Chapter 2

AVERAGE ACHIEVEMENT IN THE SCIENCE CONTENT AREAS

Recognizing that curricular differences exist between and within countries is an important aspect of IEA studies, TIMSS attempted to measure achievement in different areas within the sciences that would be useful in relating achievement to curriculum. After much deliberation, the science test for the third and fourth grades was designed to enable reporting by four content areas in accordance with the TIMSS science framework.[1] These four content areas consist of:

- earth science

- life science

- physical science

- environmental issues and the nature of science

Following the discussion in this chapter about differences in average achievement for the TIMSS countries across these content areas, Chapter 3 contains further information about the types of science items, including five or six example items within each content area and the percentage of correct responses on those items for each of the TIMSS countries.

HOW DOES ACHIEVEMENT DIFFER ACROSS SCIENCE CONTENT AREAS?

The results reported in Chapter 1 revealed substantial achievement differences among the participating countries on the TIMSS science test. This chapter examines whether the participating countries achieved at the same level in each of the content areas as they did on the science test as a whole.

Results in this chapter are based on the average percentage of correct responses to items within each content area. Because of the additional resources and time that would have been required to use the more complex IRT scaling methodology that served as the basis for the overall achievement estimates in Chapter 1, TIMSS could not generate scale scores for the four content areas for this report.[2]

Tables 2.1 and 2.2 provide the average percentage of correct responses to items in the different content areas for the fourth- and third-grade students, respectively. The countries are listed in order of their average percent correct across all items in the test. As indicated by the numbers of items overall and in each content area, the overall test contains the most items in life science (42%) and physical science (31%) and the

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[1] Please see the test development section of Appendix A for more information about the process used to develop the TIMSS tests. Appendix B provides an analysis of the match between the test and curriculum in the different TIMSS countries and the effect of this match on the TIMSS results.

[2] TIMSS plans to generate IRT scale scores for the science content areas for future reports.

fewest items in the category of environmental issues and the nature of science (9%). Thus, countries who performed very well in life science and physical science were more likely to have higher scores overall.[3]

The results for the average percent correct across all science items are presented for each country primarily to provide a basis for comparison of performance in each of the content areas. For the purpose of comparing overall achievement among countries, it is preferable to use the results presented in Chapter 1.[4] It is interesting to note, however, that even though the relative standings of countries differ somewhat from Tables 1.1 and 1.2, the slight differences are well within the limits of sampling error and can be attributed to the differences in the methods used.

The data in each column show each country's average percent correct for items in that content area and the international average across all countries for the content area (shown as the last entry in the column). Looking down each of the columns in turn, two findings become apparent. First, the countries that did well on the overall test generally did well in each of the various content areas, and those that did poorly overall also tended to do so in each of the content areas. There are differences between the relative standing of countries within each of the content areas and their overall standing, but these differences are small when sampling error is considered.

Second, the international averages show that the different content areas in the TIMSS test were not equally difficult for the students taking the test. The life science content area was the least difficult for both grades. On average, the items in this content area were answered correctly by 64% of the fourth-graders and 55% of the third-graders across countries. Internationally, the items in the content area called environmental issues and the nature of science (international averages of 51% at fourth grade, 40% at third grade) were the most difficult items for the students at both grades.

It is important to keep these differences in average difficulty in mind when reading across the rows of the tables. These differences mean that for many countries, students will appear to have higher than average performance in life science and lower than average performance in environmental issues and the nature of science. For example, even though the fourth-grade students in Korea performed above the international average in life science, they still performed less well in this area than they did on the test as a whole. That is, simply comparing performance across the rows gives an unclear picture of each country's relative performance across the content areas because the varying difficulty level of the items in each area has not been taken into account.

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[3] Table A.1 in Appendix A provides details about the distributions of items across the content areas, by format and score points (taking into account multi-part items and items scored for partial credit).

[4] The IRT scale scores provide better estimates of overall achievement, because they take the difficulty of items into account. This is important in a study such as TIMSS, where different students take overlapping but somewhat different sets of items.

Table 2.1

Average Percent Correct by Science Content Areas
Upper Grade (Fourth Grade*)

Country	Science Overall (97 items)	Earth Science (17 items)	Life Science (41 items)	Physical Science (30 items)	Environmental Issues and the Nature of Science (9 items)
Korea	74 (0.4)	72 (0.5)	76 (0.4)	75 (0.5)	70 (0.8)
Japan	70 (0.3)	66 (0.4)	73 (0.3)	70 (0.4)	62 (0.6)
United States	66 (0.5)	64 (0.7)	71 (0.6)	60 (0.6)	65 (0.8)
Czech Republic	65 (0.5)	64 (0.6)	71 (0.5)	62 (0.7)	56 (0.9)
Singapore	64 (0.8)	58 (0.8)	70 (0.8)	64 (0.8)	53 (1.1)
Canada	64 (0.6)	62 (0.6)	68 (0.6)	61 (0.7)	56 (0.7)
†²England	63 (0.6)	61 (0.6)	68 (0.6)	60 (0.8)	56 (1.0)
Hong Kong	62 (0.7)	61 (0.6)	68 (0.7)	60 (0.8)	50 (1.1)
Ireland	61 (0.6)	60 (0.8)	66 (0.6)	57 (0.7)	55 (0.9)
Norway	60 (0.6)	60 (0.6)	67 (0.7)	55 (0.7)	53 (0.9)
New Zealand	60 (0.9)	57 (0.9)	66 (0.9)	57 (1.1)	54 (1.2)
†Scotland	60 (0.8)	58 (0.9)	65 (0.8)	57 (0.8)	53 (1.2)
Iceland	55 (0.7)	55 (0.7)	60 (0.8)	52 (0.7)	47 (1.2)
Greece	54 (0.8)	52 (0.9)	61 (0.9)	49 (0.9)	43 (1.2)
Cyprus	51 (0.5)	48 (0.7)	55 (0.5)	50 (0.7)	42 (1.0)
Portugal	50 (0.7)	50 (0.8)	54 (0.8)	49 (0.9)	39 (1.0)
Iran, Islamic Rep.	40 (0.7)	38 (0.7)	44 (0.7)	40 (0.9)	26 (0.9)
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details):					
Australia	66 (0.5)	61 (0.6)	72 (0.5)	63 (0.7)	63 (0.8)
Austria	66 (0.7)	62 (0.8)	72 (0.7)	64 (0.8)	54 (1.0)
¹Latvia (LSS)	56 (0.8)	57 (1.0)	60 (0.8)	54 (0.9)	46 (1.2)
Netherlands	67 (0.5)	61 (0.6)	73 (0.5)	65 (0.6)	61 (0.9)
Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details):					
Slovenia	64 (0.7)	64 (0.7)	68 (0.7)	61 (0.8)	54 (0.8)
Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details):					
Hungary	62 (0.6)	62 (0.7)	66 (0.6)	59 (0.8)	50 (0.9)
Unapproved Sampling Procedures at Classroom Level and Not Meeting Other Guidelines (See Appendix A for Details):					
¹Israel	57 (0.8)	51 (0.8)	61 (0.9)	55 (0.9)	51 (1.3)
Kuwait	39 (0.5)	36 (0.6)	45 (0.6)	37 (0.5)	25 (0.7)
Thailand	49 (0.9)	48 (0.9)	52 (0.8)	46 (1.0)	48 (1.4)
International Average Percent Correct	59 (0.1)	57 (0.1)	64 (0.1)	57 (0.2)	51 (0.2)

*Fourth grade in most countries; see Table 2 for information about the grades tested in each country.
†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).
¹National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is
  annotated LSS for Latvian Speaking Schools only.
²National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

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

Table 2.2

**Average Percent Correct by Science Content Areas
Lower Grade (Third Grade*)**

Country	Science Overall (97 items)	Earth Science (17 items)	Life Science (41 items)	Physical Science (30 items)	Environmental Issues and the Nature of Science (9 items)
Korea	67 (0.5)	64 (0.6)	70 (0.5)	67 (0.6)	60 (0.8)
Japan	61 (0.3)	58 (0.4)	65 (0.3)	61 (0.5)	52 (0.7)
United States	56 (0.6)	55 (0.7)	62 (0.7)	51 (0.7)	52 (0.9)
Czech Republic	55 (0.6)	53 (0.7)	61 (0.6)	51 (0.6)	41 (0.9)
†2 England	55 (0.6)	53 (0.6)	60 (0.7)	52 (0.8)	45 (1.0)
Canada	53 (0.5)	52 (0.7)	59 (0.6)	50 (0.6)	44 (0.8)
Singapore	53 (0.9)	51 (0.9)	58 (0.9)	52 (0.9)	41 (1.1)
Hong Kong	53 (0.6)	52 (0.6)	58 (0.7)	50 (0.7)	36 (0.8)
Ireland	51 (0.7)	50 (0.7)	56 (0.7)	48 (0.8)	44 (0.9)
New Zealand	51 (0.9)	48 (0.8)	57 (1.0)	47 (0.9)	43 (1.2)
Norway	46 (0.7)	47 (0.7)	52 (0.8)	41 (0.9)	34 (0.8)
Greece	44 (0.7)	43 (0.8)	51 (0.8)	40 (0.8)	33 (1.1)
Iceland	42 (0.6)	44 (0.8)	47 (0.8)	40 (0.6)	30 (0.9)
Portugal	41 (0.8)	40 (0.8)	46 (0.8)	40 (0.8)	29 (0.9)
Cyprus	39 (0.5)	40 (0.5)	43 (0.6)	38 (0.7)	30 (0.7)
Iran, Islamic Rep.	30 (0.7)	29 (0.9)	33 (0.8)	30 (0.7)	20 (0.8)
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details):					
Australia	57 (0.7)	54 (0.8)	63 (0.7)	53 (0.8)	50 (1.0)
Austria	55 (0.8)	54 (1.0)	61 (0.9)	51 (1.0)	41 (1.1)
¹ Latvia (LSS)	48 (0.9)	48 (1.0)	52 (0.9)	46 (1.0)	38 (1.0)
Netherlands	56 (0.7)	49 (0.7)	63 (0.7)	53 (0.8)	48 (0.9)
Scotland	51 (0.7)	50 (0.7)	57 (0.8)	48 (0.8)	42 (1.0)
Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details):					
Slovenia	53 (0.5)	52 (0.6)	58 (0.6)	51 (0.7)	42 (0.8)
Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details):					
Hungary	50 (0.8)	47 (0.9)	55 (0.8)	48 (0.9)	39 (1.0)
Unapproved Sampling Procedures at Classroom Level and Not Meeting Other Guidelines (See Appendix A for Details):					
Thailand	42 (1.2)	41 (1.4)	45 (1.3)	39 (1.2)	39 (1.8)
International Average Percent Correct	50 (0.2)	49 (0.2)	55 (0.2)	48 (0.2)	40 (0.2)

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

†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).

¹National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

²National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).

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

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

To facilitate more meaningful comparisons across rows, TIMSS has developed profiles of relative performance, which are shown for both grades in Table 2.3. These profiles are designed to show whether participating countries performed better or worse in some content areas than they did on the test as a whole, after adjusting for the differing difficulty of the items in each of the content areas.[5] An up-arrow indicates that a country did significantly better in a content area than it did on the test as a whole, a down-arrow indicates significantly lower performance, and a circle indicates that the country's performance in a content area is not very different from its performance on the test as a whole.[6]

Table 2.3 reveals that many countries performed relatively better or worse in some content areas than they did overall. In fact, each country in the fourth grade except Canada, England and Scotland had at least one content area in which it did relatively better or worse than it did on the test as a whole (at the third grade, Latvia(LSS), Slovenia, and Hungary are also exceptions). Although countries that did well in one content area tended to do well in others, there were still significant performance differences by content area among countries. For example, Austria, the Czech Republic, Hong Kong, the Netherlands, Norway, and Greece all performed relatively better in life science than they did on the test as a whole at both grades, while Korea, Japan, and Thailand performed relatively less well. Korea, Japan, Singapore, Portugal, and Iran performed relatively better in physical science at both grades, while Australia, the United States, Ireland, Norway, New Zealand, and Thailand did not perform as well in this area as they did on the test as a whole. This is consistent with the existence of differing curricular patterns and approaches among countries as discussed in the curriculum analysis report, *Many Visions, Many Aims: A Cross-National Investigation of Curricular Intentions in School Science*.[7]

[5] In performing the computations, the first step was to adjust the average percents to make all content areas equally difficult so that the comparisons would not reflect the various difficulties of the items in the content areas. The next step was to subtract these adjusted percentages for each content area from a country's average percentage over all four content areas. If the overall percentage of correct items by students in a country was the same as the adjusted average for that country for each of the content areas, then these differences would all be zero. The standard errors for these differences were computed, and then each difference was examined for statistical significance. This approach is similar to testing interaction terms in the analysis of variance. The jackknife method was used to compute the standard error of each interaction term. The significance level was adjusted using the Bonferroni method, assuming 4 x 26 (content areas by countries) comparisons at the fourth grade and 4 x 24 at the third grade.

[6] The statistics are not independent. That is, a country cannot do better (or worse) than its average on all scales, since a country's differences must add up to zero. However, it is possible for a country to have no statistically significant differences in performance.

[7] Schmidt, W.H., Raizen, S.A., Britton, E.D., Bianchi, L.J., and Wolfe, R.G. (in press). *Many Visions, Many Aims: A Cross-National Investigation of Curricular Intentions in School Science*. Dordrecht, the Netherlands: Kluwer Academic Publishers.

Table 2.3

Profiles of Relative Performance in Science Content Areas - Lower and Upper Grades (Third and Fourth Grades*)

Third Grade					Fourth Grade				
Country	Earth Science	Life Science	Physical Science	Environmental Issues and the Nature of Science	Country	Earth Science	Life Science	Physical Science	Environmental Issues and the Nature of Science
Korea	▼	▼	▲	▲	Korea	●	▼	▲	▲
Japan	▼	▼	▲	●	Japan	▼	▼	▲	●
United States	●	●	▼	▲	United States	●	●	▼	▲
†2 England	●	●	●	●	Czech Republic	●	▲	●	●
Czech Republic	●	▲	●	▼	Singapore	▼	▲	▲	▼
Singapore	●	●	▲	▼	Canada	●	●	●	●
Canada	●	●	●	●	†2 England	●	●	●	●
Hong Kong	▲	▲	▲	▼	Hong Kong	▲	▲	●	▼
Ireland	●	●	▼	▲	Ireland	●	●	▼	▲
New Zealand	●	●	▼	▲	Norway	▲	▲	▼	●
Norway	▲	▲	▼	●	† Scotland	●	●	●	●
Iceland	▲	●	●	▼	New Zealand	●	●	▼	●
Portugal	●	●	▲	▼	Iceland	▲	●	●	●
Cyprus	▲	▼	●	●	Cyprus	●	●	▲	●
Iran, Islamic Rep.	●	▼	▲	●	Portugal	▲	▼	▲	▼
Greece	●	▲	●	●	Iran, Islamic Rep.	●	●	▲	▼
					Greece	●	▲	▼	●
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details):									
Australia	▼	●	▼	▲	Australia	▼	●	▼	▲
Austria	●	▲	●	▼	Austria	●	▲	●	▼
1 Latvia (LSS)	●	●	●	●	1 Latvia (LSS)	▲	●	●	▼
Netherlands	▼	▲	●	▲	Netherlands	▼	▲	●	▲
Scotland	●	●	●	●					
Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details):									
Slovenia	●	●	●	●	Slovenia	▲	●	●	●
Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details):									
Hungary	●	●	●	●	Hungary	▲	●	●	▼
Unapproved Sampling Procedures at Classroom Level and Not Meeting Other Guidelines (See Appendix A for Details):									
Thailand	●	▼	▼	▲	1 Israel	▼	●	●	▲
					Kuwait	●	▲	▲	▼
					Thailand	●	▼	▼	▲

▲ = Significantly higher than the country's overall average performance after adjusting for the difficulty of the content area

● = No significant difference from the country's overall average performance after adjusting for the difficulty of the content area

▼ = Significantly lower than the country's overall average performance after adjusting for the difficulty of the content area

*Third and fourth grades in most countries; see Table 2 for information about the grades tested in each country.
†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).
1 National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
2 National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).

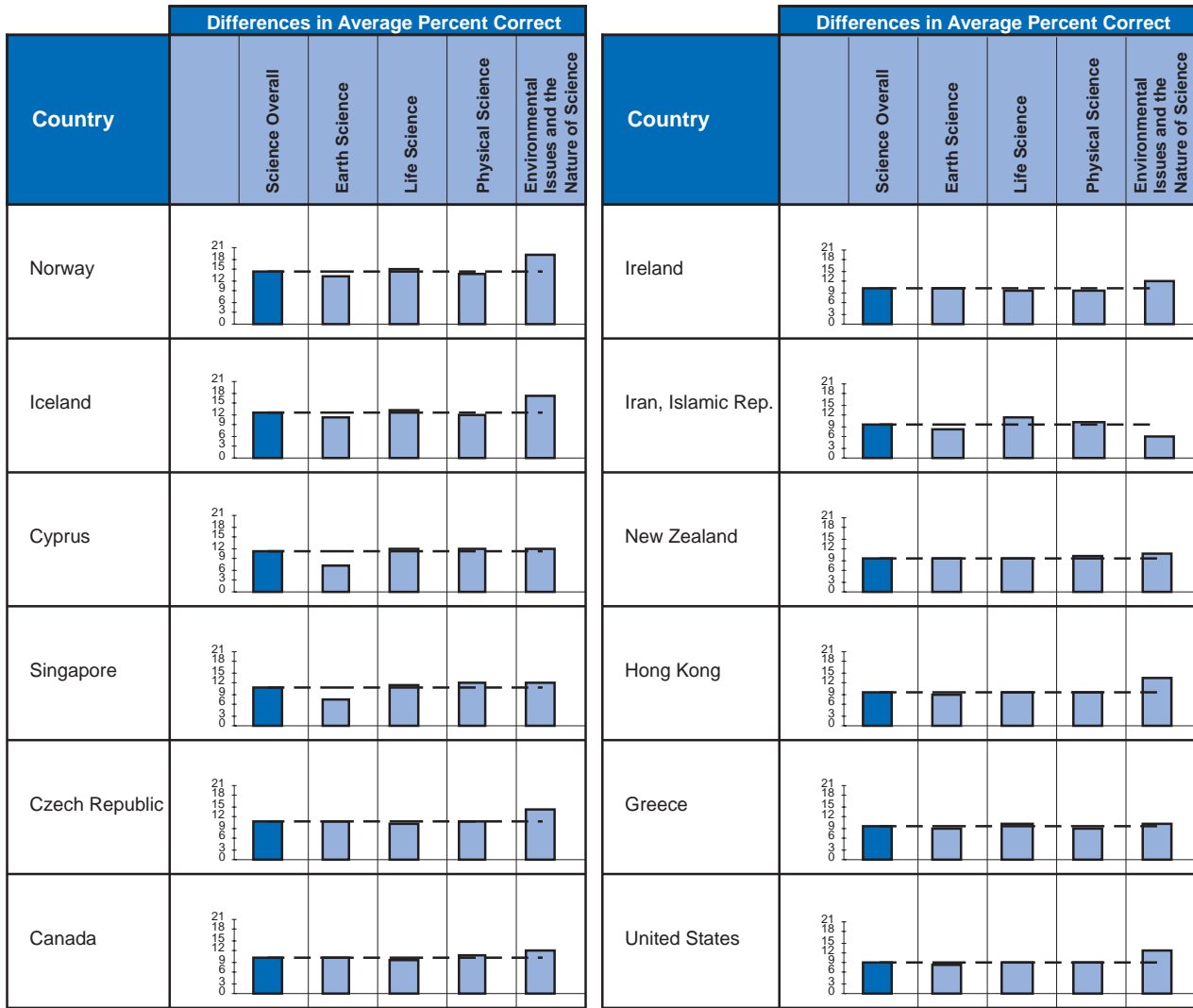SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

What Are the Increases in Achievement Between the Lower and Upper Grades?

Figure 2.1, which profiles the increases in average percent correct between the third and fourth grade for each country across content areas, also reflects these curricular differences. The countries are presented in descending order by the amount of overall increase between the grades, starting with Norway, Iceland, and Cyprus, all of which had increases of 11% to 15% in overall percentage correct. As an aid in the comparison between the increase for the science test overall and each of the four content areas, a dashed line indicating the overall between-grade increase is shown in each country's profile. Differences between grades were about nine percentage points for many of the countries, with a difference as small as 7% in Korea.
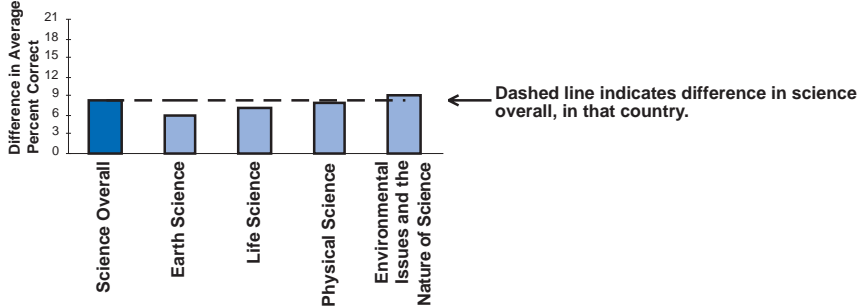
These results show that for the majority of countries, the performance differences between grades were fairly similar across content areas, particularly across life science and physical science, the content areas with most items in the TIMSS science test. There were several countries with moderate between-grade increases that were comparable across all content areas, including Canada, New Zealand, Greece, Portugal and Latvia(LSS), for example. Environmental issues and the nature of science was the content area that showed the greatest increase in many countries. This is particularly noticeable for Norway, Iceland, the Czech Republic, Hong Kong, the United States, and Australia. This may be a reflection of an informal environmentally-based approach to science teaching at these grades in some countries. Several smaller increases than the overall increase were observed in earth science, indicating that some countries may place less emphasis on this content area in the fourth grade.

Figure 2.1

Difference in Average Percent Correct Between Lower and Upper Grades (Third and Fourth Grades*) Overall and in Science Content Areas

*Third and fourth grades in most countries; see Table 2 for information about the grades tested in each country.

†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).

¹National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

²National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).

Because results are rounded to the nearest whole number, some totals may appear inconsistent.

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

Figure 2.1 (Continued)

Difference in Average Percent Correct Between Lower and Upper Grades (Third and Fourth Grades*) Overall and in Science Content Areas

*Third and fourth grades in most countries; see Table 2 for information about the grades tested in each country.

†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).

1National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is
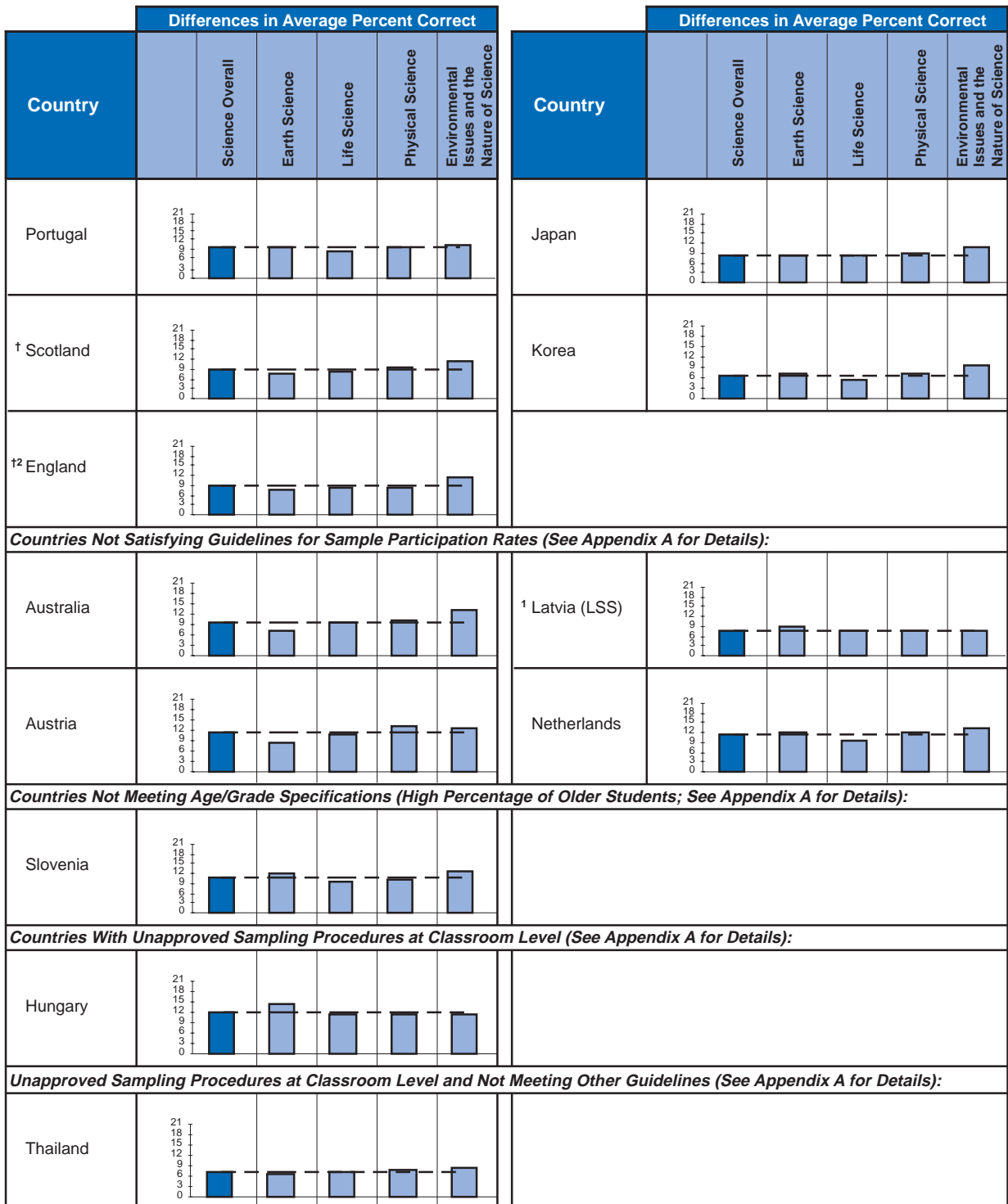 annotated LSS for Latvian Speaking Schools only.

2National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).

Because results are rounded to the nearest whole number, some totals may appear inconsistent.

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

WHAT ARE THE GENDER DIFFERENCES IN ACHIEVEMENT FOR THE CONTENT AREAS?

Tables 2.4 and 2.5 present the gender differences in terms of average percent correct for the science content areas for fourth-grade students and third-grade students, respectively. The gender differences in overall science performance shown in these tables agree well with the gender differences in scaled scores presented in Chapter 1, particularly at the fourth grade.

The science content area data reveal few significant gender differences across countries in life science or environmental issues and the nature of science at either grade level, but many significant gender differences in earth science, and to a lesser extent in physical science. In both the third and fourth grades, gender differences in earth science and physical science reflected advantages for boys. In earth science, the boys had significantly higher averages than girls in 17 countries[8] at the fourth grade and in 16 countries at the third grade. In physical science, the corresponding results revealed advantages for boys in 10 and 8 countries respectively. Even where the differences between boys and girls were not statistically significant, the direction of the differences favored boys in both content areas at both grades in most countries.

In life science and for the items covering environmental issues and the nature of science, girls and boys had similar performances at both grades. In life science, there were very few gender differences in average performance. Fourth-grade boys did better than girls in the Netherlands, and third-grade boys did better in the Czech Republic, Hong Kong, Korea, and Portugal. Girls performed better than boys at both grade levels in New Zealand. For the items in the area of environmental issues and the nature of science, fourth-grade girls had higher achievement than boys in two countries – New Zealand and Slovenia – while boys had higher achievement in Austria. At the third grade, there were no significant differences in average performance for this content area except in Canada and Thailand, where girls performed better than boys.

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8 Significance tests for gender differences are adjusted for multiple comparisons across content areas, but not across countries. Statements about the number of gender differences observed across countries may therefore overestimate the number of differences in the populations concerned.

Table 2.4

Average Percent Correct for Boys and Girls by Science Content Areas Upper Grade (Fourth Grade*)

Country	Science Overall		Earth Science		Life Science	
	Boys	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**
Canada	64 (0.7)	63 (0.6)	▲ 63 (0.9)	60 (0.7)	68 (0.7)	69 (0.8)
Cyprus	51 (0.7)	50 (0.6)	▲ 49 (0.9)	46 (0.7)	55 (0.7)	54 (0.7)
Czech Republic	▲ 67 (0.6)	64 (0.7)	▲ 67 (0.8)	61 (0.8)	72 (0.6)	71 (0.7)
†2 England	64 (0.8)	63 (0.6)	▲ 63 (0.8)	60 (0.8)	68 (0.7)	68 (0.6)
Greece	54 (1.0)	53 (1.0)	52 (1.2)	52 (0.9)	61 (0.9)	61 (1.1)
Hong Kong	▲ 63 (0.8)	61 (0.7)	▲ 63 (0.7)	59 (0.6)	69 (0.8)	67 (0.7)
Iceland	▲ 56 (0.8)	54 (0.8)	▲ 57 (1.3)	52 (0.8)	60 (0.9)	60 (1.0)
Iran, Islamic Rep.	41 (1.0)	39 (0.9)	▲ 40 (1.0)	35 (0.7)	44 (1.2)	44 (0.9)
Ireland	61 (0.7)	61 (0.8)	▲ 62 (0.9)	59 (1.1)	65 (0.7)	66 (0.9)
Japan	▲ 70 (0.4)	69 (0.4)	▲ 68 (0.5)	65 (0.6)	73 (0.5)	73 (0.4)
Korea	▲ 75 (0.5)	73 (0.5)	▲ 73 (0.6)	70 (0.7)	76 (0.5)	75 (0.6)
New Zealand	59 (1.2)	61 (0.9)	58 (1.2)	57 (1.0)	64 (1.2)	▲ 68 (0.9)
Norway	61 (0.8)	60 (0.7)	▲ 61 (1.0)	58 (0.8)	66 (0.9)	67 (0.8)
Portugal	50 (0.9)	50 (0.8)	50 (1.0)	49 (0.8)	53 (0.9)	54 (0.9)
† Scotland	61 (0.9)	60 (0.8)	▲ 60 (0.9)	56 (0.9)	65 (0.9)	66 (0.9)
Singapore	65 (0.9)	64 (1.0)	59 (0.9)	57 (1.0)	70 (0.9)	69 (1.0)
United States	▲ 67 (0.6)	65 (0.6)	▲ 65 (0.7)	62 (0.9)	72 (0.7)	71 (0.6)
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details):						
Australia	▲ 67 (0.6)	65 (0.6)	▲ 64 (0.7)	59 (0.7)	72 (0.6)	72 (0.5)
Austria	▲ 67 (0.9)	64 (0.7)	▲ 64 (0.9)	60 (1.0)	72 (0.9)	72 (0.8)
1 Latvia (LSS)	55 (0.9)	57 (1.0)	56 (1.1)	57 (1.2)	59 (0.9)	61 (1.2)
Netherlands	▲ 70 (0.7)	65 (0.7)	▲ 65 (0.8)	58 (0.8)	▲ 75 (0.7)	71 (0.7)
Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details):						
Slovenia	64 (0.7)	63 (0.8)	65 (0.7)	63 (0.9)	68 (0.9)	68 (0.8)
Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details):						
Hungary	▲ 63 (0.8)	60 (0.7)	▲ 64 (0.9)	60 (0.8)	67 (0.8)	66 (0.8)
Unapproved Sampling Procedures at Classroom Level and Not Meeting Other Guidelines (See Appendix A for Details):						
1 Israel	58 (1.1)	57 (0.8)	53 (1.2)	50 (1.0)	62 (1.3)	61 (0.9)
Thailand	49 (1.2)	49 (0.8)	48 (1.2)	47 (0.9)	52 (1.0)	53 (0.8)

▲ = Difference from other gender statistically significant at .05 level, adjusted for multiple comparisons

*Fourth grade in most countries; See Table 2 for information about the grades tested in each country.
†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).
1 National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
2 National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

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

Table 2.4 (Continued)

Average Percent Correct for Boys and Girls by Science Content Areas – Upper Grade (Fourth Grade*)

Country	Physical Science		Environmental Issues and the Nature of Science	
	Boys	**Girls**	**Boys**	**Girls**
Canada	63 (0.9)	59 (0.8)	55 (1.1)	57 (0.7)
Cyprus	51 (0.8)	49 (0.8)	42 (1.2)	42 (1.1)
Czech Republic	▲ 65 (0.8)	59 (0.8)	56 (1.2)	56 (1.2)
⁺² England	62 (1.0)	59 (0.8)	55 (1.2)	58 (1.2)
Greece	51 (1.1)	47 (1.1)	43 (1.7)	43 (1.5)
Hong Kong	▲ 62 (1.0)	58 (0.9)	51 (1.3)	49 (1.2)
Iceland	▲ 54 (1.0)	49 (0.8)	48 (1.9)	46 (1.4)
Iran, Islamic Rep.	41 (1.2)	39 (1.1)	25 (1.2)	26 (1.3)
Ireland	58 (0.9)	56 (0.8)	55 (1.0)	55 (1.3)
Japan	▲ 71 (0.5)	69 (0.6)	62 (0.8)	63 (0.7)
Korea	▲ 76 (0.7)	73 (0.5)	69 (1.1)	71 (1.0)
New Zealand	57 (1.5)	56 (1.1)	51 (1.7)	▲ 57 (1.3)
Norway	57 (1.0)	53 (0.9)	53 (1.3)	52 (1.1)
Portugal	50 (1.1)	48 (1.0)	39 (1.3)	40 (1.2)
⁺ Scotland	59 (1.0)	56 (0.9)	52 (1.5)	55 (1.2)
Singapore	65 (1.0)	63 (1.0)	53 (1.4)	54 (1.4)
United States	▲ 62 (0.7)	59 (0.7)	64 (0.9)	66 (0.9)
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details):				
Australia	▲ 64 (0.9)	61 (0.7)	63 (1.0)	63 (1.0)
Austria	▲ 67 (1.1)	60 (0.8)	▲ 56 (1.3)	51 (1.0)
¹ Latvia (LSS)	55 (1.1)	54 (1.0)	45 (1.5)	47 (1.2)
Netherlands	▲ 68 (1.0)	61 (0.8)	61 (1.1)	61 (1.3)
Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details):				
Slovenia	63 (0.9)	59 (0.9)	53 (1.2)	▲ 56 (1.1)
Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details):				
Hungary	▲ 62 (1.0)	57 (1.0)	49 (1.2)	51 (1.1)
Unapproved Sampling Procedures at Classroom Level and Not Meeting Other Guidelines (See Appendix A for Details):				
¹ Israel	56 (1.2)	55 (0.9)	52 (1.6)	52 (1.4)
Thailand	47 (1.4)	46 (1.0)	47 (1.8)	49 (1.4)

▲ = Difference from other gender statistically significant at .05 level, adjusted for multiple comparisons

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

⁺Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).

¹National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

²National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).

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

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

Table 2.5

Average Percent Correct for Boys and Girls by Science Content Areas
Lower Grade (Third Grade*)

Country	Science Overall		Earth Science		Life Science	
	Boys	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**
Canada	54 (0.7)	53 (0.6)	▲ 53 (0.8)	50 (0.8)	59 (0.7)	59 (0.7)
Cyprus	40 (0.5)	39 (0.7)	▲ 41 (0.6)	39 (0.6)	43 (0.7)	43 (0.8)
Czech Republic	▲ 56 (0.7)	53 (0.7)	▲ 55 (0.8)	50 (0.9)	▲ 62 (0.8)	60 (0.7)
†2 England	56 (0.9)	54 (0.7)	▲ 56 (0.8)	51 (0.7)	60 (0.9)	59 (0.7)
Greece	▲ 45 (0.9)	43 (0.8)	44 (1.0)	42 (0.9)	52 (1.0)	50 (0.9)
Hong Kong	▲ 54 (0.6)	51 (0.7)	▲ 54 (0.6)	50 (0.9)	▲ 60 (0.8)	57 (0.8)
Iceland	▲ 44 (0.8)	41 (0.8)	▲ 45 (1.1)	42 (1.1)	47 (1.0)	46 (1.1)
Iran, Islamic Rep.	30 (1.0)	30 (0.8)	▲ 31 (1.2)	28 (1.2)	33 (1.2)	33 (0.9)
Ireland	52 (0.9)	50 (0.8)	51 (1.0)	49 (0.9)	56 (0.9)	56 (0.8)
Japan	61 (0.4)	61 (0.4)	▲ 59 (0.5)	57 (0.5)	65 (0.4)	65 (0.5)
Korea	▲ 69 (0.5)	65 (0.6)	▲ 66 (0.8)	62 (0.7)	▲ 71 (0.5)	68 (0.7)
New Zealand	50 (1.1)	51 (0.9)	49 (1.0)	47 (0.9)	55 (1.2)	▲ 59 (1.1)
Norway	47 (0.8)	45 (1.0)	▲ 48 (1.0)	45 (1.2)	53 (0.9)	51 (1.1)
Portugal	▲ 42 (0.8)	40 (1.0)	▲ 42 (0.9)	38 (1.0)	▲ 47 (0.9)	44 (1.1)
† Scotland	52 (0.8)	51 (0.8)	▲ 51 (0.8)	49 (0.9)	57 (0.9)	57 (0.9)
Singapore	54 (1.0)	53 (0.9)	52 (1.0)	49 (1.0)	58 (1.0)	58 (1.0)
United States	57 (0.8)	56 (0.7)	▲ 56 (0.9)	54 (0.7)	62 (1.0)	62 (0.8)
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details):						
Australia	57 (1.0)	57 (0.7)	54 (1.2)	53 (0.8)	62 (1.1)	63 (0.7)
Austria	55 (1.2)	54 (0.8)	54 (1.6)	53 (0.9)	61 (1.3)	62 (0.9)
¹ Latvia (LSS)	48 (1.0)	49 (0.9)	49 (1.2)	47 (1.1)	51 (1.1)	54 (1.0)
Netherlands	▲ 57 (0.8)	55 (0.7)	▲ 51 (1.0)	47 (0.7)	63 (0.9)	63 (0.7)
Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details):						
Slovenia	▲ 54 (0.7)	51 (0.7)	▲ 54 (0.8)	50 (0.8)	59 (0.8)	57 (0.8)
Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details):						
Hungary	51 (0.8)	49 (0.9)	▲ 50 (1.0)	45 (1.0)	55 (0.8)	55 (1.0)
Unapproved Sampling Procedures at Classroom Level and Not Meeting Other Guidelines (See Appendix A for Details):						
Thailand	41 (1.2)	42 (1.4)	41 (1.3)	41 (1.6)	44 (1.3)	46 (1.5)

▲ = Difference from other gender statistically significant at .05 level, adjusted for multiple comparisons

*Three grade in most countries; See Table 2 for information about the grades tested in each country.
† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).
¹ National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is
  annotated LSS for Latvian Speaking Schools only.
² National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

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

Table 2.5 (Continued)

Average Percent Correct for Boys and Girls by Science Content Areas
Lower Grade (Third Grade*)

Country	Physical Science		Environmental Issues and the Nature of Science	
	Boys	Girls	Boys	Girls
Canada	51 (0.8)	48 (0.7)	42 (1.0)	▲ 46 (1.0)
Cyprus	39 (0.7)	37 (0.9)	31 (0.8)	29 (1.0)
Czech Republic	▲ 54 (0.9)	49 (0.8)	41 (1.2)	42 (1.3)
†2 England	53 (1.1)	51 (0.8)	45 (1.4)	44 (1.0)
Greece	▲ 42 (1.0)	39 (0.9)	34 (1.6)	32 (1.1)
Hong Kong	▲ 52 (0.8)	49 (0.8)	36 (1.0)	36 (1.2)
Iceland	▲ 43 (1.2)	38 (1.0)	30 (1.2)	30 (0.9)
Iran, Islamic Rep.	30 (1.0)	30 (0.9)	20 (1.2)	20 (0.9)
Ireland	49 (1.1)	46 (0.9)	44 (1.4)	43 (1.1)
Japan	60 (0.7)	61 (0.6)	51 (0.9)	52 (1.0)
Korea	▲ 69 (0.7)	65 (0.7)	60 (1.1)	61 (1.1)
New Zealand	48 (1.1)	46 (1.0)	42 (1.6)	43 (1.4)
Norway	43 (1.0)	40 (1.2)	35 (1.1)	33 (1.2)
Portugal	▲ 41 (0.9)	38 (1.1)	29 (1.1)	29 (1.1)
† Scotland	50 (0.9)	46 (0.9)	42 (1.3)	41 (1.2)
Singapore	53 (1.1)	51 (0.9)	41 (1.5)	41 (1.1)
United States	53 (0.8)	50 (0.9)	51 (1.3)	53 (1.1)
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details):				
Australia	54 (1.2)	51 (0.9)	49 (1.3)	51 (1.2)
Austria	52 (1.4)	50 (1.1)	40 (1.6)	42 (1.4)
1 Latvia (LSS)	47 (1.2)	46 (0.9)	38 (1.2)	38 (1.3)
Netherlands	▲ 55 (1.0)	51 (0.8)	49 (1.2)	47 (1.2)
Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details):				
Slovenia	▲ 53 (0.9)	48 (1.0)	42 (1.1)	42 (1.2)
Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details):				
Hungary	49 (1.1)	47 (1.0)	39 (1.1)	39 (1.1)
Unapproved Sampling Procedures at Classroom Level and Not Meeting Other Guidelines (See Appendix A for Details):				
Thailand	39 (1.2)	39 (1.4)	37 (1.9)	▲ 42 (1.8)

▲ = Difference from other gender statistically significant at .05 level, adjusted for multiple comparisons

*Three grade in most countries; See Table 2 for information about the grades tested in each country.
†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).
1National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
2National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

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