

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, and 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 seventh and eighth grades was designed to enable reporting by five content areas in accordance with the TIMSS science framework.¹ These five content areas include:

- earth science
- life science
- physics
- chemistry
- 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 a range of four to six example items within each content area and the percent 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 the question of whether or not the participating countries achieved at the same level in each of the various content areas as they did on the science test as a whole.

Results in this chapter are based on the average percent 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 five content areas for this report.²

Tables 2.1 and 2.2 provide the average percent of correct responses to items in the different content areas for the eighth- and seventh-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 and physics (both 30%) and the fewest

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.

items in the category of environmental issues and the nature of science (10%). Thus, countries who performed very well in life science and physics 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 of comparison for performance in each of the content areas. For the purpose of comparing overall achievement between 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 expected by sampling error and can be attributed to the differences in the methodologies 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 59% of the eighth-graders and 53% of the seventh-graders across countries. Internationally, the chemistry items (international averages of 51% at eighth grade, 43% at seventh 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 table. 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 chemistry. For example, even though the eighth-grade students in Japan performed above the international average in chemistry, 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.

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

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 (Eighth Grade*)

| Country | Science Overall (135 items) | Earth Science (22 items) | Life Science (40 items) | Physics (40 items) | Chemistry (19 items) | Environmental Issues and the Nature of Science (14 items) |
|---|--------------------------------|-----------------------------|----------------------------|-----------------------|-------------------------|--|
| Singapore | 70 (1.0) | 65 (1.1) | 72 (1.0) | 69 (0.8) | 69 (1.2) | 74 (1.1) |
| Korea | 66 (0.3) | 63 (0.5) | 70 (0.4) | 65 (0.5) | 63 (0.6) | 64 (0.8) |
| Japan | 65 (0.3) | 61 (0.4) | 71 (0.4) | 67 (0.3) | 61 (0.5) | 60 (0.7) |
| Czech Republic | 64 (0.8) | 63 (1.2) | 69 (0.8) | 64 (0.7) | 60 (1.2) | 59 (1.1) |
| ^{†2} England | 61 (0.6) | 59 (0.8) | 64 (0.8) | 62 (0.6) | 55 (0.8) | 65 (1.0) |
| Hungary | 61 (0.6) | 60 (0.8) | 65 (0.7) | 60 (0.6) | 60 (0.8) | 53 (0.8) |
| [†] Belgium (FI) | 60 (1.1) | 62 (1.2) | 64 (1.1) | 61 (1.1) | 51 (1.3) | 58 (1.5) |
| Slovak Republic | 59 (0.6) | 60 (0.7) | 60 (0.6) | 61 (0.6) | 57 (0.8) | 53 (0.9) |
| Sweden | 59 (0.6) | 62 (0.7) | 63 (0.7) | 57 (0.5) | 56 (0.7) | 52 (0.8) |
| Canada | 59 (0.5) | 58 (0.6) | 62 (0.6) | 59 (0.4) | 52 (0.7) | 61 (0.7) |
| Ireland | 58 (0.9) | 61 (1.0) | 60 (1.1) | 56 (0.8) | 54 (1.0) | 60 (1.1) |
| [†] United States | 58 (1.0) | 58 (1.0) | 63 (1.1) | 56 (0.8) | 53 (1.2) | 61 (1.0) |
| Russian Federation | 58 (0.8) | 58 (0.8) | 62 (0.7) | 57 (0.9) | 57 (1.3) | 50 (0.8) |
| New Zealand | 58 (0.8) | 56 (0.9) | 60 (1.0) | 58 (0.7) | 53 (1.1) | 59 (1.2) |
| Norway | 58 (0.4) | 61 (0.6) | 61 (0.5) | 57 (0.4) | 49 (0.6) | 55 (0.8) |
| Hong Kong | 58 (1.0) | 54 (1.0) | 61 (1.0) | 58 (0.9) | 55 (1.0) | 55 (1.3) |
| ¹ Switzerland | 56 (0.5) | 58 (0.6) | 59 (0.6) | 58 (0.5) | 50 (0.7) | 51 (0.8) |
| Spain | 56 (0.4) | 57 (0.5) | 58 (0.5) | 55 (0.4) | 51 (0.7) | 53 (0.6) |
| France | 54 (0.6) | 55 (0.8) | 56 (0.8) | 54 (0.5) | 47 (0.9) | 53 (0.9) |
| Iceland | 52 (0.9) | 50 (1.2) | 58 (1.0) | 53 (0.9) | 42 (0.8) | 49 (1.0) |
| ¹ Latvia (LSS) | 50 (0.6) | 48 (0.8) | 53 (0.7) | 51 (0.7) | 48 (0.8) | 47 (1.0) |
| Portugal | 50 (0.6) | 50 (0.7) | 53 (0.6) | 48 (0.5) | 50 (0.9) | 45 (0.8) |
| ¹ Lithuania | 49 (0.7) | 46 (0.9) | 52 (0.9) | 51 (0.7) | 48 (0.9) | 40 (1.0) |
| Iran, Islamic Rep. | 47 (0.6) | 45 (0.6) | 49 (0.6) | 48 (0.7) | 52 (0.8) | 39 (1.1) |
| Cyprus | 47 (0.4) | 46 (0.6) | 49 (0.5) | 46 (0.4) | 45 (0.6) | 46 (0.8) |
| Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details): | | | | | | |
| Australia | 60 (0.7) | 57 (0.8) | 63 (0.8) | 60 (0.7) | 54 (0.9) | 62 (1.0) |
| Austria | 61 (0.7) | 62 (0.8) | 65 (0.7) | 62 (0.7) | 58 (1.1) | 55 (0.9) |
| Belgium (Fr) | 50 (0.7) | 50 (0.9) | 55 (0.9) | 51 (0.7) | 41 (0.8) | 46 (1.0) |
| Bulgaria | 62 (1.0) | 58 (1.2) | 64 (1.0) | 60 (1.0) | 65 (1.7) | 59 (1.5) |
| Netherlands | 62 (1.0) | 61 (1.4) | 67 (1.4) | 63 (0.9) | 52 (0.9) | 65 (1.6) |
| Scotland | 55 (1.0) | 52 (1.0) | 57 (1.1) | 57 (0.8) | 51 (1.3) | 57 (1.4) |
| Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details): | | | | | | |
| Colombia | 39 (0.8) | 37 (0.8) | 44 (0.9) | 37 (0.8) | 32 (1.0) | 40 (1.1) |
| ^{†1} Germany | 58 (1.0) | 57 (1.0) | 63 (1.1) | 57 (1.0) | 54 (1.3) | 51 (1.3) |
| Romania | 50 (0.8) | 49 (1.0) | 55 (1.0) | 49 (0.8) | 46 (1.0) | 42 (1.0) |
| Slovenia | 62 (0.5) | 64 (0.7) | 65 (0.6) | 61 (0.6) | 56 (0.9) | 59 (0.9) |
| Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details): | | | | | | |
| Denmark | 51 (0.6) | 49 (0.7) | 56 (0.7) | 53 (0.7) | 41 (0.8) | 47 (1.0) |
| Greece | 52 (0.5) | 49 (0.6) | 54 (0.6) | 53 (0.5) | 51 (0.5) | 51 (1.0) |
| Thailand | 57 (0.9) | 56 (1.0) | 66 (0.9) | 54 (0.7) | 43 (1.2) | 62 (1.1) |
| Unapproved Sampling Procedures at Classroom Level and Not Meeting Other Guidelines (See Appendix A for Details): | | | | | | |
| ¹ Israel | 57 (1.1) | 55 (1.1) | 61 (1.1) | 57 (1.1) | 53 (1.5) | 52 (1.6) |
| Kuwait | 43 (0.9) | 43 (1.0) | 45 (1.1) | 43 (0.7) | 40 (1.5) | 39 (1.3) |
| South Africa | 27 (1.3) | 26 (1.1) | 27 (1.3) | 27 (1.4) | 26 (1.4) | 26 (1.3) |
| International Average Percent Correct | 56 (0.1) | 55 (0.1) | 59 (0.1) | 55 (0.1) | 51 (0.2) | 53 (0.2) |

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

^{†1}Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).

[†]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 2.2

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

| Country | Science Overall (135 items) | Earth Science (22 items) | Life Science (40 items) | Physics (40 items) | Chemistry (19 items) | Environmental Issues and the Nature of Science (14 items) |
|--|--------------------------------|-----------------------------|----------------------------|-----------------------|-------------------------|--|
| Singapore | 61 (1.2) | 60 (1.2) | 62 (1.4) | 63 (1.0) | 57 (1.3) | 62 (1.4) |
| Korea | 61 (0.4) | 59 (0.6) | 65 (0.5) | 63 (0.5) | 54 (0.6) | 61 (0.7) |
| Japan | 59 (0.3) | 56 (0.5) | 64 (0.4) | 63 (0.4) | 49 (0.5) | 53 (0.6) |
| Czech Republic | 58 (0.8) | 57 (0.9) | 63 (0.7) | 58 (0.7) | 54 (1.1) | 54 (1.1) |
| [†] Belgium (Fl) | 57 (0.5) | 60 (0.7) | 61 (0.7) | 58 (0.6) | 46 (0.7) | 54 (0.9) |
| ^{†2} England | 56 (0.6) | 56 (0.8) | 57 (0.7) | 58 (0.7) | 48 (1.0) | 56 (0.9) |
| Hungary | 56 (0.6) | 54 (0.7) | 61 (0.7) | 54 (0.6) | 54 (0.8) | 48 (1.0) |
| Slovak Republic | 54 (0.6) | 55 (0.8) | 56 (0.7) | 55 (0.6) | 50 (0.8) | 50 (0.8) |
| [†] United States | 54 (1.1) | 54 (1.1) | 59 (1.1) | 51 (1.0) | 48 (1.1) | 56 (1.5) |
| Canada | 54 (0.5) | 53 (0.7) | 57 (0.6) | 54 (0.5) | 46 (0.7) | 56 (0.7) |
| Hong Kong | 53 (1.2) | 49 (1.1) | 56 (1.2) | 55 (1.1) | 49 (1.3) | 51 (1.6) |
| Ireland | 52 (0.7) | 56 (0.8) | 52 (0.8) | 51 (0.7) | 47 (0.9) | 54 (0.9) |
| Sweden | 51 (0.5) | 53 (0.6) | 56 (0.7) | 51 (0.6) | 45 (0.7) | 46 (0.8) |
| New Zealand | 50 (0.7) | 49 (0.7) | 53 (0.8) | 51 (0.7) | 42 (0.8) | 53 (1.1) |
| Norway | 50 (0.6) | 52 (0.8) | 55 (0.7) | 51 (0.7) | 40 (0.8) | 48 (0.9) |
| [†] Switzerland | 50 (0.4) | 52 (0.6) | 53 (0.5) | 52 (0.5) | 41 (0.5) | 46 (0.7) |
| Russian Federation | 50 (0.8) | 54 (0.7) | 54 (1.0) | 50 (0.9) | 42 (0.9) | 43 (0.8) |
| Spain | 49 (0.4) | 52 (0.6) | 53 (0.5) | 48 (0.5) | 43 (0.7) | 47 (0.7) |
| [†] Scotland | 48 (0.8) | 46 (0.7) | 49 (0.9) | 51 (0.7) | 41 (1.1) | 50 (1.1) |
| Iceland | 46 (0.6) | 45 (0.7) | 51 (0.6) | 49 (0.8) | 36 (1.0) | 42 (1.1) |
| France | 46 (0.6) | 45 (0.7) | 50 (0.7) | 48 (0.6) | 38 (0.7) | 44 (1.0) |
| [†] Belgium (Fr) | 45 (0.7) | 46 (0.9) | 49 (0.8) | 46 (0.8) | 37 (0.7) | 40 (0.9) |
| Iran, Islamic Rep. | 42 (0.6) | 41 (0.8) | 45 (0.8) | 41 (0.7) | 46 (0.9) | 33 (1.0) |
| ¹ Latvia (LSS) | 42 (0.5) | 42 (0.7) | 45 (0.6) | 43 (0.6) | 34 (0.8) | 38 (0.9) |
| Portugal | 41 (0.5) | 46 (0.7) | 46 (0.6) | 39 (0.5) | 34 (0.6) | 37 (0.7) |
| Cyprus | 40 (0.4) | 39 (0.7) | 42 (0.5) | 39 (0.4) | 38 (0.6) | 40 (0.7) |
| ¹ Lithuania | 38 (0.7) | 39 (0.9) | 40 (0.8) | 40 (0.7) | 28 (0.9) | 32 (0.9) |
| Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details): | | | | | | |
| Australia | 54 (0.7) | 52 (0.7) | 56 (0.7) | 55 (0.7) | 46 (0.7) | 56 (0.9) |
| Austria | 55 (0.6) | 55 (0.8) | 60 (0.8) | 55 (0.7) | 51 (0.7) | 49 (1.0) |
| Bulgaria | 56 (1.0) | 53 (1.0) | 60 (1.1) | 57 (1.2) | 56 (1.3) | 49 (1.3) |
| Netherlands | 56 (0.7) | 56 (0.9) | 61 (0.8) | 55 (0.8) | 44 (0.8) | 58 (1.3) |
| Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details): | | | | | | |
| Colombia | 35 (0.7) | 33 (0.8) | 39 (0.8) | 34 (0.8) | 29 (0.7) | 36 (0.8) |
| ^{†1} Germany | 53 (0.8) | 52 (0.9) | 58 (0.9) | 53 (0.8) | 47 (1.0) | 46 (1.2) |
| Romania | 45 (0.7) | 44 (1.0) | 51 (0.9) | 44 (0.8) | 41 (0.9) | 37 (0.8) |
| Slovenia | 57 (0.5) | 59 (0.6) | 60 (0.6) | 55 (0.6) | 55 (0.9) | 55 (0.7) |
| Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details): | | | | | | |
| Denmark | 44 (0.4) | 42 (0.7) | 49 (0.6) | 47 (0.6) | 34 (0.6) | 39 (0.9) |
| Greece | 45 (0.5) | 43 (0.6) | 48 (0.7) | 44 (0.5) | 41 (0.7) | 43 (0.8) |
| [†] South Africa | 26 (1.0) | 26 (1.0) | 26 (1.1) | 26 (1.0) | 23 (0.9) | 25 (1.1) |
| Thailand | 53 (0.8) | 50 (0.8) | 62 (0.9) | 50 (0.7) | 38 (0.8) | 57 (1.1) |
| International Average Percent Correct | 50 (0.1) | 50 (0.1) | 53 (0.1) | 50 (0.1) | 43 (0.1) | 47 (0.2) |

*Seventh 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.

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 except Latvia, Israel, and Kuwait in the eighth grade and Belgium (French) in the seventh grade had at least one content area in which it did relatively better or worse than it did on the test as a whole. 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, Japan, Hungary, Iceland, Germany, Romania, Denmark, and Thailand all performed relatively better in life science than they did on the test as a whole at both grades. Japan, Switzerland, Iceland, Lithuania, and Denmark performed relatively better in physics at both grades. A quite different set of countries – Hungary, the Slovak Republic, Hong Kong, Iran, Cyprus, and Greece – performed relatively better at both grades in chemistry. 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 Since the items in the different content areas varied in difficulty, 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 five 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 5x41 (content areas by countries) comparisons at the eighth grade and 5x39 at the seventh 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 (Seventh and Eighth Grades*) - Indicators of Statistically Significant Differences from Overall Percent Correct Adjusted for the Difficulty of the Content Areas

| Seventh Grade | | | | | | Eighth Grade | | | | | |
|---|---------------|--------------|---------|-----------|--|----------------------------|---------------|--------------|---------|-----------|--|
| Country | Earth Science | Life Science | Physics | Chemistry | Environmental Issues and the Nature of Science | Country | Earth Science | Life Science | Physics | Chemistry | Environmental Issues and the Nature of Science |
| Singapore | ▼ | ▼ | ● | ● | ▲ | Singapore | ▼ | ▼ | ▼ | ▲ | ▲ |
| Korea | ▼ | ● | ▲ | ● | ▲ | Korea | ▼ | ● | ● | ▲ | ● |
| Japan | ▼ | ▲ | ▲ | ▼ | ▲ | Japan | ▼ | ▲ | ▲ | ● | ▼ |
| Czech Republic | ● | ▲ | ● | ▲ | ▼ | Czech Republic | ● | ● | ● | ● | ▼ |
| [†] Belgium (Fl) | ▲ | ● | ● | ▼ | ● | ^{†2} England | ● | ● | ● | ▼ | ▲ |
| ^{†2} England | ● | ▼ | ● | ● | ▲ | Hungary | ● | ▲ | ● | ▲ | ▼ |
| Hungary | ● | ▲ | ▼ | ▲ | ▼ | [†] Belgium (Fl) | ▲ | ● | ● | ▼ | ● |
| Slovak Republic | ● | ▼ | ● | ▲ | ▼ | Slovak Republic | ● | ▼ | ▲ | ▲ | ▼ |
| [†] United States | ● | ● | ▼ | ● | ▲ | Sweden | ▲ | ● | ▼ | ● | ▼ |
| Canada | ● | ● | ● | ▼ | ▲ | Canada | ● | ● | ● | ▼ | ▲ |
| Hong Kong | ▼ | ▼ | ▲ | ▲ | ● | Ireland | ▲ | ▼ | ▼ | ● | ▲ |
| Ireland | ▲ | ▼ | ▼ | ● | ▲ | [†] United States | ● | ● | ▼ | ▼ | ▲ |
| Sweden | ▲ | ● | ● | ● | ▼ | Russian Federation | ● | ● | ● | ▲ | ▼ |
| New Zealand | ● | ▼ | ● | ▼ | ▲ | New Zealand | ▼ | ● | ● | ● | ▲ |
| Norway | ▲ | ● | ● | ▼ | ● | Norway | ▲ | ● | ● | ▼ | ● |
| ¹ Switzerland | ▲ | ● | ▲ | ▼ | ● | Hong Kong | ▼ | ● | ● | ▲ | ● |
| Russian Federation | ▲ | ● | ● | ● | ▼ | ¹ Switzerland | ▲ | ● | ▲ | ▼ | ▼ |
| Spain | ▲ | ● | ▼ | ● | ● | Spain | ▲ | ● | ● | ● | ● |
| [†] Scotland | ▼ | ▼ | ▲ | ● | ▲ | France | ▲ | ▼ | ● | ▼ | ● |
| Iceland | ● | ▲ | ▲ | ▼ | ● | Iceland | ● | ▲ | ▲ | ▼ | ● |
| France | ● | ● | ▲ | ● | ● | ¹ Latvia (LSS) | ● | ● | ● | ● | ● |
| [†] Belgium (Fr) | ● | ● | ● | ● | ● | Portugal | ● | ● | ▼ | ▲ | ▼ |
| Iran, Islamic Rep. | ● | ● | ● | ▲ | ▼ | ¹ Lithuania | ● | ● | ▲ | ▲ | ▼ |
| ¹ Latvia (LSS) | ● | ● | ▲ | ● | ● | Iran, Islamic Rep. | ▼ | ▼ | ● | ▲ | ▼ |
| Portugal | ▲ | ▼ | ▼ | ● | ▼ | Cyprus | ● | ▼ | ▼ | ▲ | ● |
| Cyprus | ● | ▼ | ▼ | ▲ | ● | | | | | | |
| ¹ Lithuania | ▲ | ● | ▲ | ▼ | ▼ | | | | | | |
| Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details): | | | | | | | | | | | |
| Australia | ▼ | ▼ | ● | ▼ | ▲ | Australia | ▼ | ● | ● | ▼ | ▲ |
| Austria | ● | ● | ● | ▲ | ▼ | Austria | ● | ● | ● | ● | ▼ |
| Bulgaria | ▼ | ● | ● | ▲ | ▼ | Belgium (Fr) | ● | ▲ | ▲ | ▼ | ● |
| Netherlands | ● | ▲ | ● | ▼ | ▲ | Bulgaria | ▼ | ● | ▼ | ▲ | ● |
| | | | | | | Netherlands | ● | ● | ● | ▼ | ▲ |
| | | | | | | Scotland | ▼ | ▼ | ● | ● | ▲ |
| Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details): | | | | | | | | | | | |
| Colombia | ▼ | ● | ● | ● | ▲ | Colombia | ● | ▲ | ▼ | ▼ | ▲ |
| ^{†1} Germany | ● | ▲ | ● | ● | ▼ | ^{†1} Germany | ● | ▲ | ● | ● | ▼ |
| Romania | ● | ▲ | ● | ▲ | ▼ | Romania | ● | ▲ | ● | ● | ▼ |
| Slovenia | ● | ● | ▼ | ▲ | ● | Slovenia | ▲ | ● | ● | ● | ● |
| Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details): | | | | | | | | | | | |
| Denmark | ● | ▲ | ▲ | ▼ | ● | Denmark | ● | ▲ | ▲ | ▼ | ● |
| Greece | ▼ | ● | ▼ | ▲ | ● | Greece | ▼ | ▼ | ● | ▲ | ● |
| [†] South Africa | ● | ▼ | ● | ▲ | ● | Thailand | ● | ▲ | ▼ | ▼ | ▲ |
| Thailand | ▼ | ▲ | ▼ | ▼ | ▲ | | | | | | |
| Unapproved Sampling Procedures at Classroom Level and Not Meeting Other Guidelines (See Appendix A for Details): | | | | | | | | | | | |
| | | | | | | ¹ Israel | ● | ● | ● | ● | ● |
| | | | | | | Kuwait | ● | ● | ● | ● | ● |
| | | | | | | South Africa | ● | ▼ | ● | ▲ | ● |

▲ = Significantly higher than overall average ● = No significant difference from overall average ▼ = Significantly lower than overall average

*Seventh and eighth 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).

[†]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.

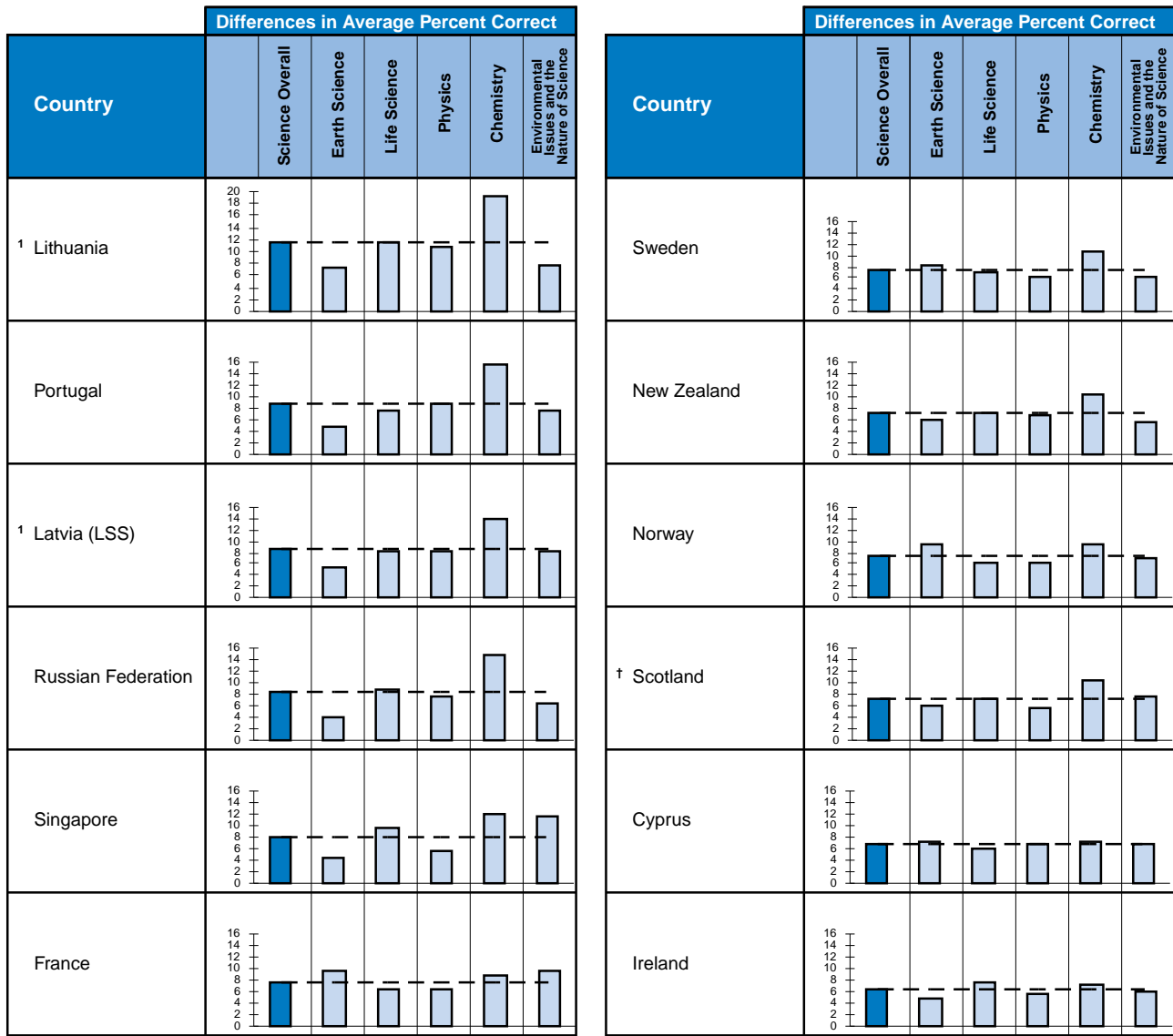
WHAT ARE THE INCREASES IN ACHIEVEMENT BETWEEN THE LOWER AND UPPER GRADES?

Figure 2.1, which profiles the increases in average percent correct between the seventh and eighth 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 Lithuania, Portugal, Latvia (LSS), and the Russian Federation, all of which had increases of 8% to 11% in overall percentage correct. As an aid in the comparison between the increase for the science test overall and each of the five content areas, a dashed line indicating the overall between-grade increase is shown in each country's profile.

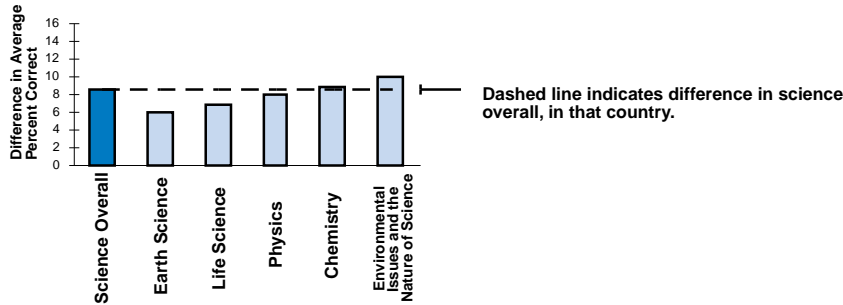
These results show that for the majority of countries, the performance differences between grades vary across content areas, most likely reflecting a greater emphasis in the eighth-grade curriculum on some areas compared to others. There were several countries, however, with moderate between-grade increases that were more comparable across all content areas, including Cyprus, the Czech Republic, Hungary, Canada, the United States, and Denmark, for example. The chemistry content area has the largest increase from seventh to eighth grade for a large number of countries. This is particularly noticeable for Lithuania, Portugal, Latvia (LSS), and the Russian Federation, where large increases between 14% and 20% were observed for chemistry. For most countries, the increases in life science were similar to the overall between-grade increases in science as were the increases for the environmental issues and nature of science items. Several lower increases than overall were observed in earth science and physics, indicating that some countries may place less emphasis on these content areas in the eighth grade.

Figure 2.1

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



Legend:



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

¹Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).

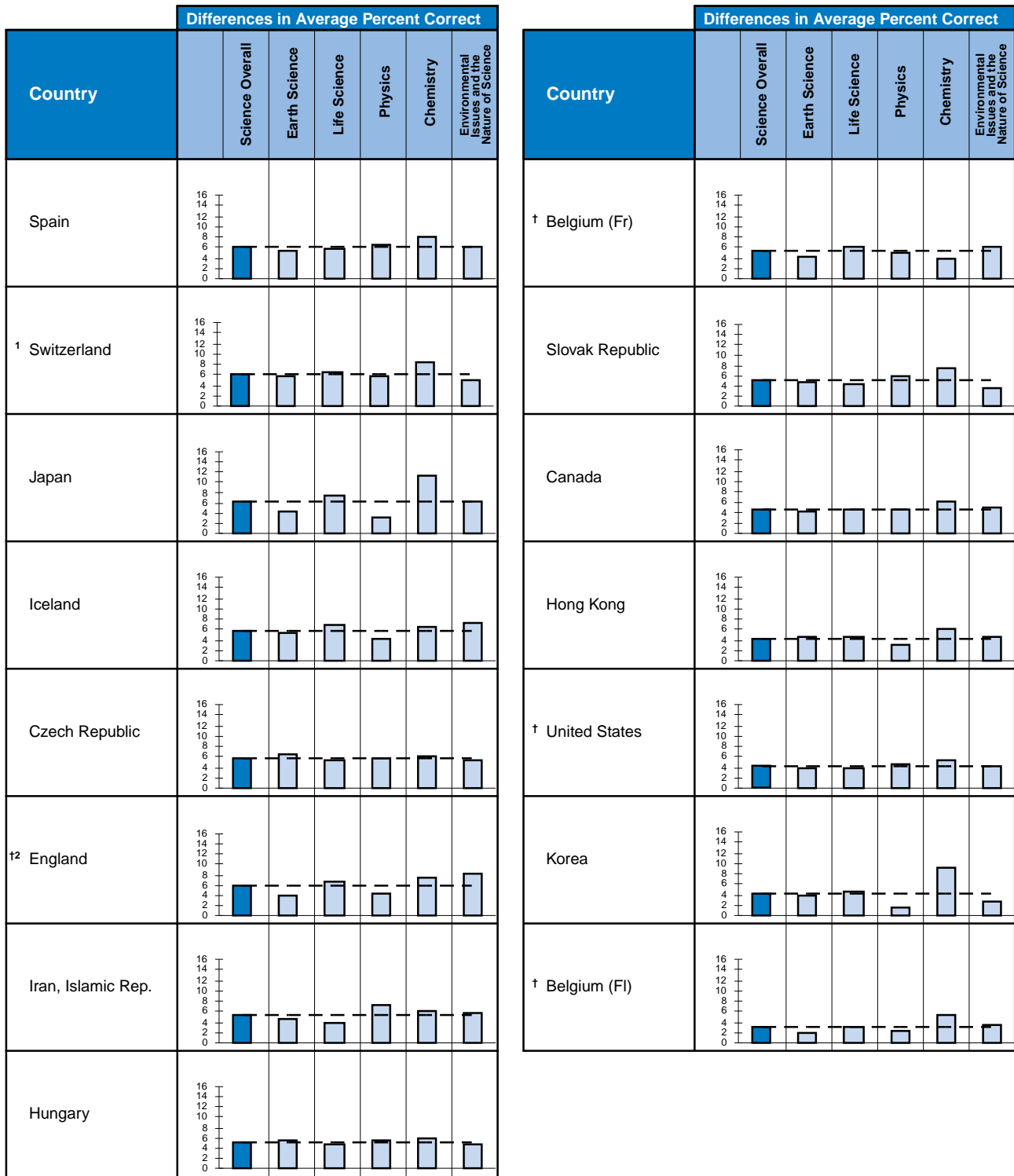
[†]National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

[‡]National 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-2)

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



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

¹Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).

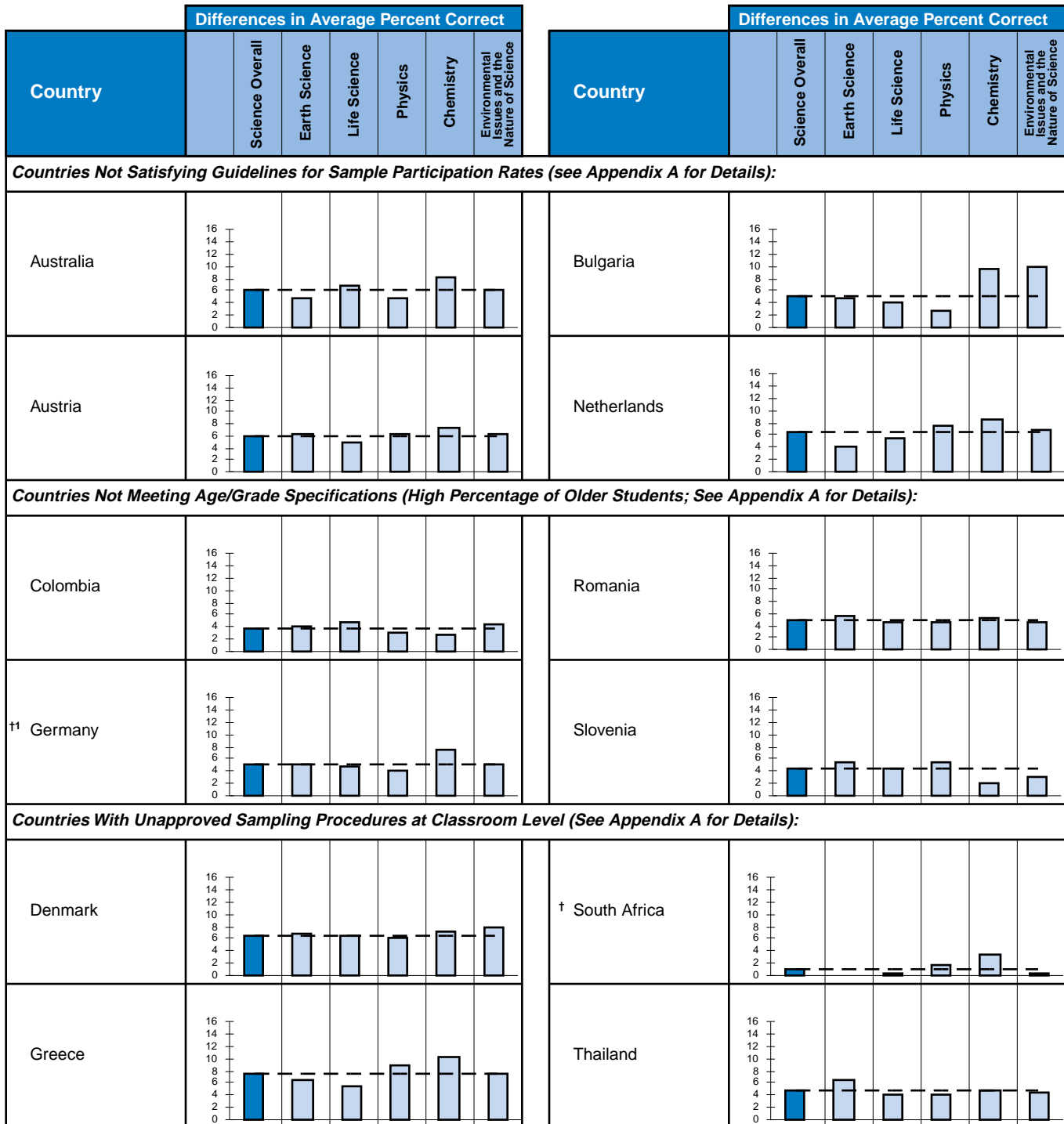
¹²National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

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-3)

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



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

^{†1}Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).

[†]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.

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 for the science content areas for eighth-grade students and seventh grade-students, respectively. The countries are listed in descending order by overall percent correct. Although these overall differences are comparable to those for the TIMSS science scale discussed in Chapter 1, the reduced number of statistically significant differences reinforces the idea of less precision in the percent-correct metric.

The science content area data reveal that the gender differences vary depending on the science subject. In both the seventh and eighth grades, gender differences in earth science, physics, and chemistry reflected advantages for boys. In earth science, the boys had significantly higher averages than girls in 18 countries at the eighth grade and in 19 countries at the seventh grade. In physics, the corresponding results revealed advantages for boys in 25 and 23 countries. In chemistry, boys out-performed girls in 16 countries at the eighth grade and 20 countries at the seventh grade. For the remaining countries except Thailand, even though the differences were not statistically significant, the direction of the differences favored boys in all three content areas at both grades.

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. In Spain, boys had significantly higher achievement than girls at both grades. Also, seventh-grade boys did better than girls in Korea. However, at the eighth grade, girls did better than boys in Cyprus. For the items in the area of environmental issues and the nature of science, eighth-grade boys had higher achievement than girls in two countries – the Czech Republic and Korea. At the seventh grade, there were no significant differences in average performance for this content area.

IEA's second science study conducted in 1983-84 found similar results for 14-year-olds in the content areas. There were negligible gender differences in biology, larger, but still small differences favoring boys in chemistry and earth science, and moderate to large advantages for boys in physics.⁸

⁸ Keeves, J.P. and Kotte, D. (1992). "Disparities Between the Sexes in Science Education: 1970-84" in J.P. Keeves (ed.), *The IEA Study of Science (Vol.) III: Changes in Science Education and Achievement: 1970 to 1984*. New York, NY: Pergamon Press.

Table 2.4**Average Percent Correct for Boys and Girls by Science Content Areas
Upper Grade (Eighth Grade*)**

| Country | Science Overall | | Earth Science | | Life Science | |
|---|-----------------|----------|---------------|----------|--------------|------------|
| | Boys | Girls | Boys | Girls | Boys | Girls |
| [†] Belgium (Fl) | 62 (1.7) | 59 (1.5) | 64 (2.0) | 60 (1.5) | 64 (1.7) | 64 (1.5) |
| Canada | 60 (0.6) | 58 (0.6) | 59 (0.8) | 56 (0.8) | 62 (0.8) | 63 (0.8) |
| Cyprus | 46 (0.4) | 47 (0.6) | 47 (0.7) | 46 (0.9) | 47 (0.6) | ▲ 51 (0.7) |
| Czech Republic | ▲ 67 (0.8) | 61 (1.1) | 66 (1.1) | 60 (1.6) | 70 (0.9) | 67 (1.2) |
| ^{†2} England | 63 (1.0) | 60 (0.7) | 61 (1.2) | 58 (0.9) | 65 (1.2) | 63 (1.1) |
| France | ▲ 55 (0.7) | 52 (0.7) | 57 (0.9) | 53 (1.0) | 57 (0.8) | 55 (0.9) |
| Hong Kong | ▲ 60 (1.1) | 55 (1.1) | ▲ 57 (1.2) | 51 (1.1) | 63 (1.2) | 59 (1.2) |
| Hungary | ▲ 63 (0.7) | 59 (0.7) | ▲ 62 (1.0) | 57 (0.9) | 66 (0.8) | 65 (0.8) |
| Iceland | 53 (1.2) | 51 (0.9) | 52 (1.5) | 48 (1.3) | 58 (1.2) | 58 (1.2) |
| Iran, Islamic Rep. | ▲ 49 (0.8) | 45 (0.8) | ▲ 47 (0.8) | 42 (0.9) | 50 (0.9) | 47 (0.9) |
| Ireland | 60 (1.3) | 57 (1.0) | 64 (1.4) | 59 (1.2) | 60 (1.4) | 60 (1.3) |
| Japan | ▲ 67 (0.5) | 64 (0.4) | ▲ 64 (0.5) | 58 (0.6) | 71 (0.5) | 70 (0.5) |
| Korea | ▲ 67 (0.5) | 64 (0.5) | ▲ 65 (0.7) | 60 (0.7) | 71 (0.7) | 69 (0.7) |
| ¹ Latvia (LSS) | ▲ 52 (0.8) | 48 (0.6) | ▲ 51 (1.1) | 45 (1.0) | 54 (0.9) | 52 (0.8) |
| ¹ Lithuania | ▲ 51 (0.8) | 47 (0.8) | ▲ 49 (1.1) | 44 (1.1) | 52 (1.0) | 52 (1.0) |
| New Zealand | 60 (1.0) | 56 (1.0) | ▲ 59 (1.1) | 52 (1.1) | 61 (1.2) | 60 (1.1) |
| Norway | 59 (0.6) | 56 (0.4) | ▲ 64 (0.8) | 59 (0.7) | 60 (0.8) | 62 (0.6) |
| Portugal | ▲ 52 (0.7) | 48 (0.6) | ▲ 53 (1.0) | 47 (0.8) | 55 (0.8) | 52 (0.8) |
| Russian Federation | 60 (0.9) | 57 (0.7) | 61 (0.9) | 57 (0.9) | 62 (0.9) | 63 (0.7) |
| Singapore | 71 (1.2) | 69 (1.1) | 66 (1.4) | 63 (1.3) | 72 (1.2) | 71 (1.2) |
| Slovak Republic | ▲ 62 (0.6) | 57 (0.7) | ▲ 62 (0.9) | 58 (0.9) | 61 (0.7) | 59 (0.8) |
| Spain | ▲ 58 (0.5) | 54 (0.5) | ▲ 59 (0.7) | 54 (0.7) | ▲ 60 (0.7) | 57 (0.6) |
| Sweden | ▲ 60 (0.6) | 57 (0.6) | 63 (0.8) | 60 (0.8) | 63 (0.7) | 63 (0.8) |
| ¹ Switzerland | ▲ 58 (0.6) | 54 (0.5) | 60 (0.9) | 56 (0.7) | 59 (0.8) | 59 (0.7) |
| [†] United States | 59 (1.0) | 57 (1.0) | 60 (1.0) | 56 (1.1) | 63 (1.2) | 63 (1.1) |
| Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details): | | | | | | |
| Australia | 61 (1.0) | 59 (0.8) | 59 (1.0) | 55 (0.9) | 62 (1.0) | 64 (0.8) |
| Austria | 63 (0.8) | 60 (0.8) | ▲ 65 (0.9) | 59 (1.0) | 65 (0.8) | 64 (0.9) |
| Belgium (Fr) | 52 (1.0) | 49 (0.7) | 52 (1.3) | 48 (0.9) | 55 (1.1) | 55 (1.0) |
| Netherlands | 64 (1.2) | 60 (1.1) | 64 (1.6) | 58 (1.4) | 67 (1.4) | 66 (1.6) |
| Scotland | 57 (1.2) | 53 (0.9) | ▲ 56 (1.2) | 48 (1.0) | 58 (1.3) | 55 (1.1) |
| Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details): | | | | | | |
| Colombia | 40 (1.4) | 37 (0.8) | 39 (1.4) | 35 (1.1) | 45 (1.6) | 42 (1.0) |
| ^{†1} Germany | 59 (1.2) | 57 (1.0) | 58 (1.1) | 56 (1.3) | 63 (1.3) | 63 (1.1) |
| Romania | 51 (0.9) | 49 (0.9) | 50 (1.1) | 48 (1.1) | 55 (1.1) | 55 (1.1) |
| Slovenia | ▲ 64 (0.6) | 59 (0.7) | ▲ 67 (0.8) | 62 (0.9) | 66 (0.7) | 63 (0.8) |
| Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details): | | | | | | |
| Denmark | ▲ 54 (0.6) | 48 (0.8) | ▲ 53 (0.9) | 44 (0.9) | 57 (0.9) | 55 (1.0) |
| Greece | ▲ 54 (0.6) | 50 (0.6) | ▲ 51 (0.8) | 46 (0.7) | 55 (0.7) | 53 (0.7) |
| Thailand | 57 (0.9) | 58 (1.0) | 56 (1.2) | 56 (1.1) | 65 (1.0) | 67 (1.1) |
| Unapproved Sampling Procedures at Classroom Level and Not Meeting Other Guidelines (See Appendix A for Details): | | | | | | |
| ¹ Israel | ▲ 61 (1.2) | 54 (1.1) | ▲ 59 (1.4) | 52 (1.3) | 63 (1.5) | 59 (1.4) |
| South Africa | 28 (1.8) | 25 (1.2) | 28 (1.6) | 24 (1.0) | 29 (1.9) | 25 (1.3) |

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

*Eighth 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 2.4 (Continued)**Average Percent Correct for Boys and Girls by Science Content Areas
Upper Grade (Eighth Grade*)**

| Country | Physics | | Chemistry | | Environmental Issues and the Nature of Science | |
|---|------------|----------|------------|----------|--|----------|
| | Boys | Girls | Boys | Girls | Boys | Girls |
| [†] Belgium (FI) | 63 (1.7) | 58 (1.4) | 53 (1.6) | 50 (1.8) | 59 (1.6) | 57 (2.3) |
| Canada | ▲ 61 (0.6) | 57 (0.5) | 53 (0.9) | 50 (0.9) | 62 (0.8) | 60 (1.0) |
| Cyprus | 47 (0.6) | 45 (0.7) | 45 (0.9) | 44 (0.8) | 45 (1.0) | 47 (0.9) |
| Czech Republic | ▲ 67 (0.8) | 60 (0.9) | ▲ 64 (1.2) | 56 (1.7) | ▲ 64 (1.2) | 55 (1.6) |
| ^{†2} England | 63 (1.0) | 60 (0.8) | 57 (1.2) | 53 (1.4) | 65 (1.6) | 64 (1.2) |
| France | ▲ 57 (0.7) | 52 (0.7) | 49 (1.2) | 45 (1.2) | 54 (1.3) | 53 (1.1) |
| Hong Kong | ▲ 62 (0.9) | 54 (1.1) | ▲ 57 (1.3) | 52 (1.2) | 57 (1.6) | 53 (1.5) |
| Hungary | ▲ 63 (0.7) | 56 (0.8) | ▲ 62 (0.9) | 58 (1.0) | 55 (1.2) | 52 (1.1) |
| Iceland | 54 (1.6) | 52 (0.9) | 43 (1.1) | 41 (1.4) | 49 (1.8) | 48 (1.2) |
| Iran, Islamic Rep. | ▲ 51 (1.0) | 44 (0.8) | 53 (1.0) | 51 (1.1) | 40 (1.4) | 37 (1.5) |
| Ireland | ▲ 59 (1.3) | 54 (1.0) | 56 (1.5) | 52 (1.2) | 60 (1.6) | 60 (1.3) |
| Japan | ▲ 68 (0.5) | 65 (0.4) | ▲ 62 (0.7) | 59 (0.6) | 61 (0.9) | 58 (0.8) |
| Korea | ▲ 67 (0.7) | 62 (0.6) | 65 (0.8) | 61 (0.9) | ▲ 66 (1.0) | 61 (1.1) |
| ¹ Latvia (LSS) | ▲ 55 (1.0) | 48 (0.7) | 50 (1.2) | 46 (1.1) | 48 (1.3) | 46 (1.2) |
| ¹ Lithuania | ▲ 56 (0.9) | 48 (0.7) | 50 (1.1) | 45 (1.1) | 41 (1.4) | 38 (1.2) |
| New Zealand | ▲ 60 (0.8) | 55 (0.8) | ▲ 56 (1.3) | 50 (1.4) | 60 (1.5) | 58 (1.3) |
| Norway | ▲ 59 (0.6) | 55 (0.5) | ▲ 52 (0.9) | 47 (0.8) | 56 (1.0) | 55 (1.1) |
| Portugal | ▲ 52 (0.6) | 45 (0.6) | ▲ 54 (1.1) | 46 (1.0) | 45 (1.1) | 45 (1.1) |
| Russian Federation | ▲ 60 (1.0) | 55 (0.9) | 60 (1.6) | 55 (1.2) | 49 (1.1) | 50 (1.0) |
| Singapore | 71 (1.0) | 67 (1.0) | 70 (1.6) | 68 (1.5) | 74 (1.3) | 74 (1.4) |
| Slovak Republic | ▲ 65 (0.7) | 58 (0.8) | ▲ 61 (1.0) | 54 (1.0) | 55 (1.1) | 52 (1.1) |
| Spain | ▲ 58 (0.5) | 52 (0.6) | ▲ 54 (0.9) | 49 (0.8) | 53 (0.8) | 53 (1.0) |
| Sweden | ▲ 60 (0.6) | 54 (0.7) | ▲ 59 (1.0) | 52 (0.7) | 53 (1.0) | 51 (0.9) |
| ¹ Switzerland | ▲ 60 (0.7) | 55 (0.6) | ▲ 53 (0.9) | 46 (0.9) | 53 (1.0) | 49 (1.0) |
| [†] United States | 57 (0.9) | 54 (0.9) | 55 (1.3) | 51 (1.2) | 59 (1.2) | 62 (1.2) |
| Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details): | | | | | | |
| Australia | 62 (0.9) | 58 (0.8) | 56 (1.2) | 52 (1.0) | 62 (1.3) | 63 (1.1) |
| Austria | ▲ 64 (0.8) | 59 (0.9) | 61 (1.3) | 56 (1.5) | 56 (1.1) | 54 (1.3) |
| Belgium (Fr) | 53 (1.1) | 50 (0.6) | 44 (1.1) | 39 (1.1) | 47 (1.6) | 46 (1.1) |
| Netherlands | ▲ 65 (1.2) | 60 (1.0) | ▲ 56 (1.0) | 49 (1.1) | 66 (2.1) | 65 (1.9) |
| Scotland | 59 (1.0) | 55 (0.9) | ▲ 55 (1.7) | 47 (1.1) | 58 (1.7) | 56 (1.6) |
| Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details): | | | | | | |
| Colombia | 39 (1.5) | 35 (0.9) | 34 (1.6) | 30 (1.0) | 41 (2.0) | 40 (1.0) |
| ^{†1} Germany | 60 (1.1) | 55 (1.0) | 57 (1.6) | 52 (1.6) | 50 (1.6) | 52 (1.3) |
| Romania | 51 (0.9) | 46 (1.0) | 48 (1.2) | 45 (1.1) | 42 (1.2) | 41 (1.3) |
| Slovenia | ▲ 64 (0.7) | 58 (0.8) | 59 (1.1) | 54 (1.1) | 60 (1.1) | 57 (1.1) |
| Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details): | | | | | | |
| Denmark | ▲ 57 (0.7) | 49 (0.9) | ▲ 44 (1.1) | 38 (1.1) | 50 (1.4) | 44 (1.3) |
| Greece | ▲ 55 (0.6) | 50 (0.6) | ▲ 54 (0.7) | 49 (0.7) | 51 (1.1) | 51 (1.1) |
| Thailand | 54 (0.8) | 54 (0.9) | 42 (1.2) | 44 (1.5) | 62 (1.2) | 62 (1.3) |
| Unapproved Sampling Procedures at Classroom Level and Not Meeting Other Guidelines (See Appendix A for Details): | | | | | | |
| ¹ Israel | ▲ 62 (1.1) | 54 (1.1) | ▲ 58 (1.7) | 50 (1.6) | 57 (2.1) | 49 (1.9) |
| South Africa | 29 (1.9) | 25 (1.3) | 28 (2.0) | 25 (1.2) | 27 (1.9) | 24 (1.5) |

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

*Eighth 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 (Seventh Grade*)

| Country | Science Overall | | Earth Science | | Life Science | |
|--|-----------------|----------|---------------|----------|--------------|----------|
| | Boys | Girls | Boys | Girls | Boys | Girls |
| [†] Belgium (Fl) | ▲ 59 (0.7) | 55 (0.7) | ▲ 63 (0.9) | 58 (0.9) | 62 (0.9) | 59 (0.8) |
| [†] Belgium (Fr) | ▲ 47 (0.8) | 43 (0.7) | ▲ 49 (1.2) | 43 (1.1) | 49 (1.0) | 48 (0.9) |
| Canada | 55 (0.6) | 53 (0.5) | 55 (0.9) | 52 (0.7) | 57 (0.7) | 58 (0.6) |
| Cyprus | 40 (0.6) | 40 (0.5) | 40 (1.0) | 38 (0.7) | 42 (0.8) | 43 (0.7) |
| Czech Republic | ▲ 60 (0.7) | 56 (0.9) | ▲ 60 (1.0) | 55 (1.1) | 64 (0.7) | 62 (0.9) |
| ^{†2} England | 57 (1.0) | 54 (0.9) | 58 (1.3) | 53 (1.1) | 58 (1.1) | 56 (1.2) |
| France | ▲ 48 (0.7) | 44 (0.7) | ▲ 48 (0.8) | 42 (0.8) | 51 (0.9) | 49 (0.8) |
| Hong Kong | 54 (1.5) | 52 (1.2) | 51 (1.4) | 47 (1.2) | 57 (1.5) | 56 (1.3) |
| Hungary | 57 (0.8) | 54 (0.7) | ▲ 56 (0.9) | 52 (0.9) | 61 (1.0) | 61 (0.7) |
| Iceland | 47 (0.9) | 45 (0.6) | ▲ 47 (0.9) | 43 (0.8) | 51 (0.9) | 51 (0.8) |
| Iran, Islamic Rep. | 43 (0.7) | 40 (0.9) | ▲ 43 (1.0) | 38 (0.9) | 46 (1.0) | 43 (1.1) |
| Ireland | ▲ 54 (1.0) | 50 (0.8) | ▲ 59 (1.2) | 54 (0.9) | 53 (1.1) | 52 (1.1) |
| Japan | ▲ 60 (0.4) | 58 (0.3) | ▲ 58 (0.7) | 55 (0.5) | 64 (0.6) | 64 (0.4) |
| Korea | ▲ 63 (0.5) | 59 (0.6) | ▲ 61 (0.6) | 55 (0.9) | ▲ 67 (0.7) | 62 (0.8) |
| ¹ Latvia (LSS) | 43 (0.7) | 40 (0.6) | 44 (1.0) | 41 (0.8) | 45 (0.8) | 44 (0.8) |
| ¹ Lithuania | 38 (0.7) | 37 (0.8) | 40 (0.9) | 38 (1.1) | 39 (0.9) | 42 (1.0) |
| New Zealand | 51 (0.8) | 49 (0.7) | ▲ 52 (1.0) | 47 (0.9) | 53 (1.0) | 53 (1.0) |
| Norway | 51 (0.7) | 49 (0.8) | 53 (1.0) | 51 (1.0) | 55 (0.9) | 55 (0.8) |
| Portugal | ▲ 43 (0.5) | 39 (0.5) | 47 (0.8) | 44 (0.8) | 47 (0.6) | 44 (0.7) |
| Russian Federation | 52 (1.0) | 48 (0.7) | ▲ 56 (1.0) | 52 (0.7) | 54 (1.2) | 53 (0.9) |
| [†] Scotland | 50 (0.9) | 47 (0.8) | ▲ 49 (1.0) | 44 (0.9) | 50 (1.0) | 48 (1.0) |
| Singapore | 62 (1.4) | 61 (1.5) | 62 (1.4) | 58 (1.6) | 62 (1.7) | 63 (1.7) |
| Slovak Republic | ▲ 57 (0.8) | 52 (0.6) | ▲ 58 (0.9) | 53 (0.9) | 58 (0.9) | 54 (0.7) |
| Spain | ▲ 51 (0.6) | 47 (0.5) | ▲ 54 (0.8) | 49 (0.8) | ▲ 54 (0.7) | 51 (0.6) |
| Sweden | 52 (0.6) | 50 (0.7) | 54 (0.8) | 53 (0.9) | 56 (0.8) | 56 (0.8) |
| ¹ Switzerland | ▲ 52 (0.5) | 48 (0.5) | ▲ 55 (0.7) | 50 (0.7) | 53 (0.6) | 53 (0.6) |
| [†] United States | 55 (1.3) | 53 (1.1) | 56 (1.3) | 52 (1.3) | 59 (1.2) | 59 (1.2) |
| Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details): | | | | | | |
| Australia | 54 (1.0) | 54 (0.7) | 54 (1.2) | 51 (0.8) | 55 (1.1) | 57 (0.8) |
| Austria | 56 (0.9) | 55 (0.7) | 57 (1.0) | 54 (1.0) | 59 (1.1) | 61 (0.9) |
| Netherlands | 57 (0.9) | 55 (0.8) | 58 (1.1) | 55 (1.1) | 61 (1.1) | 61 (0.9) |
| Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details): | | | | | | |
| Colombia | ▲ 37 (0.9) | 33 (0.8) | ▲ 36 (1.0) | 30 (1.0) | 40 (1.0) | 38 (0.9) |
| ^{†1} Germany | 55 (1.0) | 51 (0.9) | 53 (0.9) | 50 (1.2) | 58 (1.0) | 58 (1.0) |
| Romania | 46 (0.8) | 44 (0.8) | 45 (1.0) | 43 (1.1) | 51 (1.0) | 51 (0.9) |
| Slovenia | 59 (0.6) | 56 (0.6) | ▲ 61 (0.7) | 57 (0.8) | 60 (0.8) | 60 (0.7) |
| Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details): | | | | | | |
| Denmark | ▲ 46 (0.6) | 42 (0.6) | ▲ 44 (1.0) | 39 (0.9) | 50 (0.8) | 49 (0.8) |
| Greece | 45 (0.7) | 44 (0.5) | 44 (0.8) | 42 (0.6) | 48 (0.8) | 49 (0.7) |
| [†] South Africa | 27 (1.3) | 25 (0.9) | 27 (1.4) | 26 (1.0) | 27 (1.4) | 26 (1.1) |
| Thailand | 53 (0.8) | 52 (0.9) | 51 (0.9) | 49 (1.0) | 61 (0.9) | 62 (1.0) |

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

*Seventh 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).

[†]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 (Seventh Grade*)

| Country | Physics | | Chemistry | | Environmental Issues and the Nature of Science | |
|--|------------|----------|------------|----------|--|----------|
| | Boys | Girls | Boys | Girls | Boys | Girls |
| [†] Belgium (Fl) | ▲ 60 (0.8) | 56 (0.7) | ▲ 49 (0.8) | 43 (0.9) | 54 (1.4) | 54 (1.2) |
| [†] Belgium (Fr) | ▲ 49 (0.9) | 44 (0.9) | ▲ 41 (0.9) | 34 (0.9) | 40 (1.2) | 40 (1.1) |
| Canada | ▲ 56 (0.7) | 52 (0.6) | ▲ 48 (1.0) | 43 (0.7) | 56 (1.0) | 56 (1.0) |
| Cyprus | 40 (0.6) | 38 (0.6) | 38 (0.8) | 37 (0.8) | 38 (1.1) | 41 (0.9) |
| Czech Republic | ▲ 60 (0.7) | 56 (0.9) | ▲ 57 (1.1) | 51 (1.4) | 56 (1.2) | 51 (1.3) |
| ^{†2} England | 59 (1.0) | 55 (1.0) | ▲ 51 (1.4) | 44 (1.5) | 57 (1.3) | 56 (1.7) |
| France | ▲ 50 (0.8) | 46 (0.7) | ▲ 41 (1.0) | 36 (0.9) | 43 (1.4) | 44 (1.1) |
| Hong Kong | 57 (1.5) | 53 (1.1) | 50 (1.5) | 47 (1.5) | 51 (2.0) | 50 (1.9) |
| Hungary | ▲ 57 (0.7) | 51 (0.7) | 56 (1.0) | 52 (0.9) | 48 (1.4) | 49 (1.2) |
| Iceland | 51 (1.2) | 47 (0.8) | 38 (1.5) | 34 (1.0) | 42 (1.3) | 42 (1.5) |
| Iran, Islamic Rep. | ▲ 43 (0.9) | 38 (1.0) | 46 (1.0) | 46 (1.3) | 34 (1.2) | 33 (1.4) |
| Ireland | ▲ 54 (1.0) | 48 (0.8) | ▲ 51 (1.1) | 44 (1.1) | 56 (1.3) | 53 (1.1) |
| Japan | ▲ 65 (0.4) | 62 (0.5) | ▲ 51 (0.7) | 48 (0.6) | 55 (0.8) | 52 (0.8) |
| Korea | ▲ 65 (0.6) | 60 (0.7) | 55 (0.6) | 52 (0.8) | 63 (1.0) | 59 (0.9) |
| ¹ Latvia (LSS) | ▲ 46 (0.9) | 41 (0.7) | ▲ 36 (0.9) | 31 (1.0) | 38 (1.4) | 38 (1.1) |
| ¹ Lithuania | ▲ 43 (0.8) | 38 (0.9) | 29 (1.0) | 28 (1.1) | 31 (1.2) | 33 (1.1) |
| New Zealand | 52 (0.9) | 50 (0.7) | 44 (0.9) | 40 (1.1) | 54 (1.2) | 53 (1.2) |
| Norway | ▲ 53 (0.9) | 48 (1.0) | 40 (1.1) | 39 (1.1) | 48 (1.3) | 49 (1.3) |
| Portugal | ▲ 43 (0.6) | 37 (0.6) | ▲ 38 (0.8) | 31 (0.8) | 37 (1.1) | 37 (1.0) |
| Russian Federation | 52 (1.1) | 47 (0.9) | ▲ 46 (1.2) | 39 (1.0) | 45 (1.3) | 41 (0.8) |
| [†] Scotland | 53 (0.9) | 50 (0.8) | ▲ 44 (1.3) | 38 (1.1) | 50 (1.2) | 49 (1.3) |
| Singapore | 65 (1.2) | 62 (1.4) | 57 (1.6) | 56 (1.6) | 61 (1.7) | 64 (1.7) |
| Slovak Republic | ▲ 58 (0.8) | 53 (0.8) | ▲ 54 (1.1) | 46 (1.0) | 51 (1.1) | 49 (1.0) |
| Spain | ▲ 51 (0.7) | 46 (0.5) | ▲ 46 (0.8) | 41 (0.9) | 47 (1.0) | 47 (0.9) |
| Sweden | ▲ 53 (0.7) | 48 (0.8) | ▲ 47 (0.8) | 43 (1.0) | 45 (1.1) | 46 (0.9) |
| [†] Switzerland | ▲ 55 (0.6) | 49 (0.5) | ▲ 45 (0.8) | 38 (0.7) | 47 (1.0) | 45 (0.8) |
| [†] United States | 52 (1.3) | 50 (1.0) | 50 (1.6) | 46 (1.1) | 55 (1.9) | 57 (1.5) |
| Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details): | | | | | | |
| Australia | 56 (1.0) | 54 (0.8) | 46 (1.1) | 45 (1.0) | 56 (1.3) | 58 (1.1) |
| Austria | 57 (0.9) | 54 (0.9) | 53 (1.3) | 49 (1.0) | 49 (1.4) | 48 (1.1) |
| Netherlands | 57 (0.9) | 53 (1.0) | 46 (1.2) | 42 (1.1) | 59 (1.7) | 58 (1.6) |
| Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details): | | | | | | |
| Colombia | ▲ 37 (1.0) | 32 (0.9) | ▲ 32 (1.0) | 27 (0.8) | 36 (1.1) | 35 (1.0) |
| ^{†1} Germany | ▲ 56 (1.0) | 51 (0.9) | ▲ 51 (1.3) | 43 (1.2) | 47 (1.6) | 45 (1.3) |
| Romania | 46 (0.9) | 42 (0.9) | 43 (1.0) | 40 (1.1) | 37 (1.1) | 37 (1.0) |
| Slovenia | ▲ 57 (0.7) | 53 (0.7) | ▲ 57 (1.1) | 52 (1.0) | 55 (1.1) | 56 (0.8) |
| Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details): | | | | | | |
| Denmark | ▲ 50 (0.8) | 43 (0.7) | ▲ 37 (0.9) | 31 (0.9) | 39 (1.2) | 39 (1.2) |
| Greece | ▲ 46 (0.7) | 42 (0.5) | 42 (0.9) | 40 (0.9) | 43 (1.1) | 44 (1.1) |
| [†] South Africa | 28 (1.3) | 24 (0.9) | 23 (1.3) | 23 (0.8) | 25 (1.5) | 25 (1.2) |
| Thailand | 51 (0.8) | 50 (0.8) | 40 (1.1) | 37 (1.0) | 57 (1.3) | 58 (1.2) |

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

*Seventh 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.

