International Association for the Evaluation of Educational Achievement

School Contexts for Learning and Instruction

IEA's Third International Mathematics and Science Study (TIMSS)

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Executive Summary

Since its inception in 1959, the International Association for the Evaluation of Educational Achievement (IEA) has conducted a series of international comparative studies designed to provide policy makers, educators, researchers, and practitioners with information about educational achievement. The Third International Mathematics and Science Study (TIMSS) is the largest and most ambitious of these studies.

The scope and complexity of TIMSS is enormous. In 1995, the mathematics and science testing covered five grade levels, with more than 40 countries collecting data in more than 30 languages. Over half a million students were tested around the world. In addition to achievement tests in mathematics and science, TIMSS also administered background questionnaires to students, their teachers, and their schools.

Since the data were collected in 1995, the TIMSS International Study Center at Boston College has published reports detailing the results for students in third and fourth grades, seventh and eighth grades, and in their final year of secondary school, as well as background data on students and teachers. A report on the TIMSS performance assessment at fourth and eighth grades has also been published, as has a series of technical reports. The international databases containing all of the achievement and background data also have been released, together with user guides to facilitate secondary analysis.

Since the results from the school questionnaire could not be included in the initial reports because of time constraints, these data are being presented for all of the TIMSS grades together in a single volume. This report presents school questionnaire data for three grade levels in 41 countries. Results are reported for fourth grade, eighth grade, and students in the final year of secondary school (twelfth grade in most countries). The purpose of the report is to provide data on school contexts for learning mathematics and science, including school characteristics, policies, and practices. The report is organized around five major topics:

- Roles and responsibilities of schools and school principals
- School organization and staffing
- Organization for learning mathematics and science
- School resources
- School atmosphere

The school report is the final volume in the series of descriptive reports from the 1995 TIMSS assessment. The combined school results for three grade levels offer a useful overview of a range of school factors and how they vary

across grades and across countries. Together with the student achievement data and the student and teacher questionnaire results published earlier, they round off the initial presentation of the TIMSS results and provide valuable information about the relative effectiveness of a country's education system as students progress through school.

The following sections summarize the major findings described in this report.

Role and Responsibilities of Schools and School Principals

Since the school is the primary institution for formal education in all countries, its role and the responsibilities of the principal are of central concern in any comparative study of education systems. By examining which activities are a responsibility of the school, by comparing how school principals spend their time, and by reviewing the influences on the school curriculum, this section of the report sheds light on how some important school functions vary from country to country.

- One of the most obvious ways in which school systems vary is the degree to which individual schools have autonomy to make decisions about everyday affairs. At all three grade levels, on average across countries, principals reported the greatest autonomy in assigning teachers to classes and choosing textbooks. At fourth and eighth grades, hiring teachers was least often primarily a school responsibility; at the final year of secondary school, determining course content and deciding which courses are offered were also rarely primarily a school responsibility.
- In the light of research findings indicating that the school principal can be very effective in promoting school excellence, TIMSS asked principals how they divided their time among instructional leadership activities, teaching, administrative duties, and communicating with students, parents, and officials. At all three grade levels, and particularly at the final grade of secondary school, principals reported that the most time was spent on administration.
- Principals reported that the greatest influences on the curriculum taught in the school come from the national or regional education authorities, and from within the school itself. In almost every country, principals indicated that the school staff had considerable influence on the curriculum implemented in the school.

School Organization and Staffing

Organizing schools and teaching staff to provide the widest possible access to educational resources at the least cost is a challenge for every country. This report presents information on school size and staffing, admission practices, and teacher cooperation and collaboration.

- In general, countries take advantage of the economies of scale offered by large schools when providing for their upper-secondary students. Average enrollment in the schools attended by students in their final year of secondary school was approximately 622 students. With few exceptions, however, countries prefer smaller neighborhood schools (346 students on average) that may be less intimidating and require less travel time for the younger fourth-grade students.
- The ratio of students to teachers is generally highest at fourth grade and lower at eighth grade and the end of secondary school. This may mean that classes are larger on average at fourth grade or that greater numbers of specialists or ancillary staff are in the larger schools that are characteristic for the higher grades. Part-time teachers are not common at fourth grade, and are more widely employed at eighth grade and in the final grade of secondary school.
- Principals of schools with fourth- and eighth-grade students were asked about the criteria used to admit students. Among fourth-grade students, residence in the area served by the school was the most common criterion for school admission, and few schools reported applying academic criteria. At eighth grade, area of residence is also very important, but more principals report that selection practices are in use, including academic standards, parent or student interviews, or previous links with the school (e.g., parents or older siblings attended the school).

Organization for Learning Mathematics and Science

A major challenge for schools is how to deal with students of different abilities and interests in mathematics and science. This report presents information about whether countries offer more than one curricular program for students within mathematics and science, and if so, how decisions are made about students' courses of study. School policies about instructional time also are discussed.

- The results for fourth grade indicate that schools almost universally provide just one course of study for students in science, to a high degree in mathematics also, although in some countries — Israel, and the Netherlands, substantial percentages of students are in schools with more than one mathematics course. At eighth grade principals reported more differentiation in curricular programs than at fourth grade, particularly in mathematics. On average, schools with more than one eighth-grade program in either mathematics or science reported either two or three programs.
- Academic performance was reported to be the main factor in program placement decisions for eighth-grade students across countries, with teacher recommendations carrying weight in every country also. In most countries the need for students to have met curricular requirements, and the wishes of students and their parents, also entered into decisions about students' course of study.

- There was a tendency for high-performing countries to report more time in school and more instruction time than lower-performing countries. At fourth grade, the high-performing countries of Singapore, Japan, Korea, and Hong Kong were the only countries with an average number of school days of 200 or more per year. At eighth grade, high-performing countries such as Japan and Korea, with 231 and 207 school days respectively, have substantially longer school years than most other countries, where the average school year is 200 days or less.
- For both mathematics and science at fourth grade, the number of hours of instructional time varied considerably across countries. There was much more emphasis on mathematics than science at this grade level, with an international average of 75 instructional hours in science compared with 144 hours in mathematics.

School Resources

In presenting school principals' testimony about resources in their schools, this report focuses on one important resource in the modern classroom, i.e., the computer, and on shortages and inadequacies that inhibit the school's capacity to provide instruction.

- Provision of computers to schools varies dramatically across countries at fourth grade, from countries such as Canada and the United States (where almost two-thirds of schools reported that they have on average one computer for every 15 students), to countries such as Iran and Thailand where no computers were reported in any schools. Generally, more computers were reported by eighth-grade principals, although there remains a wide gap between countries with the highest level of equipment and those least well equipped. Although Canada and the United States had the most computers at fourth grade, several other countries, including England, Scotland, and Australia, had comparable or better equipment levels at eighth grade.
- At fourth and eighth grades about one-third of schools on average reported that their capacity to provide instruction was affected by resource shortages, primarily inadequate school buildings, grounds, or instructional space. Countries where problems were most severe included Belgium (French), Denmark, Iran, Latvia (LSS), Lithuania, Portugal, the Russian Federation, Slovenia, and Thailand.
- Shortages that affected the school's capacity to provide instruction in science were reported more often than in mathematics, with laboratory equipment and materials a frequent problem for science instruction, and computers and computer software a problem for both mathematics and science instruction.

School Atmosphere

Research has shown that schools with an atmosphere conducive to academic achievement tend to have higher performance than those with a less supportive environment. The TIMSS data also show higher achievement within countries with less absenteeism, more stability in the student body, and fewer student problems.

- In general, absenteeism is low in schools around the world, although rates and patterns vary considerably across countries. Whereas there are countries where an absentee rate of five percent or more was quite common, it is noteworthy that very little absenteeism was reported in the high-performing countries of Japan, Hong Kong, Korea, and Singapore. Within countries, schools with poorer attendance rates often had students with lower achievement in mathematics and science, particularly at fourth and eighth grades. Also, students in schools with more stable student bodies — i.e., with little student transfer into or out of the school — usually outperformed students in less stable schools.
- The principals of fourth-grade schools reported that the most prevalent problem reported was students intimidating other students, with physical injury to students the next most prevalent. At eighth grade student intimidation remained a problem, while vandalism, theft, and physical injury to other students were also frequently reported. In upper-secondary school vandalism and theft are still a problem; intimidation of students was less frequently reported. Unfortunately, by the end of secondary schooling illegal drug possession or use has become a noticeable problem in some countries. Nearly one-fifth of high-school school principals in the United States reported having to deal with drug possession or use at least monthly.

Chapter 1

Introduction

Overview

In 1994-95, the International Association for the Evaluation of Educational Achievement (IEA) conducted the Third International Mathematics and Science Study (TIMSS) in 41 countries. The IEA is a collaborative of research institutions in 53 education systems[1] around the world. Its primary purpose is to conduct large-scale comparative studies of educational achievement and to gain a better understanding of the effects of policies and practices on achievement within and across systems of education. Since its inception in 1959, the IEA has sponsored more than 15 studies of cross-national achievement, including TIMSS — the largest and most ambitious IEA study conducted to date. TIMSS assessed students in mathematics and science at three points in the education system — at the end of primary school (third and fourth grades in most countries), at the end of middle or lower-secondary school (seventh and eighth grades in most countries), and in the final year of secondary school (twelfth grade in most countries). Countries were required to participate in the assessment of students at the end of middle school, but could choose to participate in the other two assessments.

Achievement was measured through written tests of mathematics and science achievement taken by students in the third, fourth, seventh, and eighth grades. Students in their final year of secondary school were also tested in mathematics and science literacy. In addition, sub-populations of final-year students who had taken advanced mathematics or physics were tested in these subjects. In some countries, students in the fourth and eighth grades completed a performance assessment in addition to the written tests.

In the tradition of previous IEA studies, TIMSS sought to describe the contexts in which mathematics and science teaching and learning take place. To accomplish this, TIMSS gathered contextual information from students, teachers, and schools; investigated the curricula of the participating countries through an analysis of mathematics and science curriculum guides and textbooks; and compiled extensive information about the education systems of the participating countries. The mathematics and science achievement results for the three student populations, as well as background data collected from students and teachers, have been published in a series of reports.[2]

[1] While most IEA members are countries, some are education systems representing regions within countries.

[2] Mullis, I.V.S., Martin, M.O., Beaton, A.E., Gonzalez, E.J., Kelly, D.L., and Smith, T.A. (1998). *Mathematics and Science Achievement in the Final Year of Secondary School: IEA's Third International Mathematics and Science Study (TIMSS)*. Chestnut Hill, MA: Boston College; Mullis, I.V.S., Martin, M.O., Beaton, A.E., Gonzalez, E.J., Kelly, D.L., and Smith, T.A. (1997). *Mathematics Achievement in the Primary School Years: IEA's Third International Mathematics and Science Study (TIMSS)*. Chestnut Hill, MA: Boston College; Martin, M.O., Mullis, I.V.S., Beaton, A.E., Gonzalez, E.J., Smith, T.A., and Kelly, D.L. (1997). *Science Achievement in the Primary School Years: IEA's Third International Mathematics and Science Study (TIMSS)*. Chestnut Hill, MA: Boston College; Beaton, A.E., Mullis, I.V.S., Martin, M.O., Gonzalez, E.J.,

The purpose of this report is to present information about the school contexts for learning mathematics and science, including school characteristics, policies, and practices. In each of the 41 education systems, the principal of each school sampled for the assessment was asked to complete a questionnaire addressing the school-level instructional context. The report is organized around five major topics:

- Role and responsibilities of schools and school principals
- School organization and staffing
- Organization for learning mathematics and science
- School resources
- School atmosphere

Table 1.1 presents the countries included in this report at each of the three grade levels.[3] Results are reported for the upper grade of the primary school student population (fourth grade in most countries), the upper grade of the middle school student population (eighth grade in most countries), and for all students in their final year of secondary school (twelfth grade in most countries).[4] Although there was considerable overlap in the questions asked of the school principals, some questions were not administered at all three populations.

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

[3]Because the characteristics of its sample are not completely known, results for Israel at the final year of secondary school are not included in this report. Data for Greece and Latvia from the final year of secondary school are not included, as only advanced mathematics or physics students were sampled.

[4] Information about population definitions and sampling procedures is provided in Appendix A.

Table 1.1

Countries Included in Report

Fourth Grade	Eighth Grade	Final Year of Secondary School
Australia	Australia	Australia
Austria	Austria	Austria
Canada	Belgium (Flemish)	Canada
Cyprus	Belgium (French)	Cyprus
Czech Republic	Bulgaria	Czech Republic
England	Canada	Denmark
Greece	Colombia	France
Hong Kong	Cyprus	Germany
Hungary	Czech Republic	Hungary
Iceland	Denmark	Iceland
Iran, Islamic Republic	England	Italy
Ireland	France	Lithuania
Israel	Germany	Netherlands
Japan	Greece	New Zealand
Korea, Republic of	Hong Kong	Norway
Kuwait	Hungary	Russian Federation
Latvia	Iceland	Slovenia
Netherlands	Iran, Islamic Republic	South Africa
New Zealand	Ireland	Sweden
Norway	Israel	Switzerland
Portugal	Japan	United States
Scotland	Korea, Republic of	
Singapore	Kuwait	
Slovenia	Latvia	
Thailand	Lithuania	
United States	Netherlands	
	New Zealand	
	Norway	
	Portugal	
	Romania	
	Russian Federation	
	Scotland	
	Singapore	
	Slovak Republic	
	Slovenia	
	South Africa	
	Spain	
	Sweden	
	Switzerland	
	Thailand	
	United States	

Table 1.2 presents information about the grades and students tested for TIMSS and included in this report. For grades four and eight, the table presents, for each country, the name the country uses for the grade, the years of formal schooling the students tested have had, and the average age of the students tested. In most countries, the fourth-grade students have had four years of formal schooling, not including pre-primary school; at the eighth grade, students in most countries have had eight years.

Table 1.2 also presents information about the students tested in the final year of secondary school. There are variations across and within countries with respect to the grades representing the final year of schooling. In some countries, all students in their final year of schooling are in the same grade (e.g., secondary schooling ends for all students in grade 12). In other countries, determining the final year of schooling is more complicated because there are one or more academic tracks, one or more vocational tracks, and apprenticeship programs. Nonetheless, the goal was to identify the final year of each type of program and test the students in that final year. More information about the structure of the upper-secondary systems and the students tested is provided in the international report for this population.

For the students in the final year of secondary school, Table 1.2 presents the grades tested in each country and the average age of these students, as well as the TIMSS Coverage Index (TCI), which is a measure of how much of the school-leaving age cohort is represented in the sample.[5] The TCI reflects any omissions from the sample, such as students who were excluded because of handicap or who had dropped out of school, and, in some countries, tracks or educational programs that were not covered by the sample.

[5] More information about the TIMSS Coverage Index and how it was computed for each country is provided in Appendix A.

Table 1.2

Information About the Grades Tested

Country	Fourth Grade (TIMSS Population 1 Upper Grade)			Eighth Grade (TIMSS Population 2 Upper Grade)		
	Country's Name for Grade Tested	Years of Formal Schooling Including Grade Tested[1]	Average Age of Students Tested	Country's Name for Grade Tested	Years of Formal Schooling Including Grade Tested[1]	Average Age of Students Tested
[2] Australia	4 or 5	4 or 5	10.2	8 or 9	8 or 9	14.2
Austria	4	4	10.5	4. Klasse	8	14.3
Belgium (Fl)	–	–	–	2A & 2P	8	14.1
Belgium (Fr)	–	–	–	2A & 2P	8	14.3
Bulgaria	–	–	–	8	8	14.0
Canada	4	4	10.0	8	8	14.1
Colombia	–	–	–	8	8	15.7
Cyprus	4	4	9.8	8	8	13.7
Czech Republic	4	4	10.4	8	8	14.4
Denmark	–	–	–	7	7	13.9
England	Year 5	5	10.0	Year 9	9	14.0
France	–	–	–	4ème (90%) or 4ème Technologique (10%)	8	14.3
Germany	–	–	–	8	8	14.8
Greece	4	4	9.6	Secondary 2	8	13.6
Hong Kong	Primary 4	4	10.1	Secondary 2	8	14.2
Hungary	4	4	10.4	8	8	14.3
Iceland	4	4	9.6	8	8	13.6
Iran, Islamic Rep.	4	4	10.5	8	8	14.6
Ireland	4th Class	4	10.3	2nd Year	8	14.4
Israel	4	4	10.0	8	8	14.1
Japan	4	4	10.4	2nd Grade Lower Secondary	8	14.4
Korea	4th Grade	4	10.3	2nd Grade Middle School	8	14.2
Kuwait	5	5	10.8	9	9	15.3
Latvia	4	4	10.5	8	8	14.3
Lithuania	–	–	–	8	8	14.3
Netherlands	6	4	10.3	Secondary 2	8	14.3
[3] New Zealand	Standard 3	4.5 - 5.5	10.0	Form 3	8.5 - 9.5	14.0
Norway	3	3	9.9	7	7	13.9
Portugal	4	4	10.4	Grade 8	8	14.5
Romania	–	–	–	8	8	14.6
[4] Russian Federation	–	–	–	8	7 or 8	14.0
Scotland	Year 5	5	9.7	Secondary 2	9	13.7
Singapore	Primary 4	4	10.3	Secondary 2	8	14.5
Slovak Republic	–	–	–	8	8	14.3
Slovenia	4	4	10.9	8	8	14.8
South Africa	–	–	–	Standard 6	8	15.4
Spain	–	–	–	8 EGB	8	14.3
Sweden	–	–	–	7	7	13.9
Switzerland	–	–	–			14.2
(German)				7	7	
(French and Italian)				8	8	
Thailand	Primary 4	4	10.5	Secondary 2	8	14.3
United States	4	4	10.2	8	8	14.2

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

1 Years of Formal Schooling based on the number of years children in the grade level have been in formal schooling, beginning with primary education (International Standard Classification of Education Level 1). Does not include preprimary education.

2 Australia: Each state/territory has its own policy regarding age of entry to primary school. In four of the eight states/territories students in grades 4 and 8 were tested; in the other four states/territories students in grades 5 and 9 were tested.

3 New Zealand: The majority of students begin school on or near their fifth birthday so the "years of formal schooling" vary.

4 Russian Federation: 70% of students in the eighth grade have had 7 years of formal schooling.

A dash (–) indicates that the country did not test students in this grade level or that data are not presented in this report.

Table 1.2 (Continued)

Information About the Grades Tested

Country	Final Year of Secondary School (Varies Across and Within Countries)		
	Grades Tested for TIMSS	TIMSS Coverage Index (TCI)†	Average Age of Students Tested
Australia	Grade 12	68%	17.7
Austria	Grade 12 (academic); Grade 13 (higher technical and vocational), Grades 10, 11, 12 (intermediate technical and vocational); Grades 12, 13, 14 (apprenticeship programs)	76%	19.1
Canada	Grade 12 (all provinces except Quebec); Grades 13 and 14 (depending on program) in Quebec; Ontario OAC students in Grade 13	70%	18.6
Cyprus	Grade 12 of lycea and technical schools	48%	17.7
Czech Republic	Grades 12 and 13 (technical and gymnasia); Grades 10, 11, 12 (vocational schools)	78%	17.8
Denmark	Grade 12 (general and vocational schools)	58%	19.1
France	Grade 12 (general and technicological schools); Grade 13 (vocational); Grade 11 and 13 (vocational)	84%	18.8
Germany	Grade 12 (former East Germany); Grade 13 (former West Germany)	75%	19.5
Hungary	Grade 12 (academic and vocational); Grade 10 (trade school)	65%	17.5
Iceland	Grades 12, 13, 14	55%	21.2
Italy	Grades 12, 13, 14	52%	18.7
Lithuania	Grade 12	43%	18.1
Netherlands	Grade 12 (pre-university); Grade 11 (senior general secondary); Grade 12 (senior secondary vocational)	78%	18.5
New Zealand	Grade 11 and Grade 12	70%	17.6
Norway	Grade 12	84%	19.5
Russian Federation	Grade 11 (general secondary)	48%	16.9
Slovenia	Grade 12 (gymnasia and technical); Grade 11 (vocational)	88%	18.8
South Africa	Grade 12	49%	20.1
Sweden	Grade 11 or 12 (depending on whether reform had been implemented in school)	71%	18.9
Switzerland	Grade 12 or 13 (gymnasium); Grade 12 (general and teacher training); Grade 11, 12, 13 (vocational)	82%	19.8
United States	Grade 12	63%	18.1

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

† TIMSS Coverage Index (TCI): Estimated percentage of school-leaving age cohort covered by the TIMSS final-year sample. The TCI was computed by forming a ratio of the size of the student population covered by the TIMSS sample, as estimated from the sample itself, to the size of the school-leaving age cohort, which was derived from official census figures supplied by each country (see Appendix A).

TIMSS Achievement Results

To help interpret the school questionnaire data, this section summarizes the mathematics and science achievement of students in the fourth and eighth grades, and the mathematics and science literacy achievement of students in their final year of secondary school. Each table presents the mean (or average) achievement for the countries that participated in each assessment and whether the country mean is higher than, the same as, or lower than the international average.[6]

To illustrate the broad range of achievement across and within countries, each table also shows the distribution of student performance within each country. Achievement is shown for the 25th and 75th percentiles as well as for the 5th and 95th percentiles. Each percentile point indicates the percentages of students performing below and above that point on the scale. For example, 25% of the students in each country performed below the 25th percentile for that country, and 75% performed above the 25th percentile. The range between the 25th and 75th percentiles represents performance by the middle half of the students. In contrast, performance below the 5th and above the 95th percentiles represents the extremes in lower and higher achievement. The dark boxes at the midpoints of the distributions show the 95% confidence intervals around the average achievement in each country.[7] These intervals can be compared with the international average. Countries with a triangle pointing up performed above the international average, those with a dot performed about the same as the international average, and those with triangles pointing down performed below the international average.

The countries, shown in decreasing order of mean achievement in the upper part of the tables, were judged to have met the TIMSS requirements for testing a representative sample of students. Although all countries tried very hard to meet the TIMSS sampling requirements, several encountered resistance from schools and teachers and did not have participation rates of 85% or higher as specified in the TIMSS guidelines. In the fourth- and eighth-grade assessments, to provide a better curricular match, some countries elected to test students in grades that did not meet the TIMSS requirements, which led to their students being somewhat older than those in the other countries. Some countries encountered various difficulties in implementing the prescribed methods for within-school sampling. A discussion of the sampling procedures and outcomes for each country can be found in Appendix A.

[6] TIMSS used item response theory (IRT) methods to summarize the achievement. Data in this section are from six scales: third & fourth grade mathematics, third & fourth grade science, seventh & eighth grade mathematics, seventh & eighth grade science, final-year mathematics literacy, and final-year science literacy. Each scale was constructed to have a mean of 500 and a standard deviation of 100. For more detailed information, see the "IRT Scaling and Data Analysis" section of Appendix A.

[7] See Appendix A for more details about calculating standard errors and confidence intervals for the TIMSS statistics.

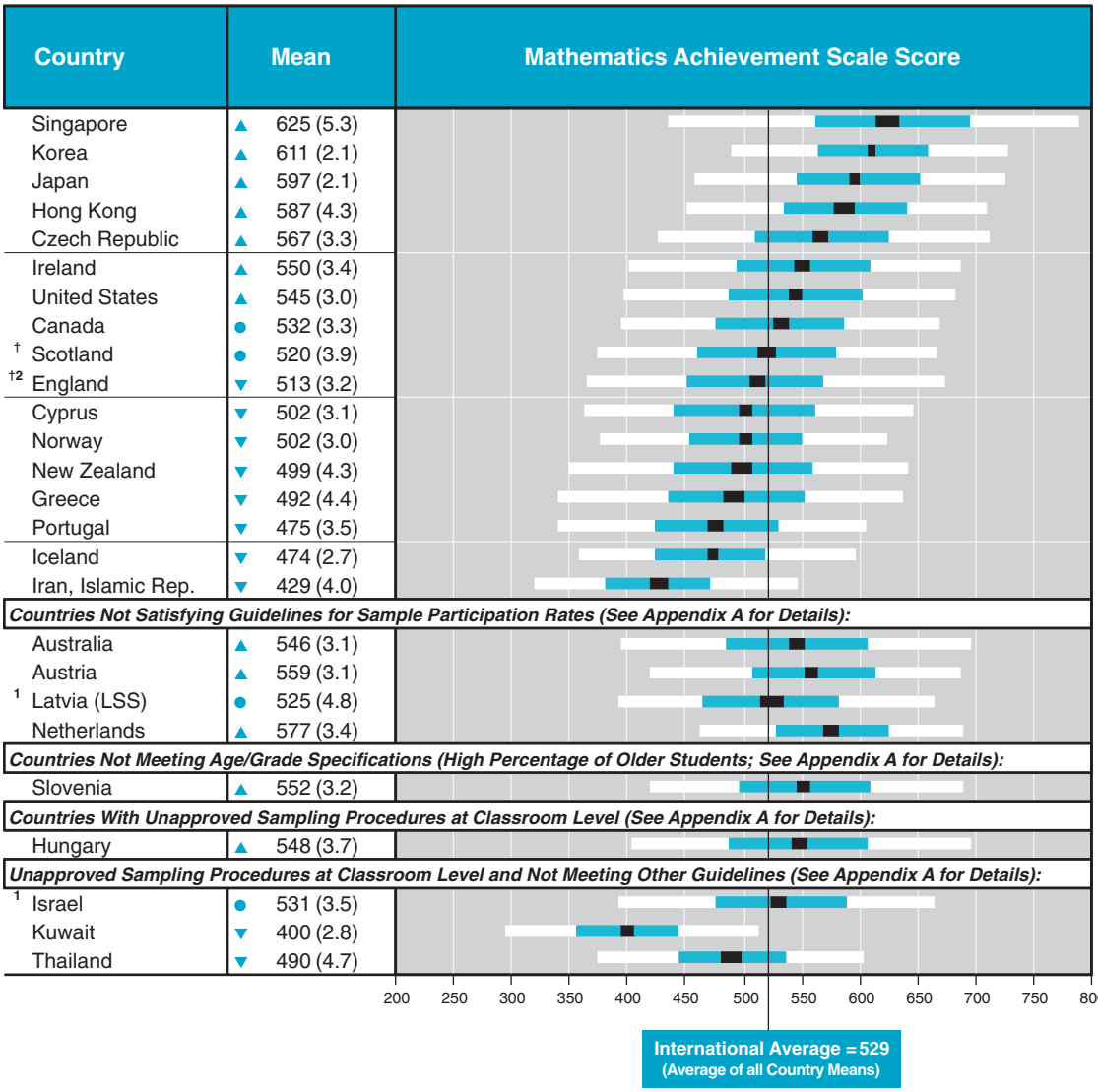
Tables 1.3 and 1.4 present the mathematics and science achievement results, respectively, for students in the fourth grade in 26 countries. As shown in Table 1.3, in mathematics at fourth grade, Singapore was the top-performing country, followed by Korea, Japan, and Hong Kong. In science, shown in Table 1.4, the top-performing countries at fourth grade were Korea, Japan, the United States, and Austria.

Tables 1.5 and 1.6 present the mathematics and science achievement results, respectively, for students in the eighth grade in 41 countries. As shown in Table 1.5, in mathematics at eighth grade, Singapore was the top-performing country, followed by Korea, Japan, and Hong Kong. In science, shown in Table 1.6, the top-performing countries at eighth grade were Singapore, the Czech Republic, Japan, and Korea.

Tables 1.7 and 1.8 present achievement on the mathematics literacy scale and the science literacy scale, respectively, for students in their final year of secondary school in 21 countries. As shown in Table 1.7, in mathematics literacy, the top-performing countries were the Netherlands, Sweden, Denmark, and Switzerland. In science literacy, shown in Table 1.8, the top-performing countries were Sweden, the Netherlands, Iceland, and Norway. Not all countries were able to test all students in their final year of secondary school, and not all students of school-leaving age are still enrolled in school. Tables 1.7 and 1.8 also present, for each country, a value for the "TIMSS Coverage Index," or TCI. The TCI is an estimate of the percentage of the school-leaving age cohort covered by the TIMSS final-year student sample.

Table 1.3

Distributions of Mathematics Achievement - Fourth Grade*



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

1 National Desired Population does not cover all of International Desired Population (see Table A.1). 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.1).

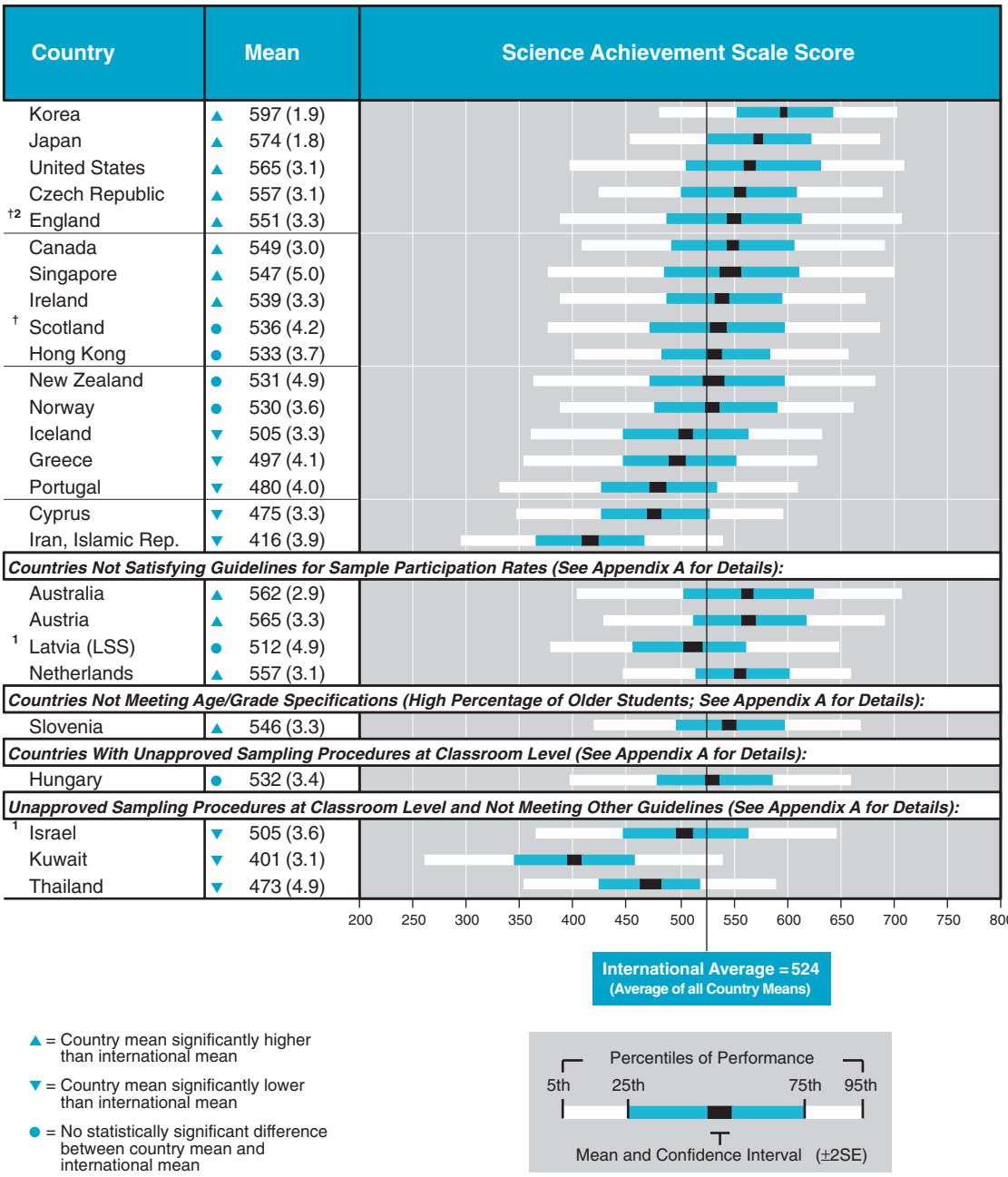
† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).

* See Table 1.2 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.

Table 1.4

Distributions of Science Achievement - Fourth Grade*



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

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

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

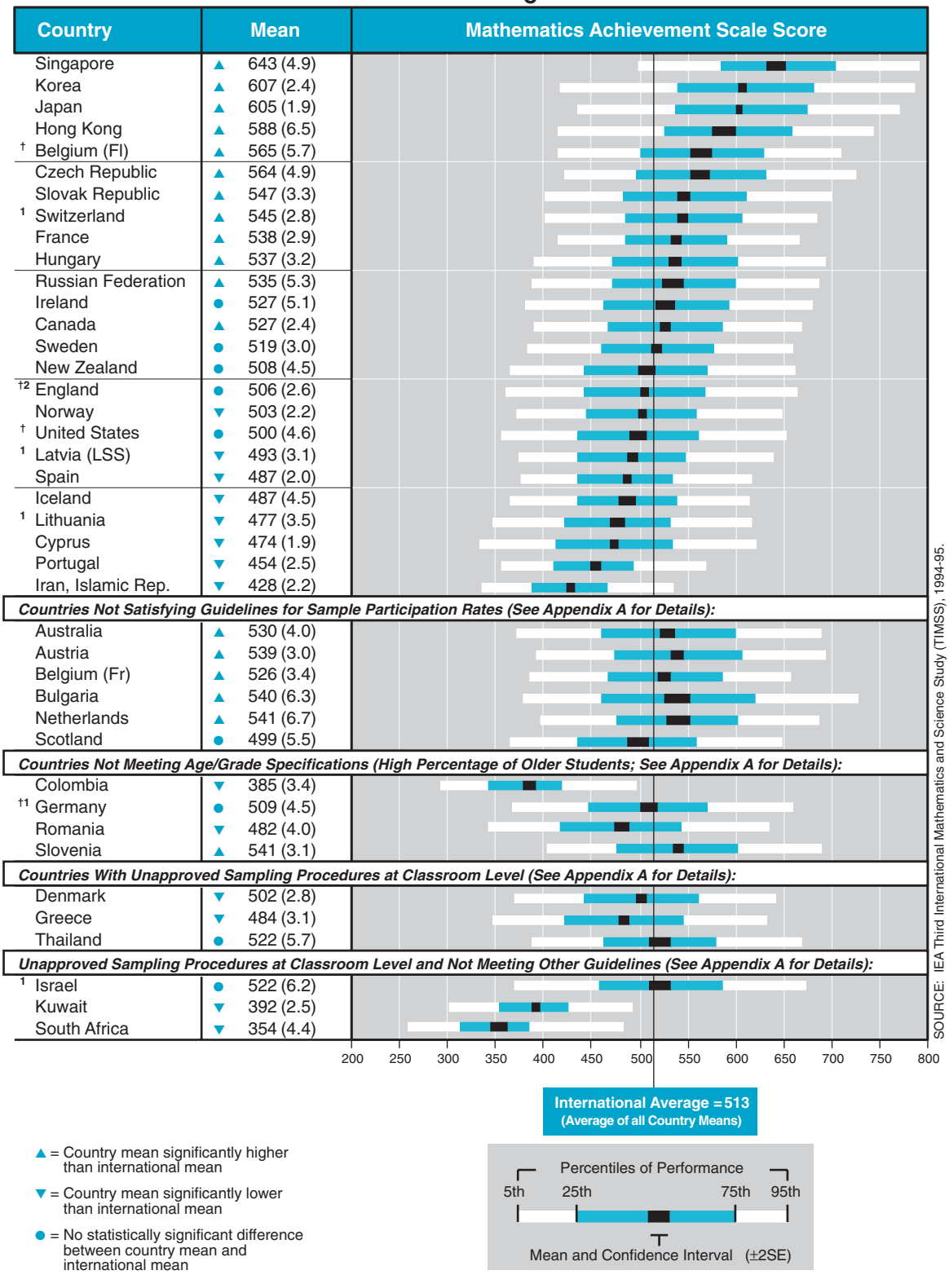
* See Table 1.2 for more information about the grades tested in each country.

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

Table 1.5

Distributions of Mathematics Achievement - Eighth Grade*

Country	Mean	Mathematics Achievement Scale Score
Singapore	▲ 643 (4.9)	
Korea	▲ 607 (2.4)	
Japan	▲ 605 (1.9)	
Hong Kong	▲ 588 (6.5)	
† Belgium (Fl)	▲ 565 (5.7)	
Czech Republic	▲ 564 (4.9)	
Slovak Republic	▲ 547 (3.3)	
1 Switzerland	▲ 545 (2.8)	
France	▲ 538 (2.9)	
Hungary	▲ 537 (3.2)	
Russian Federation	▲ 535 (5.3)	
Ireland	● 527 (5.1)	
Canada	▲ 527 (2.4)	
Sweden	● 519 (3.0)	
New Zealand	● 508 (4.5)	
†2 England	● 506 (2.6)	
Norway	▼ 503 (2.2)	
† United States	● 500 (4.6)	
1 Latvia (LSS)	▼ 493 (3.1)	
Spain	▼ 487 (2.0)	
Iceland	▼ 487 (4.5)	
1 Lithuania	▼ 477 (3.5)	
Cyprus	▼ 474 (1.9)	
Portugal	▼ 454 (2.5)	
Iran, Islamic Rep.	▼ 428 (2.2)	
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details):		
Australia	▲ 530 (4.0)	
Austria	▲ 539 (3.0)	
Belgium (Fr)	▲ 526 (3.4)	
Bulgaria	▲ 540 (6.3)	
Netherlands	▲ 541 (6.7)	
Scotland	● 499 (5.5)	
Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details):		
Colombia	▼ 385 (3.4)	
†1 Germany	● 509 (4.5)	
Romania	▼ 482 (4.0)	
Slovenia	▲ 541 (3.1)	
Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details):		
Denmark	▼ 502 (2.8)	
Greece	▼ 484 (3.1)	
Thailand	● 522 (5.7)	
Unapproved Sampling Procedures at Classroom Level and Not Meeting Other Guidelines (See Appendix A for Details):		
1 Israel	● 522 (6.2)	
Kuwait	▼ 392 (2.5)	
South Africa	▼ 354 (4.4)	



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

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).

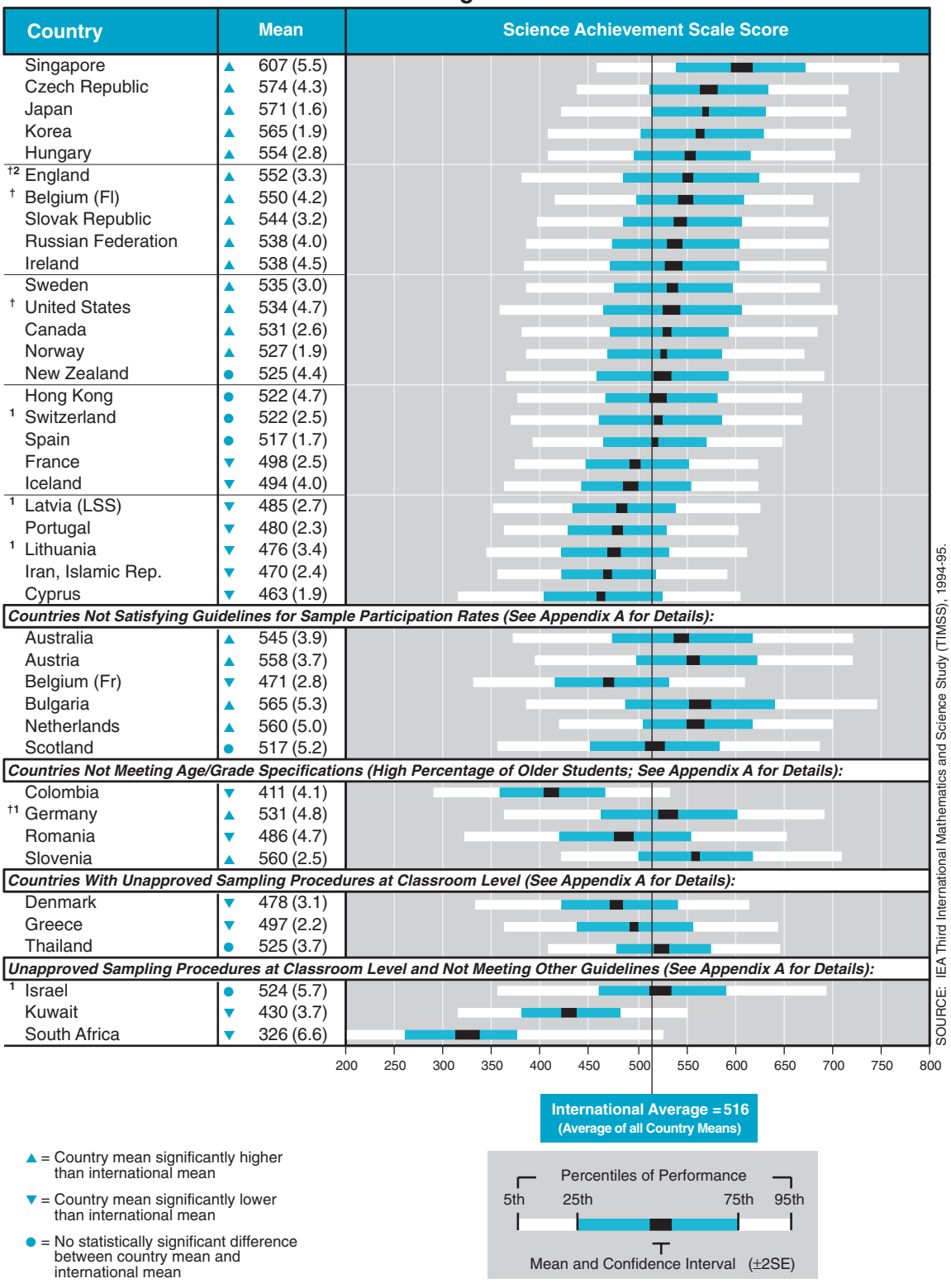
† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).

* See Table 1.2 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.

Table 1.6

Distributions of Science Achievement - Eighth Grade*



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).

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

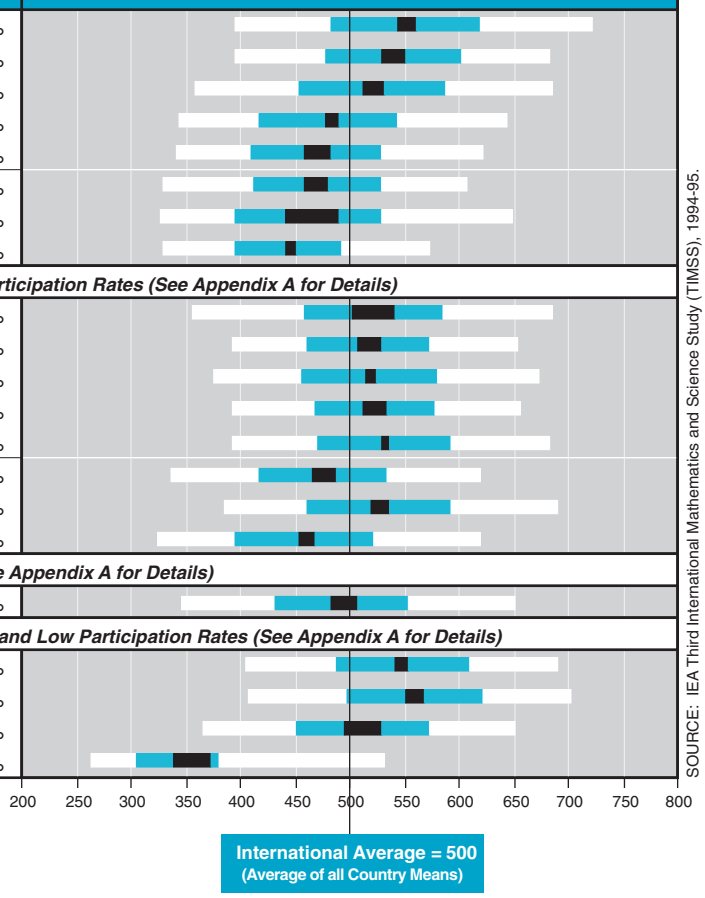
* See Table 1.2 for more information about the grades tested in each country.

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

Table 1.7

Distributions of Achievement in Mathematics Literacy - Final Year of Secondary School*

Country	Mean	TCI✦
Sweden	▲ 552 (4.3)	71%
Switzerland	▲ 540 (5.8)	82%
† New Zealand	▲ 522 (4.5)	70%
Hungary	▼ 483 (3.2)	65%
2 Russian Federation	▼ 471 (6.2)	48%
1 Lithuania	▼ 469 (6.1)	43%
Czech Republic	● 466 (12.3)	78%
2 Cyprus	▼ 446 (2.5)	48%
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details)		
Australia	● 522 (9.3)	68%
2 Austria	▲ 518 (5.3)	76%
Canada	▲ 519 (2.8)	70%
France	▲ 523 (5.1)	84%
Iceland	▲ 534 (2.0)	55%
1 Italy	▼ 476 (5.5)	52%
Norway	▲ 528 (4.1)	84%
United States	▼ 461 (3.2)	63%
Countries With Unapproved Student Sampling (See Appendix A for Details)		
† Germany	● 495 (5.9)	75%
Countries With Unapproved Sampling Procedures and Low Participation Rates (See Appendix A for Details)		
Denmark	▲ 547 (3.3)	58%
2 Netherlands	▲ 560 (4.7)	78%
Slovenia	● 512 (8.3)	88%
South Africa	▼ 356 (8.3)	49%

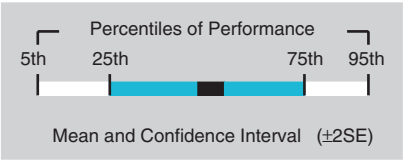


SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

▲ = Country mean significantly higher than international mean

▼ = Country mean significantly lower than international mean

● = No statistically significant difference between country mean and international mean



1 National Desired Population does not cover all of International Desired Population (see Table A.3).

2 National Defined Population covers less than 90 percent of National Desired Population (see Table A.3).

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

✦ The TIMSS Coverage Index (TCI) is an estimate of the percentage of the school-leaving age cohort covered by the TIMSS final-year student sample.

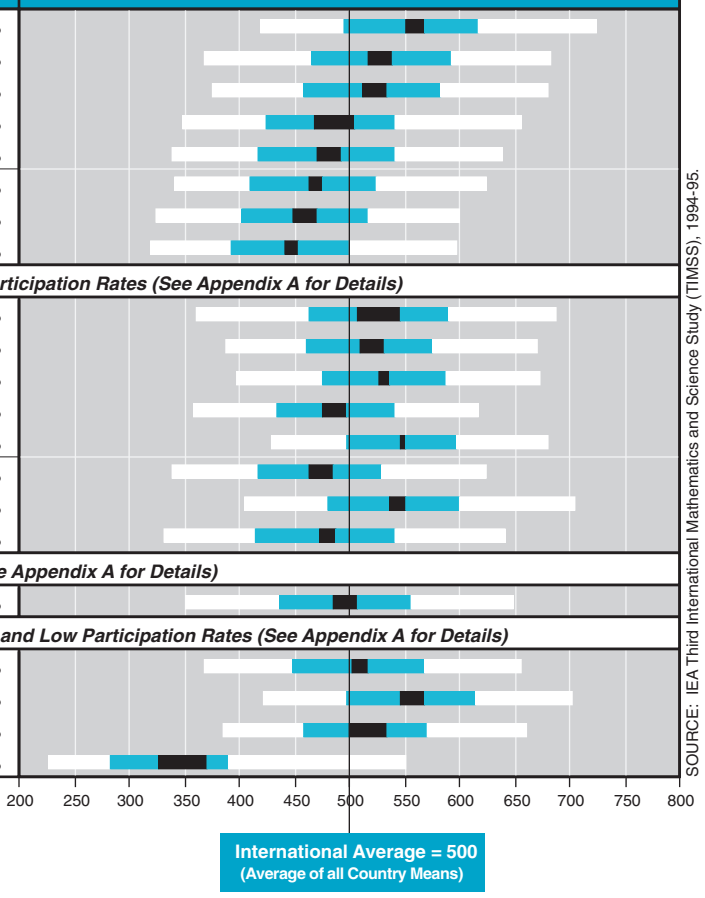
* See Table 1.2 for more information about the grades tested in each country.

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

Table 1.8

Distributions of Achievement in Science Literacy - Final Year of Secondary School*

Country	Mean	TCI✦
Sweden	▲ 559 (4.4)	71%
† New Zealand	▲ 529 (5.2)	70%
Switzerland	▲ 523 (5.3)	82%
Czech Republic	● 487 (8.8)	78%
2 Russian Federation	▼ 481 (5.7)	48%
Hungary	▼ 471 (3.0)	65%
1 Lithuania	▼ 461 (5.7)	43%
2 Cyprus	▼ 448 (3.0)	48%
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details)		
Australia	● 527 (9.8)	68%
2 Austria	▲ 520 (5.6)	76%
Canada	▲ 532 (2.6)	70%
France	● 487 (5.1)	84%
Iceland	▲ 549 (1.5)	55%
1 Italy	▼ 475 (5.3)	52%
Norway	▲ 544 (4.1)	84%
United States	▼ 480 (3.3)	63%
Countries With Unapproved Student Sampling (See Appendix A for Details)		
† Germany	● 497 (5.1)	75%
Countries With Unapproved Sampling Procedures and Low Participation Rates (See Appendix A for Details)		
Denmark	● 509 (3.6)	58%
2 Netherlands	▲ 558 (5.3)	78%
Slovenia	● 517 (8.2)	88%
South Africa	▼ 349 (10.5)	49%

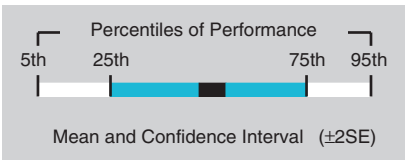


SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

▲ = Country mean significantly higher than international mean

▼ = Country mean significantly lower than international mean

● = No statistically significant difference between country mean and international mean



1 National Desired Population does not cover all of International Desired Population (see Table A.3).

2 National Defined Population covers less than 90 percent of National Desired Population (see Table A.3).

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

✦ The TIMSS Coverage Index (TCI) is an estimate of the percentage of the school-leaving age cohort covered by the TIMSS final-year student sample.

* See Table 1.2 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.

Chapter 2

Roles and Responsibilities of Schools and School Principals

The functions and responsibilities of schools differ from country to country. At one extreme are countries in which schools simply implement the decisions made by higher authorities in the education system, from hiring teachers to course content, while at the other extreme are countries in which schools have the liberty to make all administrative, curricular, and instructional decisions. How schools function can influence how instruction is organized, the educational opportunities afforded students, and, ultimately, student achievement.

To better understand the roles and responsibilities of schools across and within countries, TIMSS asked school principals about the activities that they or their teachers had primary responsibility for, how much time they spent on various school-related activities, and about internal and external influences on the curriculum. Each table presents the data for each country (unless data are unavailable) and the international average for each variable. The international average is the average response across all countries for which data were reported.

Activities that are Primarily a School Responsibility

School principals were asked who had primary responsibility for choosing textbooks, determining course content, deciding which courses are offered, establishing student grading policies, hiring teachers, and assigning teachers to classes. Tables 2.1, 2.2, and 2.3 present, for the fourth grade, eighth grade, and final year of secondary school, respectively, the percentage of schools reporting that the school (school principal, department heads, or teachers) had primary responsibility for each activity.

As shown in Table 2.1, internationally and in 15 countries, about two-thirds (65%) or more of fourth-grade schools reported having primary responsibility for choosing the textbooks to be used. Determining course content was the primary responsibility of 63% of schools internationally and at least two-thirds of schools in 12 countries. The countries in which fewer than 30% of schools reported that the choice of textbooks and course content are primarily a school responsibility – Cyprus, Greece, and Kuwait – also reported that decision-making regarding curriculum syllabi is nationally centralized.[1] All of these countries also reported nationally centralized decision-making for

[1] Mullis, I.V.S., Martin, M.O., Beaton, A.E., Gonzalez, E.J., Kelly, D.L., and Smith, T.A. (1997). *Mathematics Achievement in the Primary School Years: IEA's Third International Mathematics and Science Study (TIMSS)*. Chestnut Hill, MA: Boston College; Martin, M.O., Mullis, I.V.S., Beaton, A.E., Gonzalez, E.J., Smith, T.A., and Kelly, D.L. (1997). *Science Achievement in the Primary School Years: IEA's Third International Mathematics and Science Study (TIMSS)*. Chestnut Hill, MA: Boston College.

textbooks. In 9 countries, about two-thirds or more of fourth-grade schools reported that the school is primarily responsible for deciding which courses are offered.

Internationally and in 16 countries, 70% or more of schools at fourth grade reported that they had primary responsibility for establishing student grading policies. At fourth grade, hiring teachers was the primary responsibility of less than half of the schools (45%) internationally; in 10 countries, fewer than 20% of schools had primary responsibility for this task. While hiring teachers was not primarily the responsibility of many schools in many countries, assigning teachers to classes was primarily the responsibility of schools in 95% of schools internationally and in at least 90% of schools in 20 countries.

At eighth grade (Table 2.2), internationally 83% of schools reported that determining which textbooks are used is primarily the responsibility of the school, and at least 90% of schools so reported in 21 countries. Determining course content was primarily the responsibility of 70% of schools internationally and at least two-thirds in 21 countries. Cyprus and Greece had fewer than 30% of schools at eighth grade reporting that choosing textbooks and determining course content were primarily their responsibilities. These countries also report that decision-making regarding curriculum syllabi and decision-making for textbooks are nationally centralized at grade 8.[2] Internationally and in 18 countries, about two-thirds or more of schools at eighth grade reported that deciding which courses are offered is primarily the responsibility of the school.

Internationally, 77% of schools at eighth grade reported that they had primary responsibility for establishing student grading policies; in 27 countries about two-thirds or more (65%) of schools so reported. As at fourth grade, at eighth grade fewer schools internationally reported that hiring teachers was primarily the responsibility of the school. Just over half of the schools (59%) internationally reported that they had primary responsibility for hiring teachers. Assigning teachers to classes was primarily the responsibility of schools in 95% of schools internationally.

In the final year of secondary school (Table 2.3), in nearly all countries about 90% or more of schools reported that determining which textbooks are used is primarily a school responsibility. In Cyprus, this was not primarily the responsibility of any schools, reflecting a highly centralized system. Internationally, determining course content was primarily a school responsibility in fewer schools than was determining textbooks (66% compared with 88%). Deciding which courses are offered was reported to be

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

primarily a school responsibility in 61% of schools internationally. As at fourth and eighth grades, approximately 76% of schools internationally reported that establishing student grading policies was a school responsibility. Internationally, 74% of schools and at least two-thirds of schools in 10 countries reported that they had primary responsibility for hiring teachers. Assigning teachers to classes was primarily the responsibility of schools in 93% of schools internationally and in at least 90% of schools in all but two countries (Hungary and the Russian Federation).

As reflected in Tables 2.1, 2.2, and 2.3, the responsibilities of the school vary within and across countries, reflecting in many cases the locus of decision-making about education in each country, as well as the range of policies and traditions that existed around the world.

Table 2.1

Activities that Are Primarily a School Responsibility [1]
Fourth Grade*

Country	Determining Which Textbooks Are Used	Determining Course Content	Deciding Which Courses Are Offered	Establishing Student Grading Policies	Hiring Teachers	Assigning Teachers to Classes
Australia	r 96 (2.3)	r 78 (5.8)	r 50 (6.7)	s 84 (6.0)	r 52 (5.5)	r 100 (0.0)
Austria	98 (1.2)	90 (3.7)	81 (6.8)	76 (5.6)	2 (1.4)	91 (6.8)
Canada	79 (3.8)	34 (3.7)	27 (3.8)	56 (4.8)	46 (3.9)	97 (1.9)
Cyprus	r 8 (2.7)	r 21 (3.5)	r 29 (3.7)	r 30 (3.8)	r 0 (0.0)	r 100 (0.0)
Czech Republic	99 (0.7)	57 (4.2)	99 (0.9)	76 (3.8)	58 (4.5)	100 (0.3)
England	– –	– –	– –	– –	– –	– –
Greece	11 (5.1)	19 (5.7)	22 (5.0)	30 (6.3)	3 (0.7)	100 (0.0)
Hong Kong	81 (4.6)	66 (6.4)	64 (6.3)	r 89 (4.2)	76 (5.1)	98 (1.7)
Hungary	92 (2.8)	73 (4.7)	38 (4.6)	51 (4.4)	84 (4.1)	44 (4.2)
Iceland	r 98 (0.0)	r 98 (0.0)	r 85 (0.2)	r 98 (0.0)	96 (0.0)	100 (0.0)
Iran, Islamic Rep.	21 (3.9)	36 (4.4)	69 (4.8)	91 (2.4)	6 (2.3)	82 (3.7)
Ireland	100 (0.5)	83 (2.9)	69 (3.7)	r 100 (0.5)	18 (3.3)	100 (0.0)
Israel	x x	x x	x x	x x	s 97 (2.5)	s 99 (1.3)
Japan	30 (4.5)	– –	– –	100 (0.0)	81 (3.6)	98 (1.5)
Korea	21 (3.7)	73 (4.0)	40 (5.6)	73 (7.2)	28 (5.3)	100 (0.3)
Kuwait	s 9 (0.2)	s 2 (0.0)	s 0 (0.0)	s 0 (0.0)	s 0 (0.0)	x x
Latvia (LSS)	95 (2.4)	75 (5.8)	82 (4.3)	83 (4.4)	100 (0.0)	100 (0.0)
Netherlands	r 98 (1.7)	98 (1.1)	r 94 (2.6)	98 (1.1)	19 (3.5)	100 (0.0)
New Zealand	100 (0.0)	88 (4.6)	73 (4.1)	96 (2.6)	67 (6.1)	100 (0.3)
Norway	– –	– –	– –	– –	– –	– –
Portugal	98 (1.8)	86 (3.1)	– –	96 (2.5)	8 (2.7)	96 (2.3)
Scotland	– –	– –	– –	– –	– –	– –
Singapore	82 (0.5)	62 (0.4)	41 (0.3)	75 (0.4)	19 (0.1)	100 (0.0)
Slovenia	73 (4.3)	43 (6.0)	59 (4.5)	r 98 (1.4)	100 (0.0)	100 (0.0)
Thailand	50 (4.7)	73 (4.0)	79 (3.4)	71 (3.6)	r 16 (3.5)	98 (1.1)
United States	r 69 (6.6)	r 58 (6.1)	r 49 (6.9)	r 63 (5.7)	r 65 (5.7)	94 (6.0)
International Average	69 (0.7)	63 (0.9)	57 (1.0)	74 (0.8)	45 (0.7)	95 (0.5)

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

1 Reported as percent of schools where activity was reported to be the responsibility of the principal, department heads, or teachers. Percentages for Greece and Portugal also include schools where activity was reported to be the responsibility of the general assembly of teachers.

* See Table 1.2 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 Appendix A).

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 school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table 2.2

Activities that Are Primarily a School Responsibility[1] Eighth Grade*

Country	Determining Which Textbooks Are Used	Determining Course Content	Deciding Which Courses Are Offered	Establishing Student Grading Policies	Hiring Teachers	Assigning Teachers to Classes
Australia	r 100 (0.0)	s 92 (2.2)	r 95 (2.0)	r 91 (2.4)	r 59 (5.0)	r 100 (0.0)
Austria	100 (0.3)	98 (1.3)	r 77 (4.7)	93 (2.1)	11 (3.2)	100 (0.0)
Belgium (Fl)	r 76 (6.0)	62 (5.9)	85 (4.6)	42 (6.8)	97 (1.7)	100 (0.0)
Belgium (Fr)	s 100 (0.0)	s 41 (6.6)	x x	s 42 (6.6)	r 54 (4.8)	r 99 (1.0)
Canada	r 77 (3.6)	r 33 (3.1)	r 37 (3.2)	r 63 (4.3)	r 52 (5.4)	r 98 (1.4)
Colombia	r 86 (4.0)	r 91 (3.9)	r 56 (5.7)	r 66 (6.7)	r 36 (4.0)	r 97 (1.7)
Cyprus	s 3 (0.0)	r 8 (0.0)	r 5 (0.0)	s 70 (0.0)	r 0 (0.0)	r 100 (0.0)
Czech Republic	100 (0.5)	63 (4.6)	98 (1.2)	78 (3.9)	83 (3.3)	99 (1.0)
Denmark	r 92 (2.8)	s 82 (4.2)	s 78 (4.0)	s 23 (4.2)	s 46 (5.1)	r 100 (0.0)
England	– –	– –	– –	– –	– –	– –
France	99 (0.7)	r 15 (3.4)	r 24 (4.6)	r 100 (0.0)	23 (4.6)	100 (0.0)
Germany	s 99 (0.6)	s 98 (1.5)	x x	s 86 (4.9)	s 3 (1.7)	s 98 (1.9)
Greece	17 (6.5)	24 (6.3)	34 (6.4)	63 (5.5)	9 (5.6)	100 (0.0)
Hong Kong	r 100 (0.0)	r 92 (3.4)	r 91 (3.2)	r 97 (2.2)	r 82 (3.6)	r 100 (0.0)
Hungary	92 (2.8)	73 (4.7)	39 (4.6)	51 (4.4)	84 (4.1)	44 (4.3)
Iceland	r 99 (0.0)	r 99 (0.0)	r 87 (0.0)	r 99 (0.0)	96 (0.0)	100 (0.0)
Iran, Islamic Rep.	8 (2.7)	22 (4.0)	47 (4.8)	r 81 (4.1)	5 (2.0)	77 (5.3)
Ireland	100 (0.0)	47 (5.1)	92 (2.6)	r 95 (2.4)	35 (4.2)	100 (0.0)
Israel	s 100 (0.0)	s 100 (0.0)	s 81 (6.7)	s 100 (0.0)	s 100 (0.0)	s 100 (0.0)
Japan	32 (3.5)	94 (2.1)	92 (3.1)	99 (0.8)	84 (3.8)	100 (0.0)
Korea	100 (0.3)	95 (1.7)	94 (1.5)	96 (4.1)	53 (6.3)	100 (0.0)
Kuwait	x x	x x	x x	x x	x x	x x
Latvia (LSS)	98 (1.4)	83 (3.7)	86 (3.1)	82 (3.9)	97 (1.8)	99 (1.1)
Lithuania	87 (2.5)	49 (6.3)	42 (6.2)	67 (9.4)	95 (3.7)	84 (3.7)
Netherlands	s 98 (1.2)	s 98 (1.2)	r 84 (5.5)	s 74 (6.8)	r 63 (6.3)	s 98 (2.0)
New Zealand	100 (0.0)	96 (1.8)	99 (0.5)	99 (0.9)	74 (6.3)	100 (0.0)
Norway	– –	– –	– –	– –	– –	– –
Portugal	100 (0.0)	73 (5.8)	– –	75 (4.3)	54 (5.0)	100 (0.0)
Romania	42 (5.8)	60 (4.6)	9 (2.8)	82 (3.6)	16 (4.5)	68 (5.2)
Russian Federation	89 (3.9)	55 (4.8)	44 (4.3)	53 (4.6)	95 (1.7)	84 (4.4)
Scotland	– –	– –	– –	– –	– –	– –
Singapore	99 (0.0)	89 (0.0)	98 (0.0)	89 (0.0)	36 (0.0)	100 (0.0)
Slovak Republic	90 (3.0)	85 (4.7)	78 (3.8)	79 (3.6)	69 (5.4)	99 (0.9)
Slovenia	73 (4.3)	r 44 (6.2)	66 (4.5)	r 99 (1.0)	100 (0.0)	r 100 (0.0)
Spain	97 (1.5)	91 (2.8)	29 (3.8)	97 (2.2)	20 (3.8)	97 (2.1)
Sweden	95 (2.9)	87 (3.5)	r 84 (4.4)	70 (5.7)	97 (0.8)	99 (0.9)
[2] **Switzerland**	– –	– –	– –	– –	– –	– –
Thailand	s 87 (3.5)	s 84 (3.8)	s 98 (1.6)	r 82 (3.8)	r 87 (3.1)	s 99 (1.0)
United States	r 82 (4.0)	r 73 (4.7)	r 64 (7.8)	r 72 (5.4)	r 78 (6.5)	r 100 (0.0)
International Average	83 (0.5)	70 (0.7)	67 (0.7)	77 (0.7)	59 (0.7)	95 (0.3)

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

1 Reported as percent of schools where activity was reported to be the responsibility of the principal, department heads, or teachers. Percentages for Greece also include schools where activity was reported to be the responsibility of the general assembly of teachers.

2 Percentages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table 2.3

Activities that Are Primarily a School Responsibility[1] Final Year of Secondary School*

Country	Determining Which Textbooks Are Used	Determining Course Content	Deciding Which Courses Are Offered	Establishing Student Grading Policies	Hiring Teachers	Assigning Teachers to Classes
Australia	100 (0.0)	r 73 (6.4)	r 99 (0.5)	r 90 (5.0)	55 (8.6)	r 100 (0.0)
[2] *Austria*	– –	– –	– –	– –	– –	– –
Canada	87 (3.9)	r 57 (4.1)	r 91 (3.5)	r 84 (3.9)	69 (4.2)	99 (0.3)
Cyprus	0 (0.0)	13 (0.0)	0 (0.0)	r 76 (0.0)	0 (0.0)	r 96 (0.0)
Czech Republic	98 (1.6)	95 (2.4)	97 (1.9)	94 (2.7)	99 (1.1)	94 (4.4)
Denmark	r 100 (0.0)	s 50 (5.6)	s 46 (4.7)	s 30 (5.0)	r 93 (2.8)	s 100 (0.0)
France	100 (0.0)	24 (6.3)	r 49 (8.2)	100 (0.0)	34 (5.6)	100 (0.0)
[2] *Germany*	– –	– –	– –	– –	– –	– –
Hungary	r 96 (1.5)	r 86 (3.2)	r 63 (4.2)	r 49 (4.1)	r 86 (2.8)	39 (4.0)
Iceland	r 96 (0.0)	r 78 (0.0)	r 45 (0.0)	r 96 (0.0)	r 95 (0.0)	s 100 (0.0)
Italy	98 (1.2)	88 (4.8)	15 (4.2)	95 (3.3)	47 (5.9)	100 (0.0)
Lithuania	r 89 (2.9)	r 46 (6.0)	34 (5.7)	r 67 (5.8)	100 (0.0)	r 93 (3.1)
New Zealand	100 (0.0)	98 (1.3)	96 (2.8)	94 (4.1)	88 (5.4)	100 (0.0)
Norway	– –	– –	– –	– –	– –	– –
Russian Federation	91 (3.4)	54 (4.8)	43 (4.6)	54 (4.1)	95 (2.0)	84 (4.5)
Slovenia	x x	x x	x x	x x	x x	x x
South Africa	x x	x x	x x	x x	x x	x x
Sweden	r 90 (7.2)	s 81 (7.4)	s 87 (7.4)	s 75 (8.2)	r 100 (0.0)	r 99 (0.6)
[2] **Switzerland**	– –	– –	– –	– –	– –	– –
United States	r 90 (1.9)	r 80 (5.8)	r 87 (3.8)	55 (7.6)	72 (4.5)	100 (0.0)
International Average	88 (0.7)	66 (1.3)	61 (1.2)	76 (1.2)	74 (1.1)	93 (0.6)

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

1 Reported as percent of schools where activity was reported to be the responsibility of the prinicipal, department heads, or teachers.

2 Percentages based on total school weights cannot be computed for Austria, Germany, and Switzerland; sampling based on tracks within schools.

* See Table 1.2 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 Appendix A).

The Netherlands did not administer the school questionaire at the final year of secondary school.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

The Role of the School Principal

The role of the principal varies across and within countries. In one school, a principal might serve as an instructional leader who oversees curriculum planning, trains teachers, and works with teachers to develop educational objectives. In another school, the principal might serve primarily as an administrator who hires teachers, manages the budget and schedule, and represents the school at meetings. In yet other schools, the principal might be mainly a teacher who also has administrative duties.

Ubben and Hughes describe five functional aspects of the principalship.[3] Inside the school these are staffing and personnel development, pupil development services, program development, and resources procurement and building management, including budgeting and maintenance. A fifth function involves school-community relations. The tasks within these functions are often delegated to other staff members, but may also be carried out by the principal. How successful the principal is in managing these functions and serving as a leader of the school as an organization can influence the school's effectiveness.

To investigate the extent to which principals in the TIMSS countries carry out the activities of the principalship, TIMSS asked school principals how much time per month they spend on various school-related activities. Principals were asked how much time they spend on instructional leadership activities, including discussing educational objectives with teachers, initiating curriculum revision and/or planning, training teachers, and professional development activities. They were asked how much time they spend per month talking with parents, counseling and disciplining students, and responding to requests from local, regional, or national education officials. They also responded to questions about how much time they spend carrying out administrative duties, including hiring teachers, representing the school in the community and at official meetings, and doing internal tasks (e.g., regulations, school budget, and timetable). Finally, they were asked how much time they spend teaching.

At each grade, there was quite a range across countries with respect to the major emphasis of the principalship; although at all three grades, internationally, the emphasis was on administrative duties. At fourth grade, internationally, the principal's time is fairly evenly divided across the four categories (Table 2.4), with somewhat more time spent on administrative duties (42 hours per month). At the eighth grade (Table 2.5), internationally, principals also reported spending more time on administrative duties (53 hours per month) than on other activities. In the final year of secondary school (Table 2.6), internationally and in every country, principals spent more time on administrative duties (74 hours per month internationally) than on other activities.

[3] Ubben, G.C. and Hughes, L.W. (1987). *The Principal: Creative Leadership for Effective Schools*. Newton, MA: Allyn and Bacon.

Although different countries participated in the assessments at the fourth grade, at the eighth grade, and in the final year of secondary school, it is interesting to note the pattern in time spent on the various activities across the grades. Internationally, time per month reportedly spent by principals on instructional leadership activities, communicating with students, parents, and education officials, and on administrative duties increases from fourth grade to eighth grade and again from eighth grade to the final year of secondary school. Time spent on teaching decreases beyond fourth grade, however. At the fourth grade, principals reported spending, on average, 30 hours per month teaching. This was more than was reported at the eighth grade and in the final year of secondary school (21 and 18 hours, respectively).

Table 2.4

Hours per Month Principal Spends on Various School-Related Activities[1] Fourth Grade*

Country	Average Total Hours per Month Spent on Activities			
	Instructional Leadership Activities[2]	Communicating with Students, Parents, and Education Officials[3]	Administrative Duties[4]	Teaching (Including Preparation)
Australia	32 (1.8)	45 (2.6)	69 (5.6)	r 26 (5.0)
Austria	9 (0.8)	14 (1.3)	21 (2.4)	63 (3.9)
Canada	24 (1.5)	36 (1.7)	r 48 (2.6)	r 16 (2.4)
Cyprus	r 14 (0.7)	r 24 (0.9)	r 26 (2.1)	r 34 (1.6)
Czech Republic	26 (1.5)	26 (1.4)	46 (2.7)	51 (3.9)
England	– –	– –	– –	– –
Greece	7 (0.9)	12 (0.9)	17 (1.6)	29 (4.0)
Hong Kong	28 (3.1)	27 (3.0)	58 (6.3)	10 (4.7)
Hungary	42 (2.0)	28 (1.7)	47 (2.6)	40 (2.1)
Iceland	r 20 (0.2)	r 35 (0.7)	r 44 (0.3)	r 59 (0.4)
Iran, Islamic Rep.	21 (2.4)	32 (2.5)	21 (1.6)	10 (2.2)
Ireland	11 (1.2)	13 (1.2)	r 25 (2.3)	70 (4.8)
Israel	s 40 (4.7)	s 28 (2.6)	s 34 (2.7)	s 19 (1.7)
Japan	34 (2.1)	16 (1.1)	64 (3.3)	1 (0.2)
Korea	29 (4.0)	15 (1.8)	52 (5.1)	6 (2.7)
Kuwait	s 17 (1.2)	s 41 (1.2)	s 27 (0.5)	s 0 (0.0)
Latvia (LSS)	38 (2.7)	22 (1.6)	r 55 (2.8)	37 (2.1)
Netherlands	r 16 (1.2)	23 (2.3)	26 (1.9)	64 (2.9)
New Zealand	32 (2.0)	31 (2.6)	64 (3.7)	54 (5.1)
Norway	r 26 (2.3)	r 25 (2.3)	r 51 (4.7)	r 49 (3.4)
Portugal	r 13 (1.4)	r 17 (1.5)	r 18 (1.6)	x x
Scotland	– –	– –	– –	– –
Singapore	38 (0.1)	39 (0.0)	53 (0.1)	12 (0.1)
Slovenia	33 (2.3)	28 (2.3)	44 (3.0)	15 (2.8)
Thailand	21 (1.7)	31 (1.9)	r 43 (2.7)	r 19 (1.5)
United States	33 (2.6)	r 44 (2.9)	s 41 (2.3)	8 (3.9)
International Average	25 (0.4)	27 (0.4)	42 (0.6)	30 (0.6)

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

1 Total hours reported for activities in each category averaged across schools.

2 Instructional Leadership Activities: discussing educational objectives with teachers, initiating curriculum revision and/or planning, training teachers, and professional development activities.

3 Communicating with Students, Parents and Education Officials: talking with parents, counseling and disciplining of students, responding to requests from local, regional, or national education officials.

4 Administrative Duties: hiring teachers, representing the school in the community, representing the school at official meetings, internal administrative tasks (e.g., regulations, school budget, timetable).

* See Table 1.2 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 Appendix A).

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 school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table 2.5

Hours per Month Principal Spends on Various School-Related Activities[1] Eighth Grade*

Country	Average Total Hours per Month Spent on Activities							
	Instructional Leadership Activities[2]		Communicating with Students, Parents, and Education Officials[3]		Administrative Duties[4]		Teaching (Including Preparation)	
Australia	r	38 (4.3)	r	46 (2.9)	r	77 (4.2)	r	7 (1.3)
Austria		19 (1.5)		30 (2.4)		56 (3.2)		24 (2.4)
Belgium (Fl)	r	26 (2.8)		x x	s	61 (4.1)		0 (0.0)
Belgium (Fr)	s	37 (5.0)	s	52 (2.8)	s	60 (3.5)	r	1 (0.3)
Canada	r	27 (1.9)	r	42 (2.2)	r	51 (2.8)	r	8 (1.1)
Colombia	r	41 (2.6)	r	35 (2.5)	s	65 (8.8)	r	8 (2.1)
Cyprus	s	18 (0.0)	r	43 (0.0)	r	33 (0.0)	s	26 (0.0)
Czech Republic		34 (1.7)		32 (1.9)		63 (2.6)		36 (1.4)
Denmark	s	39 (2.2)	r	31 (1.7)	s	54 (3.1)	s	14 (1.8)
England		– –		– –		– –		– –
France	r	20 (1.7)	r	47 (3.7)	r	54 (5.0)	r	4 (1.4)
Germany	s	26 (2.1)	s	30 (1.9)	s	50 (3.6)	s	54 (3.5)
Greece		14 (1.9)		48 (3.1)	r	33 (1.9)		27 (2.3)
Hong Kong	r	29 (3.3)	r	21 (2.5)	r	80 (6.4)		5 (1.3)
Hungary		42 (2.0)		29 (1.8)		47 (2.6)		40 (2.1)
Iceland	r	20 (0.0)	r	37 (0.0)	r	44 (0.0)	r	61 (0.0)
Iran, Islamic Rep.	r	26 (2.6)	r	44 (4.0)	r	25 (2.4)		6 (1.1)
Ireland		26 (2.5)		39 (2.6)		71 (4.4)		15 (2.5)
Israel	s	35 (5.0)	s	33 (3.8)	s	44 (3.9)	s	33 (6.4)
Japan		36 (2.3)		17 (1.3)		71 (3.5)		1 (0.3)
Korea		27 (1.9)		22 (2.3)		51 (3.5)		4 (1.0)
Kuwait		x x		x x		x x		x x
Latvia (LSS)		30 (2.3)		26 (2.3)	r	55 (3.4)		40 (2.0)
Lithuania		40 (3.5)		27 (2.6)		35 (3.2)		44 (3.6)
Netherlands	s	35 (4.0)	s	22 (1.9)	s	44 (3.8)	s	16 (4.8)
New Zealand		43 (2.8)		50 (3.2)	r	120 (9.3)		11 (2.1)
Norway		25 (2.5)		25 (1.7)		52 (2.7)		33 (2.9)
Portugal	r	21 (1.8)		35 (2.5)	r	47 (2.8)		21 (2.7)
Romania		25 (2.9)		24 (1.3)		33 (2.4)		46 (3.5)
Russian Federation		54 (3.1)		38 (2.1)		50 (1.9)		45 (1.5)
Scotland		– –		– –		– –		– –
Singapore		37 (0.0)		50 (0.0)		51 (0.0)		4 (0.0)
Slovak Republic		62 (2.6)		22 (1.2)		48 (3.2)		38 (2.4)
Slovenia	r	32 (2.3)	r	28 (2.4)	r	44 (3.0)	r	12 (1.7)
Spain	r	18 (1.2)		22 (1.3)	r	32 (1.6)	s	36 (2.1)
Sweden	r	34 (1.9)	r	24 (1.8)	s	58 (3.1)	r	5 (0.9)
[5] **Switzerland**		– –		– –		– –		– –
Thailand	r	42 (3.2)	r	43 (2.9)	r	54 (2.9)		6 (1.4)
United States	r	36 (2.8)	r	55 (4.2)	r	47 (2.9)	r	4 (1.2)
International Average		32 (0.5)		34 (0.4)		53 (0.6)		21 (0.4)

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

1 Total hours reported for activities in each category averaged across schools.

2 Instructional Leadership Activities: discussing educational objectives with teachers, initiating curriculum revision and/or planning, training teachers, and professional development activities.

3 Communicating with Students, Parents and Education Officials: talking with parents, counseling and disciplining of students, responding to requests from local, regional, or national education officials.

4 Administrative Duties: hiring teachers, representing the school in the community, representing the school at official meetings, internal administrative tasks (e.g., regulations, school budget, timetable).

5 Averages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table 2.6

Hours per Month Principal Spends on Various School-Related Activities[1] Final Year of Secondary School*

Country	Average Total Hours per Month Spent on Activities			
	Instructional Leadership Activities[2]	Communicating with Students, Parents, and Education Officials[3]	Administrative Duties[4]	Teaching (Including Preparation)
Australia	r 49 (6.3)	49 (4.4)	104 (6.7)	7 (1.6)
[5] *Austria*	– –	– –	– –	– –
Canada	32 (1.6)	45 (3.5)	73 (2.7)	12 (4.2)
Cyprus	r 23 (0.0)	r 47 (0.0)	r 50 (0.0)	21 (0.0)
Czech Republic	41 (2.6)	34 (2.1)	68 (4.2)	20 (1.9)
Denmark	s 37 (2.3)	s 36 (2.0)	s 81 (4.4)	s 18 (1.6)
France	r 32 (2.6)	r 60 (5.1)	r 80 (7.1)	3 (1.3)
[5] *Germany*	– –	– –	– –	– –
Hungary	r 48 (2.3)	r 29 (1.5)	r 56 (2.6)	26 (1.5)
Iceland	s 25 (0.0)	r 38 (0.0)	s 78 (0.0)	r 27 (0.0)
Italy	– –	50 (2.6)	65 (5.2)	– –
Lithuania	r 44 (2.9)	30 (1.9)	r 48 (3.8)	41 (2.6)
New Zealand	42 (3.2)	50 (3.7)	105 (7.5)	10 (1.8)
Norway	r 24 (2.6)	r 32 (2.8)	69 (2.4)	9 (1.4)
Russian Federation	56 (3.6)	39 (2.4)	83 (6.3)	55 (2.5)
Slovenia	x x	x x	x x	x x
South Africa	x x	x x	x x	x x
Sweden	s 30 (2.0)	r 19 (1.3)	r 81 (3.5)	r 7 (1.7)
[5] **Switzerland**	– –	– –	– –	– –
United States	r 35 (2.0)	r 54 (4.2)	r 72 (3.4)	r 3 (1.0)
International Average	37 (0.8)	41 (0.7)	74 (1.2)	18 (0.5)

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

1 Total hours reported for activities in each category averaged across schools.

2 Instructional Leadership Activities: discussing educational objectives with teachers, initiating curriculum revision and/or planning, training teachers, and professional development activities.

3 Communicating with Students, Parents and Education Officials: talking with parents, counseling and disciplining of students, responding to requests from local, regional, or national education officials.

4 Administrative Duties: hiring teachers, representing the school in the community, representing the school at official meetings, internal administrative tasks (e.g., regulations, school budget, timetable).

5 Averages based on total school weights cannot be computed for Austria, Germany and Switzerland; sampling based on tracks within schools.

* See Table 1.2 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 Appendix A).

The Netherlands did not administer the school questionnaire at the final year of secondary school.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Influences on School Mathematics and Science Curricula

Although there is variation across countries with respect to the functions and responsibilities of schools, unarguably one responsibility of virtually all schools is that of teaching the curriculum. There is, however, variation in the extent to which the school determines what is taught. In some cases a national or regional body determines school curriculum, and the school is expected to follow the curriculum with little deviation. However, even when decision-making authority resides at the national or regional level, schools may still contribute to decisions about what is taught. Also, other influences outside the school may affect what is taught. This pattern in reflected to some extent in the schools' reports on the activities that are primarily their responsibility (Tables 2.1, 2.2, and 2.3)

To gather information about who influences the mathematics and science curriculum taught to students and the role of the school in this arena, TIMSS asked schools how much influence various persons or groups have in determining the curriculum – the national curriculum council or education authority (ministry of education), the educational region or district, the community, other external influences, and school-centered influences. The educational region or district might be the education authority for the province, state, or more local area around a school. Community influences might include the school governing board, parents, church or religious groups, and the business community. School-centered influences include the principal and teachers, either collectively or individually.

Tables 2.7, 2.8, and 2.9 present the percentages of schools reporting whether the national curriculum council, the educational region or district, the community, other external bodies, and individuals or groups within the school have an influence in determining the curriculum taught in the school. This was not asked separately for the mathematics and science curricula, but for the curricula overall. Within each category of influences, a school is included if it responded that the individuals or groups in that category had some or a lot of influence, on average. Some influences are not applicable in some countries and thus were not included in the questionnaire. For example, the United States has no national curriculum council, so this question was not asked of school principals in the United States.

At all three grade levels, the most prevalent influences on the curriculum are the national curriculum council, the educational region or district, and school-centered influences. In some cases, the reported influences reflect how the education systems are organized and who has decision-making authority over the curriculum. For example, as shown in Table 2.7, in Cyprus, all (100%) of the fourth-grade school principals reported that the national curriculum council has some or a lot of influence in determining the curriculum; less than a third reported that school-centered entities had this much influence. Cyprus has a highly centralized education system where the Ministry of

Education formulates the intended curriculum for all subjects, and syllabi, curricula, and textbooks are prescribed by government agencies.[4] In the Czech Republic, slightly more than half (56%) of fourth-grade schools reported that the national curriculum council has some or a lot of influence on the curriculum taught, 40% reported that the educational region or district has some or a lot of influence, and nearly all schools (99%) reported that within-school entities had some or a lot of influence. The Czech system underwent changes in 1990 that resulted in greater independence for individual schools through their directors, the municipalities, and regional school offices.[5] Previously, education had been administered through regional and national committees and controlled at the national level.

Even countries with highly centralized systems, however, still have a substantial percentage of schools reporting that the principal and teachers have some or a lot of influence in determining the curriculum. For example, Singapore has a centralized education system in which responsibility for curriculum development, textbook selection, instruction, and examination standards lies with the Ministry.[6] However, in 72% of its fourth-grade schools and 81% of its eighth-grade schools, the principal and teachers also influence the curriculum.

Internationally and in most countries, few schools at any grade reported that the community had some or a lot of influence in determining the curriculum. The international averages for this category were 10% at fourth grade and 8% at both the eighth grade and the final year of secondary school. There were some countries, however, for which community influences were substantial. For example, at fourth grade, in five countries 20% or more of schools reported that the community has some or a lot of influence. The United States had the highest percentage of schools so reporting, both at the fourth grade (43%) and in the final year of secondary school (34%). This reflects the fact that in the United States school governing boards are included in the community category.

Although various entities influence what is taught in school – national organizations, external examinations, parents, and teachers, for example – the school is the primary purveyor of educational opportunities. The school may use what is dictated at a higher level, or may establish its own curriculum within the confines of a national agenda and without regional or national guidance. To investigate the extent to which schools are providing their own curriculum, either to supplement one that already exists or to serve as the primary curriculum, TIMSS asked school principals whether their school had written statements of the mathematics and science curricula to be taught,

[4] Robitaille, D.F. (Ed.). (1997). *National Contexts for Mathematics and Science Education: An Encyclopedia of the Education Systems Participating in TIMSS*. Vancouver, B.C.: Pacific Educational Press.

[5] Robitaille (1997).

[6] Robitaille (1997).

other than national and regional guides. Table 2.10 presents the percentage of schools at the fourth grade, eighth grade, and final year of secondary school reporting that they have such statements.

At all three grade levels, there is great variation across countries in this respect. For mathematics, at fourth grade 41% of schools internationally reported having a written statement of the curriculum, with percentages ranging from 1% in the Czech Republic to 100% in the Netherlands. Internationally, fewer schools reported having a written statement of the mathematics curriculum (35%) at eighth grade than at fourth grade. The percentages of schools ranged from 0% in Belgium (Flemish), France, and the Slovak Republic to 96% in the Netherlands. In the final year of secondary school, the international average percentage of schools with a written mathematics curriculum was 46%; the percentages ranged from 8% in Lithuania to 92% in Iceland.

Within countries, the percentages of schools reporting having their own written statement of the mathematics curriculum is generally the same across the three grade levels, reflecting the nature of the educational system and the locus of decision-making authority. For example, in Cyprus, a highly centralized system, 11% of fourth-grade schools, 18% of eighth grade schools, and 25% of final-year schools reported having such statements. In Australia, however, where there is little national authority over education at any grade level, the percentages of schools reporting having their own mathematics curriculum are 72%, 87%, and 91%, respectively. In several countries the percentages of schools vary by grade, again reflecting the nature of the education system. For example, in Ireland 64% of fourth-grade schools reported having their own mathematics curriculum, while at eighth grade 7% of schools so reported. This may reflect the fact that Ireland has nationally centralized examinations in grade 9 and thus eighth-grade schools are following a set program of studies in mathematics.

Internationally and in most countries, at all three grades the percentage of schools reporting having a written statement of the science curriculum was similar to that for mathematics. Internationally, the average percentages were 40%, 35%, and 47%. As for mathematics, the percentages of schools reporting having a written statement of the science curriculum is generally the same across the grade levels. In several countries, however, the percentages vary from one grade to the next, again perhaps reflecting the nature of the education system. In Hong Kong, the percentages are 40% and 68% for fourth and eighth grades, respectively. In Ireland, 29% of fourth-grade schools and 7% of eighth-grade schools reported having their own science curriculum.

For some countries, the percentages of schools reporting having a science curriculum differed significantly from those reporting having a mathematics curriculum. For example, at fourth grade, in Ireland and Scotland more schools reported having a written statement of the mathematics than of the science curriculum. In contrast, in Norway and Portugal at fourth grade, more schools reported having a written statement of the science curriculum than the mathematics curriculum.

Table 2.7

Various Groups and Individuals Having "Some" or "A Lot" of Influence in Determining the Curriculum Taught in the School[1] - Fourth Grade*

Country	National Curriculum Council[2]	Educational Region or District	Community Influences[3]	Other External Influences[4]	School-Centered Influences[5]
Australia	– –	90 (3.2)	r 6 (2.0)	3 (1.6)	90 (3.4)
Austria	96 (2.0)	68 (6.3)	8 (4.0)	11 (3.3)	r 83 (4.1)
Canada	– –	98 (1.0)	12 (2.4)	r 18 (4.1)	r 65 (4.0)
Cyprus	r 100 (0.0)	– –	r 3 (1.1)	r 12 (2.2)	r 27 (3.2)
Czech Republic	56 (4.0)	40 (3.7)	1 (0.8)	24 (3.5)	99 (0.7)
England	– –	– –	– –	– –	– –
Greece	99 (0.6)	46 (6.7)	1 (0.8)	– –	– –
Hong Kong	82 (5.5)	– –	7 (2.9)	28 (4.8)	86 (3.8)
Hungary	54 (5.2)	36 (4.5)	8 (2.8)	29 (4.3)	83 (4.1)
Iceland	87 (0.1)	29 (0.6)	2 (0.0)	35 (0.6)	95 (0.1)
Iran, Islamic Rep.	93 (2.1)	79 (3.5)	25 (4.5)	58 (4.7)	79 (4.3)
Ireland	58 (4.3)	– –	3 (1.1)	20 (3.2)	94 (1.9)
Israel	s 95 (3.3)	x x	x x	x x	97 (2.0)
Japan	96 (2.0)	89 (3.0)	0 (0.0)	2 (1.1)	82 (3.6)
Korea	81 (5.4)	90 (2.6)	29 (7.5)	29 (7.6)	84 (5.5)
Kuwait	– –	– –	– –	– –	– –
Latvia (LSS)	94 (3.2)	67 (5.0)	r 4 (1.9)	r 37 (7.4)	r 95 (2.2)
Netherlands	61 (5.8)	– –	8 (3.0)	16 (3.9)	96 (1.8)
New Zealand	97 (1.2)	4 (1.2)	4 (1.9)	4 (1.7)	88 (4.4)
Norway	– –	– –	– –	– –	– –
Portugal	– –	92 (2.3)	27 (4.5)	r 7 (2.2)	r 81 (4.0)
Scotland	– –	– –	– –	– –	– –
Singapore	99 (0.0)	– –	1 (0.0)	22 (0.2)	72 (0.4)
Slovenia	86 (4.8)	r 87 (5.0)	1 (0.6)	r 13 (3.0)	r 50 (5.6)
Thailand	98 (1.1)	67 (3.8)	20 (3.7)	38 (4.4)	75 (3.9)
United States	– –	81 (5.6)	43 (5.9)	48 (5.3)	r 92 (2.4)
International Average	85 (0.8)	66 (1.0)	10 (0.7)	23 (0.9)	82 (0.8)

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

1 Reported as percent of schools reporting 'some' or 'a lot' of influence for each category; percentages reflect the average of responses to the questions in each category.

2 National Curriculum Council or national ministry of education.

3 Community Influences: school governing board, parents, church/religious groups, business community.

4 Other External Influences: National or regional subject associations, textbook publishers, external examinations / standardized tests, teacher unions.

5 School-Centered Influences: principal/head of school, teachers (collectively for the school), teachers (of the same subject) as a group, each teacher individually.

* See Table 1.2 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 Appendix A).

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 school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table 2.8

Various Groups and Individuals Having Some or a Lot of Influence in Determining the Curriculum Taught in the School[1] - Eighth Grade*

Country	National Curriculum Council[2]	Educational Region or District	Community Influences[3]	Other External Influences[4]	School-Centered Influences[5]
Australia	– –	r 85 (3.1)	r 13 (3.9)	r 18 (4.4)	r 94 (2.4)
Austria	94 (2.9)	56 (5.6)	9 (4.1)	25 (5.7)	97 (1.6)
Belgium (Fl)	80 (3.8)	– –	5 (2.5)	9 (3.0)	87 (3.1)
Belgium (Fr)	– –	– –	– –	– –	– –
Canada	– –	96 (1.8)	21 (3.1)	r 16 (3.3)	70 (3.8)
Colombia	85 (4.9)	58 (5.8)	12 (3.3)	r 29 (5.7)	r 90 (5.9)
Cyprus	r 100 (0.0)	– –	s 3 (0.0)	s 5 (0.0)	s 14 (0.0)
Czech Republic	62 (5.4)	28 (4.4)	0 (0.0)	24 (4.1)	100 (0.0)
Denmark	– –	– –	r 5 (2.1)	r 43 (4.6)	r 98 (1.6)
England	– –	– –	– –	– –	– –
France	99 (1.1)	r 21 (3.9)	r 0 (0.0)	r 7 (2.6)	r 19 (6.8)
Germany	s 69 (5.7)	s 63 (6.3)	s 8 (3.1)	s 6 (2.6)	s 91 (3.5)
Greece	87 (6.3)	29 (6.4)	0 (0.0)	– –	– –
Hong Kong	84 (4.1)	– –	3 (2.0)	14 (4.5)	88 (4.0)
Hungary	54 (5.2)	36 (4.5)	8 (2.8)	29 (4.3)	84 (4.1)
Iceland	85 (0.0)	26 (0.0)	1 (0.0)	41 (0.0)	r 95 (0.0)
Iran, Islamic Rep.	89 (3.0)	82 (3.6)	r 38 (5.4)	r 58 (5.0)	r 85 (3.1)
Ireland	83 (3.7)	– –	10 (3.2)	32 (4.6)	81 (4.3)
Israel	s 86 (8.6)	s 8 (4.1)	s 0 (0.0)	x x	s 88 (7.8)
Japan	94 (2.2)	81 (4.0)	0 (0.0)	1 (0.9)	88 (2.7)
Korea	82 (4.3)	58 (5.1)	20 (4.0)	32 (5.0)	90 (2.7)
Kuwait	– –	– –	– –	– –	– –
Latvia (LSS)	98 (1.6)	61 (5.0)	2 (1.5)	r 29 (4.3)	83 (3.6)
Lithuania	100 (0.3)	56 (6.4)	10 (5.3)	20 (5.7)	91 (3.0)
Netherlands	r 33 (5.3)	– –	r 12 (4.6)	r 49 (7.2)	r 97 (2.7)
New Zealand	96 (1.9)	3 (2.1)	13 (3.1)	32 (5.5)	88 (3.3)
Norway	– –	– –	– –	– –	– –
Portugal	– –	71 (5.5)	6 (2.6)	r 4 (1.7)	61 (5.5)
Romania	72 (3.2)	33 (5.0)	4 (2.1)	29 (4.4)	18 (3.7)
Russian Federation	88 (3.0)	78 (4.4)	3 (1.5)	26 (4.3)	89 (3.1)
Scotland	– –	– –	– –	– –	– –
Singapore	98 (0.0)	– –	1 (0.0)	12 (0.0)	81 (0.0)
Slovak Republic	95 (2.4)	34 (5.2)	0 (0.0)	15 (4.6)	39 (4.9)
Slovenia	87 (4.8)	r 86 (5.0)	r 0 (0.0)	r 13 (3.0)	51 (5.5)
Spain	83 (3.4)	56 (3.3)	7 (2.2)	0 (0.0)	89 (2.7)
Sweden	45 (5.7)	r 11 (3.5)	r 11 (4.6)	r 21 (4.4)	99 (0.8)
[6] **Switzerland**	– –	– –	– –	– –	– –
Thailand	98 (1.3)	64 (4.1)	26 (3.8)	37 (3.9)	80 (3.6)
United States	– –	84 (4.5)	r 26 (6.9)	r 34 (6.4)	r 87 (4.2)
International Average	83 (0.7)	52 (0.9)	8 (0.5)	23 (0.8)	78 (0.7)

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

1 Reported as percent of schools reporting 'some' or 'a lot' of influence for each category; percentages reflect the average of responses to the questions in each category.

2 National Curriculum Council or national ministry of education.

3 Community Influences: school governing board, parents, church/religious groups, business community.

4 Other External Influences: National or regional subject associations, textbook publishers, external examinations / standardized tests, teacher unions.

5 School-Centered Influences: principal/head of school, teachers (collectively for the school), teachers (of the same subject) as a group, each teacher individually.

6 Percentages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 Appendix A).

School background data for Bulgaria and South Africa are unavailable.

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

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table 2.9

Various Groups and Individuals Having "Some" or "A Lot" of Influence in Determining the Curriculum Taught in the School[1] - Final Year of Secondary School*

Country	National Curriculum Council[2]	Educational Region or District	Community Influences[3]	Other External Influences[4]	School-Centered Influences[5]
Australia	– –	81 (6.0)	14 (5.4)	25 (6.3)	94 (4.0)
[6] *Austria*	– –	– –	– –	– –	– –
Canada	– –	98 (1.1)	13 (3.9)	20 (3.8)	72 (4.8)
Cyprus	100 (0.0)	– –	4 (0.0)	r 9 (0.0)	r 27 (0.0)
Czech Republic	63 (4.2)	14 (3.7)	5 (3.1)	23 (5.3)	98 (2.2)
Denmark	r 88 (3.6)	r 2 (1.6)	r 0 (0.0)	r 25 (4.7)	r 75 (4.4)
France	96 (2.6)	37 (6.2)	8 (4.0)	12 (4.1)	18 (5.1)
[6] *Germany*	– –	– –	– –	– –	– –
Hungary	r 61 (4.3)	r 26 (3.5)	r 8 (2.1)	r 21 (3.6)	r 87 (3.2)
Iceland	r 80 (0.0)	r 0 (0.0)	r 0 (0.0)	r 0 (0.0)	r 92 (0.0)
Italy	93 (2.8)	13 (3.5)	4 (1.3)	4 (2.3)	84 (5.1)
Lithuania	99 (0.7)	37 (5.3)	7 (2.1)	r 15 (3.4)	85 (3.6)
New Zealand	93 (4.1)	0 (0.0)	11 (5.0)	29 (5.8)	92 (3.4)
Norway	– –	– –	– –	– –	– –
Russian Federation	87 (3.2)	77 (4.8)	3 (1.7)	25 (4.2)	90 (2.8)
Slovenia	x x	x x	x x	x x	x x
South Africa	x x	x x	x x	x x	x x
Sweden	r 49 (7.2)	r 4 (1.8)	r 3 (1.6)	s 20 (4.4)	r 100 (0.5)
[6] **Switzerland**	– –	– –	– –	– –	– –
United States	– –	92 (2.7)	34 (3.4)	25 (4.6)	92 (3.0)
International Average	83 (1.1)	37 (1.0)	8 (0.8)	18 (1.1)	79 (0.9)

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

1 Reported as percent of schools reporting 'some' or 'a lot' of influence for each category; percentages reflect the average of responses to the questions in each category.

2 National Curriculum Council or national ministry of education.

3 Community Influences: school governing board, parents, church/religious groups, business community.

4 Other External Influences: National or regional subject associations, textbook publishers, external examinations / standardized tests, teacher unions.

5 School-Centered Influences: principal/head of school, teachers (collectively for the school), teachers (of the same subject) as a group, each teacher individually.

6 Percentages based on total school weights cannot be computed for Austria, Germany, and Switzerland; sampling based on tracks within schools.

* See Table 1.2 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 Appendix A).

The Netherlands did not administer the school questionaire at the final year of secondary school.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table 2.10

Percent of Schools Having Their Own Written Statement of the Mathematics and Science Curriculum to Be Taught (Other than National and Regional Guides) Fourth Grade, Eighth Grade, and Final Year of Secondary School*

Country	Fourth Grade		Eighth Grade		Final Year of Secondary School	
	Mathematics	Science	Mathematics	Science	Mathematics	Science
Australia	72 (5.2)	62 (5.3)	87 (4.6)	86 (4.6)	91 (5.0)	89 (4.5)
[1] Austria	– –	– –	– –	– –	– –	– –
Belgium (Fl)	– –	– –	0 (0.0)	0 (0.0)	– –	– –
Belgium (Fr)	– –	– –	– –	– –	– –	– –
Canada	30 (3.4)	27 (3.8)	40 (4.9)	38 (5.0)	59 (3.4)	60 (3.4)
Colombia	– –	– –	46 (5.0)	45 (4.9)	– –	– –
Cyprus	r 11 (1.7)	r 9 (1.3)	r 18 (0.0)	s 14 (0.0)	25 (0.0)	r 26 (0.0)
Czech Republic	1 (0.7)	1 (0.9)	3 (2.0)	3 (2.0)	11 (3.3)	12 (3.6)
Denmark	– –	– –	r 3 (1.2)	r 5 (1.7)	– –	– –
England	94 (2.3)	91 (3.7)	r 93 (2.4)	r 92 (2.5)	– –	– –
France	– –	– –	0 (0.0)	0 (0.0)	– –	– –
[1] Germany	– –	– –	s 1 (0.8)	s 3 (1.5)	– –	– –
Greece	8 (4.9)	8 (5.0)	10 (5.5)	10 (5.5)	– –	– –
Hong Kong	42 (5.7)	40 (5.8)	72 (5.4)	68 (5.7)	– –	– –
Hungary	10 (2.8)	11 (2.3)	10 (2.8)	11 (2.3)	r 30 (5.3)	37 (5.1)
Iceland	77 (0.2)	73 (0.3)	76 (0.0)	74 (0.0)	r 92 (0.0)	r 88 (0.0)
Iran, Islamic Rep.	43 (4.9)	43 (4.6)	37 (5.3)	35 (5.2)	– –	– –
Ireland	64 (4.3)	29 (3.7)	7 (2.3)	7 (2.3)	– –	– –
Israel	s 21 (5.4)	s 41 (9.9)	s 29 (10.8)	s 22 (10.2)	– –	– –
Japan	– –	– –	28 (3.2)	29 (3.2)	– –	– –
Korea	32 (5.3)	39 (7.1)	49 (6.5)	51 (6.4)	– –	– –
Kuwait	– –	– –	– –	– –	– –	– –
Latvia (LSS)	2 (1.0)	3 (1.3)	2 (1.0)	3 (0.9)	– –	– –
Lithuania	– –	– –	5 (1.6)	5 (1.7)	8 (2.3)	8 (2.1)
Netherlands	100 (0.0)	100 (0.0)	r 96 (2.9)	r 91 (4.4)	– –	– –
New Zealand	83 (5.2)	79 (5.8)	95 (2.2)	95 (2.2)	91 (4.6)	89 (4.7)
Norway	26 (5.2)	54 (5.2)	36 (4.3)	52 (4.9)	– –	– –
Portugal	11 (2.8)	30 (4.5)	10 (4.9)	11 (4.9)	– –	– –
Romania	– –	– –	1 (1.0)	0 (0.0)	– –	– –
Russian Federation	– –	– –	12 (3.2)	15 (3.1)	13 (3.7)	18 (4.1)
Scotland	r 77 (3.4)	r 30 (4.8)	r 83 (5.1)	r 83 (3.9)	– –	– –
Singapore	60 (0.4)	57 (0.4)	60 (0.0)	60 (0.0)	– –	– –
Slovak Republic	– –	– –	0 (0.4)	0 (0.0)	– –	– –
Slovenia	4 (2.2)	5 (2.2)	4 (2.3)	5 (2.3)	x x	x x
Spain	– –	– –	75 (3.5)	76 (3.2)	– –	– –
Sweden	– –	– –	48 (6.0)	46 (5.9)	r 39 (6.3)	r 37 (6.3)
[2] Switzerland	– –	– –	– –	– –	– –	– –
Thailand	16 (3.2)	16 (3.4)	17 (3.4)	17 (3.4)	– –	– –
United States	69 (6.3)	69 (6.5)	73 (6.3)	68 (6.6)	79 (5.7)	78 (5.7)
International Average	41 (0.8)	40 (0.9)	35 (0.7)	35 (0.7)	46 (1.2)	47 (1.2)

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

1 Percentages based on total school weights cannot be computed at the final year of secondary school for Austria and Germany; sampling based on tracks within schools.

2 Percentages based on total school weights cannot be computed at grade 8 or the final year of secondary school for Switzerland; sampling based on tracks within schools.

* See Table 1.2 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.

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Chapter 3

School Organization and Staffing

How to organize their schools and teaching staff to derive the maximum benefit for students is a challenge that every society has to meet. The physical size of the school and the level of staffing are questions that must be resolved within the geographic, demographic, and economic constraints of the country. TIMSS asked school principals to report on these and a range of related issues. In particular, principals were asked how big were their schools; how many teachers they had and what was the mix of full- and part-time teachers; what criteria were used in admitting students; how long students stay with their teachers; and whether there are policies and practices that promote teacher cooperation and collaboration.

How Do Countries Organize Their Schools to Accommodate Their Student Populations?

In choosing an optimal school size, policy makers have long grappled with two potentially conflicting criteria.[1] On the one hand, the school must not be so large that it is organizationally cumbersome or that children feel isolated, and on the other it must be large enough to be able to provide educational resources such as libraries, laboratories, and gymnasia. School size is greatly influenced by the demographic characteristics of a country, with highly urbanized countries finding it easier to organize students into large schools than countries with extensive sparsely populated areas.

Tables 3.1, 3.2, and 3.3 summarize student enrollment across the TIMSS countries at the fourth grade, eighth grade, and final year of secondary school, respectively. Internationally, there is a clear tendency for students in the lower grades to be in smaller schools that are less intimidating and that keep travel time to a minimum. The average total enrollment for fourth-grade was 346 students, compared with 538 for eighth-grade and 643 for the final-year secondary school. Korea and Singapore are remarkable for the very high percentage of fourth-grade students in large schools: 80% or more of fourth-grade students were in schools with an enrollment of more than 1000 students. No other countries had such high percentages, although in Hong Kong and Slovenia 14% and 12%, respectively, of fourth-grade students were in large schools. Many countries had substantial percentages of students in small schools (up to 200 students), which may reflect the distribution of the population in those countries. Certainly, of the countries with the greatest percentages of fourth-grade students in small schools (Austria, Greece, Ireland, the Netherlands, Norway, and Portugal – all with 40% or more), all but the Netherlands have a substantial proportion of their population living in areas of low population density.

[1] For a discussion of the issue of high-school size, see Lee, V.E. and Smith, J.B. (1997), "High School Size: Which Works Best and for Whom?", *Educational Evaluation and Policy Analysis*, Vol. 19, No. 3, pp. 205-227.

Table 3.1

Percent of Students in Schools by Total School Enrollment
Fourth Grade*

Country	Percent of Students in Schools by Total School Enrollment				Average Total Enrollment[1]
	0-200	201-500	501-1000	More than 1000	
Australia	r 21 (4.8)	42 (5.5)	37 (6.2)	0 (0.3)	r 291 (25.2)
Austria	r 66 (4.2)	34 (4.2)	0 (0.0)	0 (0.0)	r 111 (10.0)
Canada	10 (1.3)	68 (2.7)	22 (2.6)	0 (0.0)	308 (9.0)
Cyprus	r 20 (3.2)	79 (3.5)	1 (1.2)	1 (0.6)	r 269 (7.3)
Czech Republic	22 (2.8)	45 (3.7)	32 (2.6)	1 (0.7)	239 (19.5)
England	16 (2.4)	79 (3.2)	5 (2.1)	0 (0.0)	261 (8.0)
Greece	47 (4.1)	50 (4.2)	3 (1.3)	1 (0.6)	118 (13.7)
Hong Kong	3 (1.4)	22 (4.5)	62 (5.2)	14 (3.5)	568 (41.3)
Hungary	9 (2.4)	48 (4.4)	42 (3.9)	0 (0.4)	369 (12.5)
Iceland	18 (1.0)	49 (5.1)	33 (5.2)	0 (0.0)	249 (1.1)
Iran, Islamic Rep.	36 (3.9)	36 (4.4)	23 (3.4)	5 (2.2)	254 (15.8)
Ireland	43 (2.5)	37 (3.8)	20 (3.4)	0 (0.0)	159 (4.6)
Israel	x x	x x	x x	x x	x x
Japan	10 (0.8)	31 (3.0)	52 (3.8)	6 (2.6)	407 (11.6)
Korea	5 (1.5)	7 (2.2)	8 (2.0)	80 (2.2)	871 (57.2)
Kuwait	s 0 (0.4)	21 (3.8)	75 (4.2)	4 (2.5)	s 636 (5.4)
Latvia (LSS)	r 23 (3.5)	37 (4.5)	33 (3.8)	7 (2.4)	r 264 (19.2)
Netherlands	r 44 (4.4)	52 (4.6)	4 (1.5)	0 (0.0)	r 172 (9.2)
New Zealand	29 (1.9)	55 (2.8)	15 (2.1)	1 (0.8)	188 (8.6)
Norway	51 (3.5)	48 (3.6)	1 (1.0)	0 (0.0)	129 (7.7)
Portugal	65 (3.2)	29 (2.7)	6 (2.4)	0 (0.0)	r 155 (9.8)
Scotland	r 23 (2.4)	72 (2.8)	5 (1.4)	0 (0.0)	r 226 (6.3)
Singapore	0 (0.0)	3 (0.2)	15 (1.2)	82 (1.2)	1310 (3.9)
Slovenia	r 2 (1.4)	34 (3.3)	51 (3.8)	12 (1.4)	r 485 (22.6)
Thailand	34 (4.2)	39 (6.0)	26 (6.4)	1 (0.4)	199 (11.4)
United States	r 5 (2.8)	46 (5.8)	45 (5.9)	4 (1.3)	r 420 (38.2)
International Average	24 (0.6)	42 (0.8)	25 (0.7)	9 (0.3)	346 (4.0)

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

1 Computed as total school enrollment averaged across schools.

* See Table 1.2 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 Appendix A).

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

An "r" indicates school data available for 70-84% of schools or students, as appropriate. An "s" indicates school data available for 50-69% of schools or students, as appropriate.

An "x" indicates school data available for <50% of schools or students, as appropriate.

Table 3.2

Percent of Students in Schools by Total School Enrollment
Eighth Grade*

Country	Percent of Students in Schools by Total School Enrollment				Average Total Enrollment[1]
	0-200	201-500	501-1000	More than 1000	
Australia	2 (1.3)	14 (2.8)	57 (5.0)	28 (4.9)	686 (36.0)
Austria	25 (4.9)	58 (5.3)	18 (2.2)	0 (0.0)	288 (11.3)
Belgium (Fl)	15 (4.5)	36 (3.9)	36 (4.2)	13 (2.8)	464 (28.1)
Belgium (Fr)	r 3 (3.1)	32 (5.1)	58 (5.9)	7 (1.9)	s 535 (35.3)
Canada	7 (2.2)	42 (3.9)	38 (3.7)	12 (1.8)	409 (12.6)
Colombia	r 11 (5.5)	24 (4.8)	34 (4.7)	31 (4.5)	s 541 (53.2)
Cyprus	s 1 (0.0)	35 (0.5)	64 (0.5)	0 (0.0)	s 521 (0.0)
Czech Republic	3 (1.0)	44 (4.7)	52 (4.6)	1 (0.7)	465 (17.2)
Denmark	r 4 (1.3)	66 (5.1)	29 (5.3)	0 (0.0)	r 372 (14.4)
England	r 3 (1.6)	7 (2.5)	54 (3.4)	36 (3.3)	r 692 (57.7)
France	4 (1.6)	34 (3.8)	57 (3.4)	5 (2.3)	474 (26.2)
Germany	s 0 (0.0)	43 (5.7)	51 (6.2)	6 (2.8)	s 509 (29.4)
Greece	18 (3.2)	76 (3.9)	6 (2.1)	0 (0.0)	r 249 (12.0)
Hong Kong	0 (0.0)	1 (1.2)	15 (4.3)	84 (4.4)	1056 (42.4)
Hungary	9 (1.9)	46 (3.9)	45 (3.7)	1 (0.7)	368 (12.6)
Iceland	17 (2.1)	40 (6.6)	42 (6.8)	0 (0.0)	251 (0.0)
Iran, Islamic Rep.	24 (3.7)	37 (4.5)	33 (4.5)	6 (1.4)	293 (18.7)
Ireland	s 3 (1.7)	41 (3.8)	52 (4.1)	5 (1.8)	s 454 (24.9)
Israel	s 4 (4.4)	23 (7.5)	53 (10.4)	19 (8.1)	x x
Japan	4 (0.8)	35 (2.2)	56 (2.8)	6 (2.5)	461 (10.7)
Korea	2 (1.2)	8 (2.1)	14 (3.2)	75 (3.4)	964 (64.5)
Kuwait	x x	x x	x x	x x	x x
Latvia (LSS)	r 26 (3.3)	22 (3.1)	42 (3.7)	10 (1.8)	286 (20.6)
Lithuania	16 (1.9)	15 (2.5)	43 (3.3)	26 (3.2)	335 (20.8)
Netherlands	r 0 (0.0)	20 (3.6)	40 (5.5)	40 (5.6)	r 774 (41.9)
New Zealand	2 (1.3)	15 (1.8)	43 (2.6)	41 (2.0)	649 (42.8)
Norway	r 29 (2.8)	70 (2.9)	1 (0.8)	0 (0.0)	182 (12.5)
Portugal	0 (0.0)	12 (2.7)	35 (3.8)	53 (3.6)	915 (48.5)
Romania	18 (1.7)	21 (2.3)	14 (2.6)	47 (2.8)	393 (25.5)
Russian Federation	4 (0.6)	16 (2.6)	38 (4.9)	42 (4.3)	663 (22.2)
Scotland	r 2 (1.6)	5 (2.2)	53 (3.5)	40 (3.1)	r 732 (33.4)
Singapore	0 (0.0)	0 (0.3)	18 (2.0)	81 (2.0)	1226 (0.0)
Slovak Republic	7 (1.0)	37 (3.1)	49 (3.4)	7 (2.1)	435 (12.7)
Slovenia	r 2 (1.3)	36 (3.2)	51 (3.5)	11 (1.1)	r 486 (22.2)
Spain	8 (2.0)	38 (3.4)	47 (3.7)	7 (2.2)	413 (16.1)
Sweden	7 (2.7)	65 (4.9)	26 (4.6)	2 (1.3)	r 392 (18.0)
[2] **Switzerland**	r 29 (3.4)	44 (3.8)	20 (2.2)	6 (2.3)	– –
Thailand	r 2 (1.1)	17 (3.0)	22 (4.0)	58 (5.1)	r 952 (77.6)
United States	r 3 (1.5)	27 (3.8)	54 (4.2)	16 (3.5)	r 498 (34.5)
International Average	8 (0.4)	32 (0.6)	38 (0.7)	22 (0.5)	538 (5.3)

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

1 Computed as total school enrollment averaged across schools.

2 Average Total Enrollment based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools or students, as appropriate. An "s" indicates school data available for 50-69% of schools or students, as appropriate.

An "x" indicates school data available for <50% of schools or students, as appropriate.

Table 3.3

Percent of Students in Schools by Total School Enrollment
Final Year of Secondary School*

Country	Percent of Students in Schools by Total School Enrollment				Average Total Enrollment[1]
	0-200	201-500	501-1000	More than 1000	
Australia	r 2 (2.4)	18 (9.3)	58 (7.0)	21 (6.3)	r 782 (41.9)
[2] *Austria*	17 (5.8)	37 (4.7)	38 (5.1)	7 (2.5)	– –
Canada	r 5 (3.0)	10 (2.7)	29 (2.5)	56 (2.3)	734 (42.4)
Cyprus	r 0 (0.0)	8 (0.7)	71 (0.8)	21 (0.6)	699 (0.0)
Czech Republic	3 (2.1)	38 (7.5)	53 (8.7)	6 (2.5)	476 (34.3)
Denmark	s 1 (0.2)	22 (4.8)	77 (4.9)	0 (0.4)	s 570 (19.4)
France	0 (0.2)	9 (2.7)	26 (6.5)	64 (7.6)	848 (72.0)
[2] *Germany*	x x	x x	x x	x x	– –
Hungary	2 (1.0)	24 (3.0)	51 (4.0)	23 (3.2)	r 618 (29.2)
Iceland	s 8 (0.1)	24 (0.4)	68 (0.4)	0 (0.0)	s 453 (0.0)
Italy	4 (2.0)	22 (4.7)	51 (5.4)	23 (4.1)	602 (44.9)
Lithuania	r 11 (3.7)	13 (3.1)	54 (5.5)	22 (3.6)	r 605 (40.2)
New Zealand	3 (2.2)	13 (3.9)	41 (6.3)	44 (6.2)	670 (43.6)
Norway	r 8 (2.6)	38 (5.3)	52 (5.1)	3 (1.5)	r 466 (39.4)
Russian Federation	4 (0.9)	19 (2.8)	40 (3.6)	37 (4.1)	688 (31.0)
Slovenia	x x	x x	x x	x x	x x
South Africa	x x	x x	x x	x x	x x
Sweden	r 6 (2.4)	4 (1.9)	35 (4.9)	55 (5.1)	r 736 (85.0)
[2] **Switzerland**	r 13 (4.0)	25 (4.7)	32 (5.2)	30 (6.2)	– –
United States	r 6 (2.7)	17 (3.0)	19 (3.3)	59 (3.7)	r 691 (64.2)
International Average	5 (0.6)	20 (1.1)	47 (1.2)	28 (1.0)	643 (11.7)

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

1 Computed as total school enrollment averaged across schools.

2 Average Total Enrollment based on total school weights cannot be computed for Austria, Germany, and Switzerland; sampling was based on tracks within schools.

* See Table 1.2 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 Appendix A).

The Netherlands did not administer the school questionnaire at the final year of secondary school.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools or students, as appropriate. An "s" indicates school data available for 50-69% of schools or students, as appropriate.

An "x" indicates school data available for <50% of schools or students, as appropriate.

With an international average of just 8% of students in schools with up to 200 students at the eighth grade, it is clear that relatively few students at this grade level attend small schools (Table 3.2). However, there are a few countries, including Austria, Latvia (LSS), Norway, and Switzerland, where 25% or more of eighth-grade students attend such schools. In more than half of the countries that participated in TIMSS at the eighth grade, most students were in schools with an enrollment of more than 500, and in three of them (Hong Kong, Korea, and Singapore) 75% or more of eighth-grade students were in schools with more than 1000.

From Table 3.3 it is clear that all of the countries that participated in TIMSS at this grade favor larger schools for students at the end of secondary school. Because of the need for more sophisticated laboratories, workshops, and libraries at this grade level there is more impetus for consolidation into larger schools, and students at this age level are generally considered better equipped to deal with the larger and more impersonal organizational structures. In all countries except Austria, most students were in schools with an enrollment of more than 500, and in four of these – Canada, France, Sweden, and the United States – the majority were in schools of more than 1000 students.[2]

How Do Countries Allocate Their Teaching Force?

Larger schools generally have more teachers than smaller schools, of course, but the important issue for policymakers has been the optimal allocation of teachers to students. The student-teacher ratio is an important indicator of human resource allocation in schools and reduction of this ratio has been a major policy goal in many countries over the years. Tables 3.4 through 3.6 present, in addition to average total student enrollment, the average number of full- and part-time teachers and the average student-teacher ratio for countries participating in TIMSS.

Looking first at trends across Tables 3.4 through 3.6 two things become apparent. The first is that although the students in the earlier grades are on average in smaller schools, the student-teacher ratio in these schools is less favorable, i.e., there are fewer teachers per student. The average student-teacher ratio for fourth-grade schools was 20, compared with 16 for eighth-grade and 13 for the upper secondary schools. While that ratio does not translate directly into class size, there is generally a strong correlation between them, and systems with low student-teacher ratios also often have small class sizes.[3]

[2] Hong Kong, Korea, and Singapore, which reported the highest percentage of students in large schools at the eighth grade, did not participate in the final-year assessment of TIMSS.

[3] Class size data reported by teachers are presented for fourth and eighth grade mathematics and science classes in the main TIMSS reports (see references in Chapter 1).

Within grades there was considerable variation in student-teacher ratios across countries. At fourth grade (Table 3.4), it ranged from a low of 10 in Latvia (LSS) to a high of 37 in Iran. Countries with the most favorable ratios (15 or less) included Austria, Greece, Hungary, Kuwait, Latvia (LSS), Norway, and Slovenia. Higher ratios (25 or more) were found in Hong Kong, Iran, Ireland, and Korea. At eighth grade there was a narrower range of ratios, from 9 to 25. Countries with the most favorable ratios (11 or less) included Austria, Belgium (Flemish), Belgium (French), Latvia (LSS), Lithuania, Norway, and Sweden, while less favorable ratios (21 or more) were found in Canada, Colombia, Hong Kong, Iran, Korea, and Romania. Student-teacher ratios at the final year of secondary school had an even more restricted range, from 9 to 19. Countries with the lowest ratios (10 or less) included Denmark, Italy, and Norway, while those with the highest (16 or more) included Canada, the Czech Republic, and New Zealand.

The second noticeable trend across grades is that while elementary schools are mostly staffed by full-time teachers, reliance on part-time teachers becomes progressively greater from fourth to eighth grade, and from eighth grade to the final year of secondary school. The ratio of part-time to full-time staff was, on average, 2:17 for countries at the fourth grade, increasing to 7:31 by eighth grade and to 9:46 by the final year of secondary school. Countries with a high ratio of part-time to full-time teachers at the fourth grade (Iceland, Iran, Israel,[4] the Netherlands, New Zealand, Norway, and Scotland) all had an average student enrollment that was below the international average. It may be that at the elementary school level, part-time teachers are most often used to supplement full-time teachers in smaller schools.

Although, on average across all countries, there was a higher ratio of part-time to full-time teachers at the eighth grade (Table 3.5), this was principally the result of high reliance on part-time teachers in a few countries. In the five countries with the highest ratio, Belgium (Flemish), Belgium (French), Cyprus, Israel, and the Netherlands, there was about one or more part-time teachers for every two full-time teachers. The Netherlands had the highest ratio, with almost one part-time teacher for every full-time teacher. Part-time teachers are common at the final year of secondary school (Table 3.6) in nearly all of the participating countries. Those with the greatest reliance on part-time teachers included Cyprus, Iceland, Norway, and Sweden.

[4] The enrollment data for Israel are not reported because of a high proportion of missing data.

Table 3.4

Total School Enrollment and Staffing[1] Fourth Grade*

Country	Average Total Enrollment	Average Number of Full-time Teachers	Average Number of Part-time Teachers	Average Student-Teacher Ratio[2]
Australia	r 291 (25.2)	12 (0.9)	2 (0.3)	r 23 (0.5)
Austria	r 111 (10.0)	7 (0.5)	2 (0.2)	r 15 (0.6)
Canada	308 (9.0)	13 (0.4)	3 (0.2)	22 (0.3)
Cyprus	r 269 (7.3)	r 11 (0.3)	r 3 (0.1)	r 20 (0.3)
Czech Republic	239 (19.5)	12 (1.0)	2 (0.2)	17 (0.3)
England	261 (8.0)	11 (0.5)	2 (0.2)	23 (0.5)
Greece	118 (13.7)	7 (0.7)	r 1 (0.1)	r 15 (0.6)
Hong Kong	568 (41.3)	22 (1.1)	0 (0.1)	r 25 (1.8)
Hungary	369 (12.5)	32 (1.1)	2 (0.3)	12 (0.6)
Iceland	249 (1.1)	9 (0.0)	5 (0.0)	r 21 (0.1)
Iran, Islamic Rep.	254 (15.8)	6 (0.4)	r 2 (0.4)	r 37 (2.3)
Ireland	159 (4.6)	6 (0.1)	0 (0.0)	25 (0.3)
Israel	x x	s 23 (1.3)	s 10 (1.1)	x x
Japan	407 (11.6)	16 (0.4)	0 (0.1)	24 (0.4)
Korea	871 (57.2)	26 (1.2)	0 (0.0)	28 (1.9)
Kuwait	s 636 (5.4)	s 54 (0.9)	s 0 (0.0)	s 12 (0.1)
Latvia (LSS)	r 264 (19.2)	22 (1.4)	5 (0.9)	r 10 (0.4)
Netherlands	r 172 (9.2)	5 (0.3)	4 (0.3)	r 22 (0.7)
New Zealand	188 (8.6)	7 (0.4)	3 (0.2)	21 (0.5)
Norway	129 (7.7)	8 (0.5)	5 (0.2)	r 11 (0.3)
Portugal	r 155 (9.8)	8 (0.4)	1 (0.3)	r 17 (0.4)
Scotland	r 226 (6.3)	8 (0.3)	4 (0.2)	r 21 (0.6)
Singapore	1310 (3.9)	55 (0.1)	0 (0.0)	23 (0.0)
Slovenia	r 485 (22.6)	31 (1.4)	1 (0.4)	r 15 (0.2)
Thailand	199 (11.4)	10 (0.5)	s 0 (0.1)	s 18 (0.6)
United States	r 420 (38.2)	20 (1.8)	2 (0.3)	s 20 (0.9)
International Average	346 (4.0)	17 (0.2)	2 (0.1)	20 (0.2)

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

1 Reported total enrollment and number of teachers averaged across schools.

2 Average Student-Teacher Ratio computed as a ratio of the number of students enrolled in school to the number of full-time and part-time teachers in school (one full-time teacher = 1; one part-time teacher = .5).

*See Table 1.2 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 Appendix A).

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

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table 3.5

Total School Enrollment and Staffing [1]
Eighth Grade*

Country	Average Total Enrollment	Average Number of Full-time Teachers	Average Number of Part-time Teachers	Average Student-Teacher Ratio[2]
Australia	686 (36.0)	44 (2.2)	5 (0.5)	15 (0.3)
Austria	288 (11.3)	27 (0.9)	5 (0.4)	10 (0.2)
Belgium (Fl)	464 (28.1)	r 36 (2.6)	23 (2.0)	r 9 (0.3)
Belgium (Fr)	s 535 (35.3)	r 46 (3.1)	r 22 (1.9)	s 9 (0.3)
Canada	409 (12.6)	19 (0.8)	3 (0.2)	21 (0.4)
Colombia	s 541 (53.2)	23 (1.8)	r 4 (0.7)	s 22 (1.2)
Cyprus	s 521 (0.0)	r 26 (0.0)	r 15 (0.0)	s 15 (0.0)
Czech Republic	465 (17.2)	24 (0.8)	3 (0.3)	18 (0.3)
Denmark	r 372 (14.4)	r 30 (1.2)	r 4 (0.4)	r 12 (0.1)
England	r 692 (57.7)	42 (3.4)	9 (1.1)	r 14 (0.7)
France	474 (26.2)	30 (1.8)	8 (1.0)	14 (0.4)
Germany	s 509 (29.4)	s 26 (1.8)	s 10 (1.0)	s 17 (0.5)
Greece	r 249 (12.0)	16 (0.8)	2 (0.3)	r 14 (0.6)
Hong Kong	1056 (42.4)	50 (1.8)	1 (0.1)	r 21 (0.4)
Hungary	368 (12.6)	32 (1.1)	2 (0.3)	12 (0.6)
Iceland	251 (0.0)	9 (0.0)	5 (0.0)	r 20 (0.0)
Iran, Islamic Rep.	293 (18.7)	8 (0.7)	7 (0.6)	r 25 (1.0)
Ireland	s 454 (24.9)	27 (0.9)	4 (0.3)	s 16 (0.3)
Israel	x x	s 32 (3.7)	s 15 (1.9)	x x
Japan	461 (10.7)	22 (0.6)	1 (0.1)	18 (0.3)
Korea	964 (64.5)	36 (1.9)	0 (0.0)	24 (0.9)
Kuwait	x x	x x	x x	x x
Latvia (LSS)	286 (20.6)	23 (1.4)	5 (0.3)	r 10 (0.4)
Lithuania	335 (20.8)	26 (1.4)	5 (0.3)	10 (0.4)
Netherlands	r 774 (41.9)	r 30 (2.5)	r 29 (1.8)	s 18 (0.7)
New Zealand	649 (42.8)	35 (2.1)	9 (0.6)	16 (0.4)
Norway	182 (12.5)	16 (0.9)	5 (0.4)	r 9 (0.3)
Portugal	915 (48.5)	70 (3.5)	8 (1.2)	12 (0.3)
Romania	393 (25.5)	14 (0.7)	3 (0.3)	23 (1.2)
Russian Federation	663 (22.2)	40 (1.4)	3 (0.3)	15 (0.4)
Scotland	r 732 (33.4)	r 56 (2.2)	r 9 (0.5)	s 13 (0.3)
Singapore	1226 (0.0)	60 (0.0)	0 (0.0)	20 (0.0)
Slovak Republic	435 (12.7)	24 (0.6)	1 (0.1)	17 (0.3)
Slovenia	r 486 (22.2)	r 31 (1.5)	1 (0.4)	r 15 (0.3)
Spain	413 (16.1)	20 (0.6)	2 (0.2)	r 20 (0.5)
Sweden	r 392 (18.0)	31 (1.7)	9 (0.6)	r 11 (0.2)
[3] **Switzerland**	– –	– –	– –	– –
Thailand	r 952 (77.6)	s 37 (5.7)	s 2 (0.8)	x x
United States	r 498 (34.5)	27 (2.5)	r 4 (0.4)	r 18 (1.1)
International Average	538 (5.3)	31 (0.3)	7 (0.1)	16 (0.1)

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

1 Reported total enrollment and number of teachers averaged across schools.

2 Average Student-Teacher Ratio computed as a ratio of the number of students enrolled in school to the number of full-time and part-time teachers in school (one full-time teacher = 1; one part-time teacher = .5).

3 Averages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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.

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

School background data for Bulgaria and South Africa are unavailable.

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Appendix A).

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table 3.6

Total School Enrollment and Staffing[1] Final Year of Secondary School*

Country	Average Total Enrollment	Average Number of Full-time Teachers	Average Number of Part-time Teachers	Average Student-Teacher Ratio[2]
Australia	r 782 (41.9)	52 (3.4)	7 (0.8)	r 14 (0.5)
[3] *Austria*	– –	– –	– –	– –
Canada	734 (42.4)	44 (2.7)	5 (0.4)	16 (0.3)
Cyprus	699 (0.0)	42 (0.0)	21 (0.0)	r 14 (0.0)
Czech Republic	476 (34.3)	23 (1.7)	8 (0.6)	19 (0.8)
Denmark	s 570 (19.4)	r 59 (3.2)	r 8 (0.6)	s 10 (0.1)
France	848 (72.0)	69 (6.1)	12 (1.4)	11 (0.4)
[3] *Germany*	– –	– –	– –	– –
Hungary	r 618 (29.2)	43 (1.9)	8 (0.8)	r 13 (0.5)
Iceland	s 453 (0.0)	r 26 (0.0)	r 10 (0.0)	s 14 (0.0)
Italy	602 (44.9)	62 (4.4)	4 (0.7)	10 (0.5)
Lithuania	r 605 (40.2)	46 (2.2)	8 (0.6)	r 12 (0.5)
New Zealand	670 (43.6)	38 (2.2)	8 (0.6)	r 16 (0.5)
Norway	r 466 (39.4)	46 (3.2)	14 (1.8)	r 9 (0.3)
Russian Federation	688 (31.0)	42 (1.8)	4 (0.5)	15 (0.4)
Slovenia	x x	x x	x x	x x
South Africa	x x	x x	x x	x x
Sweden	r 736 (85.0)	r 58 (5.9)	s 17 (1.3)	s 11 (0.5)
[3] **Switzerland**	– –	– –	– –	– –
United States	r 691 (64.2)	44 (3.4)	4 (0.5)	r 14 (0.7)
International Average	643 (11.7)	46 (0.9)	9 (0.2)	13 (0.1)

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

1 Reported total enrollment and number of teachers averaged across schools.

2 Average Student-Teacher Ratio computed as a ratio of the number of students enrolled in school to the number of full-time and part-time teachers in school (one full-time teacher = 1; one part-time teacher = .5).

3 Averages based on total school weights cannot be computed for Austria, Germany, and Switzerland; sampling was based on tracks within schools.

* See Table 1.2 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 Appendix A).

The Netherlands did not administer the school questionnaire at the final year of secondary school.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Which Criteria Do Schools Use in Admitting Students?

Principals of schools with fourth- and eighth-grade students were asked about the criteria used to admit students. For schools serving the younger students, the predominant criterion for admission in all countries was residence in the catchment area of the school (Table 3.7). Academic criteria play no role at this grade level in most schools in most countries, although in several countries, including the Czech Republic, Hungary, Israel, Latvia (LSS), Slovenia, Thailand, and the United States, 10% or more of schools reported employing such criteria for fourth-grade students. Next to student residence, school principals reported that they most often gave preference to applicants who had older siblings in the school, were children of former students, or came from a particular school. This "legacy/tradition" approach was particularly prevalent in England and Hungary, where it is customary in more than half of the schools. Equally common, on average across countries, is the practice of student or parent interviews before admission. Substantial percentages of schools in most countries subscribe to this practice, with the largest in the Czech Republic and Latvia (LSS).

At eighth grade, place of residence remains the main criterion for student admission in most countries, but principals reported greater reliance on the other criteria than at fourth grade, in line with greater emphasis on selective entry requirements (Table 3.8). The greatest additional emphasis was on academic criteria for admissions, particularly for some of the countries with tracked secondary education systems (such as Germany and the Netherlands), or with very selective secondary systems (such as Colombia and Thailand). Use of interviews and the legacy/tradition approach also were more commonly reported at the eighth grade. Most schools reported using the legacy/tradition approach in Australia, England, Hungary, Portugal, and Spain. Student or parent interviews were reported by at least half of the schools in Australia, Colombia, the Czech Republic, Germany, Latvia (LSS), the Netherlands, New Zealand, and the Russian Federation.

Table 3.7

Percent of Schools Using Various Criteria to Admit Students to School[1] Fourth Grade*

Country	Academic Criteria[2]	Interviews[3]	Legacy / Tradition[4]	Residence in a Particular Area
Australia	1 (0.6)	40 (5.2)	31 (4.2)	65 (6.2)
Austria	– –	– –	– –	– –
Canada	x x	x x	x x	x x
Cyprus	r 0 (0.0)	r 6 (2.1)	r 25 (2.9)	r 97 (1.5)
Czech Republic	12 (2.7)	52 (4.6)	24 (3.0)	86 (3.1)
England	6 (1.8)	21 (4.2)	66 (4.3)	90 (2.6)
Greece	2 (0.8)	3 (0.9)	22 (3.7)	96 (1.4)
Hong Kong	– –	– –	– –	– –
Hungary	18 (3.0)	40 (3.1)	82 (3.8)	60 (4.3)
Iceland	2 (0.0)	14 (0.2)	5 (0.1)	98 (0.0)
Iran, Islamic Rep.	– –	– –	– –	– –
Ireland	3 (0.9)	25 (3.8)	19 (3.1)	82 (3.2)
Israel	s 13 (5.3)	s 24 (6.3)	s 21 (5.7)	s 94 (6.2)
Japan	– –	– –	– –	– –
Korea	1 (0.6)	6 (3.2)	0 (0.3)	56 (6.9)
Kuwait	– –	– –	– –	– –
Latvia (LSS)	28 (5.3)	71 (4.8)	32 (4.3)	94 (2.3)
Netherlands	– –	– –	– –	– –
New Zealand	2 (1.1)	25 (5.7)	21 (4.1)	77 (4.4)
Norway	– –	– –	– –	– –
Portugal	6 (1.9)	15 (3.1)	36 (4.6)	91 (3.0)
Scotland	– –	– –	– –	– –
Singapore	– –	– –	– –	– –
Slovenia	r 17 (4.2)	r 31 (5.0)	r 17 (3.0)	r 99 (0.9)
Thailand	22 (3.8)	20 (3.7)	24 (4.0)	69 (4.4)
United States	14 (4.2)	20 (5.4)	28 (4.6)	87 (5.3)
International Average	9 (0.7)	26 (1.0)	28 (0.9)	84 (1.0)

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

1 Reported as percent of schools reporting that one or more of the criteria/factors included in a category is used to admit students to the school.

2 Academic Criteria: Student's academic performance, Performance on a standardized test, Performance on an entrance examination, Performance on an oral examination, Recommendations from previous teachers.

3 Interviews: Interview with student, Interview with parents.

4 Legacy/Tradition: Preference given to students with older brothers or sisters in the school, Preference given to students from a particular school, Preference given to children of former students.

* See Table 1.2 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 Appendix A).

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 school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table 3.8

Percent of Schools Using Various Criteria to Admit Students to School[1] Eighth Grade*

Country	Academic Criteria[2]	Interviews[3]	Legacy / Tradition[4]	Residence in a Particular Area
Australia	r 36 (5.1)	70 (4.7)	61 (4.7)	65 (4.3)
Austria	– –	– –	– –	– –
Belgium (Fl)	– –	– –	– –	– –
Belgium (Fr)	– –	– –	– –	– –
Canada	– –	– –	– –	– –
Colombia	r 80 (4.8)	63 (6.4)	r 34 (6.6)	23 (3.9)
Cyprus	r 0 (0.0)	r 0 (0.0)	r 33 (0.0)	r 100 (0.0)
Czech Republic	27 (4.4)	64 (4.8)	49 (4.5)	82 (3.8)
Denmark	– –	– –	– –	– –
England	34 (6.9)	37 (7.3)	54 (6.2)	71 (5.9)
France	– –	– –	– –	– –
Germany	s 52 (5.9)	s 51 (6.0)	s 36 (6.2)	s 82 (4.9)
Greece	10 (5.9)	8 (6.1)	46 (5.4)	86 (5.9)
Hong Kong	– –	– –	– –	– –
Hungary	18 (3.0)	40 (3.1)	82 (3.8)	60 (4.3)
Iceland	3 (0.0)	12 (0.0)	7 (0.0)	96 (0.0)
Iran, Islamic Rep.	17 (3.2)	21 (4.6)	39 (5.0)	94 (2.1)
Ireland	11 (2.9)	32 (5.3)	39 (4.2)	74 (3.9)
Israel	s 16 (7.5)	s 30 (12.2)	s 19 (5.6)	s 97 (3.0)
Japan	– –	– –	– –	– –
Korea	4 (1.5)	7 (3.1)	3 (1.3)	64 (6.1)
Kuwait	– –	– –	– –	– –
Latvia (LSS)	33 (5.0)	75 (5.5)	32 (4.1)	96 (1.2)
Lithuania	24 (5.2)	49 (6.5)	33 (5.3)	98 (1.2)
Netherlands	r 94 (2.1)	r 59 (5.8)	r 8 (2.1)	r 43 (7.1)
New Zealand	19 (3.4)	50 (5.1)	37 (5.1)	62 (5.2)
Norway	– –	– –	– –	– –
Portugal	20 (4.7)	19 (6.0)	65 (6.4)	86 (6.0)
Romania	33 (5.9)	34 (5.3)	26 (4.1)	97 (1.3)
Russian Federation	32 (4.6)	71 (4.6)	30 (3.8)	95 (2.2)
Scotland	– –	– –	– –	– –
Singapore	– –	– –	– –	– –
Slovak Republic	– –	– –	– –	– –
Slovenia	r 19 (4.2)	r 31 (4.9)	r 17 (2.9)	r 99 (0.9)
Spain	5 (2.3)	15 (3.1)	80 (3.3)	70 (4.3)
Sweden	2 (1.3)	7 (4.0)	28 (5.2)	93 (3.9)
[5] **Switzerland**	– –	– –	– –	– –
Thailand	69 (3.6)	37 (4.3)	33 (4.4)	86 (2.9)
United States	28 (5.8)	30 (5.5)	26 (5.7)	88 (5.6)
International Average	27 (0.9)	36 (1.1)	37 (0.9)	80 (0.8)

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

1 Reported as percent of schools reporting that one or more of the criteria/factors included in a category is used to admit students to the school.

* See Table 1.2 for more information about the grades tested in each country.

2 Academic Criteria: Student's academic performance, Performance on a standardized test, Performance on an entrance examination, Performance on an oral examination, Recommendations from previous teachers.

3 Interviews: Interview with student, Interview with parents.

4 Legacy/Tradition: Preference given to students with older brothers or sisters in the school, Preference given to students from a particular school, Preference given to children of former students.

5 Percentages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

( ) 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

How Long Do Students Stay with the Same Teacher?

One of the pedagogic approaches that varies across countries is the number of years students stay with the same teacher. At fourth grade, it is common in many countries for a teacher to stay with the same class of students all day, and to teach all subjects in the curriculum. When that continues over several years, students and teachers can get to know each other very well and can develop a close relationship that may enhance the teaching and learning process. It is evident from Table 3.9 that schools in almost every country differ greatly in how they address this issue, which implies that the decision may often be made at the school level.

A range of countries, including Austria, the Czech Republic, Hungary, Iceland, Latvia (LSS), Norway, and Portugal, seem to favor an extended student-teacher relationship, since most schools in these countries reported that students stay with their teachers for three to four or more years. In contrast, in countries such Cyprus, England, Iran, Korea, Thailand, and the United States the regular reassignment of students and teachers is more the norm; more than 80% of their schools reported that students and teachers spend just one year together. In many countries it seems that a range of practices prevails, with one-year and two-year periods particularly common. In a few countries such as Ireland and New Zealand all configurations are reported.

In many countries, eighth-grade students are not taught all subjects by a single teacher, but instead have specialist teachers for individual subjects. These teachers are more likely to stay with their students for extended periods. In Ireland, for example, eighth-grade students[5] are in the middle of a three- or four-year cycle and frequently have the same specialist teacher for the entire cycle. Table 3.10 reveals a great variety of practices across countries. Teachers stay with students for just one year in almost all schools (80% or more) in the United States and Canada, for two years in Singapore, for three in Norway and Sweden, and for four or more in Austria, Denmark, Latvia (LSS), Lithuania, Romania, and the Russian Federation. Teachers stay with students mostly for one or two years in Australia, Belgium (Flemish), Cyprus, France, Greece, Hong Kong, Iran, Korea, the Netherlands, New Zealand, and Scotland. Two or three years is most common in Germany, Iceland, Israel, and Spain, while three years or more is typical in the Czech Republic, Hungary, the Slovak Republic, and Slovenia. One to three years is prevalent in Japan, Portugal, and Thailand, and two to four years or more in Ireland. In Colombia teachers stay with the same students for anything from one to four years or more.

[5] "Eighth grade" as used by TIMSS is known as Second Year in Ireland.

Table 3.9

Percent of Schools by the Number of Years Students Typically Stay with the Same Teacher - Fourth Grade*

Country	One School Year	Two School Years	Three School Years	Four or More School Years
Australia	73 (6.3)	23 (6.4)	3 (2.2)	0 (0.2)
Austria	0 (0.0)	52 (7.2)	2 (1.8)	46 (7.4)
Canada	54 (3.8)	41 (4.2)	5 (2.3)	0 (0.1)
Cyprus	r 83 (3.2)	17 (3.2)	0 (0.0)	0 (0.0)
Czech Republic	4 (2.0)	45 (5.2)	26 (3.7)	25 (4.0)
England	84 (4.7)	16 (4.7)	0 (0.0)	0 (0.0)
Greece	37 (7.2)	47 (6.8)	15 (3.9)	1 (0.6)
Hong Kong	54 (6.5)	42 (6.7)	3 (1.6)	0 (0.0)
Hungary	0 (0.0)	11 (2.5)	33 (3.7)	56 (4.2)
Iceland	4 (0.0)	20 (0.2)	57 (0.6)	19 (0.7)
Iran, Islamic Rep.	93 (2.7)	2 (1.4)	0 (0.0)	5 (1.9)
Ireland	30 (2.7)	37 (3.0)	15 (3.4)	19 (2.7)
Israel	s 0 (0.0)	100 (0.0)	0 (0.0)	0 (0.0)
Japan	43 (5.2)	52 (4.8)	5 (2.3)	0 (0.0)
Korea	98 (1.3)	2 (1.3)	0 (0.0)	0 (0.3)
Kuwait	s 37 (1.8)	53 (1.9)	8 (0.1)	3 (0.0)
Latvia (LSS)	3 (2.8)	0 (0.0)	21 (5.5)	76 (6.0)
Netherlands	46 (4.9)	39 (4.1)	15 (4.6)	1 (0.7)
New Zealand	42 (2.6)	28 (4.5)	20 (7.4)	10 (6.0)
Norway	0 (0.0)	8 (2.6)	42 (5.0)	50 (5.5)
Portugal	6 (1.9)	9 (2.9)	3 (1.3)	82 (3.7)
Scotland	r 66 (4.0)	31 (4.9)	2 (1.8)	1 (0.8)
Singapore	38 (0.3)	62 (0.3)	0 (0.0)	0 (0.0)
Slovenia	r 58 (5.5)	35 (5.4)	1 (0.7)	6 (1.7)
Thailand	82 (3.4)	9 (2.3)	1 (1.1)	8 (2.6)
United States	87 (7.3)	13 (7.3)	0 (0.0)	0 (0.4)
International Average	43 (0.8)	30 (0.8)	11 (0.6)	16 (0.6)

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

* See Table 1.2 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 Appendix A).

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An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

Table 3.10

Percent of Schools by the Number of Years Students Typically Stay with the Same Teacher - Eighth Grade*

Country	One School Year	Two School Years	Three School Years	Four or More School Years
Australia	r 53 (5.3)	42 (5.2)	4 (2.2)	1 (1.0)
Austria	0 (0.0)	6 (2.7)	7 (2.5)	87 (3.5)
Belgium (Fl)	25 (4.0)	71 (4.5)	4 (2.5)	0 (0.0)
Belgium (Fr)	– –	– –	– –	– –
Canada	89 (3.4)	9 (3.3)	1 (0.6)	0 (0.0)
Colombia	21 (4.0)	39 (5.7)	19 (4.1)	21 (5.0)
Cyprus	r 33 (0.0)	67 (0.0)	0 (0.0)	0 (0.0)
Czech Republic	1 (0.5)	17 (3.2)	44 (4.6)	38 (4.8)
Denmark	r 0 (0.0)	0 (0.0)	4 (1.9)	96 (1.9)
England	– –	– –	– –	– –
France	26 (5.9)	69 (6.1)	5 (2.6)	1 (0.5)
Germany	s 3 (1.7)	42 (5.3)	38 (5.8)	17 (4.7)
Greece	56 (5.6)	36 (5.2)	7 (1.8)	1 (0.8)
Hong Kong	46 (6.2)	44 (6.1)	11 (3.4)	0 (0.0)
Hungary	0 (0.0)	11 (2.5)	33 (3.7)	56 (4.2)
Iceland	4 (0.0)	25 (0.0)	58 (0.0)	14 (0.0)
Iran, Islamic Rep.	63 (4.5)	21 (3.6)	16 (4.3)	0 (0.0)
Ireland	2 (1.7)	20 (3.6)	56 (4.6)	22 (5.2)
Israel	s 0 (0.0)	70 (10.4)	30 (10.4)	0 (0.0)
Japan	42 (5.2)	23 (4.0)	35 (5.5)	0 (0.0)
Korea	49 (6.2)	42 (6.0)	9 (3.6)	0 (0.0)
Kuwait	x x	x x	x x	x x
Latvia (LSS)	1 (0.7)	1 (0.8)	15 (4.2)	84 (4.3)
Lithuania	0 (0.0)	0 (0.1)	8 (3.2)	92 (3.2)
Netherlands	s 43 (7.1)	43 (6.8)	9 (4.5)	5 (3.7)
New Zealand	69 (6.7)	15 (7.1)	9 (4.3)	6 (4.1)
Norway	0 (0.0)	11 (7.6)	84 (7.8)	5 (2.4)
Portugal	42 (5.5)	31 (5.2)	21 (5.0)	5 (2.5)
Romania	2 (1.7)	1 (1.0)	6 (3.9)	91 (4.3)
Russian Federation	1 (1.2)	1 (0.9)	13 (4.0)	84 (3.3)
Scotland	r 40 (8.6)	51 (4.6)	5 (4.2)	4 (4.0)
Singapore	20 (0.0)	80 (0.0)	0 (0.0)	0 (0.0)
Slovak Republic	0 (0.0)	12 (3.5)	26 (4.3)	62 (4.4)
Slovenia	r 0 (0.0)	7 (2.7)	56 (6.6)	37 (6.2)
Spain	3 (1.6)	71 (4.6)	20 (4.1)	6 (2.5)
Sweden	0 (0.0)	1 (0.9)	99 (0.9)	0 (0.0)
[1] **Switzerland**	– –	– –	– –	– –
Thailand	r 57 (4.6)	15 (3.3)	27 (3.7)	1 (0.8)
United States	88 (5.4)	3 (2.0)	4 (3.4)	4 (4.2)
International Average	25 (0.7)	29 (0.8)	22 (0.7)	24 (0.5)

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

1 Percentages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 Appendix A).

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

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School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

What Do Schools Do to Promote Cooperation and Collaboration among Teachers?

Cooperation and collaboration among teachers is an effective way to improve teaching. In order for teachers to have an opportunity to meet and share ideas, schools need to support this type of activity. Table 3.11 summarizes principals' reports of relevant school policies and practices. In general, the situation in the fourth and eighth grades is very similar. Internationally more than three-quarters of schools indicated that they had an official policy of promoting cooperation and collaboration among their teaching staff. Countries where this was true of fewer than half of the schools included Australia, Canada, New Zealand, Portugal, and the United States at fourth grade, and Australia, Canada, and New Zealand at eighth grade.

Teachers meeting regularly to discuss goals and issues was reported to be very common at both grade levels also. At fourth grade, 80% or more of schools reported regular meetings in most countries, the exceptions being Austria, Greece, Korea, and the Netherlands. At eighth grade a high level of regular meetings also was reported.

[4] The enrollment data for Israel are not reported because of a high proportion of missing data.

Table 3.11

Percent of Schools Having Policies and Practices Related to Cooperation and Collaboration Among Teachers - Fourth and Eighth Grade*

Country	Fourth Grade		Eighth Grade	
	School Has Official Policy Related to Promoting Cooperation and Collaboration Among Teachers	Teachers Meet Regularly to Discuss Goals and Issues	School Has Official Policy Related to Promoting Cooperation and Collaboration Among Teachers	Teachers Meet Regularly to Discuss Goals and Issues
Australia	44 (5.9)	91 (2.5)	45 (5.3)	96 (1.7)
Austria	r 56 (7.8)	52 (8.4)	r 57 (5.9)	r 78 (4.3)
Belgium (Fl)	– –	– –	80 (6.2)	57 (7.3)
Belgium (Fr)	– –	– –	r 60 (6.1)	r 79 (5.6)
Canada	39 (4.4)	82 (3.8)	38 (3.9)	78 (3.8)
Colombia	– –	– –	80 (4.7)	86 (3.5)
Cyprus	r 97 (1.7)	r 90 (2.2)	r 95 (0.0)	r 100 (0.0)
Czech Republic	74 (4.1)	84 (3.2)	91 (2.0)	76 (4.5)
Denmark	– –	– –	r 89 (2.8)	r 74 (4.1)
England	– –	– –	– –	– –
France	– –	– –	98 (0.6)	77 (5.3)
Germany	– –	– –	s 96 (2.8)	x x
Greece	75 (6.6)	64 (6.4)	75 (5.1)	78 (4.1)
Hong Kong	82 (4.7)	92 (3.0)	80 (4.8)	90 (3.0)
Hungary	98 (1.5)	97 (1.4)	98 (1.5)	97 (1.4)
Iceland	98 (0.0)	82 (0.2)	97 (0.0)	80 (0.0)
Iran, Islamic Rep.	88 (3.2)	85 (3.3)	81 (3.9)	75 (3.7)
Ireland	81 (3.3)	80 (3.1)	61 (5.5)	59 (5.7)
Israel	s 100 (0.0)	s 98 (1.8)	s 100 (0.0)	s 88 (8.9)
Japan	71 (4.2)	85 (3.2)	76 (4.0)	93 (2.9)
Korea	91 (4.3)	71 (6.4)	90 (3.2)	67 (4.8)
Kuwait	s 98 (0.0)	s 99 (0.0)	x x	x x
Latvia (LSS)	100 (0.0)	96 (2.1)	97 (1.8)	84 (4.4)
Lithuania	– –	– –	93 (3.8)	92 (4.6)
Netherlands	89 (3.1)	75 (4.7)	r 95 (2.6)	r 87 (4.8)
New Zealand	35 (6.4)	89 (5.2)	39 (7.1)	97 (2.0)
Norway	– –	– –	– –	– –
Portugal	r 49 (4.7)	94 (2.1)	59 (5.8)	91 (3.4)
Romania	– –	– –	85 (3.1)	100 (.1)
Russian Federation	– –	– –	100 (0.0)	97 (1.6)
Scotland	– –	– –	– –	– –
Singapore	72 (0.2)	97 (.0)	67 (0.0)	94 (.0)
Slovak Republic	– –	– –	98 (1.4)	100 (.3)
Slovenia	93 (4.1)	80 (5.3)	r 94 (4.0)	79 (5.3)
Spain	– –	– –	74 (4.1)	96 (2.1)
Sweden	– –	– –	58 (5.7)	90 (3.3)
[1] **Switzerland**	– –	– –	– –	– –
Thailand	99 (0.8)	88 (2.7)	98 (1.3)	87 (2.9)
United States	40 (4.5)	93 (3.2)	52 (6.3)	88 (4.3)
International Average	77 (0.8)	85 (.8)	79 (0.7)	85 (.7)

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

1 Percentages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 Appendix A).

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School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available.

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An "x" indicates school data available for <50% of schools.

Chapter 4

Organization for Learning Mathematics and Science

One challenge for countries around the world is how to deal with students of different abilities and interests in mathematics and science. This chapter focuses on how mathematics and science curricula are generally organized within primary and lower-secondary schools, and specifically at the fourth and eighth grades. By the final year of secondary school, there is great diversity of curricula both across and within countries depending on students' course of study (academic, technical, or apprenticeship). Those differences have been described in the TIMSS report, *Mathematics and Science Achievement in the Final Year of Secondary School*. [1]

This chapter presents information about whether countries tend to offer more than one curricular program in mathematics and science to fourth- and eighth-grade students, and if so, how the decisions are made about students' courses of study. School policies on instructional time are also discussed.

Do Countries Have Different Curricular Organizations Within or Across Schools to Account for Differences in Student Ability?

For each participating country, TIMSS asked the principals and headmasters of fourth-grade and eighth-grade students about enrollment in different mathematics and science programs in their schools. The TIMSS results are consistent with the existing literature, indicating no clear agreement about whether homogenous or heterogeneous grouping is the most effective approach for high mathematics and science achievement in primary and middle schools. Some countries with predominantly only one course of study were among the top performers and others among the bottom performers (see Chapter 1 for overall achievement). Similarly, of the countries reporting multiple courses of study, some performed relatively well on the TIMSS tests and others less well.

The results for primary schools are presented in Table 4.1. In most countries, at least 90% of the fourth-grade students were in schools with a single course of study in mathematics. However, in several countries, fourth graders – from 80% to 90% – were in schools with single courses of study in mathematics, including Ireland, New Zealand, Portugal, and the United States. Countries with less than 80% of their fourth graders in schools with single courses of study in mathematics included Israel, and the Netherlands. For science, the data show that in all countries, at least 90% of the fourth-grade students were in schools having only one course of study in science.

[1] Mullis, I.V.S., Martin, M.O., Beaton, A.E., Gonzalez, E.J., Kelly, D.L., and Smith, T.A. (1998). *Mathematics and Science Achievement in the Final Year of Secondary School: IEA's Third International Mathematics and Science Study (TIMSS)*. Chestnut Hill, MA: Boston College.

Table 4.1

Enrollments in Courses of Study in Mathematics and Science
Fourth Grade*

Country		Percentage of Students in Schools with Only One Course of Study in Mathematics	Percentage of Students in Schools with More than One Course of Study in Mathematics		Percentage of Students in Schools with Only One Course of Study in Science	Percentage of Students in Schools with More than One Course of Study in Science
Australia		90 (2.3)	10 (2.3)		96 (2.1)	4 (2.1)
Austria		– –	– –		– –	– –
Canada	r	92 (1.9)	8 (1.9)	r	96 (2.2)	4 (2.2)
Cyprus	r	99 (0.6)	1 (0.6)	r	100 (0.2)	0 (0.2)
Czech Republic		100 (0.3)	0 (0.3)		100 (0.0)	0 (0.0)
England		100 (0.0)	0 (0.0)		100 (0.0)	0 (0.0)
Greece		98 (1.2)	2 (1.2)		100 (0.0)	0 (0.0)
Hong Kong		100 (0.0)	0 (0.0)		100 (0.0)	0 (0.0)
Hungary		– –	– –		– –	– –
Iceland		91 (2.7)	9 (2.7)	r	96 (2.5)	4 (2.5)
Iran, Islamic Rep.		97 (1.3)	3 (1.3)		95 (1.7)	5 (1.7)
Ireland		85 (3.8)	15 (3.8)		94 (2.3)	6 (2.3)
Israel	s	74 (6.9)	26 (6.9)	s	98 (2.3)	2 (2.3)
Japan		– –	– –		– –	– –
Korea		99 (0.9)	1 (0.9)		99 (0.9)	1 (0.9)
Kuwait		– –	– –		– –	– –
Latvia (LSS)		100 (0.0)	0 (0.0)		100 (0.0)	0 (0.0)
Netherlands		58 (5.0)	42 (5.0)		95 (2.0)	5 (2.0)
New Zealand		83 (3.2)	17 (3.2)		97 (1.7)	3 (1.7)
Norway		100 (0.0)	0 (0.0)		100 (0.0)	0 (0.0)
Portugal		85 (3.1)	15 (3.1)		95 (1.9)	5 (1.9)
Scotland		– –	– –		– –	– –
Singapore		100 (0.0)	0 (0.0)		100 (0.0)	0 (0.0)
Slovenia	r	99 (1.4)	1 (1.4)	r	99 (0.8)	1 (0.8)
Thailand		100 (0.0)	0 (0.0)		98 (1.0)	2 (1.0)
United States	r	87 (3.4)	13 (3.4)	r	98 (1.4)	2 (1.4)
International Average		92 (0.6)	8 (0.6)		98 (0.3)	2 (0.3)

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

* See Table 1.2 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 Appendix A).

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 school data available for 70-84% of students. An "s" indicates school data available for 50-69% of students.

The comparable results for eighth grade are presented for mathematics in Table 4.2 and for science in Table 4.3. School principals reported more differentiation in curricular programs in the eighth grade than at the fourth grade, particularly in mathematics. In mathematics, about half of the countries reported having essentially one curricular program. That is, 80% or more of the eighth graders attended schools reporting a single program. For the remaining half of the countries, however, heads of schools reported a range of approaches, from having most students in schools with only one program to having few students in such schools. The countries reporting 60% or more of their eighth graders in schools with multiple programs in mathematics included Austria, Belgium (Flemish), England, Ireland, the Netherlands, Singapore, and the United States.

In science (Table 4.3), the heads of schools in most of the countries reported that most eighth graders (80% or more) attended schools with only one curricular program. The only countries with 60% or more of their eighth graders in schools with more than one science program were Belgium (Fl), the Netherlands, and Singapore.

Among the countries and schools reporting multiple curricular programs, various approaches can be involved. The overall aim is to meet the individual needs of each child and the general strategy is to divide students into groups that can proceed through the curriculum at different rates. In most countries with multiple programs, the organization of students into different groups occurs within schools. In some countries, such as Ireland and New Zealand, students follow the same curriculum, but at different levels of difficulty (setting or streaming), which can occur by dividing a class into different groups or creating different classes. In other instances of ability grouping, different classes study different content (i.e., tracking).

On average within each country, the schools with more than one eighth-grade program in either mathematics or science reported from two to three programs. The data, however, do not reflect the type of organization (streaming, setting, tracking) or tracking across schools. For example, in Germany different groups of students attend different schools beginning with the fifth grade. Thus, principals may report one course of study within schools, even though different schools have different curricular programs. Other countries that begin different academic or vocational programs before or during the eighth grade for a small percentage of students include France, Greece, Hungary, Iran, Israel, Lithuania, the Philippines, Singapore, and Switzerland.[2]

There is considerable debate about the effect of ability grouping on achievement. The main argument for ability grouping is the need to adapt the content, level, and pace of instruction to students with different levels of

[2] Robitaille, D.F. (Ed.) (1997). *National Contexts for Mathematics and Science Education: An Encyclopedia of the Educational Systems Participating in TIMSS*. Vancouver, B.C.: Pacific Educational Press.

achievement. Proponents believe that tailoring instruction to the individual needs of students improves the scholastic achievement of all students. This is countered, however, by some research showing a decrease in low-achieving classes in intellectual stimulation, sense of challenge, and ambition to progress. The desirability of different curricular programs is also debated in the context of equity: grouping students by academic ability can be seen as curtailing many students' opportunity to learn.

The data in Tables 4.2 and 4.3 indicate different reasons for having different mathematics or science programs in schools. For example in mathematics, in the Belgian systems, Canada, France, Iceland, Israel, and Sweden, 60% or more of the students in multiple-program schools are in the most advanced program. That is, most students are taking the most rigorous mathematics, with the others in remedial courses. In several other countries (e.g., Germany, Lithuania, and Thailand), the most advanced courses are for accelerated coursework, with most students being enrolled in the least advanced program.

Table 4.2

Enrollments in Courses of Study in Mathematics
Eighth Grade*

Country	Percentage of Students in Schools with Only One Course of Study in Mathematics	Percentage of Students in Schools with More than One Course of Study in Mathematics	Schools with More Than One Course of Study in Mathematics[1]		
			Average Number of Courses of Study in Mathematics	Average Percentage of Students in Most Advanced Mathematics Course of Study	Average Percentage of Students in Least Advanced Mathematics Course of Study
Australia	r 65 (4.0)	35 (4.0)	2.8 (0.11)	r 44 (4.4)	r 24 (3.7)
Austria	30 (3.0)	70 (3.0)	3.0 (0.00)	– –	– –
Belgium (Fl)	39 (2.3)	61 (2.3)	2.0 (0.00)	67 (3.2)	33 (3.2)
Belgium (Fr)	45 (2.1)	55 (2.1)	2.0 (0.00)	63 (1.9)	37 (1.9)
Canada	84 (3.0)	16 (3.0)	2.2 (0.06)	69 (6.5)	23 (6.2)
Colombia	97 (2.2)	3 (2.2)	~ ~	~ ~	~ ~
Cyprus	r 100 (0.0)	0 (0.0)	~ ~	~ ~	~ ~
Czech Republic	92 (3.4)	8 (3.4)	~ ~	~ ~	~ ~
Denmark	r 99 (0.7)	1 (0.7)	~ ~	~ ~	~ ~
England	34 (4.3)	66 (4.3)	r 3.2 (0.20)	r 34 (1.5)	r 21 (1.8)
France	76 (3.6)	24 (3.6)	– –	75 (2.8)	21 (2.0)
Germany	s 74 (4.3)	26 (4.3)	s 2.0 (0.00)	s 40 (3.2)	s 60 (3.2)
Greece	100 (0.0)	0 (0.0)	~ ~	~ ~	~ ~
Hong Kong	100 (0.0)	0 (0.0)	~ ~	~ ~	~ ~
Hungary	– –	– –	– –	– –	– –
Iceland	77 (7.0)	23 (7.0)	r 2.6 (0.00)	60 (0.0)	31 (0.0)
Iran, Islamic Rep.	96 (2.7)	4 (2.7)	~ ~	~ ~	~ ~
Ireland	24 (3.5)	76 (3.5)	2.5 (0.05)	47 (2.1)	30 (2.2)
Israel	s 63 (9.5)	37 (9.5)	s 2.2 (0.15)	s 69 (3.2)	s 27 (3.4)
Japan	99 (0.7)	1 (0.7)	~ ~	~ ~	~ ~
Korea	100 (0.0)	0 (0.0)	~ ~	~ ~	~ ~
Kuwait	– –	– –	– –	– –	– –
Latvia (LSS)	97 (1.7)	3 (1.7)	~ ~	~ ~	~ ~
Lithuania	86 (3.0)	14 (3.0)	2.1 (0.07)	33 (5.8)	61 (6.1)
Netherlands	r 30 (4.9)	70 (4.9)	2.9 (0.15)	r 46 (4.2)	r 28 (2.4)
New Zealand	61 (4.2)	39 (4.2)	2.8 (0.12)	31 (4.6)	31 (8.0)
Norway	100 (0.0)	0 (0.0)	~ ~	~ ~	~ ~
Portugal	98 (1.2)	2 (1.2)	~ ~	~ ~	~ ~
Romania	98 (1.0)	2 (1.0)	~ ~	~ ~	~ ~
Russian Federation	90 (2.9)	10 (2.9)	2.1 (0.09)	26 (2.8)	– –
Scotland	r 71 (5.0)	29 (5.0)	r 2.6 (0.18)	r 46 (4.8)	r 32 (4.3)
Singapore	20 (3.9)	80 (3.9)	2.0 (0.00)	57 (0.0)	43 (0.0)
Slovak Republic	83 (3.8)	17 (3.8)	2.1 (0.07)	35 (4.5)	40 (15.6)
Slovenia	r 89 (2.9)	11 (2.9)	2.7 (0.25)	42 (10.6)	25 (5.2)
Spain	100 (0.0)	0 (0.0)	~ ~	~ ~	~ ~
Sweden	43 (5.7)	57 (5.7)	2.2 (0.05)	r 75 (1.8)	r 25 (1.8)
[2] **Switzerland**	r 63 (4.0)	37 (4.0)	– –	– –	– –
Thailand	83 (4.5)	17 (4.5)	2.0 (0.00)	r 27 (5.2)	r 69 (7.5)
United States	17 (3.2)	83 (3.2)	2.6 (0.08)	r 27 (2.9)	r 50 (4.2)
International Average	74 (0.6)	26 (0.6)	2.4 (0.02)	48 (0.9)	36 (1.2)

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

1 Reported for countries in which more than 10% of students are in schools with more than one course of study in mathematics. Reported values are averaged across schools.

2 Averages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available. A tilde (~) indicates insufficient data to report variable (percentage of students in schools with more than one course of study is less than 10).

An "r" indicates school data available for 70-84% of schools or students, as applicable. An "s" indicates school data available for 50-69% of schools or students, as applicable.

Table 4.3

Enrollments in Courses of Study in Science
Eighth Grade*

Country	Percentage of Students in Schools with Only One Course of Study in Science	Percentage of Students in Schools with More than One Course of Study in Science	Schools with More Than One Course of Study in Science[1]		
			Average Number of Courses of Study in Science	Average Percentage of Students in Most Advanced Science Course of Study	Average Percentage of Students in Least Advanced Science Course of Study
Australia	r 85 (2.8)	15 (2.8)	2.9 (0.29)	r 50 (5.3)	r 35 (4.2)
Austria	100 (0.0)	0 (0.0)	~ ~	~ ~	~ ~
Belgium (Fl)	33 (5.6)	67 (5.6)	r 2.9 (0.15)	– –	– –
Belgium (Fr)	– –	– –	– –	– –	– –
Canada	r 92 (2.1)	8 (2.1)	~ ~	~ ~	~ ~
Colombia	r 95 (2.5)	5 (2.5)	~ ~	~ ~	~ ~
Cyprus	r 100 (0.0)	0 (0.0)	~ ~	~ ~	~ ~
Czech Republic	94 (3.0)	6 (3.0)	~ ~	~ ~	~ ~
Denmark	– –	– –	– –	– –	– –
England	76 (4.3)	24 (4.3)	2.7 (0.30)	r 34 (5.6)	r 25 (5.7)
France	65 (4.5)	35 (4.5)	– –	77 (2.4)	20 (1.7)
Germany	s 91 (2.7)	9 (2.7)	~ ~	~ ~	~ ~
Greece	100 (0.0)	0 (0.0)	~ ~	~ ~	~ ~
Hong Kong	100 (0.0)	0 (0.0)	~ ~	~ ~	~ ~
Hungary	– –	– –	– –	– –	– –
Iceland	100 (0.1)	0 (0.1)	~ ~	~ ~	~ ~
Iran, Islamic Rep.	95 (2.9)	5 (2.9)	~ ~	~ ~	~ ~
Ireland	68 (4.2)	32 (4.2)	2.0 (0.04)	64 (4.1)	34 (4.1)
Israel	s 89 (6.2)	11 (6.2)	~ ~	~ ~	~ ~
Japan	100 (0.0)	0 (0.0)	~ ~	~ ~	~ ~
Korea	99 (0.7)	1 (0.7)	~ ~	~ ~	~ ~
Kuwait	– –	– –	– –	– –	– –
Latvia (LSS)	100 (0.0)	0 (0.0)	~ ~	~ ~	~ ~
Lithuania	– –	– –	– –	– –	– –
Netherlands	r 30 (4.9)	70 (4.9)	2.9 (0.15)	r 46 (4.2)	r 28 (2.4)
New Zealand	78 (3.3)	22 (3.3)	2.8 (0.13)	37 (5.9)	19 (3.3)
Norway	100 (0.0)	0 (0.0)	~ ~	~ ~	~ ~
Portugal	99 (0.9)	1 (0.9)	~ ~	~ ~	~ ~
Romania	98 (1.2)	2 (1.2)	~ ~	~ ~	~ ~
Russian Federation	93 (2.4)	7 (2.4)	~ ~	~ ~	~ ~
Scotland	r 98 (1.3)	2 (1.3)	~ ~	~ ~	~ ~
Singapore	20 (3.9)	80 (3.9)	2.0 (0.00)	57 (0.0)	43 (0.0)
Slovak Republic	86 (3.7)	14 (3.7)	2.0 (0.00)	21 (6.0)	34 (10.0)
Slovenia	r 97 (1.7)	3 (1.7)	~ ~	~ ~	~ ~
Spain	100 (0.0)	0 (0.0)	~ ~	~ ~	~ ~
Sweden	98 (1.4)	2 (1.4)	~ ~	~ ~	~ ~
[2] **Switzerland**	r 72 (3.4)	28 (3.4)	– –	– –	– –
Thailand	r 88 (4.1)	12 (4.1)	2.0 (0.00)	~ ~	~ ~
United States	81 (4.0)	19 (4.0)	2.5 (0.14)	25 (5.7)	r 49 (6.7)
International Average	86 (0.5)	14 (0.5)	2.5 (0.05)	46 (1.6)	32 (1.7)

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

1 Reported for countries in which more than 10% of students are in schools with more than one course of study in science. Reported values are averaged across schools.

2 Averages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available. A tilde (~) indicates insufficient data to report variable (percentage of students in schools with more than one course of study is less than 10 or data are available for less than 5 schools).

An "r" indicates school data available for 70-84% of schools or students, as applicable. An "s" indicates school data available for 50-69% of schools or students, as applicable.

What Factors Are Involved in Deciding Students' Courses of Study in Mathematics and Science?

Information about the factors that influence decisions about eighth-grade students' enrollment in different courses of study is presented for mathematics in Figure 4.1 and for science in Figure 4.2. In considering the data on the factors involved, please keep in mind the prevalence of differentiation in course of study in each country. For example, the data in Figure 4.1 apply to only 16% of the eighth graders in Canada; in other countries the data apply to a substantial percentage of students and can have considerable impact on their futures. In some countries, placement decisions even as early as the eighth grade can be a determinant of future type of academic program and career.

The data show that academic performance is the most crucial factor in program placement decisions across the participating countries. Teacher recommendations carry some weight in every country, and are very important in some. At the eighth-grade level, the importance of standardized test scores in placing students in different courses of study varied considerably by country, from nearly all of the students in Singapore to hardly any in Germany and Israel.[3] In most countries, the need for students to have met curricular requirements and the wishes of students and their parents also entered into decisions about students' course of study. Thailand reported school entrance examination to be important for most students; elsewhere, such examinations were important in course assignment decisions in only some schools in some countries.

[3] Values of 0 shown in Figures 4.1 and 4.2 may be due to rounding.

Figure 4.1

Factors That Are Moderately or Very Important in Deciding Courses of Study in Mathematics Eighth Grade*

Country	Percent of Students in Schools with More Than One Course of Study	Percent of Students in Schools Reporting That Factor Is Moderately or Very Important[1]					
		Academic Performance	Teacher Recommen-dations	Standardized Tests	Entrance or Oral Examinations	Curricular Requirements	Wishes of Students or Parents
Australia	r 35	r 100	94	35	12	50	63
Austria	70	r 98	44	9	24	–	10
Canada	16	98	93	32	11	83	78
England	66	r 99	92	61	14	40	19
France	24	90	96	40	9	66	94
Germany	s 26	s 92	74	0	4	41	69
Iceland	23	100	100	69	7	74	35
Ireland	76	98	91	52	27	47	75
Israel	s 37	s 100	87	0	10	100	23
Lithuania	14	100	91	52	34	73	100
Netherlands	r 70	r 100	98	64	8	95	69
New Zealand	39	100	84	78	61	33	34
Russian Federation	10	85	72	81	74	79	91
Scotland	r 29	r 97	84	60	4	66	47
[2] **Singapore**	80	100	67	99	0	0	0
Slovak Republic	17	95	81	77	78	59	85
Slovenia	r 11	r 100	92	84	51	67	100
Sweden	57	95	90	22	14	39	100
Switzerland	r 37	r 99	93	31	32	46	47
Thailand	17	97	61	66	93	89	87
United States	83	97	95	87	38	71	73
International Average	41	97	85	52	29	61	62

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

Percent of Students

1 Percentages based only on students in schools with more than one course of study in mathematics.

2 Data for Singapore pertaining to entrance examinations, oral examinations, curricular requirements, student's own wishes, and parental wishes were obtained from the ministry.

* See Table 1.2 for more information about the grades tested in each country.

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 Appendix A).

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available.

Data for the following countries are not available or are excluded because less than 10% of students attend schools with more than one course of study: Belgium (Fl), Belgium (Fr), Colombia, Cyprus, Czech Republic, Denmark, Greece, Hong Kong, Hungary, Iran, Japan, Korea, Kuwait, Latvia, Norway, Portugal, Romania, and Spain (see Table 4.2).

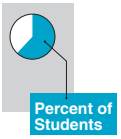
An "r" indicates school data available for 70-84% of students. An "s" indicates school data available for 50-69% of students.

Figure 4.2

Factors That Are Moderately or Very Important in Deciding Courses of Study in Science Eighth Grade*

Country	Percent of Students in Schools with More Than One Course of Study	Percent of Students in Schools Reporting That Factor Is Moderately or Very Important[1]					
		Academic Performance	Teacher Recommen-dations	Standardized Tests	Entrance or Oral Examinations	Curricular Requirements	Wishes of Students or Parents
Australia	r 15	r 87	72	19	0	60	46
England	24	r 95	77	54	5	29	20
France	35	r 74	83	20	11	61	79
Ireland	32	89	87	41	32	48	72
Netherlands	r 70	r 100	98	64	8	95	69
New Zealand	22	97	77	77	49	36	39
[2] **Singapore**	80	100	67	99	0	0	0
Slovak Republic	14	100	87	81	80	56	87
Switzerland	r 28	r 96	86	14	21	41	44
Thailand	r 12	r 96	52	77	91	95	100
United States	19	98	95	86	32	82	68
International Average	33	94	80	57	30	55	57

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



1 Percentages based only on students in schools with more than one course of study in science.

2 Data for Singapore pertaining to entrance examinations, oral examinations, curricular requirements, student's own wishes, and parental wishes were obtained from the ministry.

* See Table 1.2 for more information about the grades tested in each country.

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 Appendix A).

School background data for Bulgaria and South Africa are unavailable.

Data for the following countries are not available or are excluded because less than 10% of students attend schools with more than one course of study or data are available for less than 5 schools: Austria, Belgium (Fl), Belgium (Fr), Canada, Colombia, Cyprus, Czech Republic, Denmark, Germany, Greece, Hong Kong, Hungary, Iceland, Iran, Israel, Japan, Korea, Kuwait, Latvia, Lithuania, Norway, Portugal, Romania, Russian Federation, Scotland, Slovenia, Spain, and Sweden (see Table 4.2).

An "r" indicates school data available for 70-84% of students.

What Are School Policies for Students' Instructional Time in Mathematics and Science?

Figure 4.3 presents the average instructional days per year reported by the schools in each country for the fourth and eighth grades. The number of instructional days in the school year reported by schools varies across countries, and the average number of instructional days was positively correlated with national mean achievement.[4] Internationally, an average of about 190 days was reported at both the fourth and eighth grades, and at both levels ranged from about 160 in Iceland to about 230 in Japan. The number of instructional days reported by schools may vary somewhat from the official length of the school year, as the days devoted to examinations and other special activities may not be included. The high-performing countries of Singapore, Japan, and Korea reported an average number of instructional days of 200 or more per year at both the fourth and eighth grades — a longer school year than in most other countries. In most countries that participated at both grade levels, the average number of instructional days reported was comparable at the fourth and eighth grades. In a few, a lower number was reported at eighth grade; the most notable of these is Hong Kong, one of the highest performing countries in mathematics at both grades, where the average number of days was only 171 at grade eight versus 208 at grade four. In Hong Kong, the length of the official school year is about 200 days at eighth grade,[5] but there are several days in the school year devoted to national examinations that are not reflected in the total reported.[6]

Figures 4.4 and 4.5 show, for fourth and eighth graders, respectively, the number of hours reported by schools that students spend in school per year, and how much of that time is devoted to instruction. Interestingly enough, on average across countries, only about 80% of students' time in school at either the fourth or eighth grade is devoted to instruction. This finding was relatively consistent from country to country. However, there was a general tendency for higher-performing countries to report more time in school and more instruction time than lower-performing countries.

[4] Pearson correlation coefficients between the national mean scale score and the average instructional days per year reported in Figure 4.3 were found to be 0.68 ($p<0.001$, $n=23$) for grade 4 mathematics, 0.54 ($p<0.01$, $n=23$) for grade 4 science, and 0.48 ($p<0.01$, $n=33$) for both mathematics and science at grade 8.

[5] Robitaille, D.F. (Ed.) (1997). *National Contexts for Mathematics and Science Education: An Encyclopedia of the Educational Systems Participating in TIMSS*. Vancouver, B.C.: Pacific Educational Press.

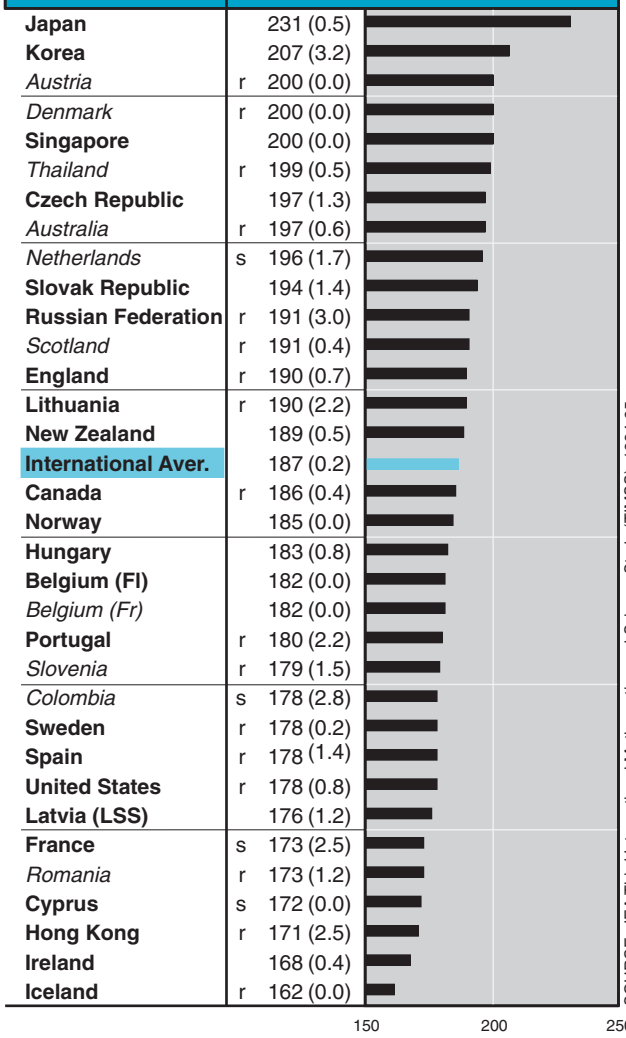
[6] Some schools in Hong Kong have up to three sets of examinations at grade 8 every academic year, each requiring 10-15 days.

Figure 4.3

Instructional Days in the School Year[1] Fourth and Eighth Grade*

Country	Fourth Grade: Average Number of Instructional Days in the School Year
Japan	232 (0.3)
Korea	r 211 (1.5)
Hong Kong	s 208 (2.4)
Singapore	200 (0.0)
Thailand	r 200 (1.6)
Australia	r 198 (0.8)
Czech Republic	r 196 (1.8)
New Zealand	197 (0.2)
Scotland	r 193 (0.6)
Netherlands	r 193 (2.3)
Austria	r 193 (3.4)
Norway	190 (0.3)
International Aver.	190 (0.3)
England	r 190 (0.3)
Slovenia	r 187 (1.4)
Canada	r 186 (0.4)
Hungary	183 (0.8)
Ireland	183 (0.1)
Cyprus	r 181 (0.5)
Latvia (LSS)	175 (0.9)
Portugal	r 175 (0.7)
United States	r 175 (3.7)
Greece	r 173 (2.6)
Iceland	r 160 (0.0)

Country	Eighth Grade: Average Number of Instructional Days in the School Year
Japan	231 (0.5)
Korea	207 (3.2)
Austria	r 200 (0.0)
Denmark	r 200 (0.0)
Singapore	200 (0.0)
Thailand	r 199 (0.5)
Czech Republic	197 (1.3)
Australia	r 197 (0.6)
Netherlands	s 196 (1.7)
Slovak Republic	194 (1.4)
Russian Federation	r 191 (3.0)
Scotland	r 191 (0.4)
England	r 190 (0.7)
Lithuania	r 190 (2.2)
New Zealand	189 (0.5)
International Aver.	187 (0.2)
Canada	r 186 (0.4)
Norway	185 (0.0)
Hungary	183 (0.8)
Belgium (Fl)	182 (0.0)
Belgium (Fr)	182 (0.0)
Portugal	r 180 (2.2)
Slovenia	r 179 (1.5)
Colombia	s 178 (2.8)
Sweden	r 178 (0.2)
Spain	r 178 (1.4)
United States	r 178 (0.8)
Latvia (LSS)	176 (1.2)
France	s 173 (2.5)
Romania	r 173 (1.2)
Cyprus	s 172 (0.0)
Hong Kong	r 171 (2.5)
Ireland	168 (0.4)
Iceland	r 162 (0.0)



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

1 Reported as number of instructional days in the school year averaged across schools.

* See Table 1.2 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable at the eighth grade.

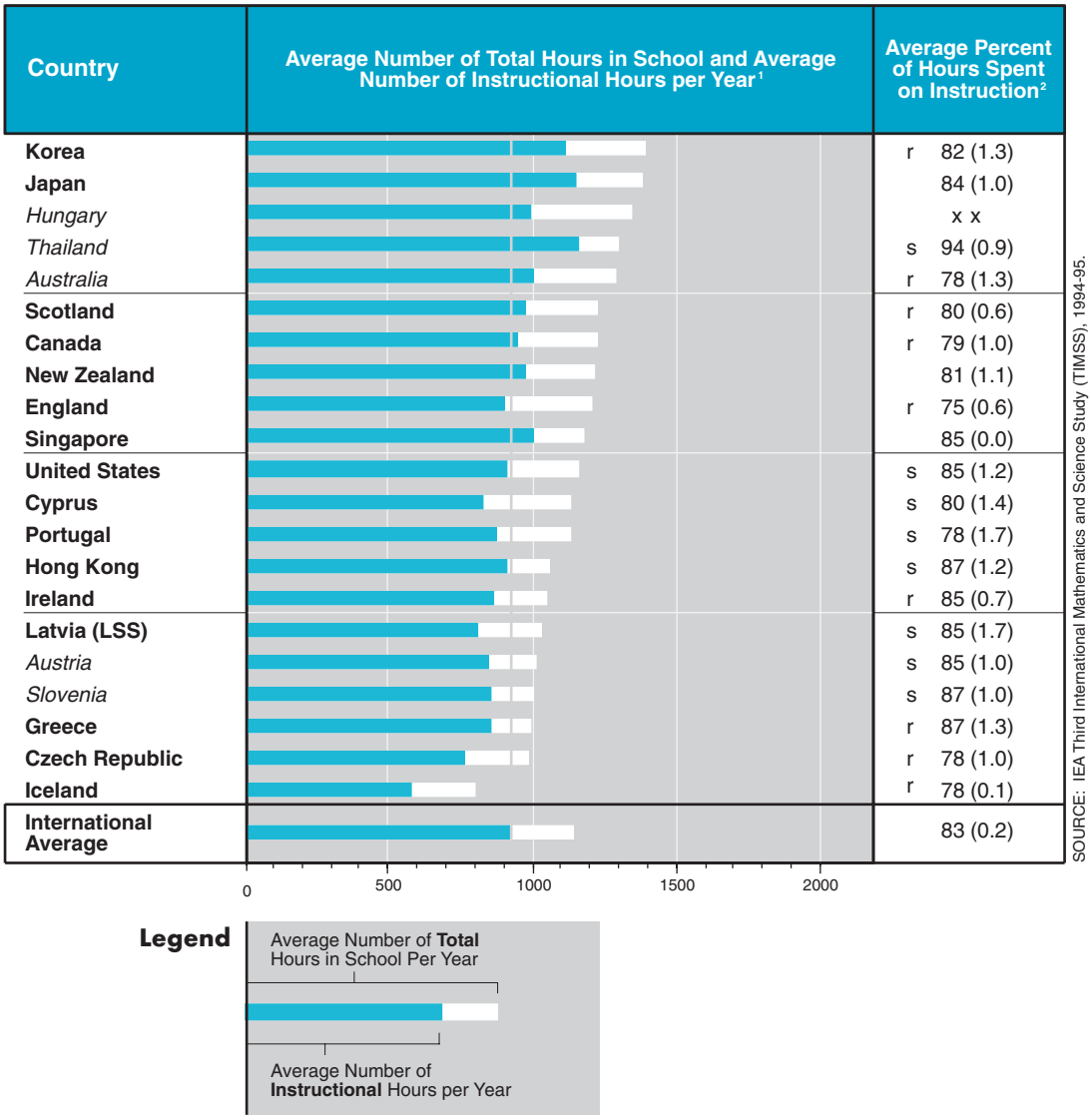
Countries where data were available for <50% of schools are omitted from the figure: Iran, Israel, and Kuwait are omitted from the first panel; Germany, Greece, Iran, Israel, and Kuwait are omitted from the second panel.

Averages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

Figure 4.4

Amount of Time in School Scheduled for Instruction Fourth Grade*



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

1 Computed from the reported instructional days in the school year, the full and half instructional days in the school week, and the total and instructional hours in the school week. Reported as number of total hours and number of instructional hours averaged across schools.

2 Reported as ratio of instructional hours to total hours averaged across schools.

* See Table 1.2 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 Appendix A).

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

Countries where questions were not asked or data were available for <50% of schools are omitted from the figure: Kuwait, the Netherlands, and Norway did not ask these questions; data available for <50% of schools in Iran and Israel.

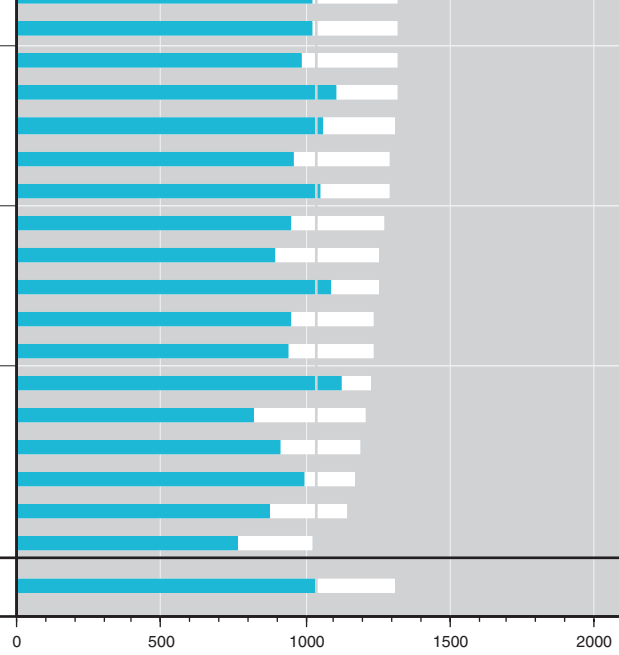
An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Figure 4.5

Amount of Time in School Scheduled for Instruction
Eighth Grade*

Country	Average Yearly Amount of Time in School and Average Amount of Instructional Time in Hours[1]	Average Percent of Hours Spent on Instruction[2]
Korea		81 (1.5)
Japan		76 (1.1)
Thailand		r 94 (0.7)
Portugal		r 80 (1.3)
France		s 78 (1.5)
Singapore		72 (0.0)
Australia		r 77 (0.8)
Slovak Republic		r 91 (0.8)
Belgium (Fl)		78 (0.0)
Belgium (Fr)		78 (0.0)
Canada		r 76 (1.1)
Colombia		s 88 (1.9)
Scotland		r 82 (1.0)
New Zealand		75 (1.2)
Lithuania		r 82 (1.8)
England		r 74 (0.5)
Latvia (LSS)		s 73 (1.0)
United States		s 86 (1.4)
Hong Kong		s 78 (1.5)
Ireland		r 78 (1.5)
Romania		r 94 (0.9)
Sweden		s 68 (1.6)
Russian Federation		r 75 (1.4)
Slovenia		s 86 (0.8)
Spain		s 82 (1.6)
Iceland		s 77 (0.0)
International Average		80 (0.2)



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

1 Computed from the reported instructional days in the school year, the full and half instructional days in the school week, and the total and instructional hours in the school week. Reported as number of total hours and number of instructional hours averaged across schools.

2 Reported as ratio of instructional hours to total hours averaged across schools.

* See Table 1.2 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

Countries where questions were not asked or data were available for <50% of schools are omitted from the figure: Austria, Czech Republic, Denmark, Greece, Kuwait, and Norway did not ask these questions; data available for <50% of schools in Cyprus, Germany, Hungary, Iran, Israel, the Netherlands, and Switzerland.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

For both mathematics and science at fourth grade, Table 4.4 presents the number of hours devoted to instruction in the subject and the percentage of total instructional time accounted for by those hours. There is tremendous variation in the number of instructional hours schools reported being devoted to mathematics per year, from 219 in Singapore to 92 in Korea, with an international average of 144 hours. On average across countries, 18% of the available instructional time was devoted to mathematics. This is a substantial amount of the total time, and the figure did not vary much from country to country (except Korea at only 9%).

For science at fourth grade, there was also a considerable range in the number of hours per year devoted to instruction, from 181 in Thailand to 18 in Latvia (LSS). Most countries reported substantially less emphasis on science than on mathematics instruction in the primary school, the average number of instructional hours — 75 hours — being only about half that reported for mathematics. Correspondingly, on average across countries, about 9% of the instructional time at fourth grade is devoted to science.

At eighth grade, information about instructional time in mathematics and science is more complicated to obtain because it differs by type of curricular program. Table 4.5 presents mathematics instructional time in hours and as a percentage of the total available time for students in schools with a single curricular program. For students in schools with more than one program, it shows instructional time for students in the most and least advanced courses of study. Table 4.6 presents the corresponding data for science.

Several patterns emerge from the data in Tables 4.5 and 4.6. In general, school principals reported spending less instructional time on mathematics at eighth grade than at fourth grade: about 20 hours less, on average, for students in schools with a single program and for those in advanced programs. The number of hours was reduced even further for students in the least advanced programs (108 hours per year at grade 8 compared with the 145 reported at grade 4).

In contrast, the amount of instructional time devoted to science increased at eighth grade to be equal to (or even greater than) the number devoted to mathematics. By the eighth grade, on average across countries, students in schools with only one science program or those in the least advanced programs received approximately 125-130 hours of science instruction per year, with higher average instructional hours for the most advanced program in some countries. In some countries, including Austria, the Czech Republic, Romania, and the Slovak Republic, the average amount of yearly science instruction was more than 200 hours.

Table 4.4

Amount of Instruction in Mathematics and Science[1]
Fourth Grade*

Country	Mathematics				Science			
	Average Amount of Yearly Mathematics Instruction in Hours[2]		Average Percent of Instructional Time Devoted to Mathematics[3]		Average Amount of Yearly Science Instruction in Hours[2]		Average Percent of Instructional Time Devoted to Science[3]	
Australia	r	182 (6.3)	r	18 (0.7)	r	49 (2.6)	r	5 (0.3)
Austria		– –		– –		– –		– –
Canada	r	165 (4.2)	s	19 (1.3)	r	92 (2.7)	s	10 (0.7)
Cyprus	r	139 (1.7)	s	21 (1.8)	r	48 (0.4)	s	7 (0.5)
Czech Republic		156 (2.2)	r	21 (0.4)		63 (1.3)	r	8 (0.2)
England	r	169 (3.6)	r	19 (0.5)	r	99 (4.9)	r	11 (0.7)
Greece		97 (6.3)	s	12 (1.1)		76 (3.5)	s	9 (0.6)
Hong Kong		130 (5.2)	s	16 (0.7)	r	40 (1.6)	s	5 (0.2)
Hungary		– –		– –		– –		– –
Iceland		103 (0.1)	r	20 (0.0)	r	43 (0.5)	s	8 (0.1)
Iran, Islamic Rep.	r	98 (6.8)		x x		66 (5.5)		x x
Ireland	r	145 (3.8)	r	19 (1.2)	s	50 (2.8)	s	6 (0.5)
Israel		x x		x x		x x		x x
Japan		– –		– –		– –		– –
Korea		92 (4.1)	r	9 (0.5)		92 (3.9)	r	9 (0.5)
Kuwait		– –		– –		– –		– –
Latvia (LSS)	s	114 (2.0)	s	19 (1.9)	r	18 (1.4)	r	3 (0.3)
Netherlands		– –		– –		– –		– –
New Zealand		149 (5.3)		15 (0.6)	r	45 (3.6)	r	5 (0.4)
Norway		111 (0.0)		– –		– –		– –
Portugal	r	190 (7.2)	s	22 (0.9)	r	154 (6.3)	s	18 (0.9)
Scotland		– –		– –		– –		– –
Singapore		219 (0.0)		22 (0.0)		81 (0.0)		8 (0.0)
Slovenia	r	127 (2.0)	s	17 (1.1)	r	54 (1.2)	s	7 (0.4)
Thailand	r	188 (5.9)	s	18 (1.4)	r	181 (7.5)	s	17 (1.4)
United States	r	156 (4.1)	s	18 (1.5)	s	106 (5.3)	s	13 (1.2)
International Average		144 (1.0)		18 (0.3)		75 (0.9)		9 (0.2)

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

1 Reported for schools where students follow the same course of study in mathematics or science (see Table 4.1).

2 Computed as yearly mathematics or science instruction averaged across schools.

3 Average percent of instructional time computed from the ratio of yearly mathematics or science instruction to the total amount of instructional time (see Figure 4.4).

* See Table 1.2 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 Appendix A).

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 school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table 4.5

Amount of Instruction in Mathematics
Eighth Grade*

Country	Schools with One Course of Study		Schools with More than One Course of Study [1]			
			Most Advanced Course of Study		Least Advanced Course of Study	
	Average Amount of Yearly Mathematics Instruction in Hours [2]	Average Percent of Instructional Time Devoted to Mathematics [3]	Average Amount of Yearly Mathematics Instruction in Hours [2]	Average Percent of Instructional Time Devoted to Mathematics [3]	Average Amount of Yearly Mathematics Instruction in Hours [2]	Average Percent of Instructional Time Devoted to Mathematics [3]
Australia	r 142 (2.7)	r 14 (0.4)	r 139 (7.0)	r 13 (0.6)	r 137 (3.9)	r 14 (0.5)
Austria	120 (0.0)	– –	120 (1.0)	– –	120 (1.0)	– –
Belgium (Fl)	127 (0.0)	12 (0.0)	127 (0.0)	12 (0.0)	63 (0.0)	6 (0.0)
Belgium (Fr)	127 (0.0)	12 (0.0)	127 (0.0)	12 (0.0)	63 (0.0)	6 (0.0)
Canada	r 153 (2.5)	r 16 (0.3)	148 (5.1)	15 (0.8)	150 (6.0)	15 (0.9)
Colombia	r 120 (6.9)	s 15 (1.7)	~ ~	~ ~	~ ~	~ ~
Cyprus	s 89 (0.0)	x x	~ ~	~ ~	~ ~	~ ~
Czech Republic	147 (2.4)	r 17 (0.2)	~ ~	~ ~	~ ~	~ ~
Denmark	r 120 (0.0)	– –	~ ~	~ ~	~ ~	~ ~
England	r 115 (4.9)	r 12 (0.6)	r 116 (1.6)	r 12 (0.2)	r 117 (1.5)	r 12 (0.2)
France	r 133 (1.4)	s 12 (0.2)	125 (4.9)	11 (0.5)	110 (14.3)	10 (1.3)
Germany	x x	x x	x x	x x	x x	x x
Greece	– –	– –	~ ~	~ ~	~ ~	~ ~
Hong Kong	r 118 (2.8)	s 13 (0.4)	~ ~	~ ~	~ ~	~ ~
Hungary	– –	– –	– –	– –	– –	– –
Iceland	110 (0.0)	r 15 (0.0)	111 (0.0)	15 (0.0)	112 (0.0)	15 (0.0)
Iran, Islamic Rep.	r 129 (6.4)	x x	~ ~	~ ~	~ ~	~ ~
Ireland	105 (2.6)	11 (0.7)	106 (1.8)	r 11 (0.2)	106 (1.9)	r 11 (0.2)
Israel	s 125 (7.1)	x x	x x	x x	x x	x x
Japan	118 (1.0)	10 (0.1)	~ ~	~ ~	~ ~	~ ~
Korea	100 (1.0)	8 (0.4)	~ ~	~ ~	~ ~	~ ~
Kuwait	– –	– –	– –	– –	– –	– –
Latvia (LSS)	s 134 (1.8)	s 15 (0.4)	~ ~	~ ~	~ ~	~ ~
Lithuania	107 (2.0)	r 10 (0.4)	157 (8.4)	14 (1.0)	106 (6.4)	9 (0.7)
Netherlands	r 100 (1.9)	s 8 (0.3)	r 102 (2.3)	s 8 (0.3)	r 97 (1.7)	s 8 (0.2)
New Zealand	139 (3.2)	r 15 (0.4)	140 (3.6)	15 (0.3)	142 (3.9)	15 (0.3)
Norway	111 (0.0)	– –	~ ~	~ ~	~ ~	~ ~
Portugal	118 (1.5)	r 11 (0.2)	~ ~	~ ~	~ ~	~ ~
Romania	114 (1.9)	r 10 (0.2)	~ ~	~ ~	~ ~	~ ~
Russian Federation	141 (2.2)	r 17 (0.4)	178 (14.1)	17 (2.6)	– –	– –
Scotland	r 139 (3.1)	r 13 (0.4)	r 134 (5.4)	r 13 (0.5)	r 134 (5.4)	r 13 (0.5)
Singapore	126 (0.0)	12 (0.0)	130 (0.0)	13 (0.0)	133 (0.0)	13 (0.0)
Slovak Republic	153 (2.7)	13 (0.3)	174 (17.3)	15 (0.2)	91 (13.3)	7 (1.1)
Slovenia	r 100 (0.9)	s 10 (0.2)	106 (3.7)	r 10 (0.4)	85 (13.7)	r 8 (1.4)
Spain	r 131 (2.2)	s 16 (1.1)	~ ~	~ ~	~ ~	~ ~
Sweden	96 (0.9)	r 12 (0.4)	97 (1.6)	r 12 (0.4)	97 (1.6)	r 12 (0.4)
[4] **Switzerland**	– –	– –	– –	– –	– –	– –
Thailand	r 107 (5.4)	s 8 (0.5)	58 (6.0)	4 (0.4)	62 (7.9)	4 (0.6)
United States	r 146 (4.2)	r 13 (0.9)	r 136 (5.7)	s 12 (0.8)	r 134 (5.9)	s 12 (0.8)
International Average	122 (0.5)	13 (0.1)	127 (1.4)	12 (0.2)	108 (1.5)	11 (0.2)

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

1 Reported for countries in which more than 10% of students are in schools with more than one course of study in mathematics (see Table 4.2).

2 Computed as yearly mathematics instruction averaged across schools.

3 Average percent of instructional time computed from the ratio of yearly mathematics instruction to the total amount of instructional time (see Figure 4.5).

4 Averages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available. A tilde (~) indicates insufficient data to report variable (percentage of students in schools with more than one course of study is less than 10).

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table 4.6

Amount of Instruction in Science
Eighth Grade*

Country	Schools with One Course of Study		Schools with More than One Course of Study[1]			
			Most Advanced Course of Study		Least Advanced Course of Study	
	Average Amount of Yearly Science Instruction in Hours[2]	Average Percent of Instructional Time Devoted to Science[3]	Average Amount of Yearly Science Instruction in Hours[2]	Average Percent of Instructional Time Devoted to Science[3]	Average Amount of Yearly Science Instruction in Hours[2]	Average Percent of Instructional Time Devoted to Science[3]
Australia	r 122 (2.3)	s 12 (0.3)	r 147 (8.0)	r 14 (0.7)	r 137 (6.0)	r 13 (0.8)
Austria	238 (0.7)	– –	~ ~	~ ~	~ ~	~ ~
Belgium (Fl)	127 (0.0)	12 (0.0)	– –	– –	– –	– –
Belgium (Fr)	– –	– –	– –	– –	– –	– –
Canada	r 105 (3.2)	s 11 (0.4)	~ ~	~ ~	~ ~	~ ~
Colombia	r 95 (4.7)	s 12 (1.5)	~ ~	~ ~	~ ~	~ ~
Cyprus	x x	x x	~ ~	~ ~	~ ~	~ ~
Czech Republic	222 (7.3)	r 26 (0.8)	~ ~	~ ~	~ ~	~ ~
Denmark	– –	– –	– –	– –	– –	– –
England	r 136 (3.6)	r 15 (0.4)	r 127 (8.4)	r 13 (1.1)	r 128 (8.5)	r 13 (1.1)
France	r 94 (5.9)	r 9 (0.7)	102 (7.3)	r 9 (0.8)	70 (6.9)	r 6 (0.7)
Germany	x x	x x	~ ~	~ ~	~ ~	~ ~
Greece	– –	– –	~ ~	~ ~	~ ~	~ ~
Hong Kong	r 84 (2.4)	s 9 (0.3)	~ ~	~ ~	~ ~	~ ~
Hungary	– –	– –	– –	– –	– –	– –
Iceland	64 (0.0)	s 9 (0.0)	~ ~	~ ~	~ ~	~ ~
Iran, Islamic Rep.	r 114 (4.6)	x x	~ ~	~ ~	~ ~	~ ~
Ireland	96 (1.9)	r 10 (0.4)	93 (2.4)	10 (0.3)	93 (2.9)	10 (0.3)
Israel	x x	x x	~ ~	~ ~	~ ~	~ ~
Japan	91 (1.2)	8 (0.1)	~ ~	~ ~	~ ~	~ ~
Korea	83 (1.3)	r 7 (0.3)	~ ~	~ ~	~ ~	~ ~
Kuwait	– –	– –	– –	– –	– –	– –
Latvia (LSS)	s 105 (9.4)	s 13 (1.0)	~ ~	~ ~	~ ~	~ ~
Lithuania	– –	– –	– –	– –	– –	– –
Netherlands	r 176 (10.9)	s 13 (1.4)	r 167 (5.4)	s 14 (0.7)	r 170 (4.8)	s 14 (0.5)
New Zealand	134 (2.4)	r 14 (0.3)	148 (3.1)	15 (0.3)	148 (3.2)	15 (0.4)
Norway	83 (0.0)	– –	~ ~	~ ~	~ ~	~ ~
Portugal	113 (4.2)	r 11 (0.5)	~ ~	~ ~	~ ~	~ ~
Romania	208 (7.6)	r 19 (0.6)	~ ~	~ ~	~ ~	~ ~
Russian Federation	192 (5.9)	r 23 (0.9)	~ ~	~ ~	~ ~	~ ~
Scotland	r 115 (2.2)	r 11 (0.3)	~ ~	~ ~	~ ~	~ ~
Singapore	134 (0.0)	13 (0.0)	139 (0.0)	14 (0.0)	137 (0.0)	14 (0.0)
Slovak Republic	270 (10.8)	22 (0.9)	218 (23.9)	18 (4.1)	125 (35.1)	~ ~
Slovenia	r 135 (3.4)	s 14 (0.4)	~ ~	~ ~	~ ~	~ ~
Spain	r 101 (2.4)	s 13 (0.7)	~ ~	~ ~	~ ~	~ ~
Sweden	r 123 (2.8)	r 15 (0.4)	~ ~	~ ~	~ ~	~ ~
[4] **Switzerland**	– –	– –	– –	– –	– –	– –
Thailand	r 100 (5.2)	r 7 (0.5)	r 56 (5.9)	r 4 (0.4)	80 (17.7)	5 (1.2)
United States	r 139 (2.2)	s 13 (0.3)	159 (5.1)	r 15 (0.6)	156 (5.7)	r 14 (0.5)
International Average	131 (0.9)	13 (0.1)	135 (2.9)	13 (0.5)	125 (4.2)	12 (0.2)

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

1 Reported for countries in which more than 10% of students are in schools with more than one course of study in Science (see Table 4.3).

2 Computed as yearly science instruction averaged across schools.

3 Average percent of instructional time computed from the ratio of yearly science instruction to the total amount of instructional time (see Figure 4.5).

4 Averages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available. A tilde (~) indicates insufficient data to report variable (percentage of students in schools with more than one course of study is less than 10 or data are available for less than 5 schools).

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Chapter 5

School Resources

While it is probably true to say that the teacher is the primary provider of instruction in every country, countries vary in the extent to which they provide the resources necessary to support effective teaching and instruction. Although a detailed examination of school resource issues was outside the scope of TIMSS, the study did seek to probe differences by focusing on one important resource in the modern classroom, i.e., the computer, and by asking school principals about resource shortages or inadequacies that inhibit their school's capacity to provide instruction.

What Is the Availability of Computers for Teachers and Students?

In the modern world, computer literacy is fast becoming an essential attribute of a well-educated person. In response to this reality and in order to ensure that their students are equipped to face the challenges of tomorrow's world, schools and school systems around the globe have been investing heavily in information technology in recent years. To gauge the extent of this development, TIMSS asked school principals about the availability of computers for use by teachers and students in their schools.

It is clear from principals' responses (Tables 5.1 and 5.2) that computer availability varies dramatically from country to country, and that economic considerations may not always be the determining factor. Among TIMSS participants at grade four, there was a complete range of availability, from countries such as Canada, England, the Netherlands, and the United States, where principals reported that every school had at least some computers, to countries such as Iran and Thailand, where no computers were reported in any schools. Countries where more than half of the schools reported no computers at all included Austria, Cyprus, Greece, Kuwait, Latvia (LSS), and Portugal. Relatively little provision of computers at fourth grade was also reported in the Czech Republic, Hong Kong, Ireland, Japan, Norway, Singapore, and Slovenia, where most schools reported either that no computers were available or that there were at least 50 students for each computer. While Canada and the United States reported the highest level of computer provision, with 60% and 63% of schools reporting a student-computer ratio of less than 15:1, several other countries reported a high level also. In Australia, England, Iceland, New Zealand, and Scotland more than half of the schools at fourth grade reported that the number of students per computer was no more than 30.

In general, provision of computers to students in schools having eighth graders was better than in schools with fourth graders. Although more countries participated in TIMSS at eighth grade, relatively fewer countries (about one-third) had low provision of computers, with more than half of the schools reporting either no computers or a student-computer ratio of more than 50:1. Colombia, Cyprus, the Czech Republic, Iran, Latvia (LSS), Lithuania, Norway, Portugal, Romania, the Russian Federation, the Slovak Republic, Slovenia, Spain, and Thailand fell into this category. At the other end of the spectrum, Canada and the United States were clearly the leaders in terms of number of computers for student and teacher use at fourth grade. At eighth grade, however, England and Scotland have more generous provision, Australia is comparable, and many other countries are not far behind. In addition to these very well-resourced countries, comparatively more countries at eighth grade (about one-third) reported a student-computer ratio of no more than 30:1 in the majority of schools. These countries include Austria, Belgium (French), Denmark, France, Iceland, Ireland, Japan, the Netherlands, New Zealand, Singapore, and Sweden.

Table 5.1

Availability of Computers in Schools for Use by Teachers and Students
Fourth Grade*

Country	Percent of Schools Without Any Computers	Percent of Schools by Number of Students per Computer[1]			
		More than 50 Students per Computer	31-50 Students per Computer	15 to 30 Students per Computer	Less than 15 Students per Computer
Australia	r 1 (1.0)	3 (1.5)	7 (2.3)	50 (5.6)	39 (6.2)
Austria	72 (5.1)	27 (5.1)	0 (0.2)	0 (0.0)	0 (0.5)
Canada	0 (0.3)	3 (1.9)	6 (2.2)	32 (3.4)	60 (4.1)
Cyprus	r 84 (2.7)	15 (2.7)	1 (0.0)	0 (0.0)	1 (0.0)
Czech Republic	46 (5.3)	31 (4.2)	13 (2.4)	7 (2.0)	3 (1.6)
England	r 0 (0.0)	0 (0.4)	10 (3.7)	72 (4.9)	18 (4.9)
Greece	93 (2.2)	3 (1.2)	3 (1.7)	2 (0.8)	0 (0.2)
Hong Kong	38 (5.8)	52 (5.9)	7 (3.5)	4 (2.7)	0 (0.0)
Hungary	7 (2.5)	27 (4.1)	36 (4.8)	24 (4.7)	5 (2.5)
Iceland	5 (0.0)	16 (0.1)	21 (0.2)	31 (0.5)	27 (0.2)
Iran, Islamic Rep.	100 (0.4)	0 (0.4)	0 (0.0)	0 (0.0)	0 (0.0)
Ireland	40 (4.5)	44 (3.8)	10 (2.6)	5 (2.0)	1 (1.2)
Israel	x x	x x	x x	x x	x x
Japan	38 (4.6)	41 (4.6)	4 (1.9)	12 (3.1)	6 (2.6)
Korea	19 (7.4)	22 (2.4)	13 (2.5)	17 (6.1)	28 (7.5)
Kuwait	s 77 (1.5)	19 (0.3)	4 (1.3)	1 (0.0)	0 (0.0)
Latvia (LSS)	71 (4.1)	13 (2.5)	5 (2.0)	9 (2.1)	1 (1.3)
Netherlands	r 0 (0.0)	28 (5.0)	36 (5.2)	25 (4.5)	11 (4.0)
New Zealand	1 (0.8)	7 (1.9)	14 (2.7)	45 (4.3)	33 (4.3)
Norway	r 25 (5.3)	28 (4.8)	7 (2.3)	19 (5.2)	20 (6.6)
Portugal	85 (3.4)	8 (2.3)	5 (2.3)	2 (1.1)	0 (0.0)
Scotland	r 1 (0.7)	6 (2.4)	15 (3.0)	56 (5.7)	23 (4.4)
Singapore	2 (0.0)	64 (0.3)	22 (0.2)	10 (0.1)	3 (0.0)
Slovenia	r 14 (4.4)	51 (6.1)	31 (6.4)	2 (1.3)	2 (1.4)
Thailand	s 100 (0.0)	0 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)
United States	s 0 (0.0)	2 (1.2)	3 (1.4)	32 (4.7)	63 (5.1)
International Average	37 (0.7)	20 (0.6)	11 (0.5)	18 (0.7)	14 (0.7)

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

1 Ratio of total enrollment to total computers for use by teachers and students.

* See Table 1.2 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 Appendix A).

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

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table 5.2

Availability of Computers in Schools for Use by Teachers and Students
Eighth Grade*

Country		Percent of Schools Without Any Computers	Percent of Schools by Number of Students per Computer[1]			
			More than 50 Students per Computer	31-50 Students per Computer	15 to 30 Students per Computer	Less than 15 Students per Computer
Australia		0 (0.0)	4 (2.6)	3 (1.4)	31 (4.8)	63 (4.8)
Austria		0 (0.0)	2 (1.3)	12 (3.5)	57 (5.6)	29 (6.5)
Belgium (Fl)	r	5 (1.7)	24 (8.0)	22 (7.0)	27 (7.3)	22 (6.3)
Belgium (Fr)	s	3 (1.9)	25 (5.1)	18 (4.8)	32 (5.9)	22 (6.6)
Canada		0 (0.0)	4 (1.7)	3 (0.7)	31 (3.9)	63 (4.3)
Colombia	r	68 (4.5)	17 (3.3)	11 (3.1)	3 (1.8)	1 (1.0)
Cyprus	r	67 (0.0)	28 (0.0)	3 (0.0)	0 (0.0)	3 (0.0)
Czech Republic		22 (4.4)	40 (4.6)	19 (3.8)	19 (4.8)	0 (0.0)
Denmark	s	0 (0.0)	0 (0.0)	3 (1.6)	59 (4.9)	38 (4.7)
England	r	0 (0.0)	1 (0.7)	1 (1.0)	16 (4.1)	82 (4.4)
France	r	0 (0.0)	18 (3.6)	17 (3.5)	33 (7.0)	32 (5.0)
Germany	s	20 (6.0)	22 (5.3)	27 (4.9)	28 (6.5)	3 (1.2)
Greece		37 (5.5)	12 (2.3)	23 (3.9)	16 (3.7)	13 (4.8)
Hong Kong		9 (3.8)	24 (4.8)	39 (5.9)	24 (4.8)	4 (4.2)
Hungary		7 (2.5)	27 (4.1)	36 (4.8)	25 (4.8)	5 (2.5)
Iceland		6 (0.0)	10 (0.0)	16 (0.0)	35 (0.0)	32 (0.0)
Iran, Islamic Rep.		100 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Ireland	s	3 (2.1)	14 (3.8)	30 (5.2)	36 (6.6)	17 (7.1)
Israel		x x	x x	x x	x x	x x
Japan		6 (2.7)	8 (2.8)	13 (2.0)	42 (4.0)	31 (4.1)
Korea		17 (4.5)	24 (3.0)	13 (2.8)	21 (5.5)	25 (5.4)
Kuwait		x x	x x	x x	x x	x x
Latvia (LSS)		62 (4.4)	17 (2.9)	10 (2.7)	11 (2.9)	1 (1.1)
Lithuania		70 (4.2)	22 (3.6)	4 (1.7)	3 (1.5)	1 (1.0)
Netherlands	s	3 (2.6)	9 (3.1)	15 (4.7)	50 (7.6)	23 (6.0)
New Zealand		0 (0.0)	3 (1.3)	4 (1.3)	38 (5.5)	55 (5.8)
Norway	r	21 (7.6)	33 (5.2)	9 (2.4)	32 (8.5)	5 (3.6)
Portugal		14 (4.2)	71 (5.0)	10 (5.1)	5 (3.1)	0 (0.0)
Romania		91 (1.3)	9 (1.2)	0 (0.2)	0 (0.0)	0 (0.0)
Russian Federation		39 (4.1)	34 (3.8)	13 (3.5)	14 (3.4)	1 (1.0)
Scotland	r	4 (4.2)	3 (1.5)	1 (0.7)	8 (2.1)	83 (4.8)
Singapore		0 (0.0)	17 (0.0)	9 (0.0)	39 (0.0)	35 (0.0)
Slovak Republic		28 (4.7)	47 (4.0)	11 (3.2)	12 (4.7)	2 (1.6)
Slovenia	r	14 (4.5)	50 (5.6)	31 (6.5)	3 (2.1)	2 (1.4)
Spain		41 (4.4)	43 (4.9)	10 (2.8)	6 (2.0)	0 (0.0)
Sweden	r	0 (0.0)	2 (1.2)	8 (3.1)	49 (5.2)	41 (5.5)
[2] **Switzerland**		– –	– –	– –	– –	– –
Thailand		71 (3.8)	24 (3.5)	4 (1.7)	1 (0.8)	0 (0.0)
United States	r	1 (0.9)	2 (1.3)	4 (1.6)	23 (5.9)	70 (6.3)
International Average		23 (0.6)	19 (0.6)	12 (0.6)	23 (0.8)	22 (0.7)

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

1 Ratio of total enrollment to total computers for use by teachers and students.

2 Percentages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

In Which Countries Is Capacity to Provide Instruction Affected by School-Wide Shortages or Inadequacies?

In an effort to inquire into the school resource issues that might inhibit instructional effectiveness, TIMSS asked school principals about shortages or inadequacies in three areas: general capacity to provide instruction; capacity to provide instruction in mathematics; and capacity to provide instruction in science. In the area of general capacity, principals were asked about instructional materials, budget for supplies, school buildings and grounds, heating/cooling and lighting, and instructional space. With reference to capacity to provide mathematics instruction, principals were asked about computers, computer software, calculators, library materials, and audio-visual resources for mathematics instruction. The list for capacity to provide science instruction included analogous items in the science instruction sphere as well as science laboratory experiments and materials. At the final year of secondary school, shortages or inadequacies in mathematics and science instruction also included a question about the availability of qualified mathematics or physics teachers. Figures 5.1 through 5.3 summarize the results, showing the percentage of students in schools reporting on the three areas of school-wide shortages or inadequacies for fourth grade, eighth grade, and the final year of secondary school, respectively.[1]

At fourth grade (Figure 5.1), about one-third of the schools, on average across all countries, reported that their general capacity to provide instruction was affected "some" or "a lot" by shortages or inadequacies in the items listed. In Iran, Latvia (LSS), Slovenia, and Thailand, more than half of the fourth-grade students were in such schools. Countries where relatively few problems were reported included Australia, Austria, Canada, Cyprus, the Czech Republic, the Netherlands, Norway, Singapore, and the United States. In these countries fewer than 20% of the fourth grade students were in schools reporting that their general capacity was affected. School buildings or grounds and instructional space were the factors most often mentioned as affecting general capacity at grade four (Table B.1).

When asked specifically about mathematics, more schools at grade four reported that shortages or inadequacies affected their capacity to provide mathematics instruction, with 40% of students on average in such schools. Countries where a majority of fourth-grade students were in such schools included Greece, Iran, Ireland, Israel, Korea, Latvia (LSS), Portugal, and Thailand. Only Austria, the Czech Republic, Hungary, and Singapore had relatively few schools reporting problems, with less than 20% of students in

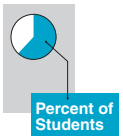
[1] The percent of schools reporting shortages or inadequacies is presented for each of the factors individually in Tables B.1-B.9 of Appendix B.

Figure 5.1

Percent of Students in Schools Reporting School-Wide Shortages or Inadequacies that Affect Capacity to Provide Instruction[1] - Fourth Grade*

Country	Facilities and Materials that Affect General Capacity to Provide Instruction[2]		Resources that Affect Capacity to Provide Instruction in Mathematics[3]		Resources that Affect Capacity to Provide Instruction in Science[4]	
Australia		18		33		45
Austria		5		8		11
Canada		17		36		52
Cyprus	r	14	r	30	r	44
Czech Republic		12		19		22
England		25		38		40
Greece		38		55		63
Hong Kong		33		25		36
Hungary		35		16		22
Iceland		28		29	r	42
Iran, Islamic Rep.		63		64		68
Ireland		26		61		78
Israel	s	20	s	57	s	64
Japan		30		32		45
Korea		41		70		79
Kuwait		x		x	s	11
Latvia (LSS)		89	r	79	r	81
Netherlands		13	r	23	r	33
New Zealand		26		37		49
Norway	r	17	r	22	r	38
Portugal		41		74		80
Scotland		–		–		–
Singapore		10		16		25
Slovenia	r	64	r	40	r	72
Thailand		96		69		78
United States	r	12	r	24	r	42
International Average		32		40		49

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



1 Reported as percent of students in schools reporting school-wide shortages or inadequacies that affect capacity to provide instruction 'some' or 'a lot' based on the average response to several questions in each category (see Tables B.1, B.2, B.3).

2 Instructional materials; budget for supplies; school buildings/grounds; heating/cooling and lighting; instructional space.

3 Computers for mathematics instruction, computer software for mathematics instruction; calculators for mathematics instruction; library materials relevant to mathematics instruction; audio-visual resources for mathematics instruction.

4 Computers for science instruction, computer software for science instruction; calculators for science instruction; library materials relevant to science instruction; audio-visual resources for science instruction; science laboratory equipment and materials.

* See Table 1.2 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 Appendix A).

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 insufficent data to report achievement.

An "r" indicates school data available for 70-84% of students. An "s" indicates school data available for 50-69% of students.

An "x" indicates school data available for <50% of students.

such schools. On average, shortages of computers and computer software and of audio-visual resources were most often reported as adversely affecting mathematics instruction (Table B.2). At grade four, the situation for science instruction was even worse, with almost half the students on average in schools where instruction was reportedly affected by resource shortages. In general, the countries where shortages affected instruction were the same for science and mathematics. Science laboratory equipment and materials were the items most often reported as adversely affecting capacity to provide science instruction (Table B.3).

The situation for schools with eighth-grade students was similar to that for fourth-grade. As seen in Figure 5.2, the countries where most eighth-grade students were in schools whose general capacity to provide instruction was affected by resource shortages included Belgium (French), Denmark, Iran, Latvia (LSS), Lithuania, Portugal, the Russian Federation, Slovenia, and Thailand. With the exception of Belgium (French) and Slovenia, these countries also had a majority of students in schools that reported that mathematics and science instruction was affected. Countries with a majority of students in schools that reported that mathematics and science instruction were affected but that their general capacity was not affected were Colombia, Korea, and Romania. In Greece, Ireland, the Slovak Republic, and the United States, the majority of students were in schools that reported shortages affecting science instruction only. As in fourth grade, general capacity to provide instruction at eighth grade was affected mostly by inadequate school buildings or shortage of instructional space (Table B.4). Lack of computers and computer software was the most common problem for mathematics instruction (Table B.5) and for science instruction (Table B.6), although science laboratory equipment and materials were also a common problem for the latter.

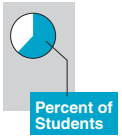
By comparison with fourth- and eighth-grade schools, resource shortages or inadequacies appear less of a problem in schools with students in the final year of secondary school (Figure 5.3). Among countries participating in TIMSS at this level, only the Russian Federation had a majority of students in schools where the general capacity to provide instruction was impaired (budget for supplies was the most frequently reported problem – Table B.7), and only this country and Lithuania had a majority in schools where mathematics or science instruction was affected. Again, shortage of computers and computer software was the most commonly reported problem for both mathematics and science instruction (Tables B.8 and B.9).

Figure 5.2

Percent of Students in Schools Reporting School-Wide Shortages or Inadequacies that Affect Capacity to Provide Instruction[1] - Eighth Grade*

Country	Facilities and Materials that Affect General Capacity to Provide Instruction[2]		Resources that Affect Capacity to Provide Instruction in Mathematics[3]		Resources that Affect Capacity to Provide Instruction in Science[4]	
Australia	r	18	r	24	r	33
Austria		12		8		26
Belgium (Fl)		4		16		9
Belgium (Fr)	r	54	r	30	r	46
Canada		13		36	r	45
Colombia		40	r	79	r	74
Cyprus	r	29	r	19	s	26
Czech Republic		10		13		20
Denmark	r	73	r	57	r	72
England	r	31	r	29	r	39
France		38		28		46
Germany	s	27	s	20	s	30
Greece		35		47		65
Hong Kong		25		22		31
Hungary		35		15		21
Iceland		23		27		30
Iran, Islamic Rep.		73		68		78
Ireland		22		49		51
Israel	s	34	s	45	s	49
Japan		27		22		31

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



1 Reported as percent of students in schools reporting school-wide shortages or inadequacies that affect capacity to provide instruction 'some' or 'a lot' based on the average response to several questions in each category (see Tables B.4, B.5, B.6).

2 Instructional materials; budget for supplies; school buildings/grounds; heating/cooling and lighting; instructional space.

3 Computers for mathematics instruction, computer software for mathematics instruction; calculators for mathematics instruction; library materials relevant to mathematics instruction; audio-visual resources for mathematics instruction.

4 Computers for science instruction, computer software for science instruction; calculators for science instruction; library materials relevant to science instruction; audio-visual resources for science instruction; science laboratory equipment and materials.

* See Table 1.2 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 Appendix A).

School background data for Bulgaria and South Africa are unavailable.

An "r" indicates school data available for 70-84% of students. An "s" indicates school data available for 50-69% of students.

Figure 5.2 (Continued)

Percent of Students in Schools Reporting School-Wide Shortages or Inadequacies that Affect Capacity to Provide Instruction[1] - Eighth Grade*

Country	Facilities and Materials that Affect General Capacity to Provide Instruction[2]	Resources that Affect Capacity to Provide Instruction in Mathematics[3]	Resources that Affect Capacity to Provide Instruction in Science[4]
Korea	44	67	78
Kuwait	x	x	x
Latvia (LSS)	r 82	r 77	r 86
Lithuania	51	71	83
Netherlands	r 8	r 13	r 8
New Zealand	27	35	47
Norway	r 16	r 19	r 27
Portugal	57	57	55
Romania	45	75	84
Russian Federation	85	82	85
Scotland	–	–	–
Singapore	10	10	12
Slovak Republic	17	49	58
Slovenia	r 62	r 38	r 68
Spain	25	28	34
Sweden	18	17	32
Switzerland	r 13	r 9	r 10
Thailand	r 83	69	77
United States	27	44	62
International Average	35	38	47

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

Percent of Students

1 Reported as percent of students in schools reporting school-wide shortages or inadequacies that affect capacity to provide instruction 'some' or 'a lot' based on the average response to several questions in each category (see Tables B.4, B.5, B.6).

2 Instructional materials; budget for supplies; school buildings/grounds; heating/cooling and lighting; instructional space.

3 Computers for mathematics instruction, computer software for mathematics instruction; calculators for mathematics instruction; library materials relevant to mathematics instruction; audio-visual resources for mathematics instruction.

4 Computers for science instruction, computer software for science instruction; calculators for science instruction; library materials relevant to science instruction; audio-visual resources for science instruction; science laboratory equipment and materials.

* See Table 1.2 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available.

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An "x" indicates school data available for <50% of students.

Figure 5.3

Percent of Students in Schools Reporting School-Wide Shortages or Inadequacies that Affect Capacity to Provide Instruction[1] - Final Year of Secondary School*

Country	Facilities and Materials that Affect General Capacity to Provide Instruction[2]		Resources that Affect Capacity to Provide Instruction in Mathematics[3]		Resources that Affect Capacity to Provide Instruction in Science[4]	
Australia		3		28		15
Austria		3		1	r	6
Canada	r	16	r	40	r	40
Cyprus	r	33	r	4	r	18
Czech Republic		15		15		12
Denmark	r	31	r	31	s	27
France	r	32		31		42
Germany	s	28	s	4	s	16
Hungary	r	33	r	35	r	26
Iceland	s	15	–		r	14
Italy		39		29		28
Lithuania	r	43	r	58	r	56
New Zealand		20		32		31
Norway		1		7	r	5
Russian Federation		65		81		74
Slovenia		x		x		–
South Africa		x		x		x
Sweden	r	7	r	8	r	13
Switzerland	r	10	r	2	r	9
United States	r	21	r	34	r	39
International Average		23		26		26

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

Percent of Students

1 Reported as percent of students in schools reporting school-wide shortages or inadequacies that affect capacity to provide instruction 'some' or 'a lot' based on the average response to several questions in each category (see Tables B.7, B.8, B.9).

2 Instructional materials; budget for supplies; school buildings/grounds; heating/cooling and lighting; instructional space.

3 Computers for mathematics instruction, computer software for mathematics instruction; calculators for mathematics instruction; library materials relevant to mathematics instruction; audio-visual resources for mathematics instruction; availability of suitably qualified mathematics teachers.

4 Computers for science instruction, computer software for science instruction; calculators for science instruction; library materials relevant to science instruction; audio-visual resources for science instruction; science laboratory equipment and materials; availability of suitably qualified physics teachers.

* See Table 1.2 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 Appendix A).

The Netherlands did not administer the school questionnaire at the final year of secondary school.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of students. An "s" indicates school data available for 50-69% of students.

An "x" indicates school data available for <50% of students.

Chapter 6

School Atmosphere

Research has shown that schools with an atmosphere more conducive to academic achievement tend to have higher performance than their counterparts with more problems. As was anticipated, the TIMSS data also show higher achievement within countries with less absenteeism, more stability in their student body, and fewer problems. Chapter 6 presents the TIMSS results for these three indicators of a positive school environment.

What Were the Rates of Absenteeism and the Stability of the Student Bodies in the TIMSS Countries?

In some countries, many schools are confronted with high absentee rates and frequent turnovers of the student body. These problems can affect the continuity of instruction and can disrupt students' learning. In general, research has shown that a higher rate of truancy is related to less serious attitudes toward school, students from lower socio-economic backgrounds, and lower academic achievement. For whatever reasons, students who miss a number of their lessons are less likely to perform well in school.

To investigate absenteeism and stability of the student bodies, TIMSS asked the principals or headmasters of the participating schools about the percentage of students likely to be absent on a typical day and the percentage of students leaving before the end of the school year. Figures 6.1 through 6.3 present summary information about absenteeism and stability of the student body for the fourth-grade, eighth-grade, and final-year students, respectively.[1] For example, the first panel in Figure 6.1 shows, for the fourth grade, the percentage of students in each country attending schools where principals reported that 5% or more of the students typically would be absent on any given day. The second panel in Figure 6.1 shows the percentages of fourth-graders attending schools where 5% or more of the students beginning the year in the school left before the end of the school year.

Looking at the results across grades, several patterns become apparent. First, in general students around the world are attending school. Principals report that only 3%, 4%, and 7% of the students typically are absent, on average, at grades four, eight, and the final year of secondary school, respectively (see Tables B.10 – B.12 in Appendix B). As shown in Figures 6.1 through 6.3, however, the rates and patterns of absenteeism vary considerably across countries. At grade four, the majority of students in the Czech Republic, Ireland, and Latvia attended schools where at least 5% of the students typically are absent. In contrast, hardly any fourth-graders (5% or less)

[1] Additional information is presented in Tables B.10 – B.15 in Appendix B. These tables show the average reported percentage of students absent on a typical day and average reported percentage of students leaving school before the end of the school year as well as the relationship to achievement.

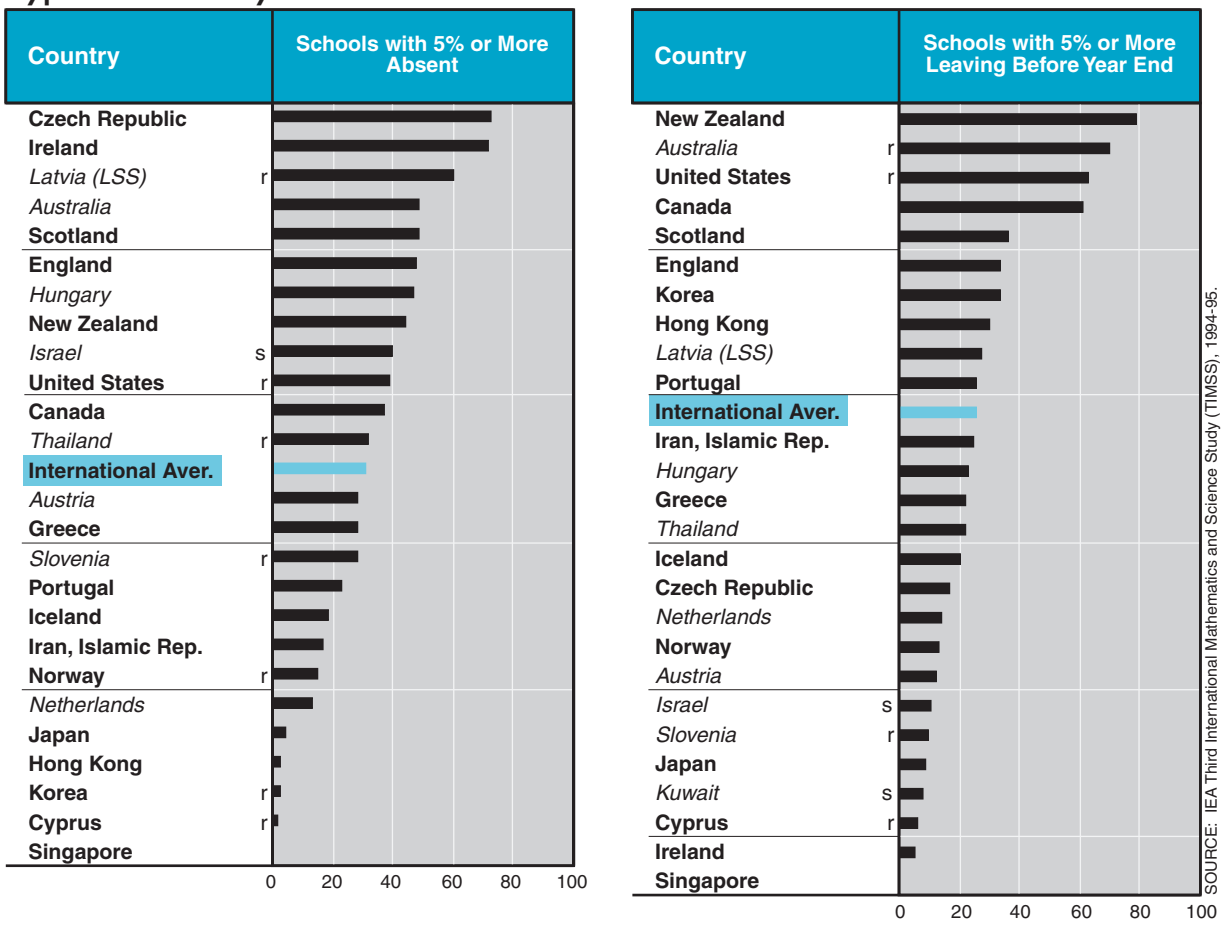
attended such schools in Singapore, Cyprus, Korea, Hong Kong, and Japan. This low rate of absenteeism continued at the eighth grade in high-performing Singapore, Hong Kong, Korea, and Japan (Figure 6.2).

As shown in the results presented in Appendix B (Tables B.10 – B.12), schools with poorer attendance rates often had students with lower average achievement in mathematics and science, particularly at the lower grades. In many of the participating countries for grades four and eight, performance was lower in schools with 5% or more of the students typically absent than in schools with less absenteeism. Interestingly, even though absenteeism increases as students progress through school, the relationship with achievement was found to be negligible during the final year of secondary school.

The TIMSS data also reveal substantial differences among countries in the percentages of students attending schools where 5% or more of the students beginning the year in the school left before the end of the school year. The countries with the highest rates of mobility at fourth grade (Figure 6.1) included New Zealand, Australia, the United States, and Canada. These four countries also were among the five with the greatest percentages of eighth-graders (Figure 6.2) attending schools where at least 5% of the student left before year end (the additional country was Colombia). Most countries reported substantially more mobility for students in their final year of secondary school than for those in the lower grades (Figure 6.3). This may be in part because some secondary-school students are participating in various types of vocational education and training programs. The results presented in Appendix B relating stability of the student body to achievement (Tables B.13 through B. 15) reveal considerable variation across countries. Nevertheless, within countries, particularly at grades four and eight, students in schools with more stable student bodies usually outperformed students in schools with less stability.

Figure 6.1

Percent of Students in Schools Reporting That At Least 5% of Students Are Absent on a Typical School Day or Leave School Before the End of the School Year[1] - Fourth Grade*



1 Average reported percentages and relationship to achievement shown in Appendix B (Tables B.10 and B.13).

* See Table 1.2 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 Appendix A).

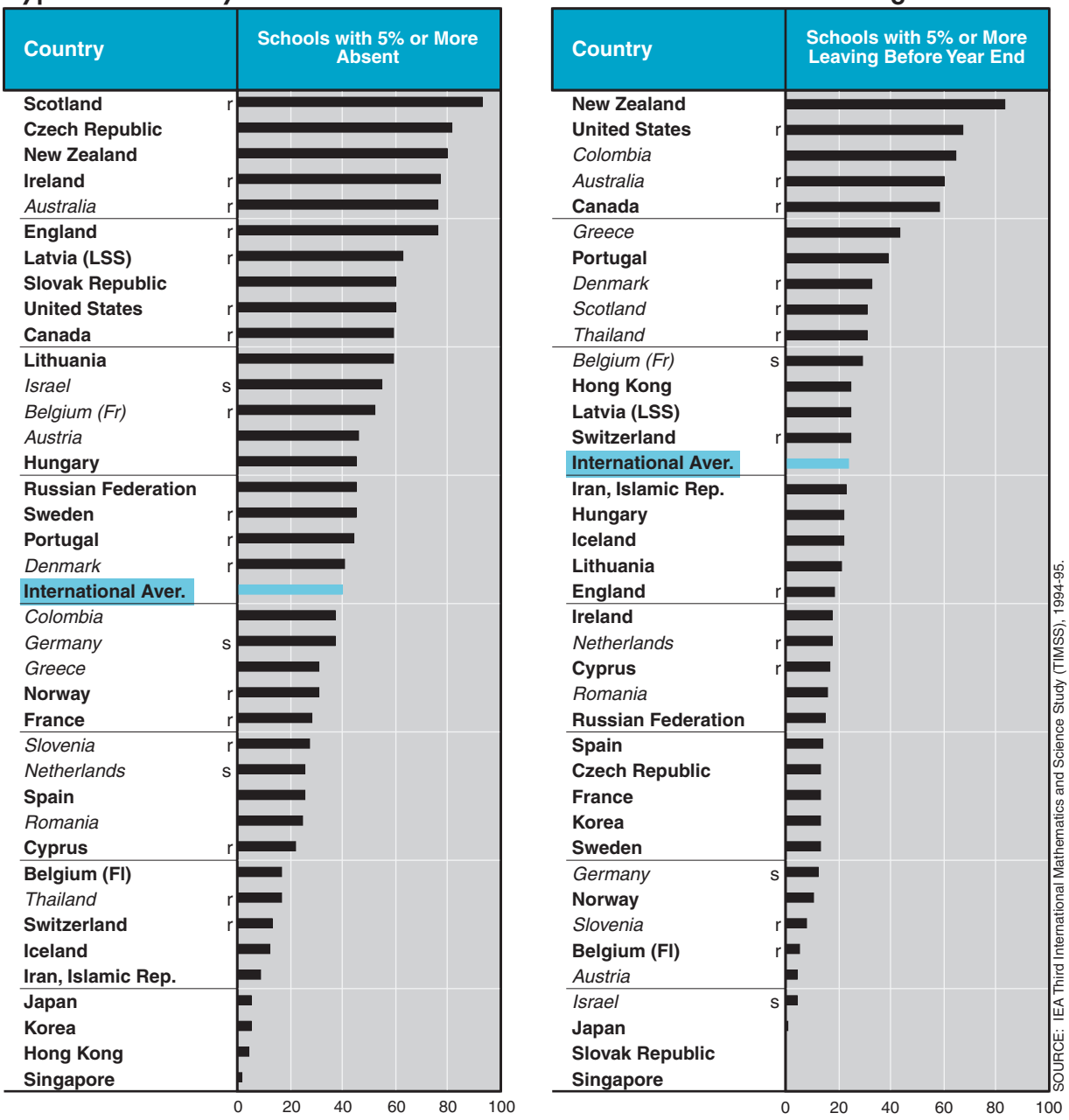
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

Countries where data were available for <50% of students are omitted from the figure (Kuwait omitted from first panel).

An "r" indicates school data available for 70-84% of students. An "s" indicates school data available for 50-69% of students.

Figure 6.2

Percent of Students in Schools Reporting That At Least 5% of Students Are Absent on a Typical School Day or Leave School Before the End of the School Year[1] - Eighth Grade*



1 Average reported percentages and relationship to achievement shown in Appendix B (Tables B.11 and B.14).

* See Table 1.2 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 Appendix A).

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

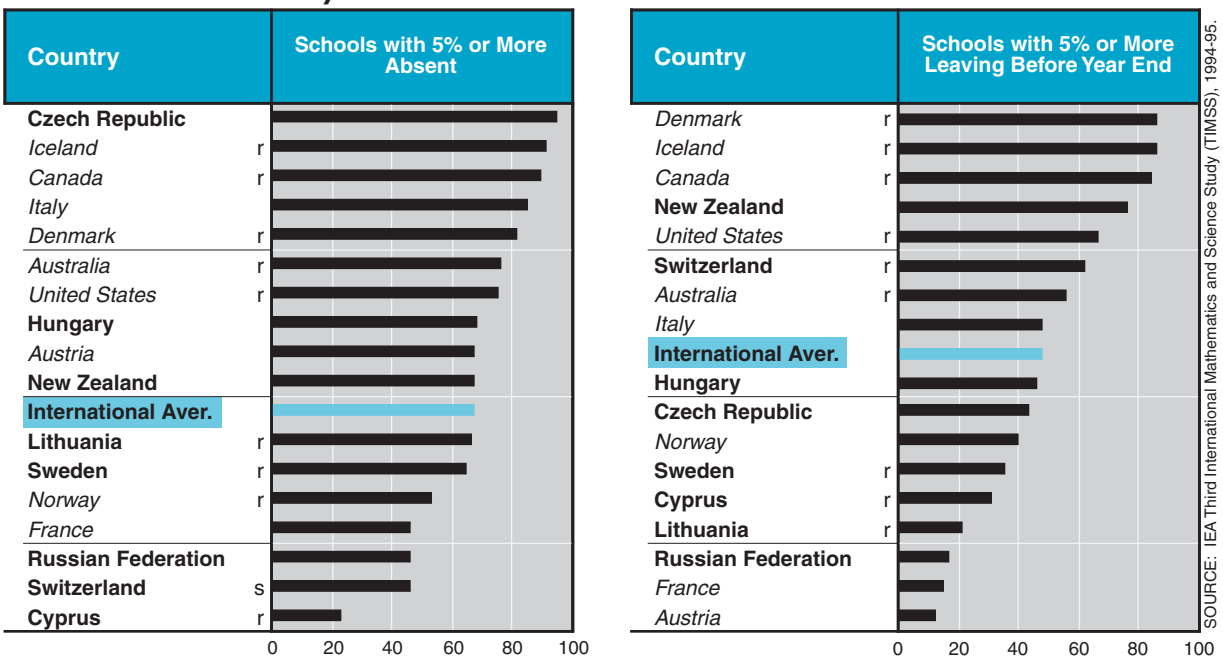
School background data for Bulgaria and South Africa are unavailable.

Countries where data were available for <50% of students are omitted from the figure (Kuwait omitted from both panels).

An "r" indicates school data available for 70-84% of students. An "s" indicates school data available for 50-69% of students.

Figure 6.3

Percent of Students in Schools Reporting That At Least 5% of Students Are Absent on a Typical School Day or Leave School Before the End of the School Year[1]
Final Year of Secondary School*



1 Average reported percentages and relationship to achievement shown in Appendix B (Tables B.12 and B.15).

* See Table 1.2 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 Appendix A).

The Netherlands did not administer the school questionnaire at the final year of secondary school.

Countries where data were available for <50% of students are omitted from the figure (Germany, Slovenia, and South Africa omitted from both panels).

An "r" indicates school data available for 70-84% of students. An "s" indicates school data available for 50-69% of students.

What Types of Problems do Schools face?

TIMSS asked the head of each participating school about the frequency with which they had to deal with various problems. Tables 6.1 through 6.3 show, for the fourth grade, eighth grade, and final year of school, respectively, the percentages of principals or school heads reporting that they faced problems at least monthly. Looking at these tables in conjunction with Tables 3.1 through 3.3 (Chapter 3), which contain the percent of students in schools by total school enrollment for the fourth grade, eighth grade, and final year of secondary school, respectively, does confirm the common sense idea that larger schools tend to have more problems. Nevertheless, there is considerable variation across countries beyond that indicated by school size.

Table 6.1 shows that at grade four, the most prevalent school problem reported was students intimidating other students. On average across countries, 40% of the principals reported having to deal with such incidents at least once a month. There was quite a range across countries, however, from 86% of the principals so reporting in Israel to only 12% to 13% in Latvia (LSS) and Singapore. Apparently, intimidation can turn more serious on occasion, as the next most prevalent problem at grade four was physical injury to students. On average, about one-fourth of the principals of fourth-graders reported having to deal with this problem monthly. For the TIMSS participants, vandalism, theft, and intimidation of teachers did not seem to be very widespread problems at fourth grade.

At eighth grade (Table 6.2), the most prevalent school problem remained students intimidating other students. On average across countries, about half of the principals or school heads reported having to deal with this at least once a month. Unfortunately, compared to the reports for the fourth grade, other school problems increased for the principals of the eighth-graders. From 21% to 27% of the principals, on average, reported at least monthly incidences of vandalism, theft, and injury to students.

TIMSS has secondary-school results for fewer countries than for the fourth and eighth grades (Table 6.3). Interestingly, however, some of the problems faced by secondary-school principals seemed to reflect a change in character rather than an increased frequency of the problems prevalent at fourth and eighth grades. Vandalism and theft remained problems in the world's secondary schools that 19% to 21% of the principals or school heads needed to deal with at least monthly. According to principals, the amount of student-to-student intimidation and injury decreased in secondary school compared to middle school. Unfortunately, by the final year of secondary school illegal drug use and possession became a noticeable problem in some countries. On average, 7% of the principals reported having to deal with illegal drug use or possession on at least a monthly basis. Of the 12 countries reporting data in response to this question, illegal drug use and possession was not a problem in Denmark or Lithuania (0% of schools reporting at least monthly occurrence). In contrast, nearly one-fifth (18%) of the school principals in the United States reported having to deal with drug use or possession on at least a monthly basis.

Table 6.1

Schools' Reports on Dealing with Students' Problem Behaviors At Least Monthly Fourth Grade*

Country	Percent of Schools by Problem Behavior				
	Vandalism	Theft	Physical Injury to Students	Intimidation of Students	Intimidation of Teachers
Australia	16 (3.5)	14 (3.3)	47 (6.0)	73 (4.1)	12 (3.0)
Austria	10 (3.7)	4 (1.7)	9 (3.4)	56 (7.7)	1 (0.7)
Canada	r 12 (2.8)	r 15 (3.3)	r 28 (3.6)	r 54 (4.5)	r 9 (2.8)
Cyprus	s 14 (3.2)	r 12 (3.0)	r 16 (2.7)	r 33 (3.4)	s 3 (0.9)
Czech Republic	6 (1.9)	3 (1.0)	19 (2.9)	18 (3.2)	0 (0.3)
England	– –	– –	– –	– –	– –
Greece	s 4 (1.9)	s 3 (1.8)	r 40 (7.3)	r 38 (7.1)	s 5 (2.2)
Hong Kong	r 10 (4.4)	r 13 (4.5)	r 12 (4.5)	r 26 (5.8)	r 11 (4.5)
Hungary	– –	– –	– –	– –	– –
Iceland	r 8 (1.1)	r 1 (0.0)	r 24 (0.7)	r 50 (0.6)	r 4 (0.0)
Iran, Islamic Rep.	r 7 (2.6)	r 8 (2.6)	r 16 (4.3)	35 (5.3)	r 3 (1.9)
Ireland	5 (1.2)	3 (1.2)	14 (3.0)	48 (3.8)	3 (1.3)
Israel	s 26 (5.6)	s 10 (4.5)	s 71 (10.4)	s 86 (9.8)	s 23 (7.9)
Japan	– –	– –	– –	– –	– –
Korea	s 24 (6.9)	s 18 (6.2)	s 22 (6.5)	s 21 (6.4)	s 8 (2.8)
Kuwait	s 38 (0.9)	s 20 (0.4)	s 41 (0.9)	s 37 (1.1)	s 17 (0.3)
Latvia (LSS)	x x	s 8 (3.3)	s 39 (6.0)	s 12 (4.3)	x x
Netherlands	17 (3.8)	2 (1.3)	9 (2.8)	53 (4.4)	6 (2.5)
New Zealand	15 (3.8)	25 (4.8)	26 (5.0)	56 (7.6)	13 (4.7)
Norway	– –	– –	– –	– –	– –
Portugal	r 9 (3.0)	r 3 (1.5)	r 32 (4.0)	r 26 (4.2)	r 2 (1.3)
Scotland	– –	– –	– –	– –	– –
Singapore	6 (0.0)	4 (0.0)	5 (0.0)	13 (0.1)	1 (0.0)
Slovenia	r 14 (3.6)	r 4 (1.9)	r 51 (5.0)	r 37 (6.0)	r 4 (2.0)
Thailand	s 30 (5.0)	s 28 (5.7)	s 35 (5.1)	s 40 (4.8)	s 23 (5.1)
United States	9 (2.9)	11 (3.0)	15 (3.6)	32 (5.3)	9 (3.0)
International Average	14 (0.8)	10 (0.7)	27 (1.0)	40 (1.2)	8 (0.7)

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

* See Table 1.2 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 Appendix A).

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 school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table 6.2

Schools' Reports on Dealing with Students' Problem Behaviors At Least Monthly Eighth Grade*

Country	Percent of Schools by Problem Behavior				
	Vandalism	Theft	Physical Injury to Students	Intimidation of Students	Intimidation of Teachers
Australia	r 47 (4.9)	r 43 (5.1)	r 37 (4.5)	r 84 (3.8)	r 44 (5.9)
Austria	39 (5.3)	20 (3.6)	12 (3.1)	70 (5.0)	12 (4.3)
Belgium (Fl)	31 (6.5)	25 (6.8)	37 (6.3)	76 (4.2)	24 (8.1)
Belgium (Fr)	r 32 (5.6)	r 30 (5.0)	r 36 (5.9)	r 51 (6.5)	s 17 (4.8)
Canada	r 23 (3.3)	r 19 (2.7)	r 26 (4.0)	r 64 (3.8)	r 22 (4.2)
Colombia	s 22 (4.4)	r 20 (4.6)	s 17 (4.1)	r 35 (6.2)	s 14 (3.9)
Cyprus	s 22 (0.0)	s 36 (0.0)	s 25 (0.0)	s 50 (0.0)	s 6 (0.0)
Czech Republic	32 (5.1)	10 (2.8)	23 (3.2)	33 (4.2)	3 (1.9)
Denmark	r 14 (3.6)	r 4 (2.0)	r 18 (4.1)	r 63 (5.0)	r 41 (4.6)
England	– –	– –	– –	– –	– –
France	9 (2.5)	25 (7.1)	29 (8.2)	52 (6.0)	5 (1.6)
Germany	x x	x x	x x	s 61 (6.9)	x x
Greece	s 19 (3.6)	s 12 (3.4)	r 28 (5.3)	r 51 (5.5)	s 20 (6.7)
Hong Kong	33 (5.2)	23 (5.0)	13 (3.7)	r 48 (6.6)	r 13 (3.9)
Hungary	– –	– –	– –	– –	– –
Iceland	r 19 (0.0)	r 9 (0.0)	23 (0.0)	49 (0.0)	r 8 (0.0)
Iran, Islamic Rep.	s 7 (3.0)	s 14 (4.7)	s 18 (3.8)	r 46 (5.7)	r 15 (4.7)
Ireland	38 (5.0)	30 (3.9)	10 (3.4)	47 (5.4)	16 (4.5)
Israel	s 41 (11.8)	s 14 (4.9)	s 53 (11.2)	s 94 (4.6)	s 21 (9.6)
Japan	– –	– –	– –	– –	– –
Korea	28 (5.8)	20 (5.3)	26 (5.5)	24 (5.4)	r 16 (6.3)
Kuwait	x x	x x	x x	x x	x x
Latvia (LSS)	x x	s 7 (3.6)	r 30 (5.8)	s 18 (5.2)	x x
Lithuania	s 2 (1.0)	r 5 (3.6)	s 2 (1.0)	r 33 (10.0)	s 8 (5.4)
Netherlands	s 58 (8.3)	s 52 (7.5)	s 15 (5.4)	s 69 (6.9)	r 12 (4.4)
New Zealand	40 (5.0)	51 (6.3)	31 (6.1)	70 (7.6)	29 (4.8)
Norway	– –	– –	– –	– –	– –
Portugal	r 20 (3.4)	r 29 (4.9)	39 (6.3)	39 (6.1)	r 10 (3.5)
Romania	x x	s 1 (1.2)	s 13 (3.4)	r 24 (4.6)	x x
Russian Federation	x x	s 16 (4.1)	s 6 (1.4)	r 29 (4.5)	s 1 (1.0)
Scotland	– –	– –	– –	– –	– –
Singapore	18 (0.0)	17 (0.0)	4 (0.0)	30 (0.0)	8 (0.0)
Slovak Republic	r 26 (4.3)	r 12 (2.8)	r 21 (4.2)	r 30 (4.0)	s 4 (1.9)
Slovenia	r 35 (4.3)	s 20 (3.7)	s 45 (5.2)	s 63 (6.2)	s 13 (3.8)
Spain	r 12 (2.7)	r 4 (1.8)	16 (3.8)	33 (4.7)	r 5 (2.4)
Sweden	34 (4.9)	20 (3.2)	6 (1.8)	44 (5.1)	r 23 (4.3)
[1] **Switzerland**	– –	– –	– –	– –	– –
Thailand	r 32 (4.9)	r 27 (4.8)	r 32 (4.6)	r 36 (4.6)	s 31 (4.7)
United States	r 20 (4.3)	r 27 (6.3)	r 33 (4.9)	r 62 (8.1)	r 18 (4.0)
International Average	27 (0.9)	21 (0.8)	23 (0.9)	49 (1.0)	16 (0.8)

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

1 Percentages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table 6.3

Schools' Reports on Dealing with Students' Problem Behaviors At Least Monthly Final Year of Secondary School*

Country	Percent of Schools by Problem Behavior					
	Vandalism	Theft	Physical Injury to Students	Intimidation of Students	Intimidation of Teachers	Illegal Drug Use / Possession
Australia	15 (3.9)	25 (5.7)	10 (4.9)	29 (5.9)	14 (5.4)	10 (4.8)
[1] *Austria*	– –	– –	– –	– –	– –	– –
Canada	19 (2.3)	25 (3.2)	9 (1.5)	34 (4.6)	16 (6.4)	15 (3.3)
Cyprus	29 (0.0)	13 (0.0)	8 (0.0)	29 (0.0)	r 9 (0.0)	r 5 (0.0)
Czech Republic	25 (3.8)	16 (3.9)	6 (3.4)	10 (4.1)	0 (0.2)	5 (2.5)
Denmark	r 23 (4.7)	r 26 (5.0)	s 0 (0.0)	r 14 (3.7)	12 (3.6)	0 (0.0)
France	27 (6.3)	r 51 (7.3)	15 (5.5)	31 (6.8)	r 13 (5.1)	r 11 (5.1)
[1] *Germany*	– –	– –	– –	– –	– –	– –
Hungary	r 18 (3.3)	r 17 (3.8)	r 11 (3.2)	r 16 (4.0)	2 (1.1)	x x
Iceland	r 4 (0.0)	r 0 (0.0)	r 0 (0.0)	r 0 (0.0)	r 0 (0.0)	r 4 (0.0)
Italy	25 (5.9)	12 (3.8)	6 (3.2)	9 (3.6)	r 2 (1.1)	– –
Lithuania	s 5 (2.9)	s 2 (0.7)	s 0 (0.0)	r 13 (3.6)	0 (0.0)	0 (0.0)
New Zealand	28 (6.4)	25 (5.1)	9 (3.3)	41 (6.8)	16 (5.6)	6 (3.3)
Norway	18 (3.5)	22 (4.3)	0 (0.0)	6 (2.0)	2 (0.9)	r 3 (1.5)
Russian Federation	s 3 (1.9)	s 9 (4.2)	s 2 (1.4)	r 12 (3.6)	0 (0.0)	x x
Slovenia	x x	x x	x x	x x	x x	x x
South Africa	x x	x x	x x	x x	x x	x x
Sweden	r 22 (4.4)	r 27 (4.8)	r 0 (0.0)	r 17 (4.3)	r 5 (1.5)	r 2 (1.1)
[1] **Switzerland**	– –	– –	– –	– –	– –	– –
United States	r 30 (4.0)	r 38 (5.9)	r 20 (4.0)	r 48 (6.8)	r 13 (3.1)	r 18 (3.0)
International Average	19 (1.0)	21 (1.1)	6 (0.7)	21 (1.2)	7 (0.8)	7 (0.8)

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

1 Percentages based on total school weights cannot be computed for Austria, Germany, and Switzerland; sampling based on tracks within schools.

* See Table 1.2 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 Appendix A).

The Netherlands did not administer the school questionnaire at the final year of secondary school.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Appendix A

TIMSS Design and Procedures

Test Design

The TIMSS tests were developed through an international consensus involving input from experts in mathematics, science, and educational measurement. The TIMSS Subject Matter Advisory Committee ensured that the tests reflected current thinking and priorities within the fields of mathematics and science. Every effort was made to help ensure that the tests represented the curricula of the participating countries and that the items exhibited no bias toward or against particular countries. This involved modifying specifications in accordance with data from the curriculum analysis component, obtaining ratings of the items by subject matter specialists within the participating countries, and conducting thorough statistical item analyses of data collected in the pilot testing. The final forms of the tests were endorsed by the National Research Coordinators (NRCs) of the participating countries.

TIMSS tested primary-school (third and fourth grades) and middle-school (seventh and eighth grades) students in mathematics and science. In mathematics, the third- and fourth-grade tests included items from six content areas: whole numbers; fractions and proportionality; measurement, estimation, and number sense; data representation, analysis, and probability; geometry; and algebra. For the seventh and eighth grades, the mathematics test included items from six content areas: fractions and number sense; proportionality; measurement; data representation, analysis, and probability; geometry; and algebra. In science, the primary-school test included items from four content areas: earth science; life science; physical science; and environmental issues and the nature of science. For the seventh and eighth grades, the science test included items from five content areas: earth science; life science; chemistry; physics; and environmental issues and the nature of science.

The mathematics and science literacy test for final-year students was designed to test students' general knowledge and understanding of mathematical and scientific principles. The mathematics items cover number sense, including fractions, percentages, and proportionality. Algebraic sense, measurement, and estimation are also covered, as are data representation and analysis. Reasoning and social utility were emphasized in several items. A general criterion in selecting the items was that they should involve the types of mathematics questions that could arise in real-life situations and that they be contextualized accordingly. Similarly, the science items selected for use in the TIMSS literacy test were organized according to three areas of science – earth science, life science, and physical science – and included a reasoning and social utility component. The emphasis was on measuring how well students can use their knowledge in addressing real-world problems having a science

component. The test was designed to enable reporting for mathematics literacy and science literacy separately as well as overall.

To maximize the content coverage of the TIMSS tests, yet minimize the burden on individual students, TIMSS used a multiple matrix sampling design whereby subsets of items from the total item pool were administered to subsamples of students.[1] Each student responded to a subset of the total item pool; by aggregating data across booklets, TIMSS was able to derive population estimates of mathematics and science achievement. TIMSS does not provide individual proficiency estimates. The design was nearly identical for the primary and middle school assessments, but different for the assessment of final-year students.

For the primary and middle school tests, items were assigned to 26 mutually exclusive groups or "clusters." The clusters were then assigned to eight test booklets so that one cluster appeared in all test booklets, some clusters appeared in several test booklets, and some clusters appeared in one test booklet. Each test booklet contained mathematics and science test items. The test booklets were systematically distributed to students and each student completed one. Primary-school students had 64 minutes to complete their test booklets, and middle-school students had 90 minutes.

For the final year of secondary-school assessment, there were nine test booklets containing the assessment material for mathematics and science literacy, advanced mathematics, and physics. Two of these booklets contained exclusively mathematics and science literacy items, and one booklet contained some mathematics and science literacy items. Students were assigned one of nine booklets depending upon their academic preparation; all students were eligible to receive the two mathematics and science literacy booklets. Final-year students had 90 minutes to complete their booklets.

In each test, approximately one-quarter of the items were in the free-response format, requiring students to generate and write their own answers. Designed to take up about one-third of students' response time, some of these questions asked for short answers while others required extended responses in which students needed to show their work. The remaining questions were in multiple-choice format. In scoring the tests, correct answers to most questions were worth one point. Consistent with the approach of allotting longer response times for constructed-response questions than for multiple-choice questions, responses to some of these questions (particularly those requiring extended responses) could earn partial credit, with a fully correct answer being awarded two or three points.

[1] The TIMSS test design is fully described in Adams, R.J. and Gonzalez, E.J. (1996). "TIMSS Test Design" in M.O. Martin and D.L. Kelly (eds.), *Third International Mathematics and Science Study Technical Report, Volume I.* Chestnut Hill, MA: Boston College.

SAMPLING

TIMSS included testing at three separate populations.

> Population 1: Students enrolled in the two adjacent grades that contained the largest proportion of 9-year-old students at the time of testing – third- and fourth-grade students in most countries.
>
> Population 2: Students enrolled in the two adjacent grades that contained the largest proportion of 13-year-old students at the time of testing – seventh- and eighth-grade students in most countries.
>
> Population 3: Students in their final year of secondary education. As an additional option, countries could test two special subgroups of these students: (1) students taking advanced courses in mathematics and (2) students taking physics.

Countries participating in the study were required to test the students in the two grades at Population 2, but could choose whether or not to participate at the other levels.

The selection of valid and efficient samples is crucial to the quality and success of an international comparative study such as TIMSS. The accuracy of the survey results depends on the quality of sampling information available and on the quality of the sampling activities themselves. For TIMSS, NRCs worked on all phases of sampling with staff from Statistics Canada. NRCs were trained in how to select the school and student samples and in the use of the sampling software. In consultation with the TIMSS sampling referee (Keith Rust, Westat), staff from Statistics Canada reviewed the national sampling plans, sampling data, sampling frames, and sample execution. This documentation was used by the International Study Center in consultation with Statistics Canada, the sampling referee, and the Technical Advisory Committee to evaluate the quality of the samples. In the achievement tables presented in Chapter 1 of this report, countries are grouped according to the extent to which they met the TIMSS sampling requirements. In the remaining tables, the names of countries that did not meet the TIMSS standards for sampling are presented in italics.

COVERAGE OF THE TARGET POPULATIONS

In a few situations where it was not possible to implement TIMSS testing for the entire internationally desired population, countries were permitted to define a national desired population that did not include part of the internationally desired population. Tables A.1, A.2, and A.3 show any differences in coverage between the international and national desired populations for countries participating in each assessment. Most participants

achieved 100% coverage. In some instances, countries, as a matter of practicality, needed to define their tested population according to the structure of school systems; in others, parts of the country were simply unwilling to take part in TIMSS. Because coverage fell below 65% for Latvia, the Latvian results have been labeled "Latvia (LSS)," for Latvian Speaking Schools, throughout the report. Within the desired population, countries could define a population that excluded a small percentage (less than 10%) of certain kinds of schools or students that would be very difficult or resource intensive to test (e.g., schools for students with special needs or schools that were very small or located in extremely rural areas).

Table A.1

Coverage of TIMSS Target Population - Population 1

The International Desired Population is defined as follows:
Population 1 - All students enrolled in the two adjacent grades with the largest proportion of 9-year-old students at the time of testing.

Country	International Desired Population		National Desired Population		
	Coverage	Notes on Coverage	School-Level Exclusions	Within-Sample Exclusions	Overall Exclusions
Australia	100%		0.1%	1.6%	1.8%
Austria	100%		2.6%	0.2%	2.8%
Canada	100%		2.5%	3.6%	6.2%
Cyprus	100%		3.1%	0.1%	3.2%
Czech Republic	100%		4.1%	0.0%	4.1%
[2] England	100%		8.6%	3.5%	12.1%
Greece	100%		1.5%	4.0%	5.4%
Hong Kong	100%		2.6%	0.0%	2.7%
Hungary	100%		3.8%	0.0%	3.8%
Iceland	100%		1.9%	4.3%	6.2%
Iran, Islamic Rep.	100%		0.3%	1.0%	1.3%
Ireland	100%		5.3%	1.6%	6.9%
[1] Israel	72%	Hebrew Public Education System	1.1%	0.1%	1.2%
Japan	100%		3.0%	0.0%	3.0%
Korea	100%		3.9%	2.6%	6.6%
Kuwait	100%		0.0%	0.0%	0.0%
[1] Latvia (LSS)	60%	Latvian-speaking schools	2.1%	0.0%	2.1%
Netherlands	100%		4.0%	0.4%	4.4%
New Zealand	100%		0.7%	0.6%	1.3%
Norway	100%		1.1%	2.0%	3.1%
Portugal	100%		6.6%	0.7%	7.3%
Scotland	100%		2.4%	4.3%	6.7%
Singapore	100%		0.0%	0.0%	0.0%
Slovenia	100%		1.9%	0.0%	1.9%
Thailand	100%		6.8%	1.5%	8.3%
United States	100%		0.4%	4.3%	4.7%

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

1 National Desired Population does not cover all of International Desired Population. 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.

Table A.2

Coverage of TIMSS Target Population - Population 2

The International Desired Population is defined as follows:
Population 2 - All students enrolled in the two adjacent grades with the largest proportion of

Country	International Desired Population		National Desired Population		
	Coverage	Notes on Coverage	School-Level Exclusions	Within-Sample Exclusions	Overall Exclusions
Australia	100%		0.2%	0.7%	0.8%
Austria	100%		2.9%	0.2%	3.1%
Belgium (Fl)	100%		3.8%	0.0%	3.8%
Belgium (Fr)	100%		4.5%	0.0%	4.5%
Bulgaria	100%		0.6%	0.0%	0.6%
Canada	100%		2.4%	2.1%	4.5%
Colombia	100%		3.8%	0.0%	3.8%
Cyprus	100%		0.0%	0.0%	0.0%
Czech Republic	100%		4.9%	0.0%	4.9%
Denmark	100%		0.0%	0.0%	0.0%
[2] England	100%		8.4%	2.9%	11.3%
France	100%		2.0%	0.0%	2.0%
[1] Germany	88%	One region (B-W) excluded	8.8%	0.9%	9.7%
Greece	100%		1.5%	1.3%	2.8%
Hong Kong	100%		2.0%	0.0%	2.0%
Hungary	100%		3.8%	0.0%	3.8%
Iceland	100%		1.7%	2.9%	4.5%
Iran, Islamic Rep.	100%		0.3%	0.0%	0.3%
Ireland	100%		0.0%	0.4%	0.4%
[1] Israel	74%	Hebrew Public Education System	3.1%	0.0%	3.1%
Japan	100%		0.6%	0.0%	0.6%
Korea	100%		2.2%	1.6%	3.8%
Kuwait	100%		0.0%	0.0%	0.0%
[1] Latvia (LSS)	51%	Latvian-speaking schools	2.9%	0.0%	2.9%
[1] Lithuania	84%	Lithuanian-speaking schools	6.6%	0.0%	6.6%
Netherlands	100%		1.2%	0.0%	1.2%
New Zealand	100%		1.3%	0.4%	1.7%
Norway	100%		0.3%	1.9%	2.2%
Portugal	100%		0.0%	0.3%	0.3%
Romania	100%		2.8%	0.0%	2.8%
Russian Federation	100%		6.1%	0.2%	6.3%
Scotland	100%		0.3%	1.9%	2.2%
Singapore	100%		4.6%	0.0%	4.6%
Slovak Republic	100%		7.4%	0.1%	7.4%
Slovenia	100%		2.4%	0.2%	2.6%
South Africa	100%		9.6%	0.0%	9.6%
Spain	100%		6.0%	2.7%	8.7%
Sweden	100%		0.0%	0.9%	0.9%
[1] Switzerland	86%	22 of 26 cantons	4.4%	0.8%	5.3%
Thailand	100%		6.2%	0.0%	6.2%
United States	100%		0.4%	1.7%	2.1%

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

1 National Desired Population does not cover all of International Desired Population. 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.

* One region (Baden-Wuerttemberg) did not participate.

Table A.3

Coverage of TIMSS Target Population - Population 3

The International Desired Population is defined as follows:
Population 3 - All students in final year of secondary school*

Country	International Desired Population		National Desired Population	
	Coverage	Notes on Coverage	Sample Exclusions	Notes on Exclusions
Australia	100%		5.5%	
Austria	100%		18.2%	Colleges and courses lasting less than 3 years excluded
Canada	100%		8.9%	
Cyprus	100%		22.0%	Private and vocational schools excluded
Czech Republic	100%		6.0%	
Denmark	100%		2.3%	
France	100%		1.0%	
Germany	100%		11.3%	
Hungary	100%		0.2%	
Iceland	100%		0.1%	
Italy	70%	Four regions did not participate	0.9%	
Lithuania	84%	Lithuanian speaking students	0.0%	
Netherlands	100%		21.6%	Apprenticeship programs excluded
New Zealand	100%		0.0%	
Norway	100%		3.8%	
Russian Federation	100%		43.0%	Vocational schools and non-Russian speaking students excluded
Slovenia	100%		6.0%	
South Africa	100%		0.0%	
Sweden	100%		0.2%	
Switzerland	100%		2.5%	
United States	100%		3.7%	

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

* See Table 1.2 for more information about the grades tested in each country.

TIMSS Coverage Index for Final-Year Assessment

A further difficulty in defining the desired population for the final-year assessment is that many students drop out before the final year of any track. Thus a TIMSS Coverage Index (TCI) was calculated that quantifies the proportion of the entire school-leaving age cohort that is covered by the TIMSS final-year sample in each country. The TCI was defined as follows:

$$TCI = \frac{\textit{Total Enrollment in TIMSS Grades 1995}}{\textit{(Total National Population Aged 15 - 19 in 1995)/5}}$$

The *numerator* in this expression is the total enrollment in the grades tested by TIMSS, estimated from the weighted sample data. This estimate corresponds to the size of the population to which the TIMSS results generalize and makes appropriate provision for student non-response. It does not include students who are no longer attending school or students who were excluded from the sample on grounds of physical or other disability. It also does not include students who were repeating the final grade. Because some students repeat the final year of a track, or take the final year in more than one track at different times, they may be in the final year of a track without completing their secondary education that year. On the one hand, students who are not completing their education still have the potential to gain further knowledge in additional years of schooling, and thus will not have attained their full yield at the time of the TIMSS assessment. On the other hand, and of more serious concern, the presence both of students who are repeating the final track and of those who will repeat that track can contribute a substantial downward bias to the estimated achievement of the population. Repeating students would be represented twice in the population, and are likely to be lower-achieving on average than those who do not repeat. The only practical way for TIMSS to deal with this problem was to exclude students who were repeating the final year. Thus, the population of final-year students is formally defined as those students taking the final year of one track of the secondary system for the first time.

The *denominator* in the expression is an estimate of the school-leaving age cohort size. Since the age at which students in upper-secondary school may leave school varies, TIMSS estimated the size of the school-leaving age cohort by taking the average of the size of the 1995 age cohorts for 15-, 16-, 17-, 18-, and 19-year-olds in each country. (Although the estimate was generally based on the 15-19 age group, there were exceptions; for example, in Germany it was based on the 17-19 age group.) This information was provided by NRCs from official population census figures in their countries. This approach reflects the fact that students in the final year of secondary school are likely to be almost entirely a subset of the population of 15- to 19-year-olds in most countries. Table A.4 presents the computation of the TCI for each country.

Table A.4

Computation of TCI: Estimated Percentage of School-Leaving Age Cohort Covered by TIMSS Sample - Final Year of Secondary School*

Country	Estimated School-Leaving Age Cohort Size (A)	Estimated Number of Students Represented by Sample (B)	Estimated Number of Students Excluded from Sample (C)	Estimated Number of Other Students Not Represented by Sample (D)	TIMSS Coverage Index (TCI)† (B/A)
Australia	250,852	170,849	9,944	70,059	68%
Austria	93,168	70,721	15,682	6,765	76%
Canada	374,499	263,241	25,559	85,699	70%
Cyprus	9,464	4,535	1,279	3,650	48%
Czech Republic	177,180	137,467	8,821	30,892	78%
Denmark	65,683	37,872	872	26,939	58%
France	760,452	637,935	6,509	116,008	84%
Germany	870,857	655,916	83,514	131,427	75%
Hungary	170,524	111,281	201	59,042	65%
Iceland	4,231	2,308	2	1,921	55%
Italy	739,268	380,834	3,459	354,975	52%
Lithuania	52,140	22,160	0	29,980	43%
Netherlands	187,087	145,916	40,293	878	78%
New Zealand	53,284	37,549	4	15,731	70%
Norway	52,180	43,806	1,747	6,627	84%
Russian Federation	2,145,918	1,031,187	777,913	336,818	48%
Slovenia	30,354	26,636	1,706	2,012	88%
South Africa	766,334	374,618	0	391,716	49%
Sweden	101,058	71,333	168	29,557	71%
Switzerland	79,547	65,174	1,671	12,702	82%
United States	3,612,800	2,278,564	88,642	1,245,594	63%

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

* See Table 1.2 for more information about the grades tested in each country.

† TIMSS Coverage Index (TCI): Estimated percentage of school-leaving age cohort covered by TIMSS sample.

School and Student Sampling and Participation Rates

Within countries, TIMSS used a two-stage sample design at Population 1 and Population 2, where the first stage involved selecting 150 public and private schools within each country.[2] Within each school, the basic approach required countries to use random procedures to select, for the Population 1 assessment, one mathematics class at the fourth grade and one at the third grade, and for the Population 2 assessment, one mathematics class at the eighth grade and one at the seventh grade (or the corresponding upper and lower grades in that country). All of the students in those two classes were to participate in the TIMSS testing. This approach was designed to yield, for each population, a representative sample of 7,500 students per country, with approximately 3,750 students at each grade. Tables A.5 and A.6 present the school and student samples sizes for fourth grade, and Tables A.7 and A.8 those for eighth grade.

TIMSS also used a two-stage sample design for Population 3, the final year of secondary school. The first stage involved sampling 120 public and private schools in each country. Within each school, the basic approach required countries to use random procedures to select 40 students. The actual number of schools and students selected depended in part on the structure of the education system – tracked or untracked – and on where the student subpopulations were in the system. Within each sampled school, eligible students were classified as being one of four types (not having taken advanced mathematics or physics, having taken advanced mathematics but not physics, having taken physics but not advanced mathematics, or having taken both advanced mathematics and physics), and a sample of each group was drawn. Test booklets were assigned to students based on their classification. Tables A.9 and A.10 present the school and student samples sizes for the final year of secondary school mathematics and science literacy assessment.

For each assessment, countries were required to achieve a participation rate of at least 85% of both schools and students, or a combined rate of 75% (the product of school and student participation with or without replacement schools). Tables A.11 through A.13 present the school, student, and overall participation rates for fourth grade, eighth grade, and the final year of secondary school.

Table A.5

School Sample Sizes
Fourth Grade*

Country	Number of Schools in Original Sample	Number of Eligible Schools in Original Sample	Number of Schools in Original Sample That Participated	Number of Replacement Schools That Participated[1]		Total Number of Schools That Participated
				Procedural	Other	
Australia	268	268	169	9	0	178
Austria	150	150	71	31	31	133
Canada	423	420	390	0	0	390
Cyprus	150	150	146	0	0	146
Czech Republic	215	215	181	7	0	188
England	150	145	92	35	0	127
Greece	187	187	174	0	0	174
Hong Kong	156	148	124	0	0	124
Hungary	150	150	150	0	0	150
Iceland	153	151	144	0	0	144
Iran, Islamic Rep.	180	180	180	0	0	180
Ireland	175	173	161	4	0	165
Israel	100	100	40	0	47	87
Japan	150	150	137	4	0	141
Korea	150	150	150	0	0	150
Kuwait	150	150	150	0	0	150
Latvia (LSS)	169	169	125	0	0	125
Netherlands	196	196	63	67	0	130
New Zealand	150	150	120	29	0	149
Norway	150	148	126	13	0	139
Portugal	150	150	143	0	0	143
Scotland	184	184	143	9	0	152
Singapore	191	191	191	0	0	191
Slovenia	150	150	121	0	0	121
Thailand	155	155	154	0	0	154
United States	220	213	182	0	0	182

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

* See Table 1.2 for more information about the grades tested in each country.

1 Replacement schools selected in accordance with the TIMSS sampling procedures are listed in the "procedural" column. Those selected using unapproved methods are listed in the "other" column and were not included in the computation of school participation rates.

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

Table A.6

Student Sample Sizes
Fourth Grade*

Country	Number of Sampled Students in Participating Schools	Number of Students Withdrawn from Class/School	Number of Students Excluded	Number of Students Eligible	Number of Students Absent	Number of Students Assessed
Australia	6930	37	104	6789	282	6507
Austria	2779	12	6	2761	116	2645
Canada	9193	81	268	8844	436	8408
Cyprus	3972	4	3	3965	589	3376
Czech Republic	3555	7	0	3548	280	3268
England	3489	73	122	3294	168	3126
Greece	3358	6	116	3236	183	3053
Hong Kong	4475	0	1	4474	63	4411
Hungary	3272	0	0	3272	266	3006
Iceland	2149	23	101	2025	216	1809
Iran, Islamic Rep.	3521	5	36	3480	95	3385
Ireland	3134	14	40	3080	207	2873
Israel	2486	0	3	2483	132	2351
Japan	4453	0	0	4453	147	4306
Korea	2971	133	0	2838	26	2812
Kuwait	4578	34	0	4544	226	4318
Latvia (LSS)	2390	12	1	2377	161	2216
Netherlands	2639	0	4	2635	111	2524
New Zealand	2627	82	20	2525	104	2421
Norway	2391	16	42	2333	76	2257
Portugal	2994	15	16	2963	110	2853
Scotland	3735	0	139	3596	295	3301
Singapore	7274	14	0	7260	121	7139
Slovenia	2720	3	0	2717	151	2566
Thailand	3042	0	50	2992	0	2992
United States	8224	61	412	7751	455	7296

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

* See Table 1.2 for more information about the grades tested in each country.

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

Table A.7

School Sample Sizes
Eighth Grade*

Country	Number of Schools in Original Sample	Number of Eligible Schools in Original Sample	Number of Schools in Original Sample That Participated	Number of Replacement Schools That Participated	Total Number of Schools That Participated
Australia	214	214	158	3	161
Austria	159	159	62	62	124
Belgium (Fl)	150	150	92	49	141
Belgium (Fr)	150	150	85	34	119
Bulgaria	167	167	111	4	115
Canada	413	388	363	1	364
Colombia	150	150	136	4	140
Cyprus	55	55	55	0	55
Czech Republic	150	149	143	6	149
Denmark	158	157	144	0	144
England	150	144	80	41	121
France	151	151	127	0	127
Germany	153	150	102	32	134
Greece	180	180	156	0	156
Hong Kong	105	104	85	0	85
Hungary	150	150	150	0	150
Iceland	161	132	129	0	129
Iran, Islamic Rep.	192	191	191	0	191
Ireland	150	149	125	7	132
Israel	100	100	45	1	46
Japan	158	158	146	5	151
Korea	150	150	150	0	150
Kuwait	69	69	69	0	69
Latvia (LSS)	170	169	140	1	141
Lithuania	151	151	145	0	145
Netherlands	150	150	36	59	95
New Zealand	150	150	137	12	149
Norway	150	150	136	10	146
Portugal	150	150	142	0	142
Romania	176	176	163	0	163
Russian Federation	175	175	170	4	174
Scotland	153	153	119	8	127
Singapore	137	137	137	0	137
Slovak Republic	150	150	136	9	145
Slovenia	150	150	121	0	121
South Africa	180	180	107	7	114
Spain	155	154	147	6	153
Sweden	120	120	116	0	116
Switzerland	259	258	247	3	250
Thailand	150	150	147	0	147
United States	220	217	169	14	183

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

* See Table 1.2 for more information about the grades tested in each country.

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

Table A.8

Student Sample Sizes
Eighth Grade*

Country	Number of Sampled Students in Participating Schools	Number of Students Withdrawn from Class/School	Number of Students Excluded	Number of Students Eligible	Number of Students Absent	Total Number of Students Assessed
Australia	8027	63	61	7903	650	7253
Austria	2969	14	4	2951	178	2773
Belgium (Fl)	2979	1	0	2978	84	2894
Belgium (Fr)	2824	0	1	2823	232	2591
Bulgaria	2300	0	0	2300	327	1973
Canada	9240	134	206	8900	538	8362
Colombia	2843	6	0	2837	188	2649
Cyprus	3045	15	0	3030	107	2923
Czech Republic	3608	6	0	3602	275	3327
Denmark	2487	0	0	2487	190	2297
England	2015	37	60	1918	142	1776
France	3141	0	0	3141	143	2998
Germany	3318	0	35	3283	413	2870
Greece	4154	27	23	4104	114	3990
Hong Kong	3415	12	0	3403	64	3339
Hungary	3339	0	0	3339	427	2912
Iceland	2025	10	65	1950	177	1773
Iran, Islamic Rep.	3770	20	0	3750	56	3694
Ireland	3411	28	10	3373	297	3076
Israel	1453	6	0	1447	32	1415
Japan	5441	0	0	5441	300	5141
Korea	2998	31	0	2967	47	2920
Kuwait	1980	3	0	1977	322	1655
Latvia (LSS)	2705	19	0	2686	277	2409
Lithuania	2915	2	0	2913	388	2525
Netherlands	2112	14	1	2097	110	1987
New Zealand	4038	121	12	3905	222	3683
Norway	3482	26	49	3407	140	3267
Portugal	3589	70	13	3506	115	3391
Romania	3899	0	0	3899	174	3725
Russian Federation	4311	42	10	4259	237	4022
Scotland	3289	0	46	3243	380	2863
Singapore	4910	18	0	4892	248	4644
Slovak Republic	3718	5	3	3710	209	3501
Slovenia	2869	15	8	2846	138	2708
South Africa	4793	0	0	4793	302	4491
Spain	4198	27	102	4069	214	3855
Sweden	4483	71	28	4384	309	4075
Switzerland	4989	16	24	4949	94	4855
Thailand	5850	0	0	5850	0	5850
United States	8026	104	108	7814	727	7087

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

* See Table 1.2 for more information about the grades tested in each country.

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

Table A.9

School Sample Sizes - Mathematics and Science Literacy
Final Year of Secondary School*

Country	Number of Schools in Original Sample	Number of Eligible Schools in Original Sample	Number of Schools in Original Sample That Participated	Number of Replacement Schools That Participated	Total Number of Schools That Participated
Australia	132	132	71	16	87
Austria	182	182	74	95	169
Canada	389	389	333	4	337
Cyprus	29	28	28	0	28
Czech Republic	150	150	150	0	150
Denmark	130	130	122	0	122
France	71	71	56	0	56
Germany	174	174	121	31	152
Hungary	204	204	204	0	204
Iceland	30	30	30	0	30
Italy	150	150	93	8	101
Lithuania	168	142	142	0	142
Netherlands	141	141	52	27	79
New Zealand	79	79	68	11	79
Norway	171	171	122	9	131
Russian Federation	175	165	159	4	163
Slovenia	172	172	79	0	79
South Africa	185	140	90	0	90
Sweden	157	157	145	0	145
Switzerland	401	401	378	5	383
United States	250	250	190	21	211

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

* See Table 1.2 for more information about the grades tested in each country.

Table A.10

Student Sample Sizes - Mathematics and Science Literacy
Final Year of Secondary School*

Country	Number of Students Sampled in Participating Schools	Number of Students Withdrawn†	Number of Students Excluded	Number of Students Eligible	Number of Students Absent	Number of Participating Students
Australia	4130	37	0	4093	1040	1844
Austria	3693	140	0	3553	398	1779
Canada	11782	732	0	11050	1470	4832
Cyprus	1224	15	0	1209	38	473
Czech Republic	4188	43	0	4145	326	1899
Denmark	5208	0	0	5208	672	2604
France	4096	275	0	3821	600	1590
Germany	6971	94	117	6760	1666	2182
Hungary	5493	265	0	5228	137	5091
Iceland	2500	132	2	2366	663	1703
Italy	2426	148	3	2275	192	1578
Lithuania	4196		0	4195	574	2887
Netherlands	1882		20	1681	211	1470
New Zealand	2687	580	1	2106	343	1763
Norway	4056	76	65	3915	349	2518
Russian Federation	5356	536	0	4820	182	2289
Slovenia	3755	37	1	3717	282	1387
South Africa	3695	906	0	2789	32	2757
Sweden	5362	184	12	5166	589	2816
Switzerland	5939	258	0	5681	262	2976
United States	14812	603	293	13916	3082	5371

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

* See Table 1.2 for more information about the grades tested in each country.

† Sampled students who reported that they were repeating the final year, were incorrectly classified, or were otherwise ineligible.

Table A.11

Participation Rates
Fourth Grade*

Country	School Participation		Student Participation (Weighted Percentage)	Overall Participation	
	School Participation Before Replacement (Weighted Percentage)	School Participation After Replacement (Weighted Percentage)		Overall Participation Before Replacement (Weighted Percentage)	Overall Participation After Replacement (Weighted Percentage)
Australia	66	69	96	63	66
Austria	51	72	96	49	69
Canada	90	90	96	86	86
Cyprus	97	97	86	83	83
Czech Republic	91	94	92	84	86
England	63	88	95	60	83
Greece	93	93	95	88	88
Hong Kong	84	84	98	83	83
Hungary	100	100	92	92	92
Iceland	95	95	90	86	86
Iran, Islamic Rep.	100	100	97	97	97
Ireland	94	96	93	88	90
Israel	40	40	94	38	38
Japan	93	96	97	90	92
Korea	100	100	95	95	95
Kuwait	100	100	95	95	95
Latvia (LSS)	74	74	93	69	69
Netherlands	31	62	96	29	59
New Zealand	80	99	96	77	95
Norway	85	94	97	82	91
Portugal	95	95	96	92	92
Scotland	78	83	92	71	76
Singapore	100	100	98	98	98
Slovenia	81	81	94	76	76
Thailand	96	96	100	96	96
United States	85	85	94	80	80

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

* See Table 1.2 for more information about the grades tested in each country.
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

Table A.12

Participation Rates
Eighth Grade*

Country	School Participation		Student Participation (Weighted Percentage)	Overall Participation	
	School Participation Before Replacement (Weighted Percentage)	School Participation After Replacement (Weighted Percentage)		Overall Participation Before Replacement (Weighted Percentage)	Overall Participation After Replacement (Weighted Percentage)
Australia	75	77	92	69	70
Austria	41	84	95	39	80
Belgium (Fl)	61	94	97	59	91
Belgium (Fr)	57	79	91	52	72
Bulgaria	72	74	86	62	63
Canada	90	91	93	84	84
Colombia	91	93	94	85	87
Cyprus	100	100	97	97	97
Czech Republic	96	100	92	89	92
Denmark	93	93	93	86	86
England	56	85	91	51	77
France	86	86	95	82	82
Germany	72	93	87	63	81
Greece	87	87	97	84	84
Hong Kong	82	82	98	81	81
Hungary	100	100	87	87	87
Iceland	98	98	90	88	88
Iran, Islamic Rep.	100	100	98	98	98
Ireland	84	89	91	76	81
Israel	45	46	98	44	45
Japan	92	95	95	87	90
Korea	100	100	95	95	95
Kuwait	100	100	83	83	83
Latvia (LSS)	83	83	90	75	75
Lithuania	96	96	87	83	83
Netherlands	24	63	95	23	60
New Zealand	91	99	94	86	94
Norway	91	97	96	87	93
Portugal	95	95	97	92	92
Romania	94	94	96	89	89
Russian Federation	97	100	95	93	95
Scotland	79	83	88	69	73
Singapore	100	100	95	95	95
Slovak Republic	91	97	95	86	91
Slovenia	81	81	95	77	77
South Africa	60	64	97	58	62
Spain	96	100	95	91	94
Sweden	97	97	93	90	90
Switzerland	93	95	98	92	94
Thailand	99	99	100	99	99
United States	77	85	92	71	78

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

* See Table 1.2 for more information about the grades tested in each country.

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

Table A.13

Participation Rates - Mathematics and Science Literacy
Final Year of Secondary School*

Country	School Participation		Student Participation (Weighted Percentage)	Overall Participation	
	School Participation Before Replacement (Weighted Percentage)	School Participation After Replacement (Weighted Percentage)		Overall Participation Before Replacement (Weighted Percentage)	Overall Participation After Replacement (Weighted Percentage)
Australia	48.8	66.2	78.1	38.1	51.8
Austria	35.9	90.9	79.7	28.6	72.5
Canada	82.2	82.6	82.7	68.0	68.3
Cyprus	100.0	100.0	98.2	98.2	98.2
Czech Republic	100.0	100.0	92.2	92.2	92.2
Denmark	54.9	54.9	88.9	48.8	48.8
France	80.3	80.3	85.6	68.7	68.7
Germany	88.7	100.0	80.1	71.0	80.1
Hungary	100.0	100.0	97.7	97.7	97.7
Iceland	100.0	100.0	73.6	73.6	73.6
Italy	59.9	65.0	94.8	56.8	61.6
Lithuania	97.1	97.1	87.9	85.4	85.4
Netherlands	35.8	56.3	87.6	31.3	49.3
New Zealand	87.0	100.0	80.6	70.1	80.6
Norway	74.1	80.0	88.9	65.9	71.1
Russian Federation	93.0	99.3	90.9	84.6	90.3
Slovenia	45.6	45.6	92.8	42.3	42.3
South Africa	65.0	65.0	99.4	64.6	64.6
Sweden	95.3	95.3	86.5	82.4	82.4
Switzerland	87.0	89.1	95.0	82.6	84.6
United States	77.1	85.1	74.6	57.6	63.5

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

* See Table 1.2 for more information about the grades tested in each country.

Indicating Compliance with Sampling Guidelines

In Figures A.1, A.2, and A.3, countries are grouped by how they met the TIMSS sampling requirements. Countries that achieved acceptable participation rates – 85% of both the schools and students, or a combined rate (the product of school and student participation) of 75% – with or without replacement schools – and that complied with the TIMSS guidelines for grade selection and classroom sampling are shown in the first panel of each figure. Countries that met the guidelines only after including replacement schools are annotated.

Countries not reaching at least 50% school participation without the use of replacement schools, or that failed to reach the participation standard even with the inclusion of replacement schools, are shown in the second panel of the figures.

For the Population 1 and Population 2 assessments, some countries sought to provide a better curricular match and thus did not test the two grades required by the TIMSS population definition (for Population 1, the two grades with the most 9-year-olds at the time of testing, and for Population 2 the two grades with the most 13-year-olds at the time of testing). This led to their students being somewhat older than those in the other countries. These countries are grouped together in Figures A.1 and A.2.

For a variety of reasons, some countries did not comply with the guidelines for within-school sampling or had difficulty meeting several sampling guidelines; these are grouped together in the figures.

[2] The sample design for TIMSS is described in detail in Foy, P., Schleicher, A., and Rust, K. (1996). "TIMSS Sample Design" in M.O. Martin and D.L. Kelly (eds.), *Third International Mathematics and Science Study Technical Report, Volume I*. Chestnut Hill, MA: Boston College.

Figure A.1

Countries Grouped According to Their Compliance with Guidelines for Sample Implementation and Participation Rates - Fourth Grade*

Fourth Grade

Countries satisfying guidelines for sample participation rates, grade selection, and sampling procedures	
Canada	Japan
Cyprus	Korea
Czech Republic	New Zealand
†2 England	Norway
Greece	Portugal
Hong Kong	† Scotland
Iceland	Singapore
Iran, Islamic Rep.	United States
Ireland	

Countries not satisfying guidelines for sample participation	
Australia	1 Latvia (LSS)
Austria	Netherlands

Countries not meeting age/grade specifications (high percentage of older students)
Slovenia

Countries with unapproved sampling procedures at the classroom level
Hungary

Countries with unapproved sampling procedures at classroom level and not meeting other guidelines	
1 Israel	Thailand
Kuwait	

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

1 National Desired Population does not cover all of International Desired Popoulation (see Table A.1).

2 National Defined Population covers less than 90 percent of National Desired Population (see Table A.1).

† Met guidelines for sample participation rates only after replacement schools were included.

* See Table 1.2 for more information about the grades tested in each country.

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

Figure A.2

Countries Grouped According to Their Compliance with Guidelines for Sample Implementation and Participation Rates - Eighth Grade*

Eighth Grade

Countries satisfying guidelines for sample participation rates, grade selection, and sampling procedures

† Belgium (Fl)	[1] Latvia (LSS)
Canada	[1] Lithuania
Cyprus	New Zealand
Czech Republic	Norway
[†2] England	Portugal
France	Russian Federation
Hong Kong	Singapore
Hungary	Slovak Republic
Iceland	Spain
Iran, Islamic Rep.	Sweden
Ireland	[1] Switzerland
Japan	† United States
Korea	

Countries not satisfying guidelines for sample participation

Australia	Bulgaria
Austria	Netherlands
Belgium (Fr)	† Scotland

Countries not meeting age/grade specifications (high percentage of older students)

Colombia	Romania
[†1] Germany	Slovenia

Countries with unapproved sampling procedures at the classroom level

Denmark	Thailand
Greece	

Countries with unapproved sampling procedures at classroom level and not meeting other guidelines

[1] Israel	South Africa
Kuwait	

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

1 National Desired Population does not cover all of International Desired Popoulation (see Table A.2).

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

† Met guidelines for sample participation rates only after replacement schools were included.

* See Table 1.2 for more information about the grades tested in each country.

Figure A.3

Countries Grouped According to Their Compliance with Guidelines for Sample Implementation and Participation Rates – Mathematics and Science Literacy* Final Year of Secondary School

Final Year of Secondary School

Countries satisfying guidelines for sample participation rates and sampling procedures	
[2] Cyprus	† New Zealand
Czech Republic	[2] Russian Federation
Hungary	Sweden
[1] Lithuania	Switzerland
Countries not satisfying guidelines for sample participation rates	
Australia	Iceland
[2] Austria	[1] Italy
Canada	Norway
France	United States
Countries with unapproved student sampling	
† Germany	
Countries with unapproved sampling procedures and low participation rates	
Denmark	Slovenia
[2] Netherlands	South Africa

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

1 National Desired Population does not cover all of International Desired Popoulation (see Table A.3).

2 National Defined Population covers less than 90 percent of National Desired Population (see Table A.3).

† Met guidelines for sample participation rates only after replacement schools were included.

* See Table 1.2 for more information about the grades tested in each country.

Data Collection Procedures

Each participating country was responsible for carrying out all aspects of the data collection, using standardized procedures developed for the study. Training manuals were developed for school coordinators and test administrators that detailed procedures for receipt and distribution of materials as well as for the activities related to the testing sessions. The test administrator manuals covered test security, standardized scripts to regulate directions and timing, rules for answering students' questions, and steps to ensure that identification on the test booklets and questionnaires corresponded to the information on the forms used to track students.

Each country was responsible for conducting quality control procedures and for describing these in their NRC's reports. In addition, the International Study Center considered it essential to establish some method to monitor compliance with standard procedures. NRCs were asked to nominate a person, such as a retired school teacher, to serve as quality control monitor for their countries, and in almost all cases the International Study Center adopted the NRCs' first suggestion. The International Study Center developed manuals for the quality control monitors and briefed them in two-day training sessions about TIMSS, the responsibilities of the national centers in conducting the study, and their own roles and responsibilities.

The quality control monitors interviewed the NRCs about data collection plans and procedures. They also selected about 10 schools to visit, where they observed testing sessions and interviewed school coordinators.[3] The results of the interviews indicate that, in general, NRCs had prepared well for data collection and, despite the heavy demands of the schedule and shortages of resources, were in a position to collect the data in an efficient and professional manner. Similarly, the TIMSS tests appeared to have been administered in compliance with international procedures throughout the activities preliminary to the testing session, those during testing, and the school-level activities related to receiving, distributing, and returning materials from the national centers.

Scoring the Free-Response Items

Because about one-third of the written test time was devoted to free-response items, TIMSS needed to develop procedures for reliably evaluating student responses within and across countries. Scoring used two-digit codes with rubrics specific to each item. Development of the rubrics was led by the Norwegian TIMSS national center. The first digit designates the correctness

[3] The results of the interviews and observations by the quality control monitors are presented in Martin, M.O., Hoyle, C.D., and Gregory, K.D. (1996) "Monitoring the TIMSS Data Collection" and "Observing the TIMSS Test Administration" both in M.O. Martin and I.V.S. Mullis (eds.), *Third International Mathematics and Science Study: Quality Assurance in Data Collection*. Chestnut Hill, MA: Boston College.

level of the response. The second digit, combined with the first, represents a diagnostic code used to identify specific types of approaches, strategies, or common errors and misconceptions. Although not specifically used to estimate overall proficiency in mathematics and science, analyses of responses based on the second digit should provide insight into ways to help students better understand mathematics concepts and problem-solving approaches.

To ensure reliable scoring procedures based on the TIMSS rubrics, the International Study Center prepared guides containing the rubrics and explaining how to implement them together with example student responses for the various rubric categories. These guides, together with more examples of student responses for practice in applying the rubrics, were used as a basis for an ambitious series of regional training sessions. These sessions were designed to assist representatives of national centers who would then be responsible for training personnel in their countries to apply the two-digit codes reliably.[4]

To gather and document empirical information about the within-country agreement among scorers, TIMSS developed a procedure whereby systematic subsamples of some 10% of the students' responses were coded independently by two scorers. The percentage of exact agreement between the scorers was computed for each free-response item based on both the score level (first digit) and the diagnostic code (second digit) level. A very high percentage of exact agreement at the score level was observed for the free-response items on all TIMSS tests.[5]

Data Processing

To ensure the availability of comparable, high-quality data for analysis, TIMSS undertook a rigorous set of quality control steps to create the international database.[6] TIMSS prepared manuals and software for countries to use in entering their data so that the information would be in a standard international format before being forwarded to the IEA Data Processing Center in Hamburg. Upon arrival at the Center, the data from each country underwent an exhaustive cleaning process. That process involved several iterative steps and procedures designed to identify, document, and correct

[4] The procedures used in the training sessions are documented in Mullis, I.V.S., Garden, R.A., and Jones, C.A. (1996) "Training for Scoring the TIMSS Free-Response Items" in M.O. Martin and D.L. Kelly (eds.), *Third International Mathematics and Science Study Technical Report,*

[5] Summaries of the scoring reliability data for each test are included in the appendices of the international reports (see references in Chapter 1).

[6] These steps are detailed in Jungclaus, H. and Bruneforth, M. (1996). "Data Consistency Checking Across Countries" in M.O. Martin and D.L. Kelly (eds.), *Third International Mathematics and Science Study Technical Report, Volume I.* Chestnut Hill, MA: Boston College.

deviations from the international instruments, file structures, and coding schemes. The process also emphasized consistency of information within national data sets and appropriate linking among the many student, teacher, and school data files.

Throughout the process, the data were checked and double-checked by the IEA Data Processing Center, the International Study Center, and the national centers. The national centers were contacted regularly and given multiple opportunities to review the data for their countries. In conjunction with the Australian Council for Educational Research (ACER), the International Study Center reviewed the item statistics of each cognitive item in each country to identify poorly performing items. Usually the poor statistics (negative point-biserials for the key, large item-by-country interactions, and statistics indicating lack of fit with the model) were a result of deviations in translation, adaptation, or printing.

IRT Scaling and Data Analysis

The mathematics and science achievement results were summarized using an item response theory (IRT) scaling method (Rasch model).[7] This scaling method produces a test score by averaging the responses of each student to the items they took in a way that takes into account the difficulty of each item. The method used in TIMSS includes refinements that enable reliable scores to be produced even though individual students responded to relatively small subsets of the total mathematics item pool. Analyses of the response patterns of students from participating countries indicated that, although the items in each TIMSS test address a wide range of mathematics or science content, the performance of the students across the items was sufficiently consistent to be usefully summarized in a single score per test.

The IRT method was preferred for developing comparable estimates of performance for all students, since students answered different test items depending upon which test booklet they received. The IRT analysis provides a common scale on which performance can be compared across countries. In addition to providing a basis for estimating mean achievement, scale scores permit estimates of how students within countries vary and provide information on percentiles of performance. For Population 1 and Population 2, each scale was standardized using students from both the grades tested. When all participating countries and grades are treated equally, the TIMSS scale average is 500 and the standard deviation is 100. Since the countries vary in size, each country was reweighted to contribute equally to the mean and standard deviation of the scale. The international averages of the Population 1

[7] The TIMSS scaling model is fully documented in Adams, R.J., Wu, M.L., and Macaskill, G. (1997). "Scaling Methodology and Procedures for the Mathematics and Science Scales" in M.O. Martin and D.L. Kelly (eds.), *Third International Mathematics and Science Study Techni-*

scale scores (mathematics and science) were constructed to be the averages of the 26 means of countries that were available at fourth grade and the 24 means of those at third grade. The international averages of the Population 2 scale scores (mathematics and science) were constructed to be the averages of the 41 means of countries that were available at eighth grade and the 39 means of those at seventh grade. For the Population 3 mathematics and science literacy assessment, the mathematics literacy scale and the science literacy scale were constructed using data from the 21 countries that participated in the assessment and have an average of 500 and a standard deviation of 100.

Estimating Sampling Error

Because the statistics presented in this report are national estimates based on samples of schools and students rather than the values that could be calculated if every school and student in a country answered every question, it is important to have measures of the degree of uncertainty of the estimates. The jackknife procedure was used to estimate the standard error associated with each statistic presented in this report.[8] The use of confidence intervals, based on the standard errors, allows inferences to be made about the population means and proportions in a manner that reflects the uncertainty associated with the sample estimates. An estimated sample statistic plus or minus two standard errors represents a 95% confidence interval for the corresponding population result.

[8] The jackknife repeated replication technique for estimating sampling errors is documented in Gonzalez, E.J. and Foy, P. (1997). "Estimation of Sampling Variability, Design Effects, and Effective Sample Sizes" in M.O. Martin and D.L. Kelly (eds.), *Third International Mathematics and Science Study Technical Report, Volume II.* Chestnut Hill, MA: Boston College.

Appendix B

Supplementary Tables for Chapters 5 and 6, School Resources and Atmosphere

Table B.1

School-Wide Shortages or Inadequacies in Facilities and Materials that Affect General Capacity to Provide Instruction "Some" or "A Lot" [1] – Fourth Grade*

Country	Percent of Schools by Shortage or Inadequacy				
	Instructional Materials	Budget for Supplies	School Buildings / Grounds	Heating / Cooling and Lighting	Instructional Space
Australia	19 (4.1)	20 (4.3)	27 (4.8)	16 (3.7)	29 (4.9)
Austria	4 (2.2)	5 (1.5)	16 (3.7)	11 (3.6)	22 (4.3)
Canada	25 (3.7)	26 (3.6)	29 (3.9)	14 (2.8)	25 (3.2)
Cyprus	r 24 (2.6)	r 10 (2.6)	r 26 (3.1)	r 43 (3.5)	r 20 (3.5)
Czech Republic	15 (3.3)	44 (4.5)	21 (3.2)	10 (2.5)	20 (3.6)
England	25 (4.9)	31 (4.9)	45 (5.0)	15 (3.5)	33 (5.0)
Greece	49 (6.7)	39 (6.3)	44 (6.6)	37 (6.4)	40 (6.0)
Hong Kong	27 (5.1)	25 (4.8)	41 (6.0)	28 (4.7)	43 (6.5)
Hungary	53 (5.4)	50 (5.0)	35 (4.7)	48 (4.6)	35 (4.6)
Iceland	39 (0.6)	17 (0.2)	59 (0.5)	9 (0.7)	59 (0.5)
Iran, Islamic Rep.	52 (5.2)	71 (4.6)	65 (5.0)	58 (5.2)	63 (5.1)
Ireland	24 (3.6)	41 (3.9)	39 (4.0)	11 (1.9)	33 (3.9)
Israel	s 11 (4.5)	s 14 (4.6)	s 43 (10.0)	s 50 (7.1)	s 44 (6.5)
Japan	25 (3.9)	30 (3.9)	37 (5.2)	37 (5.3)	32 (4.6)
Korea	25 (7.0)	26 (7.1)	44 (7.3)	58 (8.6)	37 (6.3)
Kuwait	s 100 (0.0)	s 100 (0.0)	s 98 (0.0)	s 95 (0.1)	s 97 (0.0)
Latvia (LSS)	92 (2.6)	97 (1.5)	79 (5.3)	67 (6.6)	72 (6.1)
Netherlands	44 (4.4)	33 (5.0)	23 (4.4)	11 (3.2)	27 (3.9)
New Zealand	29 (5.5)	28 (4.9)	28 (7.1)	11 (4.7)	34 (7.0)
Norway	25 (4.7)	7 (2.9)	25 (3.9)	16 (3.5)	24 (4.2)
Portugal	63 (4.4)	69 (4.4)	54 (4.9)	32 (3.9)	35 (5.5)
Scotland	– –	– –	– –	– –	– –
Singapore	8 (0.1)	4 (0.0)	30 (0.2)	13 (0.1)	35 (0.4)
Slovenia	74 (5.2)	64 (5.7)	54 (6.6)	44 (6.0)	68 (5.8)
Thailand	97 (1.4)	95 (1.9)	89 (2.9)	73 (3.4)	79 (3.9)
United States	13 (3.8)	17 (4.1)	31 (6.0)	9 (2.9)	32 (6.3)
International Average	38 (0.8)	39 (0.8)	43 (1.0)	33 (0.9)	42 (1.0)

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

1 Used to compute scale of school-wide shortages or inadequacies in facilities and materials that affect general capacity to provide instruction (see Figure 5.1).

* See Table 1.2 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 Appendix A).

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 school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

Table B.2

Shortages or Inadequacies that Affect Capacity to Provide Instruction in Mathematics "Some" or "A Lot" [1] – Fourth Grade*

Country	Percent of Schools by Shortage or Inadequacy				
	Computers for Mathematics Instruction	Computer Software for Mathematics Instruction	Calculators for Mathematics Instruction	Library Materials Relevant to Mathematics Instruction	Audio-Visual Resources for Mathematics Instruction
Australia	43 (6.2)	54 (6.3)	12 (3.1)	30 (5.6)	34 (5.8)
[2] *Austria*	13 (3.3)	10 (2.8)	4 (1.5)	8 (2.8)	11 (2.8)
Canada	45 (4.7)	55 (3.9)	23 (3.2)	37 (3.3)	35 (3.6)
Cyprus	r 42 (3.9)	r 34 (4.1)	r 24 (3.4)	r 26 (3.3)	r 35 (3.6)
Czech Republic	52 (4.2)	45 (4.2)	9 (2.0)	9 (2.1)	17 (3.7)
England	28 (4.0)	46 (4.7)	9 (2.7)	36 (5.1)	39 (5.5)
Greece	57 (6.2)	58 (6.2)	40 (6.0)	56 (6.2)	72 (5.0)
Hong Kong	32 (5.2)	33 (5.4)	24 (5.6)	37 (6.1)	33 (5.0)
Hungary	19 (3.4)	13 (3.0)	18 (3.3)	50 (4.6)	42 (4.7)
Iceland	45 (0.5)	44 (0.5)	18 (0.6)	27 (0.6)	12 (0.1)
Iran, Islamic Rep.	67 (4.4)	67 (4.4)	56 (4.8)	68 (4.5)	79 (3.7)
Ireland	70 (4.1)	74 (4.4)	54 (4.0)	61 (4.3)	72 (3.9)
Israel	s 79 (6.1)	s 75 (5.7)	s 41 (6.2)	s 57 (6.1)	s 48 (6.6)
Japan	36 (5.2)	41 (5.3)	21 (3.7)	19 (3.7)	31 (4.6)
Korea	67 (6.7)	71 (7.2)	52 (7.0)	50 (6.6)	78 (5.6)
Kuwait	s 5 (0.1)	s 8 (0.1)	s 8 (0.1)	s 4 (0.1)	s 28 (1.0)
Latvia (LSS)	r 77 (5.3)	r 79 (5.0)	59 (4.5)	68 (5.5)	73 (5.9)
Netherlands	38 (4.9)	41 (5.3)	16 (3.4)	19 (3.3)	21 (3.7)
New Zealand	49 (5.6)	57 (6.3)	18 (4.4)	32 (7.0)	45 (6.4)
Norway	46 (6.3)	52 (6.4)	r 11 (2.4)	r 18 (4.3)	r 29 (4.7)
Portugal	72 (4.2)	69 (4.6)	67 (4.3)	64 (5.2)	82 (3.8)
Scotland	– –	– –	– –	– –	– –
Singapore	33 (0.2)	33 (0.4)	9 (0.1)	21 (0.2)	17 (0.1)
Slovenia	r 51 (5.7)	r 55 (6.0)	r 23 (5.5)	39 (5.7)	45 (5.0)
Thailand	54 (4.7)	52 (4.7)	50 (4.5)	90 (2.6)	87 (2.8)
United States	45 (5.4)	47 (6.4)	15 (3.9)	29 (5.8)	25 (4.3)
International Average	47 (1.0)	49 (1.0)	27 (0.8)	38 (0.9)	44 (0.9)

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

1 Used to compute scale of school-wide shortages or inadequacies in resources that affect capacity to provide mathematics instruction (see Figure 5.1).

2 Data included for "Computers for Mathematics Instruction" are based on a single question regarding shortage of computers for instruction in general; the same data are used for both the mathematics and science scales regarding shortages or inadequacies affecting instruction.

* See Table 1.2 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 Appendix A).

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 school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

Table B.3

Shortages or Inadequacies that Affect Capacity to Provide Instruction in Science "Some" or "A Lot" [1] – Fourth Grade*

Country	Percent of Schools by Shortage or Inadequacy					
	Computers for Science Instruction	Computer Software for Science Instruction	Calculators for Science Instruction	Library Materials Relevant to Science Instruction	Audio-Visual Resources for Science Instruction	Science Laboratory Equipment and Materials
Australia	52 (5.8)	61 (6.0)	18 (4.1)	28 (4.8)	34 (5.3)	51 (6.1)
[2] *Austria*	13 (3.3)	12 (3.1)	4 (1.6)	18 (3.9)	17 (4.0)	37 (7.3)
Canada	49 (4.9)	62 (4.5)	27 (3.5)	43 (3.7)	42 (4.0)	60 (4.0)
Cyprus	r 43 (3.8)	r 36 (4.0)	r 26 (3.5)	r 36 (3.7)	r 45 (3.6)	r 61 (3.6)
Czech Republic	46 (4.6)	44 (4.5)	8 (1.9)	10 (2.5)	18 (3.3)	28 (4.3)
England	39 (5.1)	60 (5.0)	14 (3.2)	23 (3.9)	39 (6.0)	29 (5.1)
Greece	63 (6.1)	65 (6.0)	38 (5.9)	72 (5.0)	84 (3.2)	91 (2.3)
Hong Kong	34 (5.4)	37 (5.7)	26 (4.7)	38 (5.5)	45 (5.5)	61 (6.2)
Hungary	12 (3.2)	11 (2.8)	11 (3.2)	56 (4.5)	51 (4.8)	45 (5.0)
Iceland	47 (0.5)	53 (0.5)	18 (0.6)	38 (0.7)	18 (0.6)	61 (0.4)
Iran, Islamic Rep.	63 (4.6)	61 (4.4)	53 (4.8)	71 (4.7)	83 (3.0)	72 (4.3)
Ireland	74 (4.0)	76 (4.0)	66 (4.5)	67 (4.1)	77 (4.5)	82 (3.5)
Israel	s 76 (6.1)	s 72 (6.5)	s 52 (7.3)	s 49 (10.3)	s 49 (10.6)	s 60 (9.1)
Japan	36 (4.8)	39 (4.8)	14 (3.2)	25 (3.9)	40 (4.8)	48 (5.2)
Korea	59 (7.4)	75 (6.7)	57 (7.2)	63 (8.7)	71 (8.2)	59 (7.8)
Kuwait	s 10 (1.1)	s 9 (0.2)	s 4 (0.1)	s 23 (0.4)	s 34 (1.3)	s 86 (1.1)
Latvia (LSS)	r 75 (5.2)	r 77 (5.3)	r 46 (5.4)	82 (4.5)	r 84 (4.6)	r 90 (2.9)
Netherlands	34 (4.1)	43 (5.0)	21 (3.8)	37 (4.0)	37 (3.9)	56 (4.2)
New Zealand	46 (7.6)	59 (6.9)	36 (6.5)	35 (7.6)	45 (7.9)	53 (7.7)
Norway	r 45 (5.1)	r 49 (5.3)	r 8 (2.6)	r 29 (5.6)	r 47 (4.6)	r 58 (5.9)
Portugal	70 (4.7)	72 (4.7)	55 (4.7)	76 (4.5)	92 (2.3)	87 (3.0)
Scotland	– –	– –	– –	– –	– –	– –
Singapore	38 (0.3)	48 (0.4)	13 (0.1)	21 (0.2)	19 (0.1)	15 (0.1)
Slovenia	59 (6.2)	r 64 (5.8)	24 (5.7)	54 (5.4)	66 (6.1)	r 84 (4.1)
Thailand	61 (4.2)	59 (4.4)	54 (4.4)	90 (2.9)	86 (3.1)	92 (2.4)
United States	52 (5.2)	62 (4.9)	23 (4.6)	31 (5.4)	40 (6.4)	53 (6.0)
International Average	48 (1.0)	52 (1.0)	29 (0.9)	45 (1.0)	51 (1.0)	61 (1.0)

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

1 Used to compute scale of school-wide shortages or inadequacies in resources that affect capacity to provide science instruction (see Figure 5.1).

2 Data included for "Computers for Science Instruction" are based on a single question regarding shortage of computers for instruction in general; the same data are used for both the mathematics and science scales regarding shortages or inadequacies affecting instruction.

* See Table 1.2 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 Appendix A).

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 school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

Table B.4

School-Wide Shortages or Inadequacies in Facilities and Materials that Affect General Capacity to Provide Instruction "Some" or "A Lot" [1] – Eighth Grade*

Country	Percent of Schools by Shortage or Inadequacy				
	Instructional Materials	Budget for Supplies	School Buildings / Grounds	Heating / Cooling and Lighting	Instructional Space
Australia	19 (4.2)	22 (4.5)	r 32 (5.0)	r 18 (3.5)	26 (4.6)
Austria	6 (2.9)	15 (4.2)	26 (4.7)	9 (2.6)	46 (6.2)
Belgium (Fl)	3 (2.2)	9 (3.4)	39 (7.8)	6 (4.4)	33 (6.6)
Belgium (Fr)	r 51 (6.7)	r 31 (7.0)	r 82 (4.6)	r 48 (6.5)	r 76 (4.8)
Canada	24 (3.5)	23 (3.0)	23 (3.1)	12 (2.4)	20 (2.3)
Colombia	52 (4.7)	48 (5.1)	42 (5.5)	40 (5.4)	32 (5.0)
Cyprus	r 15 (0.0)	r 15 (0.0)	r 53 (0.0)	r 43 (0.0)	r 41 (0.0)
Czech Republic	22 (3.9)	37 (5.2)	24 (3.5)	3 (1.2)	34 (4.5)
Denmark	r 70 (4.7)	r 39 (4.7)	r 72 (4.5)	r 61 (4.7)	r 80 (4.0)
England	r 36 (5.5)	r 26 (4.3)	r 40 (6.5)	r 13 (4.1)	r 39 (6.0)
France	36 (6.0)	19 (4.0)	41 (5.6)	43 (8.8)	45 (6.3)
Germany	s 23 (5.4)	s 22 (5.8)	s 36 (5.6)	s 11 (3.9)	s 34 (5.9)
Greece	33 (4.7)	30 (5.2)	57 (5.9)	37 (5.8)	52 (5.8)
Hong Kong	23 (5.0)	16 (4.2)	51 (5.7)	27 (5.0)	72 (6.1)
Hungary	53 (5.4)	50 (5.0)	36 (4.7)	48 (4.6)	35 (4.6)
Iceland	37 (0.0)	16 (0.0)	58 (0.0)	10 (0.0)	55 (0.0)
Iran, Islamic Rep.	60 (4.8)	74 (4.6)	63 (5.4)	73 (3.9)	64 (5.1)
Ireland	20 (3.8)	33 (4.4)	51 (4.7)	13 (3.4)	43 (5.3)
Israel	s 5 (2.5)	s 8 (3.4)	s 35 (11.2)	s 36 (10.2)	s 48 (12.2)
Japan	17 (3.5)	24 (3.9)	31 (4.4)	35 (3.9)	30 (3.9)
Korea	39 (5.3)	26 (5.3)	53 (6.2)	66 (6.5)	52 (6.2)
Kuwait	x x	x x	x x	x x	x x
Latvia (LSS)	85 (4.4)	97 (2.0)	70 (4.6)	58 (5.7)	66 (4.9)
Lithuania	85 (5.6)	58 (5.2)	40 (6.6)	49 (5.9)	46 (6.1)
Netherlands	r 11 (4.2)	r 12 (4.5)	r 33 (5.5)	r 8 (3.7)	r 19 (5.2)
New Zealand	29 (5.4)	35 (6.1)	36 (6.3)	12 (4.1)	36 (5.8)
Norway	24 (4.1)	9 (3.1)	33 (6.2)	18 (4.4)	25 (4.6)
Portugal	33 (5.7)	40 (5.3)	56 (5.6)	49 (4.0)	55 (5.7)
Romania	39 (5.9)	62 (4.8)	39 (4.8)	35 (4.1)	25 (4.6)
Russian Federation	90 (3.0)	89 (3.0)	76 (5.3)	51 (5.1)	75 (4.9)
Scotland	– –	– –	– –	– –	– –
Singapore	10 (0.0)	5 (0.0)	32 (0.0)	17 (0.0)	36 (0.0)
Slovak Republic	18 (3.6)	69 (5.4)	28 (5.0)	6 (2.8)	25 (4.4)
Slovenia	74 (5.2)	64 (5.8)	54 (6.3)	r 43 (5.9)	68 (5.3)
Spain	22 (3.6)	34 (3.9)	41 (4.1)	23 (3.8)	34 (3.5)
Sweden	32 (5.5)	20 (4.6)	38 (4.7)	16 (4.0)	42 (5.8)
[2] **Switzerland**	– –	– –	– –	– –	– –
Thailand	84 (3.6)	81 (3.7)	88 (2.5)	73 (3.9)	84 (3.1)
United States	26 (5.9)	r 17 (4.3)	43 (6.2)	15 (4.0)	46 (6.2)
International Average	36 (0.7)	36 (0.7)	46 (0.9)	31 (0.8)	46 (0.9)

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

1 Used to compute scale of school-wide shortages or inadequacies in facilities and materials that affect general capacity to provide instruction (see Figure 5.2).

2 Percentages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table B.5

Shortages or Inadequacies that Affect Capacity to Provide Instruction in Mathematics "Some" or "A Lot" [1] – Eighth Grade*

Country	Percent of Schools by Shortage or Inadequacy				
	Computers for Mathematics Instruction	Computer Software for Mathematics Instruction	Calculators for Mathematics Instruction	Library Materials Relevant to Mathematics Instruction	Audio-Visual Resources for Mathematics Instruction
Australia	r 41 (5.2)	r 47 (5.5)	r 6 (2.0)	r 18 (3.4)	r 29 (5.1)
Austria	36 (4.7)	35 (4.9)	10 (3.9)	19 (4.9)	24 (5.0)
Belgium (Fl)	39 (6.2)	33 (5.6)	2 (1.1)	10 (4.9)	20 (7.5)
Belgium (Fr)	r 38 (5.6)	r 39 (5.9)	r 47 (6.9)	r 40 (5.8)	r 39 (5.6)
Canada	52 (3.5)	63 (3.6)	24 (3.1)	40 (3.8)	39 (3.8)
Colombia	76 (4.7)	80 (5.1)	r 60 (6.2)	70 (3.8)	79 (4.3)
Cyprus	r 41 (0.0)	r 21 (0.0)	r 13 (0.0)	s 29 (0.0)	r 23 (0.0)
Czech Republic	54 (5.2)	53 (5.0)	4 (1.5)	6 (2.3)	14 (3.5)
Denmark	r 67 (4.5)	r 71 (4.3)	r 55 (5.2)	r 32 (4.4)	r 54 (4.4)
England	r 43 (6.8)	r 48 (7.1)	r 9 (2.6)	r 30 (5.6)	r 29 (5.6)
France	39 (8.1)	40 (8.9)	25 (3.9)	22 (4.1)	18 (3.6)
Germany	s 40 (6.7)	s 39 (6.8)	s 11 (4.3)	s 14 (4.0)	s 25 (5.5)
Greece	47 (5.6)	49 (5.4)	31 (4.4)	52 (6.1)	62 (6.1)
Hong Kong	37 (6.4)	41 (6.4)	13 (4.1)	28 (5.4)	29 (5.0)
Hungary	18 (3.4)	12 (3.0)	18 (3.3)	50 (4.6)	42 (4.7)
Iceland	42 (0.0)	41 (0.0)	17 (0.0)	26 (0.0)	14 (0.0)
Iran, Islamic Rep.	75 (4.1)	71 (4.4)	63 (4.9)	72 (4.5)	81 (3.9)
Ireland	52 (5.6)	64 (5.6)	16 (3.3)	48 (5.3)	51 (5.6)
Israel	s 47 (11.4)	s 74 (8.1)	s 38 (11.5)	s 44 (11.8)	s 41 (11.9)
Japan	23 (3.6)	47 (4.7)	14 (3.4)	17 (2.5)	26 (3.1)
Korea	65 (5.7)	67 (6.1)	55 (5.6)	58 (5.0)	69 (4.6)
Kuwait	x x	x x	x x	x x	x x
Latvia (LSS)	74 (3.6)	76 (3.9)	65 (5.3)	71 (3.5)	80 (4.1)
Lithuania	63 (8.8)	65 (9.1)	57 (8.4)	65 (4.3)	83 (2.9)
Netherlands	r 31 (7.1)	r 32 (7.1)	r 9 (4.0)	r 22 (6.3)	r 13 (5.2)
New Zealand	60 (6.6)	63 (7.1)	23 (5.3)	24 (5.1)	39 (7.3)
Norway	45 (7.3)	50 (5.8)	5 (1.7)	6 (2.8)	19 (3.3)
Portugal	71 (6.2)	67 (6.5)	35 (4.9)	37 (5.2)	55 (5.3)
Romania	83 (5.1)	83 (5.0)	74 (5.3)	53 (6.0)	76 (5.5)
Russian Federation	86 (3.3)	89 (2.8)	75 (3.7)	69 (4.3)	79 (3.9)
Scotland	– –	– –	– –	– –	– –
Singapore	26 (0.0)	36 (0.0)	5 (0.0)	16 (0.0)	22 (0.0)
Slovak Republic	69 (4.9)	71 (5.5)	15 (3.6)	31 (5.1)	46 (5.6)
Slovenia	r 50 (5.7)	r 55 (5.9)	r 23 (5.6)	40 (5.9)	r 45 (5.2)
Spain	36 (4.9)	39 (5.1)	23 (4.1)	37 (4.7)	36 (4.7)
Sweden	51 (5.5)	56 (5.4)	11 (3.5)	18 (3.9)	12 (3.4)
[2] **Switzerland**	– –	– –	– –	– –	– –
Thailand	64 (4.3)	63 (4.3)	55 (4.4)	79 (3.6)	82 (3.5)
United States	68 (5.6)	67 (6.2)	32 (8.2)	49 (5.9)	50 (7.8)
International Average	51 (0.9)	54 (0.9)	29 (0.8)	37 (0.8)	43 (0.8)

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

1 Used to compute scale of school-wide shortages or inadequacies in resources that affect capacity to provide mathematics instruction (see Figure 5.2).

2 Percentages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table B.6

Shortages or Inadequacies that Affect Capacity to Provide Instruction in Science "Some" or "A Lot" [1] – Eighth Grade*

Country	Percent of Schools by Shortage or Inadequacy					
	Computers for Science Instruction	Computer Software for Science Instruction	Calculators for Science Instruction	Library Materials Relevant to Science Instruction	Audio-Visual Resources for Science Instruction	Science Laboratory Equipment and Materials
Australia	r 52 (5.7)	r 53 (5.4)	r 10 (2.2)	r 28 (5.2)	r 34 (5.2)	r 29 (5.6)
Austria	37 (5.1)	50 (5.6)	11 (4.0)	29 (5.8)	23 (4.7)	39 (5.2)
Belgium (Fl)	29 (5.3)	30 (5.3)	3 (2.0)	9 (4.6)	14 (5.4)	23 (5.6)
Belgium (Fr)	r 51 (5.7)	r 54 (5.7)	r 38 (5.7)	r 43 (5.1)	r 57 (6.3)	r 69 (5.7)
Canada	55 (3.2)	67 (3.4)	29 (3.0)	41 (3.5)	41 (3.9)	45 (3.7)
Colombia	83 (4.4)	r 83 (4.7)	65 (5.8)	66 (5.9)	65 (6.2)	68 (5.5)
Cyprus	r 36 (0.0)	s 32 (0.0)	r 10 (0.0)	r 28 (0.0)	r 44 (0.0)	r 38 (0.0)
Czech Republic	52 (5.2)	51 (5.4)	7 (2.4)	10 (2.4)	15 (3.3)	20 (3.2)
Denmark	r 73 (4.5)	r 72 (4.6)	r 37 (5.2)	r 54 (5.3)	r 64 (4.8)	r 71 (4.3)
England	r 47 (6.3)	r 50 (6.4)	r 16 (3.3)	r 41 (6.3)	r 19 (5.1)	r 39 (6.5)
France	41 (8.2)	41 (8.3)	19 (3.7)	30 (4.2)	34 (4.5)	71 (4.7)
Germany	s 44 (6.6)	s 47 (6.5)	s 10 (4.1)	s 22 (5.1)	s 27 (5.5)	s 32 (6.0)
Greece	59 (5.8)	58 (5.8)	30 (4.5)	56 (6.3)	71 (6.0)	74 (5.9)
Hong Kong	38 (6.4)	43 (6.8)	10 (3.7)	32 (5.5)	32 (5.5)	27 (5.0)
Hungary	12 (3.2)	11 (2.9)	11 (3.2)	55 (4.6)	51 (4.9)	45 (5.0)
Iceland	42 (0.0)	49 (0.0)	14 (0.0)	34 (0.0)	19 (0.0)	56 (0.0)
Iran, Islamic Rep.	76 (4.2)	75 (4.3)	62 (4.5)	67 (5.1)	74 (4.6)	73 (3.9)
Ireland	51 (5.3)	64 (5.4)	19 (3.7)	52 (6.3)	44 (6.4)	42 (5.9)
Israel	s 49 (13.0)	s 58 (10.5)	s 21 (8.8)	s 48 (11.2)	s 55 (11.8)	s 49 (11.0)
Japan	26 (3.5)	45 (5.0)	11 (3.2)	18 (2.4)	39 (4.3)	41 (4.1)
Korea	74 (5.8)	77 (5.6)	62 (5.1)	62 (4.8)	79 (4.3)	64 (5.5)
Kuwait	x x	x x	x x	x x	x x	x x
Latvia (LSS)	72 (4.4)	73 (4.4)	61 (4.7)	83 (3.8)	83 (4.4)	88 (3.7)
Lithuania	68 (5.8)	68 (6.3)	41 (9.2)	72 (5.9)	90 (2.6)	83 (5.7)
Netherlands	r 19 (4.9)	r 30 (6.6)	r 9 (4.0)	r 22 (6.2)	r 14 (5.1)	r 19 (6.2)
New Zealand	59 (7.5)	66 (5.8)	27 (6.1)	34 (5.2)	42 (6.2)	50 (7.0)
Norway	47 (7.8)	57 (5.8)	7 (4.0)	18 (4.9)	39 (6.7)	36 (6.3)
Portugal	61 (6.0)	66 (6.1)	31 (4.6)	38 (4.2)	42 (3.6)	52 (5.9)
Romania	84 (4.9)	83 (5.2)	70 (5.6)	63 (6.1)	78 (4.9)	66 (6.5)
Russian Federation	84 (3.3)	84 (3.2)	68 (4.3)	72 (4.0)	79 (4.2)	90 (2.1)
Scotland	– –	– –	– –	– –	– –	– –
Singapore	26 (0.0)	38 (0.0)	4 (0.0)	13 (0.0)	18 (0.0)	12 (0.0)
Slovak Republic	70 (4.8)	75 (5.0)	21 (4.2)	31 (5.0)	59 (4.8)	65 (4.5)
Slovenia	r 60 (6.1)	r 64 (5.7)	r 24 (5.9)	55 (5.5)	66 (6.1)	83 (3.9)
Spain	38 (4.9)	40 (4.7)	19 (3.9)	40 (4.5)	45 (4.5)	39 (4.3)
Sweden	54 (5.9)	62 (5.4)	11 (3.5)	30 (5.2)	23 (4.5)	47 (6.3)
[2] **Switzerland**	– –	– –	– –	– –	– –	– –
Thailand	68 (4.0)	68 (4.2)	58 (4.4)	84 (3.2)	85 (3.1)	90 (2.8)
United States	73 (6.1)	71 (6.5)	47 (7.9)	50 (7.5)	45 (7.6)	63 (7.0)
International Average	53 (0.9)	57 (0.9)	28 (0.8)	43 (0.9)	47 (0.9)	53 (0.9)

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

1 Used to compute scale of school-wide shortages or inadequacies in resources that affect capacity to provide science instruction (see Figure 5.2).

2 Percentages based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 totatls 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table B.7

School-Wide Shortages or Inadequacies in Facilities and Materials that Affect General Capacity to Provide Instruction "Some" or "A Lot" [1] – Final Year of Secondary School*

Country	Percent of Schools by Shortage or Inadequacy				
	Instructional Materials	Budget for Supplies	School Buildings / Grounds	Heating / Cooling and Lighting	Instructional Space
Australia	7 (3.6)	17 (8.0)	13 (7.4)	16 (7.5)	7 (2.6)
[2] *Austria*	– –	– –	– –	– –	– –
Canada	21 (4.1)	29 (4.8)	23 (8.6)	8 (1.4)	22 (8.5)
Cyprus	16 (0.0)	12 (0.0)	46 (0.0)	50 (0.0)	38 (.0)
Czech Republic	44 (6.8)	20 (4.5)	21 (5.0)	8 (3.0)	23 (5.2)
Denmark	s 46 (5.7)	s 12 (3.8)	s 40 (5.7)	s 28 (5.1)	s 53 (5.8)
France	42 (7.9)	25 (6.2)	41 (7.3)	30 (7.1)	49 (6.7)
[2] *Germany*	– –	– –	– –	– –	– –
Hungary	52 (4.2)	39 (5.1)	r 30 (4.3)	r 46 (4.5)	r 36 (4.6)
Iceland	r 52 (0.0)	r 13 (0.0)	r 32 (0.0)	r 0 (0.0)	r 25 (.0)
Italy	30 (5.9)	34 (5.5)	47 (6.4)	39 (6.4)	58 (6.8)
Lithuania	81 (5.2)	55 (6.3)	29 (5.0)	39 (5.4)	42 (5.1)
New Zealand	31 (6.9)	39 (6.9)	24 (6.5)	15 (5.5)	27 (7.0)
Norway	8 (4.2)	0 (0.0)	8 (2.8)	12 (3.6)	14 (3.6)
Russian Federation	69 (3.9)	85 (3.2)	64 (4.4)	38 (4.2)	62 (5.0)
Slovenia	x x	x x	x x	x x	x x
South Africa	x x	x x	x x	x x	x x
Sweden	r 12 (3.3)	r 15 (6.3)	r 15 (3.9)	r 5 (2.0)	r 15 (4.1)
[2] **Switzerland**	– –	– –	– –	– –	– –
United States	14 (3.5)	24 (4.5)	28 (5.3)	19 (5.0)	35 (6.0)
International Average	35 (1.3)	28 (1.3)	31 (1.4)	23 (1.2)	34 (1.4)

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

1 Used to compute scale of school-wide shortages or inadequacies in facilities and materials that affect general capacity to provide instruction (see Figure 5.3).

2 Percentages based on total school weights cannot be computed for Austria, Germany, and Switzerland; sampling based on tracks within schools.

* See Table 1.2 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 Appendix A).

The Netherlands did not administer the school questionnaire at the final year of secondary school.

A dash (–) indicates data are not available

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table B.8

Shortages or Inadequacies that Affect Capacity to Provide Instruction in Mathematics "Some" or "A Lot" [1] – Final Year of Secondary School*

Country	Percent of Schools by Shortage or Inadequacy					
	Computers for Mathematics Instruction	Computer Software for Mathematics Instruction	Calculators for Mathematics Instruction	Library Materials Relevant to Mathematics Instruction	Audio-Visual Resources for Mathematics Instruction	Availability of Suitably Qualified Mathematics Teachers
Australia	41 (6.7)	49 (7.5)	22 (7.7)	25 (8.1)	32 (8.6)	25 (8.0)
[2] *Austria*	– –	– –	– –	– –	– –	– –
Canada	65 (3.8)	66 (3.7)	24 (2.2)	34 (6.6)	45 (8.6)	17 (4.0)
Cyprus	r 26 (0.0)	13 (0.0)	8 (0.0)	20 (0.0)	32 (0.0)	8 (0.0)
Czech Republic	40 (5.9)	38 (5.2)	6 (2.6)	10 (2.9)	21 (4.4)	5 (2.1)
Denmark	s 45 (5.4)	s 46 (5.5)	s 32 (4.7)	s 33 (5.5)	s 27 (5.0)	r 28 (4.7)
France	45 (7.3)	43 (7.8)	29 (6.6)	27 (6.3)	32 (6.6)	44 (7.5)
[2] *Germany*	– –	– –	– –	– –	– –	– –
Hungary	40 (4.5)	29 (3.8)	r 33 (4.4)	r 51 (4.5)	r 50 (4.6)	r 36 (4.6)
Iceland	r 40 (0.0)	r 56 (0.0)	r 4 (0.0)	r 16 (0.0)	r 8 (0.0)	– –
Italy	36 (6.0)	39 (6.2)	31 (5.8)	36 (5.9)	41 (6.2)	17 (4.4)
Lithuania	70 (4.6)	71 (4.5)	56 (5.5)	59 (6.3)	70 (6.2)	9 (2.9)
New Zealand	63 (6.3)	62 (6.1)	11 (4.2)	28 (6.1)	33 (6.2)	48 (7.1)
Norway	27 (6.1)	32 (6.9)	7 (4.5)	3 (1.6)	5 (1.8)	18 (9.3)
Russian Federation	83 (2.7)	86 (1.9)	68 (4.7)	64 (4.3)	78 (4.0)	41 (3.8)
Slovenia	x x	x x	x x	x x	x x	x x
South Africa	x x	x x	x x	x x	x x	x x
Sweden	r 37 (7.0)	r 32 (6.6)	r 6 (2.1)	r 16 (6.0)	r 12 (3.8)	r 7 (2.4)
[2] **Switzerland**	– –	– –	– –	– –	– –	– –
United States	67 (6.4)	68 (5.9)	24 (5.6)	48 (6.4)	40 (6.5)	18 (4.4)
International Average	48 (1.4)	49 (1.4)	24 (1.2)	31 (1.4)	35 (1.4)	23 (1.4)

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

1 Used to compute scale of school-wide shortages or inadequacies in resources that affect capacity to provide mathematics instruction (see Figure 5.3).

2 Percentages based on total school weights cannot be computed for Austria, Germany, and Switzerland; sampling based on tracks within schools.

* See Table 1.2 for characteristics of the student samples.

( ) 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 Appendix A).

The Netherlands did not administer the school questionnaire at the final year of secondary school.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table B.9

Shortages or Inadequacies that Affect Capacity to Provide Instruction in Science "Some" or "A Lot" [1] – Final Year of Secondary School*

Country	Percent of Schools by Shortage or Inadequacy						
	Computers for Science Instruction	Computer Software for Science Instruction	Calculators for Science Instruction	Library Materials Relevant to Science Instruction	Audio-Visual Resources for Science Instruction	Science Laboratory Equipment and Materials	Availability of Suitably Qualified Physics Teachers
Australia	41 (7.7)	45 (8.4)	15 (7.5)	18 (7.7)	9 (3.2)	26 (8.0)	25 (7.3)
[2] *Austria*	– –	– –	– –	– –	– –	– –	– –
Canada	67 (6.0)	69 (6.0)	25 (4.0)	39 (8.3)	44 (6.9)	40 (8.6)	18 (6.4)
Cyprus	29 (0.0)	r 35 (0.0)	13 (0.0)	17 (0.0)	33 (.0)	29 (.0)	r 4 (0.0)
Czech Republic	33 (5.2)	33 (5.5)	8 (2.6)	17 (5.0)	27 (6.6)	31 (6.3)	2 (1.0)
Denmark	s 50 (5.8)	s 51 (5.7)	s 21 (4.6)	s 26 (5.0)	s 28 (4.9)	s 48 (5.8)	s 17 (4.0)
France	43 (6.3)	43 (6.3)	25 (5.5)	31 (6.2)	41 (6.7)	49 (7.3)	39 (7.6)
[2] *Germany*	– –	– –	– –	– –	– –	– –	– –
Hungary	r 33 (4.7)	r 27 (4.2)	r 23 (3.9)	r 38 (4.5)	r 47 (4.2)	r 46 (4.3)	r 32 (4.7)
Iceland	r 36 (0.0)	r 40 (0.0)	r 4 (0.0)	r 24 (0.0)	r 8 (.0)	r 40 (.0)	r 20 (0.0)
Italy	41 (6.7)	49 (5.9)	35 (6.0)	38 (5.9)	29 (5.7)	45 (6.0)	25 (5.4)
Lithuania	65 (5.0)	67 (4.7)	43 (5.0)	72 (5.6)	77 (5.1)	72 (5.3)	19 (4.7)
New Zealand	63 (5.8)	67 (5.9)	16 (5.2)	24 (6.3)	26 (5.8)	46 (5.7)	36 (7.6)
Norway	28 (5.9)	47 (7.9)	5 (3.7)	2 (1.1)	6 (2.2)	r 21 (5.2)	r 15 (9.9)
Russian Federation	80 (2.5)	84 (1.9)	61 (3.6)	69 (4.6)	72 (4.6)	87 (2.3)	40 (4.2)
Slovenia	x x	x x	x x	– –	– –	x x	x x
South Africa	x x	x x	x x	x x	x x	x x	x x
Sweden	s 28 (4.9)	s 27 (5.0)	s 6 (2.1)	s 25 (7.7)	s 14 (5.0)	s 21 (4.8)	r 4 (1.6)
[2] **Switzerland**	– –	– –	– –	– –	– –	– –	– –
United States	65 (6.6)	65 (6.3)	43 (6.0)	56 (5.4)	47 (6.3)	57 (5.5)	30 (5.7)
International Average	47 (1.4)	50 (1.4)	23 (1.2)	33 (1.4)	34 (1.3)	44 (1.4)	22 (1.4)

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

1 Used to compute scale of school-wide shortages or inadequacies in resources that affect capacity to provide science instruction (see Figure 5.3).

2 Percentages based on total school weights cannot be computed for Austria, Germany, and Switzerland; sampling based on tracks within schools.

* See Table 1.2 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 Appendix A).

The Netherlands did not administer the school questionnaire at the final year of secondary school.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools. An "s" indicates school data available for 50-69% of schools.

An "x" indicates school data available for <50% of schools.

Table B.10

Percent of Students Who Are Absent on a Typical School Day
Fourth Grade*

Country	Average Percent Absent [1]	Schools with 5% or More Absent			Schools with Less than 5% Absent		
		Percent of Students	Mean Mathematics Achievement	Mean Science Achievement	Percent of Students	Mean Mathematics Achievement	Mean Science Achievement
Australia	▲ 4 (0.2)	49 (5.5)	544 (5.9)	561 (6.0)	51 (5.5)	556 (4.7)	569 (4.6)
Austria	● 3 (0.3)	28 (4.2)	555 (4.9)	559 (5.4)	72 (4.2)	561 (4.1)	567 (4.3)
Canada	● 4 (0.3)	37 (3.7)	529 (6.5)	553 (5.3)	63 (3.7)	533 (4.1)	549 (3.3)
Cyprus	r ▼ 2 (0.1)	r 2 (1.2)	~ ~	~ ~	98 (1.2)	503 (3.9)	476 (4.0)
Czech Republic	▲ 7 (0.4)	73 (3.5)	572 (4.3)	563 (4.1)	27 (3.5)	554 (5.9)	541 (5.1)
England	▲ 4 (0.3)	48 (4.9)	504 (5.3)	539 (5.4)	52 (4.9)	525 (5.2)	566 (5.2)
Greece	● 4 (0.7)	28 (3.8)	490 (5.9)	492 (6.3)	72 (3.8)	495 (5.2)	501 (5.0)
Hong Kong	▼ 1 (0.1)	3 (1.7)	591 (16.6)	532 (5.8)	97 (1.7)	588 (4.5)	534 (3.9)
Hungary	▲ 4 (0.2)	47 (4.6)	550 (6.1)	536 (5.6)	53 (4.6)	549 (4.4)	529 (4.4)
Iceland	▼ 2 (0.0)	19 (5.4)	471 (5.1)	511 (8.6)	81 (5.4)	476 (3.1)	503 (3.7)
Iran, Islamic Rep.	▼ 2 (0.2)	17 (3.5)	433 (10.5)	420 (9.3)	83 (3.5)	428 (4.5)	415 (4.9)
Ireland	▲ 5 (0.3)	72 (3.9)	549 (4.4)	537 (4.2)	28 (3.9)	557 (5.7)	547 (5.2)
Israel	s ● 6 (1.8)	s 40 (6.9)	525 (6.3)	497 (8.3)	60 (6.9)	529 (5.3)	501 (6.4)
Japan	▼ 2 (0.2)	4 (1.8)	588 (12.5)	556 (15.2)	96 (1.8)	597 (2.1)	574 (1.7)
Korea	▼ 1 (0.3)	r 3 (1.6)	568 (9.7)	563 (7.1)	97 (1.6)	611 (2.5)	597 (2.1)
Kuwait	s ● 4 (0.1)	x x	x x	x x	x x	x x	x x
Latvia (LSS)	▲ 6 (0.5)	r 60 (4.8)	526 (6.0)	514 (6.1)	40 (4.8)	525 (9.5)	512 (10.9)
Netherlands	▼ 2 (0.2)	13 (3.9)	575 (10.1)	551 (9.4)	87 (3.9)	577 (3.8)	557 (3.5)
New Zealand	● 4 (0.5)	44 (4.4)	484 (7.3)	512 (8.6)	56 (4.4)	512 (5.1)	547 (5.0)
Norway	▼ 2 (0.1)	r 15 (3.5)	493 (8.0)	522 (10.3)	85 (3.5)	501 (3.3)	530 (3.9)
Portugal	▼ 3 (0.2)	23 (4.1)	464 (7.9)	469 (9.0)	77 (4.1)	476 (4.5)	480 (4.9)
Scotland	● 4 (0.3)	49 (5.1)	514 (7.0)	526 (6.8)	51 (5.1)	530 (6.0)	549 (6.0)
Singapore	▼ 1 (0.0)	1 (1.0)	~ ~	~ ~	99 (1.0)	626 (5.3)	547 (5.0)
Slovenia	r ● 3 (0.3)	r 28 (5.2)	553 (6.6)	548 (6.2)	72 (5.2)	546 (4.3)	540 (4.0)
Thailand	r ● 3 (0.3)	r 32 (6.4)	472 (9.6)	457 (8.8)	68 (6.4)	500 (6.4)	485 (6.7)
United States	r ▲ 4 (0.2)	r 39 (4.9)	522 (5.3)	540 (6.6)	61 (4.9)	564 (4.4)	586 (4.0)
International Average	3 (0.1)	31 (0.9)	525 (1.7)	524 (1.6)	69 (0.9)	537 (1.0)	532 (1.0)

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

▲ = Country mean significantly higher than international mean

▼ = Country mean significantly lower than international mean

● = No statistically significant difference between country mean and international mean

1 Reported percent of students absent on a typical school day averaged across schools.

* See Table 1.2 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 Appendix A).

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

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

An "r" indicates school data available for 70-84% of schools or students, as applicable. An "s" indicates school data available for 50-69% of schools or students, as applicable.

An "x" indicates school data available for <50% of schools or students, as applicable.

Table B.11

Percent of Students Who Are Absent on a Typical School Day
Eighth Grade*

Country	Average Percent Absent [1]	Schools with 5% or More Absent			Schools with Less than 5% Absent		
		Percent of Students	Mean Mathematics Achievement	Mean Science Achievement	Percent of Students	Mean Mathematics Achievement	Mean Science Achievement
Australia	r ▲ 7 (0.4)	r 76 (3.9)	519 (4.4)	535 (4.3)	24 (3.9)	556 (9.7)	568 (10.7)
Austria	● 4 (0.2)	46 (5.7)	546 (6.6)	564 (5.7)	54 (5.7)	533 (5.8)	550 (7.2)
Belgium (Fl)	r ▼ 3 (0.3)	17 (6.4)	495 (10.4)	491 (7.7)	83 (6.4)	581 (5.5)	563 (3.1)
Belgium (Fr)	r ● 6 (0.5)	r 52 (6.0)	512 (7.8)	460 (6.7)	48 (6.0)	548 (5.5)	484 (4.5)
Canada	● 5 (0.3)	r 59 (3.8)	523 (4.0)	530 (3.8)	41 (3.8)	533 (4.5)	540 (4.4)
Colombia	r ● 5 (0.6)	37 (5.2)	370 (6.9)	395 (8.4)	63 (5.2)	390 (3.4)	418 (3.8)
Cyprus	r ▼ 3 (0.0)	r 22 (0.5)	477 (3.4)	471 (6.8)	78 (0.5)	471 (2.7)	458 (2.1)
Czech Republic	▲ 8 (0.3)	81 (4.3)	565 (6.0)	575 (5.2)	19 (4.3)	559 (7.3)	569 (4.7)
Denmark	s ▼ 4 (0.2)	r 41 (5.8)	494 (4.6)	476 (4.3)	59 (5.8)	508 (5.2)	483 (5.3)
England	r ● 6 (0.7)	r 76 (4.4)	494 (4.1)	540 (4.9)	24 (4.4)	536 (11.4)	587 (10.7)
France	r ● 4 (0.6)	r 28 (4.6)	539 (7.0)	498 (6.1)	72 (4.6)	540 (4.6)	499 (3.3)
Germany	s ● 4 (0.3)	s 37 (5.5)	515 (10.7)	536 (11.0)	63 (5.5)	512 (8.8)	535 (8.6)
Greece	● 4 (0.4)	31 (3.9)	477 (5.4)	492 (4.4)	69 (3.9)	489 (2.9)	499 (2.4)
Hong Kong	▼ 2 (0.3)	4 (2.2)	504 (27.4)	459 (24.0)	96 (2.2)	589 (7.3)	523 (5.2)
Hungary	● 4 (0.2)	45 (4.2)	538 (5.8)	554 (5.3)	55 (4.2)	535 (3.9)	552 (3.6)
Iceland	▼ 3 (0.0)	12 (4.3)	486 (8.8)	494 (8.3)	88 (4.3)	490 (5.1)	496 (4.8)
Iran, Islamic Rep.	● 3 (0.6)	9 (2.9)	413 (10.4)	457 (8.4)	91 (2.9)	429 (2.0)	471 (2.4)
Ireland	▲ 7 (0.4)	r 77 (4.6)	531 (6.5)	538 (5.7)	23 (4.6)	538 (10.3)	548 (9.6)
Israel	s ● 5 (0.7)	s 55 (11.0)	530 (14.3)	545 (12.7)	45 (11.0)	531 (10.3)	531 (12.0)
Japan	▼ 2 (0.1)	5 (2.3)	598 (26.6)	572 (25.7)	95 (2.3)	605 (1.9)	571 (1.5)
Korea	▼ 1 (0.2)	5 (1.8)	610 (15.3)	555 (9.3)	95 (1.8)	606 (2.6)	564 (2.1)
Kuwait	x x	x x	x x	x x	x x	x x	x x
Latvia (LSS)	▲ 6 (0.5)	r 63 (5.0)	492 (4.7)	484 (3.4)	37 (5.0)	489 (4.7)	483 (4.3)
Lithuania	● 4 (0.5)	59 (5.1)	480 (4.8)	479 (4.7)	41 (5.1)	470 (5.7)	470 (5.3)
Netherlands	s ▼ 3 (0.4)	s 26 (6.8)	506 (29.3)	534 (24.7)	74 (6.8)	556 (7.4)	571 (5.7)
New Zealand	▲ 7 (0.4)	80 (2.9)	507 (4.9)	526 (5.0)	20 (2.9)	524 (11.8)	538 (9.3)
Norway	▼ 3 (0.2)	r 31 (4.1)	503 (4.6)	526 (3.7)	69 (4.1)	502 (3.0)	527 (2.9)
Portugal	● 5 (0.3)	r 44 (4.7)	447 (3.6)	475 (4.0)	56 (4.7)	460 (3.5)	485 (3.3)
Romania	● 4 (0.4)	25 (3.5)	466 (9.9)	461 (9.0)	75 (3.5)	487 (4.8)	495 (5.7)
Russian Federation	● 5 (0.4)	45 (3.9)	527 (6.8)	530 (6.6)	55 (3.9)	542 (8.0)	544 (5.4)
Scotland	r ▲ 8 (0.5)	r 93 (2.8)	494 (5.5)	510 (4.8)	7 (2.8)	515 (13.4)	559 (19.5)
Singapore	▼ 2 (0.0)	2 (1.1)	~ ~	~ ~	98 (1.1)	644 (5.1)	608 (5.7)
Slovak Republic	● 6 (0.6)	60 (4.6)	548 (4.7)	548 (4.3)	40 (4.6)	545 (6.0)	539 (5.3)
Slovenia	r ● 4 (0.5)	r 27 (4.5)	543 (5.6)	561 (4.9)	73 (4.5)	539 (4.6)	557 (3.6)
Spain	▼ 3 (0.2)	26 (3.8)	481 (5.1)	511 (4.1)	74 (3.8)	488 (2.8)	517 (2.1)
Sweden	r ● 4 (0.3)	r 45 (5.2)	518 (5.2)	534 (5.2)	55 (5.2)	520 (4.3)	537 (3.5)
[2] **Switzerland**	– –	r 13 (1.9)	557 (9.3)	527 (8.7)	87 (1.9)	545 (4.1)	520 (3.7)
Thailand	r ▼ 3 (0.3)	r 17 (3.8)	522 (18.7)	523 (9.5)	83 (3.8)	520 (6.5)	524 (4.5)
United States	r ● 5 (0.5)	r 60 (4.6)	497 (5.0)	531 (4.7)	40 (4.6)	516 (6.4)	553 (4.9)
International Average	4 (0.1)	40 (0.7)	509 (1.8)	513 (1.6)	60 (0.7)	525 (1.1)	527 (1.0)

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

▲ = Country mean significantly higher than international mean

▼ = Country mean significantly lower than international mean

● = No statistically significant difference between country mean and international mean

1 Reported percent of students absent on a typical school day averaged across schools.

2 Average Percent Absent based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available. A tilde (~) indicates insufficent data to report achievement.

An "r" indicates school data available for 70-84% of schools or students, as applicable. An "s" indicates school data available for 50-69% of schools or students, as applicable.

An "x" indicates school data available for <50% of schools or students, as applicable.

Table B.12

Percent of Students Who Are Absent on a Typical School Day
Final Year of Secondary School*

Country	Average Percent Absent[1]		Schools with 5% or More Absent			Schools with Less than 5% Absent		
			Percent of Students	Mean Mathematics Achievement	Mean Science Achievement	Percent of Students	Mean Mathematics Achievement	Mean Science Achievement
Australia	r ●	8 (0.4)	r 76 (9.7)	531 (7.2)	533 (8.2)	24 (9.7)	528 (10.4)	542 (11.6)
[2]*Austria*		– –	67 (5.7)	529 (7.5)	532 (7.9)	33 (5.7)	506 (12.8)	506 (14.0)
Canada	●	8 (0.5)	r 89 (2.0)	517 (3.1)	530 (2.5)	11 (2.0)	531 (5.4)	543 (5.8)
Cyprus	r ▼	4 (0.0)	r 23 (0.8)	443 (3.9)	451 (4.4)	77 (0.8)	446 (3.0)	446 (3.9)
Czech Republic	▲	10 (0.5)	95 (2.6)	466 (13.1)	486 (9.4)	5 (2.6)	465 (17.7)	489 (22.7)
Denmark	s ●	7 (0.4)	r 81 (6.2)	550 (4.7)	511 (6.9)	19 (6.2)	547 (5.7)	497 (10.5)
France	▼	5 (0.5)	46 (8.9)	526 (10.5)	486 (10.6)	54 (8.9)	524 (6.6)	489 (7.1)
[2]*Germany*		– –	x x	x x	x x	x x	x x	x x
Hungary	r ●	7 (0.3)	68 (3.5)	479 (5.1)	465 (4.3)	32 (3.5)	487 (11.0)	478 (9.7)
Iceland	r ▲	7 (0.0)	r 91 (0.3)	528 (3.0)	543 (2.0)	9 (0.3)	520 (4.6)	534 (6.9)
Italy	▲	11 (1.3)	85 (3.9)	472 (5.8)	471 (6.0)	15 (3.9)	496 (15.3)	491 (14.7)
Lithuania	r ●	6 (0.4)	r 66 (5.3)	473 (7.2)	462 (7.4)	34 (5.3)	472 (15.0)	467 (15.0)
New Zealand	●	7 (0.4)	73 (5.6)	518 (6.3)	523 (7.5)	27 (5.6)	531 (8.5)	541 (8.8)
Norway	r ●	5 (0.6)	r 53 (4.9)	532 (6.2)	549 (6.8)	47 (4.9)	531 (8.8)	546 (8.6)
Russian Federation	▼	5 (0.4)	46 (4.5)	464 (6.5)	474 (5.8)	54 (4.5)	476 (10.2)	487 (9.5)
Slovenia		x x	x x	x x	x x	x x	x x	x x
South Africa		x x	x x	x x	x x	x x	x x	x x
Sweden	s ●	6 (0.4)	r 65 (4.6)	562 (5.7)	569 (5.8)	35 (4.6)	571 (6.8)	576 (7.3)
[2]**Switzerland**		– –	s 46 (4.8)	536 (9.5)	515 (10.0)	54 (4.8)	545 (8.5)	530 (8.3)
United States	r ●	6 (0.3)	r 75 (4.8)	462 (4.2)	482 (3.8)	25 (4.8)	473 (8.7)	494 (9.5)
International Average		7 (0.1)	67 (1.3)	505 (1.7)	505 (1.7)	33 (1.3)	509 (2.5)	509 (2.7)

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

▲ = Country mean significantly higher than international mean

▼ = Country mean significantly lower than international mean

● = No statistically significant difference between country mean and international mean

1 Reported percent of students absent on a typical school day averaged across schools.

2 Average Percent Absent based on total school weights cannot be computed for Austria, Germany, and Switzerland; sampling based on tracks within schools.

* See Table 1.2 for characteristics of the student samples.

( ) 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 Appendix A).

The Netherlands did not administer the school questionnaire at the final year of secondary school.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools or students, as applicable. An "s" indicates school data available for 50-69% of schools or students, as applicable.

An "x" indicates school data available for <50% of schools or students, as applicable.

Table B.13

Percent of Students Leaving School Before the End of the School Year Fourth Grade*

Country	Average Percent Leaving School Before Year End[1]	Schools with 5% or More Leaving Before Year End			Schools with Less than 5% Leaving Before Year End		
		Percent of Students	Mean Mathematics Achievement	Mean Science Achievement	Percent of Students	Mean Mathematics Achievement	Mean Science Achievement
Australia	● 8 (0.8)	r 70 (4.6)	545 (4.3)	562 (4.2)	30 (4.6)	562 (5.9)	572 (6.0)
Austria	● 4 (1.6)	12 (3.5)	546 (13.7)	548 (16.6)	88 (3.5)	561 (3.1)	567 (3.1)
Canada	● 11 (1.7)	61 (3.7)	519 (5.3)	546 (4.5)	39 (3.7)	554 (3.6)	559 (3.0)
Cyprus	r ● 5 (1.1)	r 6 (2.1)	515 (19.1)	484 (11.9)	94 (2.1)	503 (3.8)	475 (4.0)
Czech Republic	● 7 (1.6)	17 (3.2)	577 (9.3)	569 (8.1)	83 (3.2)	565 (3.5)	554 (3.4)
England	▼ 4 (0.3)	34 (3.6)	498 (5.6)	532 (5.8)	66 (3.6)	522 (4.6)	563 (4.5)
Greece	● 7 (3.0)	22 (3.3)	494 (7.6)	495 (7.1)	78 (3.3)	491 (5.7)	497 (5.1)
Hong Kong	● 19 (4.4)	30 (5.5)	585 (9.0)	530 (7.9)	70 (5.5)	589 (5.0)	536 (4.5)
Hungary	● 14 (3.6)	23 (3.2)	539 (8.1)	523 (7.9)	77 (3.2)	551 (4.0)	535 (4.0)
Iceland	▲ 12 (0.1)	20 (4.3)	466 (7.4)	494 (9.5)	80 (4.3)	477 (2.7)	507 (2.9)
Iran, Islamic Rep.	● 5 (1.1)	25 (4.1)	427 (8.1)	416 (8.1)	75 (4.1)	430 (4.8)	417 (5.1)
Ireland	▼ 1 (0.1)	5 (2.0)	518 (10.1)	508 (11.9)	95 (2.0)	552 (3.8)	540 (3.6)
Israel	s ● 6 (3.2)	s 11 (4.5)	526 (7.4)	492 (5.2)	89 (4.5)	525 (4.1)	500 (5.0)
Japan	▼ 1 (0.2)	9 (2.4)	614 (6.1)	591 (4.9)	91 (2.4)	595 (2.1)	572 (1.8)
Korea	● 7 (3.1)	34 (4.0)	614 (4.2)	600 (3.6)	66 (4.0)	610 (2.7)	596 (2.2)
Kuwait	s ▼ 3 (0.0)	s 8 (2.7)	398 (9.3)	408 (6.1)	92 (2.7)	404 (3.5)	409 (4.1)
Latvia (LSS)	● 17 (3.4)	27 (4.0)	528 (9.2)	517 (10.0)	73 (4.0)	522 (6.1)	510 (6.2)
Netherlands	▼ 2 (0.3)	14 (3.6)	546 (9.3)	530 (10.6)	86 (3.6)	582 (3.5)	561 (2.8)
New Zealand	▲ 13 (1.6)	79 (3.9)	491 (5.4)	523 (6.2)	21 (3.9)	528 (6.8)	559 (6.7)
Norway	● 5 (1.4)	13 (3.0)	509 (7.5)	542 (9.3)	87 (3.0)	499 (3.3)	527 (3.8)
Portugal	● 6 (1.7)	26 (3.9)	465 (8.6)	476 (10.2)	74 (3.9)	477 (4.3)	478 (4.5)
Scotland	● 6 (1.2)	36 (4.9)	519 (8.8)	532 (8.7)	64 (4.9)	522 (5.1)	539 (5.1)
Singapore	▼ 0 (0.0)	0 (0.0)	~ ~	~ ~	100 (0.0)	625 (5.3)	547 (5.0)
Slovenia	r ● 8 (3.2)	r 10 (3.2)	541 (7.8)	541 (5.9)	90 (3.2)	549 (4.0)	543 (4.0)
Thailand	● 5 (1.2)	22 (5.4)	493 (13.0)	472 (13.7)	78 (5.4)	491 (7.1)	477 (7.4)
United States	● 16 (3.9)	r 63 (4.9)	532 (3.8)	551 (4.4)	37 (4.9)	576 (5.6)	601 (5.4)
International Average	7 (0.4)	26 (0.7)	520 (1.8)	519 (1.7)	74 (0.7)	533 (0.9)	528 (0.9)

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

▲ = Country mean significantly higher than international mean

▼ = Country mean significantly lower than international mean

● = No statistically significant difference between country mean and international mean

1 Reported percent of students leaving school before the end of the school year averaged across schools.

* See Table 1.2 for characteristics of the student samples.

( ) 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 Appendix A).

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

An "r" indicates school data available for 70-84% of schools or students, as applicable. An "s" indicates school data available for 50-69% of schools or students, as applicable.

Table B.14

Percent of Students Leaving School Before the End of the School Year
Eighth Grade*

Country	Average Percent Leaving School Before Year End[1]		Schools with 5% or More Leaving Before Year End			Schools with Less than 5% Leaving Before Year End		
			Percent of Students	Mean Mathematics	Mean Science Achievement	Percent of Students	Mean Mathematics	Mean Science Achievement
Australia	r ●	7 (0.8)	r 60 (4.0)	517 (5.4)	535 (5.0)	40 (4.0)	540 (7.6)	550 (8.6)
Austria	▼	1 (0.1)	4 (1.3)	475 (13.5)	496 (11.9)	96 (1.3)	541 (3.7)	560 (4.3)
Belgium (Fl)	r ▼	2 (0.3)	r 5 (2.0)	525 (13.7)	519 (8.1)	95 (2.0)	568 (7.1)	553 (5.4)
Belgium (Fr)	r ●	8 (3.8)	s 29 (5.9)	491 (8.5)	443 (6.9)	71 (5.9)	545 (5.8)	483 (4.8)
Canada	r ●	6 (0.5)	r 58 (3.6)	521 (3.8)	525 (3.7)	42 (3.6)	535 (4.2)	544 (4.1)
Colombia	r ▲	20 (3.6)	65 (4.2)	373 (3.9)	398 (4.8)	35 (4.2)	398 (4.8)	429 (5.1)
Cyprus	r ●	6 (0.0)	r 17 (0.6)	451 (4.9)	439 (4.4)	83 (0.6)	476 (2.4)	465 (2.4)
Czech Republic	●	7 (2.3)	13 (3.8)	559 (14.4)	564 (7.4)	87 (3.8)	564 (5.6)	575 (4.7)
Denmark	r ●	8 (2.0)	r 33 (5.4)	495 (7.7)	474 (7.9)	67 (5.4)	506 (3.4)	484 (3.9)
England	r ▼	2 (0.2)	r 19 (3.0)	473 (5.1)	521 (6.0)	81 (3.0)	513 (4.4)	559 (5.1)
France	●	4 (1.2)	13 (3.3)	538 (10.2)	500 (8.4)	87 (3.3)	538 (3.7)	497 (2.8)
Germany	s ▼	3 (0.7)	s 12 (3.8)	497 (30.9)	510 (32.5)	88 (3.8)	516 (6.4)	539 (5.9)
Greece	●	13 (2.5)	43 (4.3)	487 (4.2)	501 (3.6)	57 (4.3)	482 (3.6)	493 (2.9)
Hong Kong	●	13 (3.8)	25 (5.1)	586 (16.4)	515 (11.7)	75 (5.1)	587 (9.5)	523 (6.6)
Hungary	●	14 (3.6)	22 (3.0)	532 (7.9)	550 (6.0)	78 (3.0)	537 (3.9)	554 (3.6)
Iceland	▲	13 (0.0)	22 (7.1)	493 (8.2)	499 (11.9)	78 (7.1)	489 (4.9)	495 (3.3)
Iran, Islamic Rep.	●	5 (1.3)	23 (5.8)	435 (3.2)	473 (5.9)	77 (5.8)	426 (2.8)	469 (2.8)
Ireland	▼	3 (0.7)	18 (3.7)	507 (14.1)	522 (12.7)	82 (3.7)	537 (6.1)	544 (5.3)
Israel	s ▼	1 (1.0)	s 4 (3.7)	482 (.0)	514 (.0)	96 (3.7)	531 (8.9)	537 (8.5)
Japan	▼	1 (0.1)	2 (1.1)	~ ~	~ ~	98 (1.1)	605 (1.9)	571 (1.7)
Korea	●	5 (1.8)	13 (3.0)	614 (10.2)	563 (7.0)	87 (3.0)	606 (2.6)	565 (2.1)
Kuwait		x x	x x	x x	x x	x x	x x	x x
Latvia (LSS)	●	9 (2.2)	25 (4.2)	497 (7.3)	489 (5.4)	75 (4.2)	489 (3.7)	481 (3.0)
Lithuania	●	13 (4.2)	21 (3.3)	467 (9.0)	473 (8.3)	79 (3.3)	479 (4.0)	476 (4.1)
Netherlands	r ▼	3 (0.5)	r 18 (4.8)	537 (15.0)	558 (10.2)	82 (4.8)	555 (6.1)	571 (4.6)
New Zealand	▲	11 (1.1)	83 (3.0)	509 (5.1)	526 (4.8)	17 (3.0)	521 (14.7)	537 (13.0)
Norway	●	8 (3.1)	11 (2.8)	505 (7.6)	518 (8.3)	89 (2.8)	502 (2.7)	528 (2.5)
Portugal	●	11 (3.0)	39 (4.3)	448 (3.7)	473 (4.2)	61 (4.3)	458 (3.3)	483 (3.1)
Romania	●	7 (2.8)	16 (2.8)	465 (9.6)	468 (9.9)	84 (2.8)	485 (4.5)	490 (5.4)
Russian Federation	●	5 (1.1)	15 (3.5)	527 (9.0)	538 (10.8)	85 (3.5)	537 (6.2)	538 (4.5)
Scotland	r ●	9 (2.3)	r 31 (5.1)	495 (9.6)	508 (9.4)	69 (5.1)	494 (5.3)	516 (5.3)
Singapore	▼	1 (0.0)	0 (0.0)	~ ~	~ ~	100 (0.0)	643 (4.9)	607 (5.5)
Slovak Republic	▼	1 (0.1)	1 (0.6)	~ ~	~ ~	99 (0.6)	547 (3.4)	544 (3.3)
Slovenia	r ●	7 (3.1)	r 8 (2.8)	539 (12.3)	555 (7.0)	92 (2.8)	540 (3.9)	558 (3.3)
Spain	●	6 (2.2)	14 (3.3)	488 (7.9)	518 (5.6)	86 (3.3)	486 (2.4)	515 (2.1)
Sweden	●	11 (4.1)	13 (3.9)	530 (7.7)	536 (7.5)	87 (3.9)	518 (3.3)	536 (3.2)
[2] **Switzerland**		– –	r 25 (3.1)	529 (9.9)	507 (8.6)	75 (3.1)	550 (4.5)	524 (3.9)
Thailand	r ●	9 (2.0)	r 31 (4.9)	517 (11.1)	526 (6.0)	69 (4.9)	522 (7.4)	523 (5.2)
United States	r ●	17 (4.4)	r 67 (4.3)	498 (5.4)	532 (5.1)	33 (4.3)	518 (6.1)	555 (4.6)
International Average		7 (0.4)	24 (0.6)	503 (1.8)	508 (1.6)	76 (0.6)	523 (0.9)	526 (.8)

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

▲ = Country mean significantly higher than international mean

▼ = Country mean significantly lower than international mean

● = No statistically significant difference between country mean and international mean

1 Reported percent of students leaving school before the end of the school year averaged across schools.

2 Average Percent Leaving School Before Year End based on total school weights cannot be computed for Switzerland; sampling based on tracks within schools at grade 8.

* See Table 1.2 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 Appendix A).

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

School background data for Bulgaria and South Africa are unavailable.

A dash (–) indicates data are not available. A tilde (~) indicates insufficent data to report achievement.

An "r" indicates school data available for 70-84% of schools or students, as applicable. An "s" indicates school data available for 50-69% of schools or students, as applicable.

An "x" indicates school data available for <50% of schools or students, as applicable.

Table B.15

Percent of Students Leaving School Before the End of the School Year
Final Year of Secondary School*

Country	Average Percent Leaving School Before Year End[1]	Schools with 5% or More Leaving Before Year End			Schools with Less than 5% Leaving Before Year End		
		Percent of Students	Mean Mathematics Achievement	Mean Science Achievement	Percent of Students	Mean Mathematics Achievement	Mean Science Achievement
Australia	r ● 9 (2.3)	r 56 (8.8)	521 (7.1)	526 (9.1)	44 (8.8)	546 (13.2)	553 (12.2)
[2] *Austria*	– –	12 (4.5)	519 (45.9)	523 (48.0)	88 (4.5)	521 (5.3)	523 (5.4)
Canada	● 15 (1.6)	r 84 (2.3)	514 (4.0)	528 (3.2)	16 (2.3)	532 (5.5)	542 (4.8)
Cyprus	▲ 26 (0.0)	r 31 (0.7)	446 (4.6)	456 (4.2)	69 (0.7)	443 (2.9)	442 (4.4)
Czech Republic	● 17 (4.0)	43 (9.9)	436 (18.8)	461 (11.7)	57 (9.9)	489 (14.9)	506 (12.1)
Denmark	r ● 12 (1.5)	r 86 (5.9)	551 (4.3)	512 (6.2)	14 (5.9)	546 (4.9)	491 (10.2)
France	▼ 3 (0.3)	15 (5.4)	493 (19.8)	452 (18.7)	85 (5.4)	527 (6.1)	491 (6.1)
[2] *Germany*	– –	x x	x x	x x	x x	x x	x x
Hungary	r ● 9 (1.5)	46 (4.1)	451 (6.0)	447 (5 2)	54 (4.1)	509 (6.9)	490 (6.1)
Iceland	r ▲ 17 (0.0)	r 86 (0.1)	523 (3.1)	542 (1.9)	14 (0.1)	553 (3.9)	546 (6.9)
Italy	● 15 (3.8)	44 (5.0)	454 (10.4)	456 (10.2)	56 (5.0)	494 (6.7)	490 (6.7)
Lithuania	r ● 8 (1.7)	r 21 (4.4)	458 (19.5)	446 (17.8)	79 (4.4)	476 (5.9)	468 (6.4)
New Zealand	● 8 (0.9)	76 (5.2)	514 (6.0)	521 (7.3)	24 (5.2)	543 (6.8)	549 (8.5)
Norway	● 9 (1.8)	40 (5.1)	516 (8.9)	532 (8.6)	60 (5.1)	538 (5.6)	554 (6.9)
Russian Federation	▼ 6 (1.4)	17 (3.9)	463 (10.1)	473 (9.2)	83 (3.9)	473 (7.5)	483 (7.1)
Slovenia	x x	x x	x x	x x	x x	x x	x x
South Africa	x x	x x	x x	x x	x x	x x	x x
Sweden	s ▼ 4 (0.6)	r 35 (4.9)	554 (6.9)	561 (7.0)	65 (4.9)	570 (6.0)	576 (6.4)
[2] **Switzerland**	– –	r 62 (4.9)	526 (9.1)	506 (9.1)	38 (4.9)	573 (7.8)	560 (8.7)
United States	r ● 10 (1.6)	r 66 (4.5)	456 (4.2)	476 (4.3)	34 (4.5)	483 (6.6)	501 (7.0)
International Average	11 (0.5)	48 (1.3)	494 (3.7)	495 (3.6)	52 (1.3)	519 (1.8)	516 (1.9)

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

▲ = Country mean significantly higher than international mean

▼ = Country mean significantly lower than international mean

● = No statistically significant difference between country mean and international mean

1 Reported percent of students leaving school before the end of the school year averaged across schools.

2 Average Percent Leaving School Before Year End based on total school weights cannot be computed for Austria, Germany, and Switzerland; sampling based on tracks within schools.

* See Table 1.2 for characteristics of the student samples.

( ) 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 Appendix A).

The Netherlands did not administer the school questionnaire at the final year of secondary school.

A dash (–) indicates data are not available.

An "r" indicates school data available for 70-84% of schools or students, as applicable. An "s" indicates school data available for 50-69% of schools or students, as applicable.

An "x" indicates school data available for <50% of schools or students, as applicable.

Appendix C

ACKNOWLEDGMENTS

TIMSS was truly a collaborative effort among hundreds of individuals around the world. Staff from the national research centers, the international management, advisors, and funding agencies worked closely to design and implement the most ambitious study of international comparative achievement ever undertaken. TIMSS would not have been possible without the tireless efforts of all involved. Below, the individuals and organizations are acknowledged for their contributions. Given that implementing TIMSS has spanned more than seven years and involved so many people and organizations, this list may not pay heed to all who contributed throughout the life of the project. Any omission is inadvertent. TIMSS also acknowledges the students, teachers, and school principals who contributed their time and effort to the study. This report would not be possible without them.

MANAGEMENT AND OPERATIONS

Since 1993, TIMSS has been directed by the International Study Center at Boston College in the United States. Prior to this, the study was coordinated by the International Coordinating Center at the University of British Columbia in Canada. Although the study was directed centrally by the International Study Center and its staff members implemented various parts of TIMSS, important activities also were carried out in centers around the world. The data were processed centrally by the IEA Data Processing Center in Hamburg, Germany. Statistics Canada was responsible for collecting and evaluating the sampling documentation from each country and for calculating the sampling weights. The Australian Council for Educational Research conducted the scaling of the achievement data.

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NATIONAL RESEARCH COORDINATORS

The TIMSS National Research Coordinators and their staff had the enormous task of implementing the TIMSS design in their countries. This required obtaining funding for the project; participating in the development of the instruments and procedures; conducting field tests; participating in and conducting training sessions; translating the instruments and procedural manuals into the local language; selecting the sample of schools and students; working with the schools to arrange for the testing; arranging for data collection, coding, and data entry; preparing the data files for submission to the IEA Data Processing Center; contributing to the development of the international reports; and preparing national reports. The way in which the national centers operated and the resources that were available varied considerably across the TIMSS countries. In some countries, the tasks were conducted centrally, while in others, various components were subcontracted to other organizations. In some countries, resources were more than adequate, while in others, the national centers were operating with limited resources. Of course, across the life of the project, some NRCs have changed. This list attempts to include all past NRCs who served for a significant period of time as well as all the present NRCs. All of the TIMSS National Research Coordinators and their staff members are to be commended for their professionalism and their dedication in conducting all aspects of TIMSS.

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The TIMSS International Study Center was supported in its work by several advisory committees. The TIMSS International Steering Committee provided guidance to the International Study Director on policy issues and general direction of the study. The TIMSS Technical Advisory Committee provided guidance on issues related to design, sampling, instrument construction, analysis, and reporting, ensuring that the TIMSS methodologies and procedures were technically sound. The Subject Matter Advisory Committee ensured that current thinking in mathematics and science education were addressed by TIMSS, and was instrumental in the development of the TIMSS tests. The Free-Response Item Coding Committee developed the coding rubrics for the free-response items. The Performance Assessment Committee worked with the Performance Assessment Coordinator to develop the TIMSS performance assessment. The Quality Assurance Committee helped to develop the quality assurance program.

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