- -	- -	- -
<b>Singapore</b>	1 (0.1)	~ ~	9 (0.5)	496 (8.6)	49 (1.0)	533 (4.5)	41 (1.2)	575 (5.8)
<i>Slovenia</i>	2 (0.3)	~ ~	13 (0.9)	531 (6.4)	46 (1.2)	539 (3.9)	40 (1.4)	560 (3.7)
<i>Thailand</i>	1 (0.2)	~ ~	15 (1.1)	446 (6.2)	64 (1.0)	472 (4.6)	20 (1.2)	493 (7.3)
<b>United States</b>	3 (0.3)	547 (7.6)	13 (0.7)	542 (5.6)	40 (0.9)	557 (4.1)	44 (1.2)	583 (3.3)

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

<sup>1</sup>Index of overall attitudes towards science is based on average of responses to the following statements:

1) I like science; 2) I enjoy learning science; 3) Science is boring (reversed scale).

( ) 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).

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

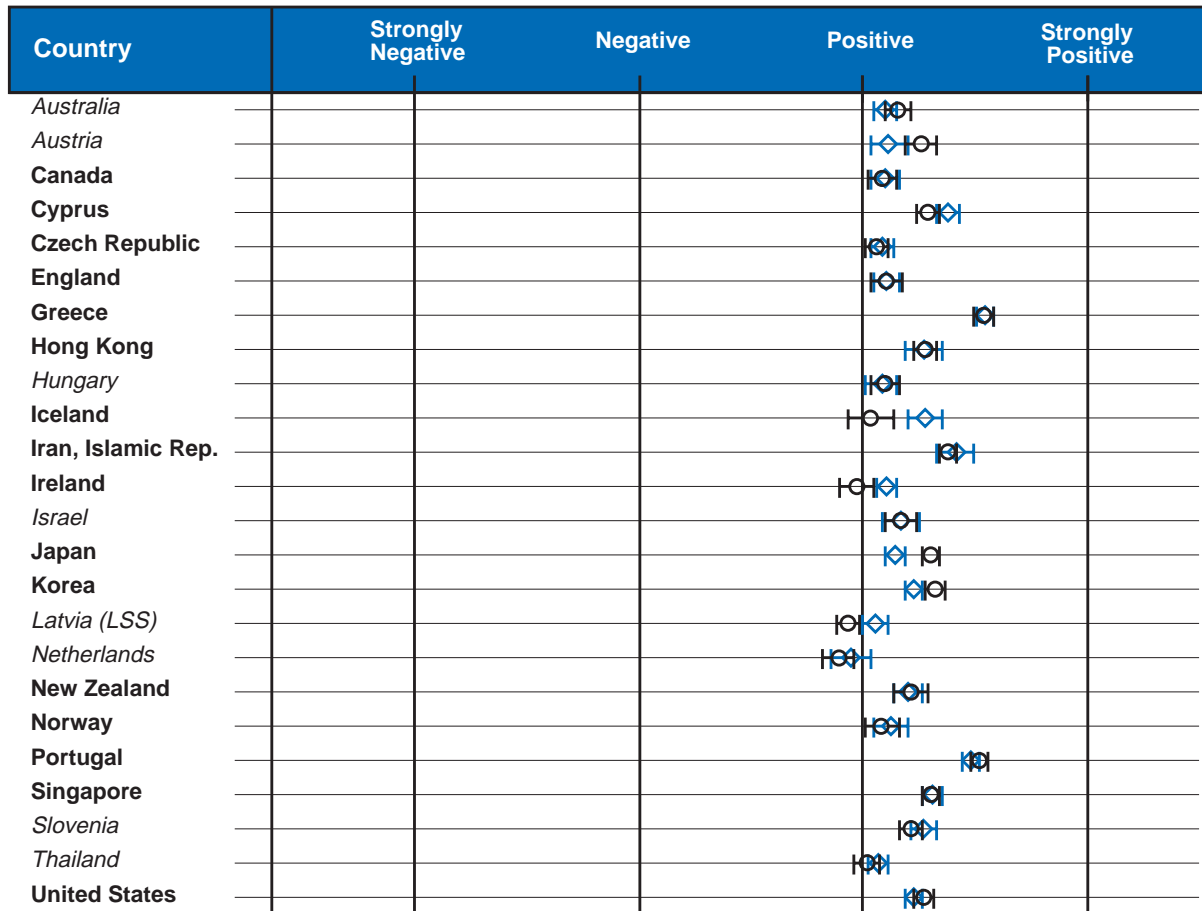
A dash (-) indicates data are not available. A tilde (~) indicates insufficient data to report achievement.

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

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

**Figure 4.3**

**Gender Differences in Students' Overall Attitudes<sup>1</sup> Towards Science  
Upper Grade (Fourth Grade\*)**



◆ = Average for Girls (±2SE)  
■ = Average for Boys (±2SE)

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

<sup>1</sup>Index of overall attitudes towards mathematics is based on average of responses to the following statements:

1) I like science; 2) I enjoy learning science; 3) Science is boring (reversed scale).

Data for Scotland not available.

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).

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.

