

# Chapter 4

## STUDENTS' BACKGROUNDS AND ATTITUDES TOWARDS MATHEMATICS

To provide an educational context for interpreting the mathematics 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 mathematics reflect what happens in school and their perceptions of the value of mathematics 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 mathematics and indicate their attitudes toward mathematics.

### 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 many countries fourth-grade students with all three of these educational study aids had higher mathematics 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 that they have 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 about half 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>

<sup>1</sup> Beaton, A.E., Mullis, I.V.S., Martin, M.O., Gonzalez, E.J., Kelly, D.L., and Smith, T.A. (1996). *Mathematics Achievement in the Middle School Years: 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 - Mathematics - 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)	563 (3.2)	50 (1.0)	530 (3.8)	78 (1.0)	93 (0.6)	63 (1.1)
<i>Austria</i>	50 (1.4)	559 (3.3)	50 (1.4)	561 (4.0)	95 (0.6)	82 (1.2)	61 (1.5)
<b>Canada</b>	41 (1.2)	553 (3.9)	59 (1.2)	517 (3.9)	85 (0.8)	78 (1.0)	52 (1.1)
<b>Cyprus</b>	29 (1.0)	515 (4.4)	71 (1.0)	501 (3.3)	84 (0.8)	89 (0.7)	35 (1.0)
<b>Czech Republic</b>	25 (1.2)	590 (5.2)	75 (1.2)	561 (3.1)	82 (1.0)	78 (0.9)	33 (1.3)
<b>England</b>	68 (1.3)	521 (3.8)	32 (1.3)	494 (4.0)	93 (0.6)	80 (1.0)	88 (0.9)
<b>Greece</b>	20 (1.0)	504 (4.9)	80 (1.0)	494 (4.1)	90 (0.9)	88 (1.0)	23 (1.1)
<b>Hong Kong</b>	31 (1.1)	594 (4.8)	69 (1.1)	584 (4.5)	98 (0.3)	75 (1.2)	37 (1.2)
<i>Hungary</i>	28 (1.4)	582 (5.7)	72 (1.4)	537 (3.3)	69 (1.3)	87 (0.8)	37 (1.4)
<b>Iceland</b>	60 (1.6)	483 (3.5)	40 (1.6)	466 (2.9)	79 (1.3)	92 (0.6)	81 (1.1)
<b>Iran, Islamic Rep.</b>	r 3 (0.5)	442 (10.6)	97 (0.5)	437 (4.3)	r 39 (2.0)	r 34 (2.1)	r 8 (0.8)
<b>Ireland</b>	58 (1.2)	561 (3.6)	42 (1.2)	538 (4.0)	95 (0.5)	74 (1.1)	79 (0.9)
<i>Israel</i>	r 67 (2.0)	540 (4.0)	33 (2.0)	522 (4.9)	r 97 (0.6)	r 95 (0.6)	r 70 (1.9)
<b>Japan</b>	- -	- -	- -	- -	- -	- -	- -
<b>Korea</b>	22 (1.0)	630 (4.4)	78 (1.0)	606 (2.1)	93 (0.6)	91 (0.7)	23 (1.0)
<i>Kuwait</i>	40 (1.6)	413 (3.3)	60 (1.6)	394 (2.8)	70 (1.2)	75 (1.4)	66 (1.3)
<i>Latvia (LSS)</i>	18 (1.2)	520 (6.5)	82 (1.2)	527 (5.2)	84 (1.0)	95 (0.6)	21 (1.3)
<i>Netherlands</i>	69 (1.3)	588 (3.7)	31 (1.3)	563 (3.9)	88 (0.8)	95 (0.7)	80 (1.2)
<b>New Zealand</b>	43 (1.3)	524 (3.9)	57 (1.3)	483 (4.9)	93 (0.7)	78 (1.4)	53 (1.5)
<b>Norway</b>	44 (1.4)	517 (3.1)	56 (1.4)	491 (3.4)	76 (1.2)	92 (0.8)	56 (1.3)
<b>Portugal</b>	26 (1.4)	503 (4.1)	74 (1.4)	468 (3.9)	89 (1.1)	64 (1.5)	34 (1.7)
<b>Scotland</b>	64 (1.1)	534 (3.8)	36 (1.1)	502 (4.4)	91 (0.9)	75 (1.1)	89 (0.6)
<b>Singapore</b>	40 (1.3)	653 (6.0)	60 (1.3)	606 (4.9)	96 (0.3)	89 (0.5)	44 (1.3)
<i>Slovenia</i>	36 (1.4)	569 (4.1)	64 (1.4)	544 (3.6)	82 (1.0)	87 (0.9)	43 (1.3)
<i>Thailand</i>	1 (0.5)	~ ~	99 (0.5)	488 (4.4)	35 (2.6)	33 (2.2)	3 (0.6)
<b>United States</b>	49 (1.5)	563 (3.2)	51 (1.5)	529 (3.1)	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 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 mathematics test. In nearly all countries, students reporting more than 100 books in the home had higher mathematics achievement than students reporting fewer books. 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, half or more of the students reported 25 or fewer books in the home. In comparison, more than 40% 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, 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 graders' responses to the question of how often they spoke the language of the TIMSS mathematics test at home. In all but a few of the countries, 80% or more of the students responded that at home they always or almost always spoke the language in which they were tested, and in eight of those countries 90% or more of the students so responded. 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 mathematics achievement than their counterparts who reported speaking the language of the test only sometimes or never.

**Table 4.2****Students' Reports on the Number of Books in the Home  
Mathematics - 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)	461 (8.2)	7 (0.4)	503 (6.6)	23 (0.7)	544 (3.8)	24 (0.6)	551 (3.7)	44 (1.0)	563 (3.4)
<i>Austria</i>	9 (0.8)	512 (8.5)	17 (0.9)	531 (4.6)	35 (1.7)	567 (4.7)	18 (1.2)	579 (4.8)	21 (1.5)	584 (4.3)
<b>Canada</b>	5 (0.6)	472 (9.4)	13 (1.0)	513 (3.8)	29 (0.9)	541 (3.9)	20 (0.6)	546 (3.8)	33 (1.3)	536 (4.0)
<b>Cyprus</b>	11 (0.7)	476 (5.8)	26 (1.2)	502 (4.0)	28 (1.2)	518 (4.2)	16 (0.9)	527 (5.1)	19 (1.0)	519 (4.5)
<b>Czech Republic</b>	2 (0.3)	~ ~	10 (0.7)	529 (4.9)	38 (1.3)	557 (3.5)	25 (1.0)	579 (4.0)	25 (1.2)	599 (5.4)
<b>England</b>	7 (0.6)	451 (5.1)	13 (0.9)	475 (4.4)	26 (1.0)	505 (3.5)	23 (1.0)	533 (5.8)	31 (1.2)	537 (4.5)
<b>Greece</b>	r 11 (1.2)	450 (7.4)	27 (1.2)	493 (4.1)	36 (1.3)	517 (3.6)	15 (1.0)	527 (8.2)	12 (0.8)	530 (9.0)
<b>Hong Kong</b>	23 (1.2)	569 (5.3)	27 (0.9)	584 (4.5)	28 (1.2)	605 (4.3)	11 (0.7)	599 (6.6)	11 (1.0)	594 (5.0)
<i>Hungary</i>	5 (0.6)	493 (8.1)	11 (0.7)	508 (4.2)	30 (1.3)	543 (4.4)	19 (0.8)	567 (6.0)	35 (1.6)	579 (4.5)
<b>Iceland</b>	2 (0.4)	~ ~	12 (0.9)	451 (6.1)	30 (1.1)	470 (3.7)	24 (1.3)	483 (3.5)	33 (1.0)	490 (4.4)
<b>Iran, Islamic Rep.</b>	54 (2.4)	418 (3.6)	24 (1.6)	449 (4.3)	11 (1.1)	458 (7.8)	3 (0.4)	451 (9.1)	7 (0.8)	469 (8.0)
<b>Ireland</b>	9 (0.8)	487 (6.6)	19 (1.1)	532 (5.0)	30 (0.9)	559 (3.9)	20 (1.0)	573 (3.5)	23 (1.2)	573 (4.9)
<i>Israel</i>	r 6 (0.6)	521 (9.2)	18 (1.5)	526 (6.5)	36 (1.2)	534 (3.5)	19 (1.2)	545 (6.5)	20 (1.3)	536 (6.3)
<b>Japan</b>	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
<b>Korea</b>	11 (0.6)	568 (4.1)	11 (0.6)	579 (4.4)	32 (1.0)	606 (2.4)	25 (0.8)	627 (3.2)	22 (0.9)	636 (3.5)
<i>Kuwait</i>	27 (1.4)	386 (2.6)	24 (1.0)	400 (2.8)	22 (1.2)	412 (3.4)	9 (0.6)	424 (3.8)	17 (1.2)	422 (4.8)
<i>Latvia (LSS)</i>	4 (0.4)	479 (9.3)	8 (0.7)	509 (8.2)	25 (1.3)	533 (9.2)	21 (1.0)	531 (6.0)	42 (1.7)	538 (4.4)
<i>Netherlands</i>	6 (0.8)	536 (10.4)	13 (0.9)	548 (4.7)	33 (1.3)	577 (3.8)	23 (1.2)	594 (3.6)	25 (1.6)	595 (5.0)
<b>New Zealand</b>	7 (0.8)	416 (8.3)	9 (0.7)	454 (6.1)	22 (1.2)	499 (5.9)	23 (1.0)	520 (4.9)	39 (1.7)	521 (4.6)
<b>Norway</b>	3 (0.5)	446 (10.0)	10 (0.7)	467 (4.5)	27 (1.0)	492 (3.6)	23 (0.9)	514 (3.8)	37 (1.2)	521 (3.7)
<b>Portugal</b>	28 (1.9)	445 (5.8)	29 (1.3)	479 (3.3)	25 (1.3)	503 (3.3)	9 (0.8)	513 (5.3)	9 (1.1)	520 (7.8)
<b>Scotland</b>	10 (1.0)	451 (6.2)	15 (1.0)	490 (4.4)	25 (1.0)	522 (4.5)	20 (0.9)	541 (5.0)	31 (1.5)	556 (4.8)
<b>Singapore</b>	9 (0.6)	553 (5.1)	21 (0.9)	583 (5.5)	36 (0.8)	635 (4.5)	18 (0.8)	660 (5.9)	16 (1.1)	666 (8.1)
<i>Slovenia</i>	6 (0.8)	485 (6.9)	20 (1.2)	524 (4.6)	37 (1.2)	558 (3.8)	18 (0.9)	578 (4.5)	18 (1.3)	574 (6.3)
<i>Thailand</i>	47 (2.1)	477 (4.6)	28 (1.1)	492 (5.2)	17 (1.1)	504 (5.8)	4 (0.6)	523 (8.0)	4 (0.5)	513 (12.5)
<b>United States</b>	8 (0.6)	473 (4.7)	13 (0.7)	506 (3.3)	24 (0.7)	546 (3.0)	22 (0.6)	562 (4.9)	34 (1.2)	567 (2.6)

\*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).

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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 - Mathematics - 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)	524 (10.9)	89 (1.0)	550 (2.8)
<i>Austria</i>	s 3 (0.6)	523 (21.6)	14 (1.2)	502 (6.2)	83 (1.5)	566 (3.9)
<b>Canada</b>	1 (0.2)	~ ~	13 (1.2)	501 (5.2)	86 (1.2)	539 (3.4)
<b>Cyprus</b>	3 (0.4)	478 (9.2)	9 (0.8)	500 (7.3)	88 (0.9)	507 (3.0)
<b>Czech Republic</b>	1 (0.2)	~ ~	3 (0.5)	539 (9.7)	96 (0.5)	569 (3.3)
<b>England</b>	1 (0.2)	~ ~	6 (0.8)	477 (9.0)	93 (0.8)	516 (3.4)
<b>Greece</b>	r 2 (0.4)	~ ~	7 (0.7)	448 (9.6)	90 (0.9)	502 (3.8)
<b>Hong Kong</b>	- -	- -	- -	- -	- -	- -
<i>Hungary</i>	x x	x x	x x	x x	x x	x x
<b>Iceland</b>	1 (0.3)	~ ~	10 (0.9)	476 (6.0)	89 (1.0)	477 (2.9)
<b>Iran, Islamic Rep.</b>	23 (2.2)	403 (4.3)	22 (1.7)	421 (6.8)	54 (2.8)	444 (5.0)
<b>Ireland</b>	3 (0.3)	467 (6.0)	5 (0.6)	504 (9.7)	92 (0.8)	557 (3.3)
<i>Israel</i>	r 2 (0.3)	~ ~	15 (1.2)	527 (6.6)	83 (1.2)	535 (4.0)
<b>Japan</b>	- -	- -	- -	- -	- -	- -
<b>Korea</b>	1 (0.1)	~ ~	10 (0.7)	603 (4.6)	89 (0.7)	613 (2.3)
<i>Kuwait</i>	13 (1.5)	395 (3.9)	37 (2.2)	403 (2.8)	50 (2.4)	403 (3.8)
<i>Latvia (LSS)</i>	1 (0.3)	~ ~	7 (0.8)	491 (7.5)	92 (0.8)	530 (5.1)
<i>Netherlands</i>	5 (0.9)	563 (6.8)	11 (1.4)	553 (7.3)	84 (1.7)	585 (3.6)
<b>New Zealand</b>	2 (0.2)	~ ~	11 (1.0)	450 (8.0)	87 (1.1)	509 (4.3)
<b>Norway</b>	r 2 (0.3)	~ ~	8 (0.9)	460 (8.3)	90 (1.0)	507 (3.0)
<b>Portugal</b>	r 2 (0.3)	~ ~	4 (0.5)	465 (9.4)	94 (0.5)	478 (3.7)
<b>Scotland</b>	- -	- -	- -	- -	- -	- -
<b>Singapore</b>	9 (0.6)	567 (6.9)	71 (1.3)	618 (4.4)	20 (1.5)	676 (7.9)
<i>Slovenia</i>	1 (0.2)	~ ~	9 (0.9)	520 (5.3)	90 (1.0)	556 (3.6)
<i>Thailand</i>	11 (1.6)	457 (10.8)	29 (2.4)	483 (4.9)	60 (2.9)	498 (5.3)
<b>United States</b>	2 (0.2)	~ ~	13 (1.1)	508 (4.6)	85 (1.1)	553 (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 "s" indicates a 50-69% 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 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 was 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 mathematics achievement (e.g., Australia, Israel, and New Zealand). In about one-third 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., Greece, the Netherlands, and the United States).

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 mathematics achievement than their classmates born in the country.

**Table 4.4****Students' Reports on Whether or Not Their Parents Were Born in the Country - Mathematics - 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)	545 (7.7)	20 (0.9)	548 (4.2)	61 (1.1)	549 (3.3)
<i>Austria</i>	11 (0.9)	514 (8.2)	9 (0.7)	557 (7.0)	80 (1.2)	566 (2.7)
<b>Canada</b>	17 (1.5)	515 (4.7)	14 (0.5)	520 (5.9)	69 (1.6)	542 (3.5)
<i>Cyprus</i>	3 (0.4)	464 (8.3)	11 (0.8)	491 (6.1)	85 (0.9)	508 (3.0)
<b>Czech Republic</b>	2 (0.3)	~ ~	8 (0.6)	546 (6.1)	89 (0.7)	571 (3.3)
<b>England</b>	r 9 (1.2)	495 (12.2)	15 (0.9)	510 (6.4)	76 (1.8)	518 (3.7)
<i>Greece</i>	5 (0.6)	450 (8.2)	10 (0.9)	478 (6.7)	85 (1.0)	500 (3.8)
<b>Hong Kong</b>	38 (1.8)	588 (5.1)	21 (0.9)	592 (4.8)	41 (1.8)	586 (4.6)
<i>Hungary</i>	2 (0.3)	~ ~	3 (0.3)	528 (12.4)	95 (0.4)	550 (3.7)
<i>Iceland</i>	1 (0.2)	~ ~	6 (0.6)	477 (10.2)	93 (0.7)	476 (2.8)
<b>Iran, Islamic Rep.</b>	r 5 (0.7)	426 (4.9)	4 (0.4)	416 (5.9)	91 (0.8)	436 (4.4)
<b>Ireland</b>	2 (0.3)	~ ~	10 (0.7)	543 (6.1)	88 (0.8)	552 (3.4)
<i>Israel</i>	r 32 (2.2)	531 (5.3)	24 (1.2)	534 (5.1)	44 (1.9)	535 (4.3)
<b>Japan</b>	- -	- -	- -	- -	- -	- -
<b>Korea</b>	0 (0.1)	~ ~	1 (0.2)	~ ~	99 (0.2)	611 (2.1)
<i>Kuwait</i>	10 (0.7)	416 (5.2)	16 (0.7)	394 (3.9)	74 (1.1)	401 (2.9)
<i>Latvia (LSS)</i>	2 (0.3)	~ ~	16 (0.9)	516 (5.5)	82 (0.9)	529 (5.1)
<i>Netherlands</i>	r 8 (1.7)	538 (9.5)	6 (0.6)	565 (8.3)	86 (1.6)	585 (3.2)
<b>New Zealand</b>	11 (0.9)	490 (6.4)	21 (1.0)	502 (5.5)	68 (1.4)	502 (4.9)
<i>Norway</i>	4 (0.7)	456 (7.9)	7 (0.5)	494 (7.7)	89 (1.0)	505 (2.9)
<b>Portugal</b>	5 (0.6)	445 (8.2)	8 (0.6)	478 (6.3)	86 (0.9)	478 (3.6)
<b>Scotland</b>	9 (0.9)	540 (8.0)	19 (0.9)	524 (4.9)	72 (1.4)	520 (4.2)
<b>Singapore</b>	12 (0.6)	635 (5.6)	21 (0.5)	622 (6.0)	68 (0.7)	625 (5.6)
<i>Slovenia</i>	12 (1.2)	530 (5.3)	9 (0.6)	559 (6.7)	79 (1.4)	555 (3.6)
<i>Thailand</i>	2 (0.4)	~ ~	3 (0.3)	438 (9.6)	96 (0.6)	491 (4.4)
<b>United States</b>	12 (1.2)	508 (5.9)	10 (0.7)	531 (4.5)	78 (1.3)	553 (3.3)

\*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.

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

Country	Yes		No	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
<i>Australia</i>	91 (0.9)	547 (3.1)	9 (0.9)	543 (8.9)
<i>Austria</i>	91 (1.3)	563 (2.9)	9 (1.3)	527 (16.4)
<b>Canada</b>	93 (0.7)	536 (3.1)	7 (0.7)	500 (8.0)
<b>Cyprus</b>	88 (0.9)	505 (2.9)	12 (0.9)	501 (6.3)
<b>Czech Republic</b>	98 (0.2)	568 (3.2)	2 (0.2)	~ ~
<b>England</b>	93 (0.7)	516 (3.4)	7 (0.7)	463 (6.2)
<b>Greece</b>	92 (0.6)	498 (3.8)	8 (0.6)	463 (8.1)
<b>Hong Kong</b>	82 (2.0)	590 (4.4)	18 (2.0)	574 (6.6)
<i>Hungary</i>	98 (0.3)	551 (3.8)	2 (0.3)	~ ~
<b>Iceland</b>	87 (2.3)	475 (2.5)	13 (2.3)	476 (9.1)
<b>Iran, Islamic Rep.</b>	92 (0.8)	433 (4.1)	8 (0.8)	395 (4.7)
<b>Ireland</b>	96 (0.5)	551 (3.5)	4 (0.5)	545 (9.1)
<i>Israel</i>	84 (1.5)	535 (3.8)	16 (1.5)	525 (6.5)
<b>Japan</b>	- -	- -	- -	- -
<b>Korea</b>	99 (0.2)	611 (2.1)	1 (0.2)	~ ~
<i>Kuwait</i>	87 (1.0)	400 (2.5)	13 (1.0)	406 (6.2)
<i>Latvia (LSS)</i>	97 (0.5)	528 (5.0)	3 (0.5)	475 (6.6)
<i>Netherlands</i>	89 (0.9)	584 (3.4)	11 (0.9)	550 (7.9)
<b>New Zealand</b>	90 (0.7)	500 (4.4)	10 (0.7)	496 (9.1)
<b>Norway</b>	96 (0.5)	504 (2.9)	4 (0.5)	464 (9.2)
<b>Portugal</b>	94 (0.6)	479 (3.4)	6 (0.6)	440 (9.6)
<b>Scotland</b>	90 (0.8)	521 (4.0)	10 (0.8)	523 (8.7)
<b>Singapore</b>	93 (0.6)	624 (5.4)	7 (0.6)	638 (6.6)
<i>Slovenia</i>	96 (0.5)	554 (3.3)	4 (0.5)	513 (9.8)
<i>Thailand</i>	100 (0.0)	489 (4.5)	0 (0.0)	~ ~
<b>United States</b>	93 (0.5)	550 (3.0)	7 (0.5)	494 (4.7)

\*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. In almost every country, nearly all fourth graders agreed or strongly agreed that it was important to do well in mathematics. The percentages were in the high 90s for many countries and exceeded 90% in all countries, except Japan (75%), Korea (72%), and Thailand (80%). In many countries, somewhat fewer fourth-grade students agreed with the importance of doing well in science. Still, the percentages were relatively high, ranging from more than 90% agreement in a number of countries to a low of 72% in Japan and 69% in Korea.

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. Although students' friends purportedly were in general agreement with 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%). According to students, their friends felt even somewhat less strongly about the importance of doing well in science. The percentage of students reporting that their friends thought it was important to do well in science ranged from a high of about 90% in Greece and Portugal to a low of 54% in the Netherlands.

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 about two-thirds of the countries, more than 90% of the fourth graders agreed that it was important to have fun. At the lower end of the range, about three-fourths of the students in Korea and Kuwait agreed with the importance of having fun and the fewest agreed in Hong Kong (58%) and Singapore (57%). The variation in fourth-grade responses is interesting in view of the responses provided by the eighth-grade students, who nearly universally (usually 95% or more) agreed that it was important to have fun. 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 four activities by students varied from country to country.

In nearly all countries, 75% 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 Hong Kong (31%), Korea (66%), Kuwait (71%), and Singapore (46%). According to students, their mothers give a moderate to high degree of support to the importance of being good at sports (from 67% to 90%), except in Hong Kong (36%) and Thailand (57%).

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%), Singapore (65%), and Thailand (84%). Internationally, fourth 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 59% in Hong Kong to a high of 91% in Slovenia.

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

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

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

Country	Percent of Students Responding Yes			
	Do Well in Mathematics	Do Well in Science	Have Time to Have Fun	Be Good at Sports
<i>Australia</i>	76 (0.8)	68 (0.9)	95 (0.4)	86 (0.5)
<i>Austria</i>	83 (1.4)	76 (1.6)	91 (0.8)	82 (1.2)
<b>Canada</b>	81 (0.8)	73 (1.0)	96 (0.4)	82 (0.7)
<b>Cyprus</b>	85 (0.8)	75 (1.4)	79 (1.1)	83 (0.9)
<b>Czech Republic</b>	88 (0.9)	85 (1.1)	93 (0.6)	84 (1.0)
<b>England</b>	78 (1.2)	71 (1.3)	93 (0.6)	88 (0.7)
<b>Greece</b>	93 (0.6)	90 (0.8)	82 (1.1)	76 (1.1)
<b>Hong Kong</b>	84 (1.2)	73 (1.2)	65 (1.0)	59 (1.0)
<i>Hungary</i>	84 (0.9)	80 (1.0)	94 (0.6)	80 (1.1)
<b>Iceland</b>	87 (1.0)	75 (1.9)	92 (0.9)	88 (0.9)
<b>Iran, Islamic Rep.</b>	r 87 (1.7)	87 (1.7)	r 76 (1.9)	r 83 (1.6)
<b>Ireland</b>	79 (1.2)	68 (1.6)	96 (0.4)	90 (0.6)
<i>Israel</i>	r 70 (1.5)	r 65 (1.5)	r 76 (1.2)	r 78 (0.9)
<b>Japan</b>	70 (0.7)	62 (0.9)	92 (0.4)	75 (0.7)
<b>Korea</b>	59 (1.1)	58 (1.0)	78 (1.1)	64 (0.9)
<i>Kuwait</i>	88 (1.0)	86 (1.2)	75 (1.4)	76 (1.2)
<i>Latvia (LSS)</i>	88 (1.0)	78 (1.2)	92 (0.6)	82 (1.2)
<i>Netherlands</i>	65 (2.0)	54 (2.1)	92 (0.7)	72 (1.5)
<b>New Zealand</b>	76 (1.2)	67 (1.3)	96 (0.6)	88 (0.9)
<b>Norway</b>	83 (1.3)	77 (1.4)	97 (0.5)	82 (1.0)
<b>Portugal</b>	91 (0.8)	91 (0.8)	93 (0.6)	88 (1.0)
<b>Scotland</b>	78 (1.0)	68 (1.2)	95 (0.5)	89 (0.8)
<b>Singapore</b>	94 (0.4)	87 (0.7)	65 (1.6)	81 (1.0)
<i>Slovenia</i>	89 (0.8)	86 (0.9)	90 (0.6)	91 (0.8)
<i>Thailand</i>	76 (1.4)	74 (1.5)	84 (1.1)	63 (1.4)
<b>United States</b>	72 (0.9)	69 (0.8)	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. Table 4.9 presents fourth-grade students' reports about the number of hours outside of school they spend studying or doing homework in mathematics on a normal school day. Fourth-grade students in most countries reported normally averaging approximately an hour (.7 to 1.3 of an hour) studying mathematics. Fourth-graders in the Netherlands, Norway, and Scotland were at the lower end of the range, reporting an average of about one-half hour per school day (.5 to .6 of an hour). About one-fourth of the students in Norway and Scotland and nearly half in the Netherlands reported that they normally spent no time outside of school studying mathematics. Those in Iran and Kuwait were at the top end, reporting about two hours of mathematics homework per school day.

Table 4.9 also shows the relationship between time spent studying mathematics outside of school and students' average mathematics achievement. The relationship was curvilinear in most countries, with the highest achievement being associated with a moderate amount of homework per day (less than 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 only Iran, Japan, and Korea did students who reported progressively more time studying mathematics outside of school have correspondingly higher average mathematics achievement. The only inverse relationship was noted for the Netherlands. Still, different countries clearly have different policies and practices about assigning homework and encouraging the study of mathematics outside of school.

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 average amount of time spent on a normal school day 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 all countries reported that they normally spent an hour or two each school day watching television. Across countries, students often reported watching from 1.5 to 2 hours per normal school day, with those in Hungary, Israel, and Latvia (LSS), reporting from 2.3 to 2.5 hours. Fourth graders in many countries also appear to spend from one to two hours per school day playing or talking with

**Table 4.9**

**Students' Reports on the Amount of Out-of-School Time Spent Studying Mathematics or Doing Mathematics Homework on a Normal School Day Mathematics - 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>	15 (0.9)	526 (5.6)	61 (1.2)	559 (3.2)	24 (1.0)	530 (4.4)	0.8 (0.02)
<i>Austria</i>	4 (0.7)	555 (8.6)	58 (1.8)	571 (3.8)	38 (1.6)	546 (4.1)	1.0 (0.03)
<b>Canada</b>	14 (1.1)	526 (4.4)	60 (1.4)	544 (4.0)	26 (1.2)	522 (5.0)	0.8 (0.02)
<b>Cyprus</b>	9 (0.7)	473 (6.1)	51 (1.9)	519 (3.6)	40 (1.6)	495 (3.8)	1.1 (0.03)
<b>Czech Republic</b>	9 (0.9)	547 (6.6)	69 (1.2)	576 (3.6)	22 (1.1)	560 (4.3)	0.7 (0.02)
<b>England</b>	--	--	--	--	--	--	--
<b>Greece</b>	6 (0.5)	453 (6.8)	38 (1.6)	512 (4.1)	56 (1.7)	493 (4.0)	1.6 (0.04)
<b>Hong Kong</b>	6 (0.7)	550 (7.9)	44 (1.2)	595 (4.2)	50 (1.2)	586 (4.5)	1.3 (0.03)
<i>Hungary</i>	5 (0.7)	543 (10.8)	58 (1.3)	563 (3.9)	37 (1.4)	533 (4.2)	1.0 (0.03)
<b>Iceland</b>	10 (0.8)	457 (4.3)	63 (1.4)	483 (3.5)	27 (1.4)	472 (3.2)	0.8 (0.02)
<b>Iran, Islamic Rep.</b>	r 5 (0.7)	402 (6.6)	17 (1.3)	433 (6.0)	78 (1.5)	443 (4.5)	r 2.3 (0.07)
<b>Ireland</b>	7 (0.6)	516 (7.1)	70 (1.3)	565 (3.2)	23 (1.2)	530 (4.9)	0.8 (0.02)
<sup>2</sup> <i>Israel</i>	r 14 (1.3)	525 (6.4)	46 (2.2)	535 (4.7)	40 (1.9)	528 (4.1)	r 1.1 (0.05)
<b>Japan</b>	10 (0.7)	558 (4.3)	60 (1.1)	598 (2.3)	31 (1.2)	610 (3.0)	0.9 (0.02)
<b>Korea</b>	14 (0.8)	593 (4.2)	44 (1.1)	610 (2.5)	42 (1.2)	621 (2.3)	1.0 (0.02)
<i>Kuwait</i>	5 (0.7)	372 (5.7)	34 (1.4)	410 (3.0)	60 (1.5)	401 (2.8)	1.9 (0.05)
<sup>2</sup> <i>Latvia (LSS)</i>	7 (0.7)	476 (7.5)	61 (1.9)	542 (6.3)	33 (1.7)	518 (5.1)	1.0 (0.03)
<i>Netherlands</i>	47 (2.7)	593 (4.3)	39 (2.3)	578 (3.6)	14 (1.5)	541 (6.1)	0.5 (0.03)
<b>New Zealand</b>	21 (1.6)	488 (9.7)	54 (1.7)	512 (4.4)	25 (1.4)	493 (5.2)	0.8 (0.03)
<b>Norway</b>	23 (1.3)	503 (4.1)	58 (1.2)	512 (3.3)	19 (1.1)	497 (5.3)	0.6 (0.02)
<b>Portugal</b>	3 (0.5)	420 (9.1)	55 (1.7)	489 (3.9)	42 (1.6)	470 (3.9)	1.3 (0.03)
<b>Scotland</b>	26 (1.8)	519 (7.2)	63 (2.0)	528 (3.8)	11 (1.0)	501 (8.9)	0.5 (0.02)
<b>Singapore</b>	--	--	--	--	--	--	--
<i>Slovenia</i>	3 (0.4)	502 (11.4)	57 (1.5)	563 (3.7)	40 (1.4)	548 (3.7)	1.0 (0.03)
<i>Thailand</i>	17 (1.3)	470 (4.3)	44 (1.6)	496 (4.5)	39 (1.8)	489 (6.1)	1.0 (0.03)
<b>United States</b>	8 (0.5)	516 (4.4)	60 (1.1)	561 (3.1)	32 (1.1)	528 (2.9)	1.0 (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.

**Table 4.10****Students' Reports on How They Spend Their Leisure Time on a Normal School Day<sup>1</sup> - Mathematics - 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.

friends and one to two hours per school day 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 on some of these largely non-academic activities as on studying and doing mathematics homework.

Table 4.11 shows the relationship between mathematics achievement and the amount of time normally spent watching television on school days. Across the TIMSS countries, the highest mathematics achievement was associated with watching from one to two hours or even three to four hours of television per school day. Most commonly, fourth-grade students reported watching either less than one hour or from one to two hours of television on school days. That watching less than one hour of television per school day generally was associated with lower average mathematics achievement than watching one to two hours in many countries most likely has little to do with the influence of television viewing on mathematics 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 nearly all countries, students watching more than four hours of television per day had the lowest average mathematics achievement. In about half the countries, 10% or more of the students reported watching more than four hours of television each day. The countries with 15% or more 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 - Mathematics - 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)	547 (3.9)	36 (0.8)	555 (3.3)	17 (0.7)	555 (4.1)	15 (1.0)	520 (5.7)
<i>Austria</i>	41 (1.7)	554 (3.8)	43 (1.7)	568 (4.2)	9 (0.8)	573 (6.0)	7 (0.7)	534 (7.3)
<b>Canada</b>	36 (1.0)	533 (4.9)	37 (0.9)	548 (3.5)	14 (0.7)	532 (6.3)	13 (0.9)	510 (5.1)
<b>Cyprus</b>	34 (1.7)	504 (4.9)	41 (1.4)	512 (3.3)	15 (0.9)	504 (4.6)	10 (0.8)	483 (5.0)
<b>Czech Republic</b>	32 (1.4)	562 (4.7)	44 (1.3)	576 (3.5)	15 (0.8)	576 (4.0)	9 (0.8)	553 (4.6)
<b>England</b>	28 (1.3)	506 (5.3)	38 (1.0)	530 (3.9)	16 (0.9)	532 (4.9)	18 (0.9)	496 (4.1)
<b>Greece</b>	53 (1.4)	498 (4.0)	32 (1.5)	502 (4.0)	8 (0.7)	501 (8.9)	7 (0.6)	463 (9.9)
<b>Hong Kong</b>	48 (1.4)	586 (4.2)	31 (0.9)	597 (4.4)	12 (0.7)	589 (5.4)	9 (0.6)	563 (9.1)
<i>Hungary</i>	21 (1.2)	555 (5.4)	42 (1.2)	563 (4.4)	17 (0.8)	553 (4.9)	20 (1.2)	515 (4.6)
<b>Iceland</b>	53 (1.6)	478 (3.5)	33 (1.4)	479 (3.6)	9 (0.8)	481 (8.6)	5 (0.6)	455 (7.1)
<b>Iran, Islamic Rep.</b>	<sup>r</sup> 52 (2.1)	426 (3.8)	35 (1.7)	452 (5.6)	7 (0.7)	453 (6.4)	6 (0.7)	443 (10.2)
<b>Ireland</b>	33 (1.3)	538 (4.7)	37 (1.1)	565 (3.9)	16 (1.0)	566 (5.0)	14 (0.9)	538 (5.3)
<sup>1</sup> <i>Israel</i>	<sup>r</sup> 23 (1.3)	526 (5.7)	40 (1.3)	535 (3.7)	25 (1.2)	530 (5.1)	12 (0.9)	527 (6.2)
<b>Japan</b>	33 (0.8)	581 (2.9)	36 (0.9)	614 (2.5)	20 (0.6)	600 (3.0)	11 (0.6)	600 (4.6)
<b>Korea</b>	43 (1.0)	605 (2.6)	35 (0.9)	620 (2.9)	16 (0.8)	620 (3.5)	7 (0.5)	600 (7.0)
<i>Kuwait</i>	59 (1.1)	401 (2.8)	23 (1.0)	409 (3.2)	9 (0.5)	397 (4.5)	10 (0.5)	396 (3.5)
<sup>1</sup> <i>Latvia (LSS)</i>	32 (1.3)	514 (6.1)	37 (1.5)	549 (6.9)	19 (1.1)	534 (5.6)	12 (1.0)	503 (7.1)
<i>Netherlands</i>	36 (1.4)	579 (4.1)	39 (1.2)	583 (4.5)	15 (0.9)	592 (4.8)	9 (1.0)	553 (6.7)
<b>New Zealand</b>	36 (1.5)	503 (5.7)	31 (1.4)	520 (4.8)	15 (0.9)	507 (7.0)	19 (1.2)	463 (7.7)
<b>Norway</b>	33 (1.4)	493 (4.2)	46 (1.3)	512 (3.2)	14 (0.8)	521 (5.7)	8 (0.7)	503 (6.5)
<b>Portugal</b>	48 (1.8)	474 (4.3)	35 (1.5)	488 (4.0)	9 (0.7)	480 (6.6)	9 (0.9)	462 (6.5)
<b>Scotland</b>	37 (1.3)	518 (4.4)	36 (1.1)	532 (4.6)	13 (0.7)	527 (6.8)	14 (1.2)	502 (6.8)
<b>Singapore</b>	- -	- -	- -	- -	- -	- -	- -	- -
<i>Slovenia</i>	41 (1.6)	546 (4.4)	40 (1.3)	562 (3.9)	12 (0.9)	557 (5.9)	6 (0.7)	553 (7.7)
<i>Thailand</i>	65 (2.2)	488 (4.1)	23 (1.3)	500 (5.6)	5 (0.6)	500 (8.7)	6 (1.7)	457 (12.8)
<b>United States</b>	32 (0.9)	542 (3.2)	36 (0.7)	558 (3.5)	15 (0.8)	561 (3.9)	17 (0.7)	516 (3.0)

\*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 MATHEMATICS?

Table 4.12 presents fourth-grade students' perceptions about doing well in mathematics. In most countries, 85% or more of the students agreed or strongly agreed that they did well in mathematics. The exceptions, where more than 15% of the students disagreed or strongly disagreed about doing well, were Austria (17%), the Czech Republic (22%), Hong Kong (31%), Hungary (16%), Japan (27%), Latvia (LSS) (22%), Portugal (16%), Singapore (23%), and Thailand (21%). These countries represented a range in mathematics performance. Within countries, the pattern was much more consistent. Students who reported usually doing well in mathematics generally had higher achievement than students who reported doing less well. However, in several countries, most notably Norway, Scotland, and Thailand, 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, internationally, there was little difference between the genders in students' self-perceptions about how well they usually do in mathematics. This figure and the distributions shown in Table 4.12 also show that, on average, both boys and girls in the participating countries tended to agree about usually doing well in mathematics rather than report the extremes of strongly agreeing or disagreeing. For most countries both boys and girls tended to indicate that they did well in mathematics – a perception that did not always coincide with their achievement on the TIMSS mathematics test. However, fourth-grade girls had lower self-perceptions than boys in Austria, Hong Kong, Japan, the Netherlands, Singapore, and Slovenia. Hong Kong, Japan, and the Netherlands did show a significant difference in performance that favored boys at either the third or fourth grades. Considering their comparatively lower self-perceptions, it is interesting to note that fourth-grade Singaporean girls averaged 10 points higher on the TIMSS mathematics scale than did boys, though the difference was not statistically significant.

**Table 4.12****Students' Self-Perceptions About Usually Doing Well in Mathematics  
Upper Grade (Fourth Grade\*)**

Country	Strongly Disagree		Disagree		Agree		Strongly Agree	
	Percent of Students	Mean Achievement						
<i>Australia</i>	3 (0.3)	462 (7.7)	7 (0.5)	489 (6.2)	59 (1.0)	545 (2.5)	31 (0.9)	578 (4.9)
<i>Austria</i>	3 (0.3)	476 (6.6)	14 (0.9)	509 (4.3)	39 (1.1)	548 (3.9)	44 (1.2)	591 (3.4)
<b>Canada</b>	2 (0.3)	~ ~	4 (0.4)	479 (7.9)	53 (1.3)	525 (3.8)	41 (1.3)	553 (4.0)
<i>Cyprus</i>	1 (0.2)	~ ~	2 (0.3)	~ ~	30 (1.1)	490 (3.7)	67 (1.2)	517 (3.5)
<b>Czech Republic</b>	3 (0.3)	490 (6.4)	19 (1.0)	521 (4.6)	58 (1.3)	580 (3.8)	20 (1.0)	590 (5.1)
<b>England</b>	3 (0.4)	457 (9.6)	7 (0.5)	486 (7.0)	57 (0.9)	517 (3.6)	33 (0.9)	521 (5.0)
<b>Greece</b>	1 (0.2)	~ ~	4 (0.4)	430 (8.9)	32 (1.4)	492 (4.4)	63 (1.4)	505 (3.9)
<b>Hong Kong</b>	6 (0.4)	515 (7.3)	25 (1.0)	571 (5.4)	53 (1.0)	598 (4.1)	17 (0.8)	603 (5.7)
<i>Hungary</i>	2 (0.3)	~ ~	14 (0.8)	506 (5.2)	53 (1.1)	546 (3.7)	31 (1.2)	581 (4.6)
<b>Iceland</b>	2 (0.3)	~ ~	5 (0.5)	441 (6.0)	42 (1.4)	472 (2.9)	51 (1.5)	485 (3.8)
<b>Iran, Islamic Rep.</b>	2 (0.3)	~ ~	3 (0.5)	405 (7.8)	40 (1.9)	435 (4.5)	55 (2.0)	435 (4.4)
<b>Ireland</b>	2 (0.2)	~ ~	5 (0.5)	498 (5.9)	57 (1.4)	553 (3.5)	36 (1.3)	559 (4.7)
<i>Israel</i>	3 (0.4)	531 (11.7)	5 (0.7)	528 (8.4)	31 (1.2)	530 (4.6)	61 (1.2)	538 (4.4)
<b>Japan</b>	3 (0.2)	495 (6.9)	24 (0.8)	545 (2.9)	62 (1.0)	609 (2.2)	12 (0.7)	661 (4.6)
<b>Korea</b>	- -	- -	- -	- -	- -	- -	- -	- -
<i>Kuwait</i>	5 (0.6)	405 (5.0)	6 (0.5)	381 (4.8)	33 (1.1)	396 (2.4)	56 (1.2)	408 (3.4)
<i>Latvia (LSS)</i>	2 (0.3)	~ ~	20 (1.3)	509 (10.9)	52 (1.5)	532 (4.8)	26 (1.2)	531 (5.6)
<i>Netherlands</i>	2 (0.4)	~ ~	13 (0.8)	547 (4.3)	61 (1.3)	580 (4.4)	24 (1.0)	601 (4.2)
<b>New Zealand</b>	3 (0.4)	426 (12.2)	8 (0.7)	465 (6.4)	56 (1.3)	500 (3.8)	32 (1.2)	517 (7.6)
<b>Norway</b>	3 (0.4)	454 (11.6)	7 (0.7)	493 (7.8)	56 (1.5)	510 (3.2)	35 (1.6)	503 (3.9)
<b>Portugal</b>	4 (0.4)	418 (7.9)	12 (1.0)	453 (5.7)	49 (1.2)	485 (3.4)	34 (1.3)	486 (5.0)
<b>Scotland</b>	2 (0.3)	~ ~	8 (0.6)	498 (6.8)	64 (1.3)	529 (3.8)	26 (1.2)	518 (6.0)
<b>Singapore</b>	4 (0.3)	502 (6.6)	19 (1.0)	571 (5.7)	55 (1.0)	637 (4.6)	22 (1.0)	673 (7.0)
<i>Slovenia</i>	1 (0.2)	~ ~	12 (0.8)	507 (4.7)	55 (1.1)	551 (3.8)	31 (1.2)	581 (5.7)
<i>Thailand</i>	3 (0.7)	448 (14.5)	18 (0.8)	467 (5.9)	41 (1.9)	500 (5.1)	37 (1.9)	491 (5.5)
<b>United States</b>	2 (0.2)	~ ~	7 (0.6)	501 (6.7)	47 (1.0)	541 (3.0)	44 (1.3)	564 (3.4)

\*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.

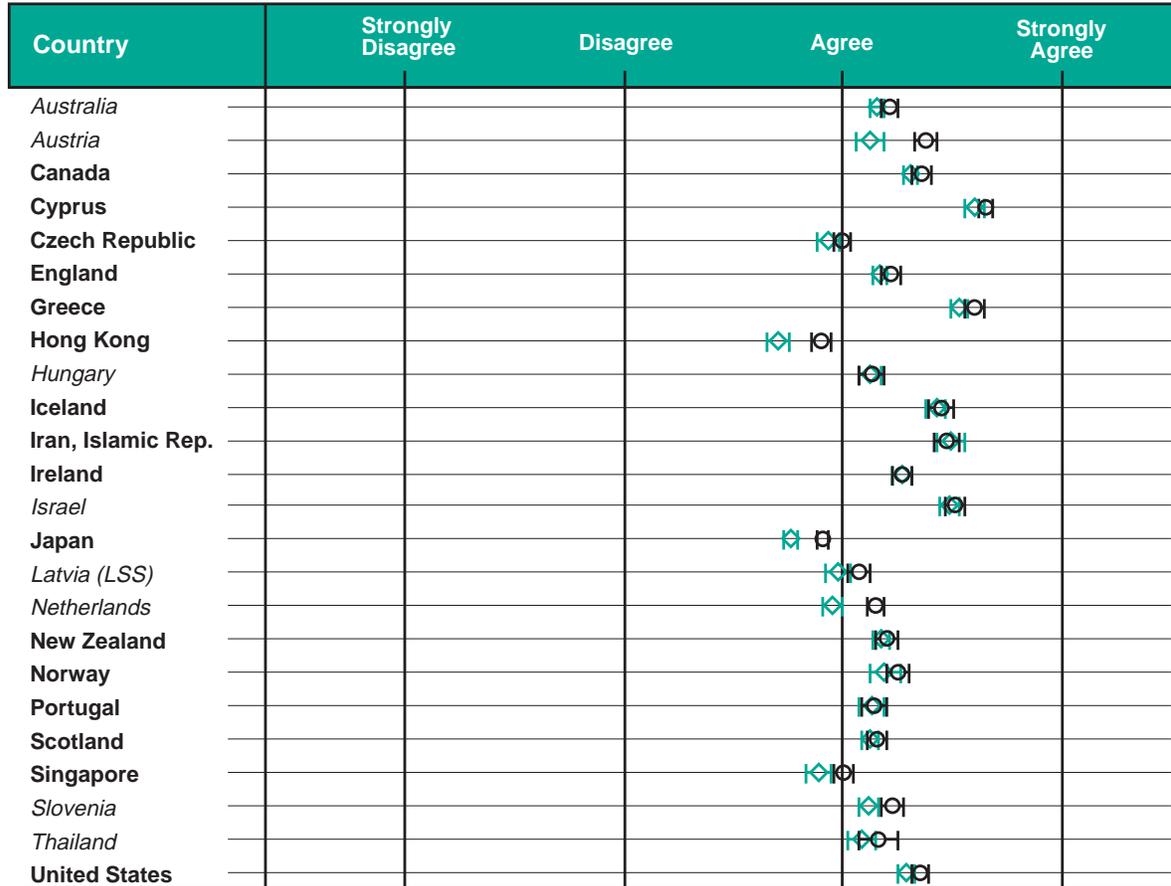
A dash (-) indicates data are not available. A tilde (~) indicates insufficient data to report achievement.

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 Mathematics - 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. Data are not available for Korea.

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

Students were asked about the necessity of various attributes or activities to do well in mathematics (see Table 4.13). There was some variation from country to country in the percentage of fourth-grade students agreeing that natural talent or ability were important to do well in mathematics. At the low end of the range, approximately 60% of the students agreed in the Czech Republic, Greece, and the United States. In comparison, 90% or more agreed in Hungary, Iran, Korea, Kuwait, and Norway.

The majority of students in about two-thirds of the countries were of the opinion that good luck was necessary to do well in mathematics. In only several countries did relatively few students agree that good luck was important to do well – Hong Kong (20%), the Netherlands (28%), and Singapore (36%). The countries where more than 70% of the fourth graders agreed that good luck was needed to do well in mathematics 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 mathematics. Percentages of agreement were in the 80s and 90s for all countries except the Netherlands (77%) and Thailand (68%). There also was moderate consistency regarding students' agreement that it was necessary to memorize the textbook or notes. In about half the countries, more than 70% of the fourth-grade students agreed or strongly agreed that memorization was important to do well in mathematics. Ninety percent of the fourth graders agreed that memorization was important in Iceland, Iran, and Japan. In contrast, fewer than one-half of the fourth graders in the Netherlands (25%) and Slovenia (44%) agreed that memorization was important.

**Table 4.13**

**Students' Reports on Things Necessary to Do Well in Mathematics  
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>	85 (0.8)	59 (1.2)	84 (0.8)	68 (1.2)
<i>Austria</i>	72 (1.8)	54 (1.7)	83 (1.6)	58 (1.9)
<b>Canada</b>	81 (1.0)	49 (1.4)	90 (0.8)	62 (1.6)
<b>Cyprus</b>	68 (1.8)	58 (2.3)	96 (0.4)	71 (2.2)
<b>Czech Republic</b>	61 (1.5)	68 (1.3)	87 (0.8)	61 (1.9)
<b>England</b>	- -	- -	- -	- -
<b>Greece</b>	62 (1.4)	48 (1.7)	87 (1.0)	73 (1.8)
<b>Hong Kong</b>	74 (1.3)	20 (1.0)	95 (0.3)	62 (2.2)
<i>Hungary</i>	96 (0.4)	75 (1.1)	88 (0.7)	82 (1.0)
<b>Iceland</b>	79 (1.4)	63 (1.6)	90 (0.9)	92 (0.8)
<b>Iran, Islamic Rep.</b>	r 96 (0.6)	r 74 (2.4)	r 94 (0.6)	r 90 (1.0)
<b>Ireland</b>	87 (1.0)	65 (1.4)	91 (0.7)	72 (1.4)
<i>Israel</i>	r 66 (1.6)	r 43 (1.8)	r 96 (0.5)	r 67 (1.8)
<b>Japan</b>	79 (0.9)	53 (1.2)	91 (0.5)	93 (0.5)
<b>Korea</b>	90 (0.6)	62 (1.1)	95 (0.5)	84 (0.9)
<i>Kuwait</i>	92 (0.6)	76 (1.5)	87 (0.8)	89 (0.9)
<i>Latvia (LSS)</i>	77 (1.3)	86 (1.0)	92 (0.7)	60 (2.2)
<i>Netherlands</i>	64 (1.6)	28 (1.7)	77 (1.6)	25 (2.2)
<b>New Zealand</b>	84 (1.1)	64 (1.4)	87 (0.9)	73 (1.4)
<b>Norway</b>	93 (0.5)	58 (1.6)	89 (0.9)	81 (1.0)
<b>Portugal</b>	86 (1.2)	66 (2.1)	95 (0.5)	80 (1.7)
<b>Scotland</b>	- -	- -	- -	- -
<b>Singapore</b>	88 (0.7)	36 (1.5)	95 (0.5)	60 (2.0)
<i>Slovenia</i>	84 (1.2)	63 (2.1)	92 (0.8)	44 (2.0)
<i>Thailand</i>	78 (1.2)	65 (2.0)	68 (2.3)	87 (1.0)
<b>United States</b>	62 (1.0)	46 (1.2)	93 (0.4)	69 (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 MATHEMATICS?

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

Table 4.14 provides students' responses to the question about how much they like or dislike mathematics. In more than a third of the countries, a positive relationship was observed between a stronger liking of mathematics and higher achievement. Even though the pattern was not uniform across countries, students who reported either liking mathematics or liking it a lot generally had higher achievement than students who reported disliking it to some degree. The overwhelming majority of fourth-graders in every country indicated they liked mathematics to some degree, but not all students felt positive about this subject area. In Japan, Korea, and the Netherlands, more than one-quarter of the fourth-grade students reported disliking mathematics.

The data in Figure 4.2 reveal that, on average, fourth graders of both genders were relatively positive about liking mathematics. In Austria, Hong Kong, Japan, and the Netherlands boys reported a significantly stronger liking of the subject area than did girls. However, girls reported liking mathematics better than boys did in Ireland and Scotland. As a point of comparison, these patterns generally held at the eighth grade. The countries where eighth-grade boys reported liking mathematics better than girls also included Norway, but the differences in Ireland and Scotland favoring girls were no longer significant.

**Table 4.14**

### Students' Reports on How Much They Like Mathematics Upper Grade (Fourth Grade\*)

Country	Dislike a Lot		Dislike		Like		Like a Lot	
	Percent of Students	Mean Achievement						
<i>Australia</i>	7 (0.6)	501 (6.0)	10 (0.6)	547 (5.1)	42 (0.8)	547 (3.5)	41 (1.1)	561 (4.2)
<i>Austria</i>	10 (0.9)	532 (5.4)	14 (0.8)	548 (6.7)	32 (1.1)	556 (3.9)	44 (1.1)	574 (4.1)
<b>Canada</b>	5 (0.4)	511 (5.8)	6 (0.4)	535 (6.6)	39 (1.2)	531 (4.1)	50 (1.2)	538 (3.7)
<i>Cyprus</i>	2 (0.3)	~ ~	3 (0.4)	482 (8.6)	22 (1.2)	499 (4.0)	73 (1.4)	510 (3.2)
<b>Czech Republic</b>	4 (0.5)	534 (7.6)	13 (0.9)	552 (6.9)	48 (1.0)	571 (3.9)	36 (1.3)	573 (3.9)
<b>England</b>	7 (0.7)	498 (5.9)	9 (0.6)	516 (7.8)	32 (1.0)	519 (3.9)	52 (1.3)	512 (4.2)
<b>Greece</b>	2 (0.3)	~ ~	4 (0.5)	475 (11.1)	23 (0.9)	487 (4.0)	71 (1.2)	502 (4.4)
<b>Hong Kong</b>	6 (0.5)	551 (8.0)	13 (0.8)	572 (6.6)	46 (1.8)	592 (4.6)	36 (2.1)	595 (5.0)
<i>Hungary</i>	6 (0.6)	520 (7.6)	10 (0.8)	536 (5.9)	47 (1.3)	546 (4.3)	37 (1.5)	563 (4.7)
<b>Iceland</b>	3 (0.6)	445 (7.6)	4 (0.6)	458 (9.0)	30 (1.5)	466 (3.4)	63 (1.8)	484 (3.6)
<b>Iran, Islamic Rep.</b>	1 (0.3)	~ ~	2 (0.3)	~ ~	18 (1.3)	438 (5.1)	79 (1.5)	433 (4.4)
<b>Ireland</b>	8 (0.7)	528 (7.0)	8 (0.6)	543 (6.8)	33 (1.1)	555 (4.0)	50 (1.3)	555 (4.1)
<i>Israel</i>	7 (0.7)	535 (7.1)	11 (1.0)	542 (7.5)	33 (1.6)	528 (5.2)	50 (2.1)	534 (4.1)
<b>Japan</b>	6 (0.4)	539 (5.4)	22 (0.8)	574 (2.9)	47 (0.9)	598 (2.1)	24 (1.0)	633 (3.8)
<b>Korea</b>	6 (0.5)	572 (7.2)	21 (0.8)	593 (3.5)	40 (0.9)	614 (2.4)	33 (0.9)	629 (2.9)
<i>Kuwait</i>	3 (0.3)	378 (6.3)	3 (0.4)	391 (6.6)	18 (0.8)	395 (2.9)	76 (1.2)	405 (3.1)
<i>Latvia (LSS)</i>	7 (0.8)	481 (10.0)	11 (0.8)	515 (8.7)	45 (1.4)	528 (6.0)	37 (1.4)	537 (4.7)
<i>Netherlands</i>	9 (0.9)	567 (6.1)	26 (1.1)	571 (4.0)	37 (1.3)	585 (4.1)	27 (1.1)	586 (4.4)
<b>New Zealand</b>	10 (0.8)	475 (7.2)	9 (0.6)	494 (7.9)	35 (1.3)	505 (4.4)	46 (1.6)	504 (6.1)
<b>Norway</b>	9 (0.9)	500 (5.3)	14 (1.1)	513 (6.5)	37 (1.3)	511 (3.0)	40 (1.7)	498 (3.7)
<b>Portugal</b>	2 (0.3)	~ ~	6 (0.6)	453 (5.3)	36 (1.3)	475 (3.1)	55 (1.5)	483 (4.3)
<b>Scotland</b>	8 (0.6)	501 (7.8)	9 (0.6)	534 (6.5)	33 (1.1)	535 (4.5)	51 (1.3)	516 (4.6)
<b>Singapore</b>	2 (0.2)	~ ~	5 (0.4)	565 (8.4)	40 (0.9)	610 (5.8)	52 (1.0)	648 (5.0)
<i>Slovenia</i>	3 (0.5)	560 (13.7)	8 (0.6)	534 (5.9)	40 (1.3)	550 (4.2)	49 (1.7)	558 (4.0)
<i>Thailand</i>	2 (0.5)	~ ~	7 (0.7)	464 (8.4)	37 (1.6)	488 (5.4)	55 (1.8)	494 (5.0)
<b>United States</b>	8 (0.5)	513 (4.2)	8 (0.5)	535 (4.7)	34 (1.2)	549 (3.6)	50 (1.6)	550 (3.9)

\*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.

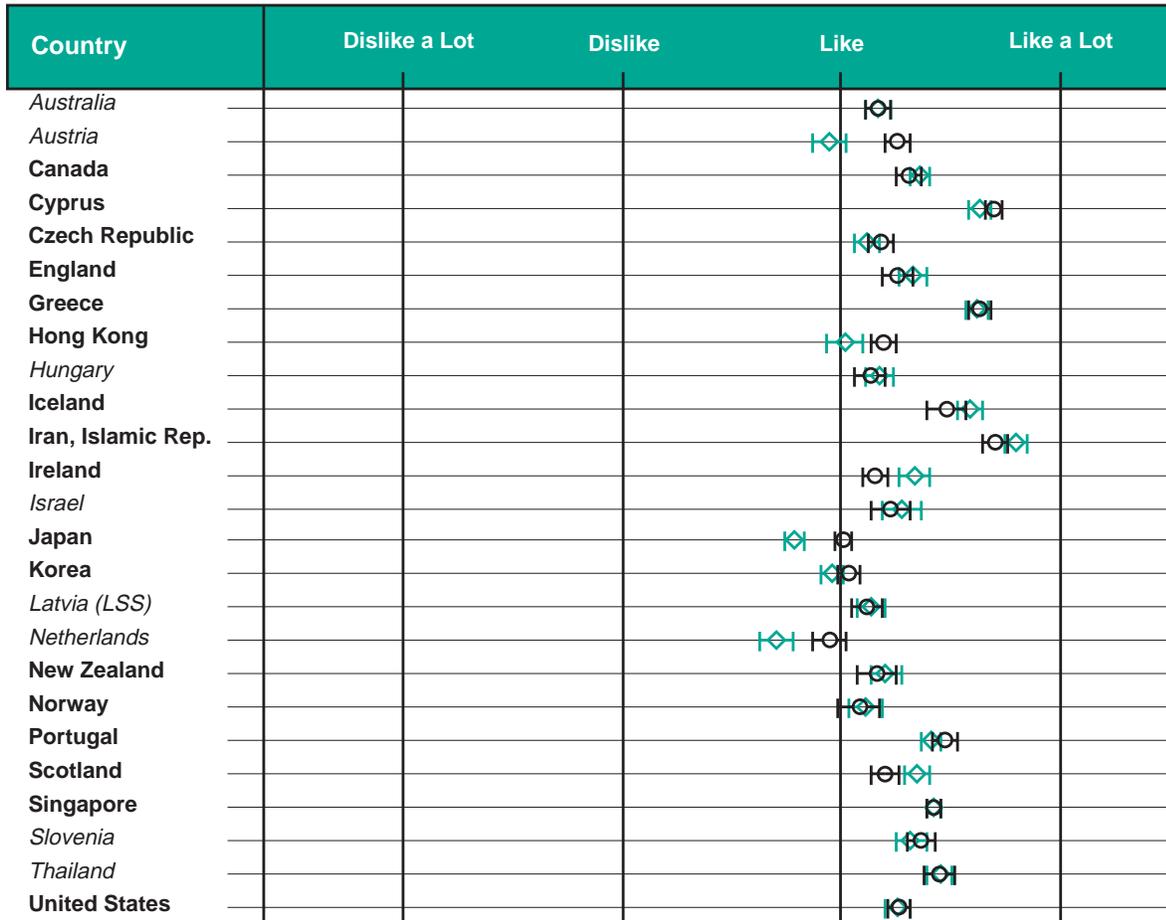
A tilde (~) indicates insufficient data to report achievement.

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 Mathematics  
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.

To gain some understanding of fourth graders' enjoyment of mathematics as a school subject, TIMSS asked students to state their level of agreement with the following two statements: 1) Mathematics is boring, and 2) I enjoy learning mathematics. The results for these two questions were combined with students' responses to the question about liking mathematics to form an index of their overall attitudes toward mathematics based on all three questions.

The data for the index in Table 4.15 reveal that fourth-grade students generally had positive attitudes toward mathematics, and that those students with more positive attitudes had higher average mathematics achievement. On average, across the three questions comprising the mathematics attitude index, the majority of students in each TIMSS country expressed positive or strongly positive attitudes about mathematics. Few students (usually 5% or less) consistently had strongly negative opinions about all three aspects of the enjoyability of the subject, and less than one-fourth expressed any type of negative feelings.

Gender differences for the index of overall liking and enjoyability of mathematics are portrayed in Figure 4.3. In many countries, girls and boys reported similarly positive overall attitudes towards mathematics. The countries where boys' attitudes were significantly more positive than those of girls included Austria, Hong Kong, Japan, and the Netherlands. In Ireland, girls had more positive overall attitudes towards mathematics than did boys.

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

Country	Strongly Negative		Negative		Positive		Strongly Positive	
	Percent of Students	Mean Achievement						
<i>Australia</i>	5 (0.5)	513 (6.1)	14 (0.7)	531 (4.7)	44 (0.9)	543 (3.6)	37 (1.1)	567 (4.4)
<i>Austria</i>	6 (0.7)	548 (5.8)	19 (1.0)	537 (4.7)	36 (1.2)	559 (3.9)	39 (1.5)	574 (4.5)
<b>Canada</b>	3 (0.4)	522 (8.4)	10 (0.7)	522 (5.1)	41 (1.2)	524 (4.2)	46 (1.1)	544 (3.5)
<b>Cyprus</b>	1 (0.2)	~ ~	4 (0.4)	475 (6.9)	34 (1.0)	480 (3.8)	61 (1.2)	522 (3.0)
<b>Czech Republic</b>	2 (0.3)	~ ~	16 (0.9)	553 (5.3)	55 (1.0)	565 (3.7)	26 (1.2)	583 (4.4)
<b>England</b>	5 (0.5)	510 (7.3)	13 (0.8)	505 (6.2)	32 (1.1)	509 (4.3)	50 (1.5)	518 (3.9)
<b>Greece</b>	1 (0.2)	~ ~	5 (0.5)	463 (10.5)	28 (0.9)	471 (4.4)	66 (1.2)	509 (4.0)
<b>Hong Kong</b>	3 (0.4)	580 (9.0)	16 (0.8)	566 (6.4)	52 (1.5)	585 (4.5)	29 (1.8)	603 (5.3)
<i>Hungary</i>	4 (0.5)	538 (7.6)	17 (1.2)	536 (5.7)	49 (1.1)	538 (3.8)	30 (1.2)	577 (5.2)
<b>Iceland</b>	3 (0.6)	459 (9.9)	7 (0.6)	459 (5.5)	31 (1.5)	461 (3.9)	59 (1.6)	487 (3.6)
<b>Iran, Islamic Rep.</b>	1 (0.2)	~ ~	5 (0.6)	425 (5.9)	48 (1.7)	418 (3.9)	47 (1.9)	447 (4.8)
<b>Ireland</b>	5 (0.6)	542 (6.5)	15 (0.8)	542 (4.4)	39 (1.0)	546 (4.5)	41 (1.2)	560 (3.9)
<i>Israel</i>	5 (0.7)	540 (7.6)	13 (1.0)	538 (7.8)	39 (1.3)	526 (3.9)	43 (1.8)	539 (4.7)
<b>Japan</b>	3 (0.3)	547 (6.8)	22 (0.9)	570 (3.3)	56 (1.0)	598 (2.3)	18 (0.8)	636 (3.8)
<b>Korea</b>	4 (0.4)	588 (8.5)	24 (0.9)	591 (3.1)	43 (0.9)	610 (2.6)	29 (0.9)	633 (2.7)
<i>Kuwait</i>	1 (0.2)	~ ~	6 (0.4)	381 (4.8)	40 (1.2)	383 (2.7)	53 (1.3)	418 (2.9)
<i>Latvia (LSS)</i>	2 (0.4)	~ ~	16 (1.0)	509 (8.5)	52 (1.2)	526 (5.8)	30 (1.2)	538 (4.1)
<i>Netherlands</i>	8 (0.8)	569 (6.9)	24 (1.1)	570 (4.3)	41 (1.4)	581 (4.3)	27 (1.2)	590 (4.1)
<b>New Zealand</b>	5 (0.6)	498 (7.1)	15 (0.8)	479 (5.7)	41 (1.1)	493 (5.0)	40 (1.3)	515 (5.8)
<b>Norway</b>	5 (0.6)	507 (7.8)	17 (1.2)	509 (5.0)	39 (1.3)	503 (3.4)	40 (1.7)	504 (3.5)
<b>Portugal</b>	1 (0.1)	~ ~	7 (0.6)	448 (7.2)	42 (1.2)	457 (4.2)	51 (1.4)	498 (3.3)
<b>Scotland</b>	- -	- -	- -	- -	- -	- -	- -	- -
<b>Singapore</b>	1 (0.1)	~ ~	7 (0.5)	565 (8.4)	43 (0.8)	605 (5.5)	49 (1.0)	652 (5.2)
<i>Slovenia</i>	2 (0.4)	~ ~	12 (0.9)	539 (5.7)	46 (1.3)	543 (4.5)	40 (1.5)	567 (3.6)
<i>Thailand</i>	0 (0.1)	~ ~	10 (1.2)	445 (7.9)	62 (1.5)	487 (4.4)	28 (1.8)	509 (4.6)
<b>United States</b>	5 (0.4)	527 (7.4)	14 (0.7)	527 (4.0)	37 (1.1)	542 (3.9)	44 (1.5)	556 (3.5)

\*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 mathematics; 2) I enjoy learning mathematics; 3) Mathematics 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 Mathematics  
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 mathematics; 2) I enjoy learning mathematics; 3) Mathematics is boring (reversed scale).

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.

Data are not available for Scotland.

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

