Chapter 5

TEACHERS AND INSTRUCTION

Teachers and the instructional approaches they use are fundamental in building students' mathematical understanding. Primary among their many duties and responsibilities, teachers structure and guide the pace of individual, small-group, and whole-class work to present new material, engage students in mathematical tasks, and help deepen students' grasp of the mathematics being studied. Teachers may help students use technology and tools to investigate mathematical ideas, analyze students' work for misconceptions, and promote positive attitudes towards mathematics. They also may assign homework and conduct informal as well as formal assessments to monitor progress in student learning, make ongoing instructional decisions, and evaluate achievement outcomes.

Effective teaching is a complex endeavor requiring knowledge about the subject matter of mathematics and the ways students learn, as well as familiarity with a variety of pedagogical approaches in mathematics. It can be fostered through institutional support and adequate resources. Teachers also can support each other in planning instructional strategies, devising real-world applications of mathematical concepts, and developing sequences that move students from concrete tasks to the ability to think for themselves and explore mathematical theories.

TIMSS administered a background questionnaire to teachers to gather information about their backgrounds and training, and how they think about mathematics. The questionnaire also asked about how they spend their school-related time and the instructional approaches they use in their classrooms. Information was collected about the materials used in instruction, the activities students do in class, the use of calculators and computers in mathematics lessons, and the role of homework.

This chapter presents the results of teachers' responses to some of these questions. Because the sampling for the teacher questionnaires was based on participating students, the responses to the mathematics teacher questionnaire do not necessarily represent all of the fourth-grade mathematics teachers in each of the TIMSS countries. Rather, they represent teachers of the representative samples of students assessed. It is important to note that in this report, the student is always the unit of analysis, even when information from the teachers' questionnaires is being reported. Using the student as the unit of analysis makes it possible to describe the instruction received by representative samples of students. Although this approach may provide a different perspective from that obtained by simply collecting information from teachers, it is consistent with the TIMSS goals of providing information about the educational contexts and performance of students.

In the primary grades, students generally are taught both mathematics and science by a single classroom teacher who provides instruction in all subjects. Accordingly, the international version of the teacher questionnaire for the primary grades was prepared as a single document asking about demographic information and instruction in both mathematics and science. However, in some countries, a portion or even all of the students are taught mathematics and science by different teachers, and it was difficult to make provisions for both teachers to complete the questionnaire. Also, because countries were required to sample two classes (from adjacent grades), it was possible for an individual to be the mathematics and/or science teacher of both the upper- and lower-grade classes. In order to keep the response burden for teachers to a minimum, no teacher was asked to respond to more than one questionnaire, even where that teacher taught mathematics and/or science to more than one of the sampled classes. These situations, together with the fact that teachers sometimes did not complete the questionnaire assigned to them, meant that each country had some percentage of students for whom no teacher questionnaire information was available. The tables in this chapter contain special notation regarding the availability of teacher responses. For a country where teacher responses were available for 70% to 84% of the students, an "r" is included next to the data for that country. When teacher responses were available for 50% to 69% of the students, an "s" is included next to the data for that country. When teacher responses were available for less than 50% of the students, an "x" replaces the data.

Who Delivers Mathematics Instruction?

This section provides information about the mathematics teaching force in each of the participating countries, in terms of certification, degrees, age, gender, and years of teaching experience.

Table 5.1 summarizes information gathered from each country about the requirements for the certification held by the majority of the third- and fourth-grade teachers. In some countries, the type of education required for qualification includes a university degree. In other countries, study at a teacher training institution is required, or even both a university degree and study at a teacher training institution. The number of years of post-secondary education required for a teaching qualification ranged from two years in Iran, Hong Kong, and Singapore to as much as six years in Canada, although many countries reported three or four years. All of the countries except Greece and Kuwait reported that teaching practice was required. A large number of countries reported that an evaluation or examination was required for certification. The countries not having such a requirement were Canada, Greece, Iran, Israel, Korea, Portugal, and the United States.

Table 5.2 summarizes teachers' reports on their age and gender. If a constant supply of teachers were entering the teaching force, devoting their careers to the classroom, and then retiring, one might expect approximately equal percentages of students taught by teachers in their 20s, 30s, 40s, and 50s. However, this does not appear to hold for most countries. In most countries, the majority of the fourth-grade students were taught

Table 5.1

Requirements for Certification Held by the Majority of Lower- and Upper-Grade (Third and Fourth Grade*) Teachers [1]

Country	Type of Education Required for Qualification	Number of Years of Post-Secondary Education Required	Teaching or Practice Experience Required	Evaluation or Examination Required
Australia	University or Teacher Training Institution	3–4	yes	yes
Austria	Teacher Training Institution	3	yes	yes
Canada	University	4–6	yes	no
Cyprus	Teacher Training Institution	3	yes	yes
Czech Republic	University	4	yes	yes
[2] England	University or Higher Education Institution	3–5	yes	yes
[3] Greece	Post-Secondary Non-University Teacher Training Institution	4	no	no
Hong Kong	Teacher Training Institution	2 or 3	yes	yes
Hungary	Teacher Training Institution	3	yes	yes
Iceland	University	3	yes	yes
Iran	Teacher Training Institution	2	yes	no
Ireland	University College	3	yes	yes
Israel	Teacher Training Institution	3	yes	no
Japan	University	4	yes	yes
Korea	University	4	yes	no
Kuwait	University	4	no	yes
Latvia	Teacher Training Institution	3	yes	yes
Netherlands	Teacher Training Institution	3 [4]	yes	yes
New Zealand	Teacher Training Institution	3	yes	yes
Norway	Teacher Training Institution	3 [5]	yes	yes
Portugal	Teacher Training Institution	3 [6]	yes	no
Scotland	University or Teacher Training Institution	4	yes	yes
Singapore	Teacher Training Institution	2	yes	yes
Slovenia	University	4	yes	yes
Thailand	University or Teacher Training Institution	4	yes	yes
[7] United States	University	4	yes	no

*Third and fourth grades in most countries; see Table 2 for more information about the grades tested in each country.
[1] Certification pertains to the majority (more than 50%) of teachers of lower- and upper-grade students in each country.
[2] England: The majority of teachers of primary schools students will have studied education and their specialist subject concurrently for 4 years (B. Ed. with honors) or 3 years (B. Ed without honors). Some, however, will have studied their specialist subject for a degree (B. Sc. or B.A.) for 3 or 4 years followed by a one-year post graduate course. All teachers who qualified since 1975 are graduates. Some teachers who qualified before this date hold teachers' certificates but are not graduates.
[3] Greece: The vast majority of primary school teachers are Post-Secondary Non-University Teacher Training Institute graduates (last graduates 1990). Only a small fraction of existing teachers are graduates of the newly founded University Education Departments (first graduates 1989).
[4] Netherlands: As of August 1984 a 4-year teacher training program integrating training for kindergarten and primary education is required. Before August 1994, 3 years of teacher training were required for primary education.
[5] Norway: Until 1965 2 years of post-secondary education were required. Between 1965 and 1995 3 years were required. As of 1996, new certified teachers are required to have completed 4 years of post-secondary education.
[6] Portugal: Until 1986 2 years of post-secondary education were required. As of 1986 3 years are required.
[7] United States: Certification requirements vary considerably according to state in the United States. Information in this table represents the most typical requirements across states.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95. Information provided by TIMSS National Research Coordinators.

Table 5.2

Teachers' Reports on Their Age and Gender
Mathematics - Upper Grade (Fourth Grade*)

Country	Percent of Students Taught by Teachers				Percent of Students Taught by Teachers	
	29 Years or Under	30 - 39 Years	40 - 49 Years	50 Years or Older	Female	Male
Australia	21 (3.0)	31 (3.3)	36 (3.3)	12 (2.2)	65 (4.0)	35 (4.0)
Austria	10 (2.6)	29 (4.6)	47 (5.0)	15 (3.4)	78 (4.3)	22 (4.3)
Canada	8 (1.8)	22 (3.4)	44 (3.3)	26 (2.7)	80 (3.1)	20 (3.1)
Cyprus	s 40 (5.8)	12 (3.1)	29 (5.1)	19 (4.4)	s 69 (5.1)	31 (5.1)
Czech Republic	13 (2.8)	23 (3.4)	20 (3.0)	45 (3.8)	94 (1.8)	6 (1.8)
England	16 (3.5)	19 (4.1)	49 (5.1)	16 (3.3)	75 (3.2)	25 (3.2)
Greece	12 (2.8)	41 (4.3)	33 (4.1)	14 (2.9)	49 (4.6)	51 (4.6)
Hong Kong	34 (4.9)	25 (5.3)	18 (3.3)	23 (4.5)	66 (4.3)	34 (4.3)
Hungary	9 (2.4)	41 (4.6)	31 (4.0)	19 (3.6)	91 (2.3)	9 (2.3)
Iceland	11 (2.2)	35 (5.3)	44 (5.1)	11 (2.5)	83 (3.9)	17 (3.9)
Iran, Islamic Rep.	42 (4.2)	43 (4.5)	14 (2.8)	1 (0.8)	54 (4.3)	46 (4.3)
Ireland	17 (3.3)	31 (4.1)	31 (4.5)	22 (4.1)	69 (3.9)	31 (3.9)
Israel	s 13 (4.8)	40 (7.6)	35 (7.3)	13 (4.2)	s 98 (2.1)	2 (2.1)
Japan	12 (2.7)	40 (4.1)	38 (4.5)	11 (2.3)	61 (3.9)	39 (3.9)
Korea	22 (3.2)	29 (3.0)	33 (3.9)	16 (2.8)	64 (3.8)	36 (3.8)
Kuwait	r 33 (4.5)	53 (5.0)	11 (3.0)	3 (1.6)	r 54 (2.7)	46 (2.7)
Latvia (LSS)	21 (4.3)	35 (4.4)	21 (4.1)	23 (4.0)	97 (1.4)	3 (1.4)
Netherlands	17 (3.3)	29 (4.1)	40 (4.6)	14 (3.4)	35 (4.3)	65 (4.3)
New Zealand	21 (3.4)	28 (3.5)	37 (4.2)	14 (2.4)	68 (3.5)	32 (3.5)
Norway	6 (2.1)	15 (3.4)	44 (4.6)	35 (4.7)	78 (3.6)	22 (3.6)
Portugal	6 (2.3)	21 (3.5)	48 (4.2)	25 (3.8)	95 (1.9)	5 (1.9)
Scotland	19 (3.1)	21 (3.6)	40 (4.6)	19 (3.4)	92 (2.1)	8 (2.1)
Singapore	34 (3.7)	16 (2.3)	33 (3.6)	17 (2.5)	82 (3.2)	18 (3.2)
Slovenia	12 (3.1)	34 (4.9)	30 (4.5)	24 (4.6)	92 (2.6)	8 (2.6)
Thailand	4 (2.3)	50 (5.3)	35 (5.0)	11 (3.5)	55 (6.1)	45 (6.1)
United States	16 (2.8)	23 (2.7)	37 (4.3)	24 (4.0)	86 (2.5)	14 (2.5)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.

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

by teachers in their 30s or 40s. Very few countries seemed to have a comparatively younger teaching force, but those that did included Iran and Kuwait, in particular. In these two countries, 80% or more of the students had mathematics teachers in their 30s or younger. According to teachers' reports, the teaching force in fourth-grade mathematics also was comparatively older in a few countries. The TIMSS participants where 65% or more of the fourth-grade students had mathematics teachers in their 40s or older included the Czech Republic, England, and Norway.

In several countries, approximately equivalent percentages of fourth-grade students were taught mathematics by male teachers and female teachers, including Greece, Iran, Kuwait, and Thailand. However, in most countries the teaching force was predominantly female. Ninety percent or more of the fourth-grade students had female mathematics teachers in the Czech Republic, Hungary, Israel, Latvia (LSS), Portugal, Scotland, and Slovenia. In contrast, 65% of the students had male teachers in the Netherlands.

As might be expected from the differences in teachers' ages from country to country, the TIMSS data indicate differences in teachers' longevity across countries (see Table 5.3). The countries with younger teaching forces tended to have more students taught by less experienced teachers. At least half the fourth-grade students in Cyprus, Iceland, Iran, and Kuwait had mathematics teachers with 10 years or less of experience. In contrast, at least half the students in the Czech Republic and Portugal had mathematics teachers with more than 20 years of experience.

The relationship between years of teaching experience and mathematics achievement was not consistent across countries. In more than half the countries, there was essentially no difference in students' performance in relation to years of teaching experience. In about one-fourth of the countries, the fourth-grade students with the most experienced teachers (more than 20 years) had higher mathematics achievement than did those with less experienced teachers (five years or less). This may reflect the practice of giving teachers with more seniority the more advanced classes. However, in Hong Kong and Singapore, the pattern of higher student performance for the more experienced teachers was reversed. For the remaining countries, there were inconsistent patterns of performance differences in relation to years of teaching experience.

Table 5.3

Teachers' Reports on Their Years of Teaching Experience
Mathematics - Upper Grade (Fourth Grade*)

Country	0 - 5 Years		6-10 Years		11-20 Years		More than 20 Years	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
Australia	r 15 (2.4)	553 (7.9)	23 (3.1)	546 (6.5)	38 (3.5)	546 (6.0)	25 (3.4)	543 (7.4)
Austria	10 (2.7)	564 (9.3)	11 (3.3)	566 (7.2)	31 (4.1)	551 (7.7)	47 (4.9)	564 (4.5)
Canada	11 (1.8)	507 (10.6)	18 (2.9)	537 (8.4)	24 (2.8)	533 (5.4)	47 (3.5)	536 (5.5)
Cyprus	s 37 (5.5)	501 (7.0)	13 (4.0)	505 (10.7)	11 (2.7)	498 (12.8)	39 (5.6)	515 (8.1)
Czech Republic	16 (2.7)	553 (6.5)	8 (2.3)	544 (8.7)	20 (2.8)	570 (7.1)	55 (4.1)	574 (4.9)
England	19 (3.5)	504 (6.8)	14 (3.4)	513 (11.2)	34 (4.4)	513 (7.6)	33 (4.4)	521 (7.5)
Greece	11 (2.5)	493 (17.9)	22 (3.3)	495 (6.2)	31 (4.1)	492 (7.4)	36 (4.0)	500 (7.7)
Hong Kong	26 (4.4)	598 (9.4)	14 (3.0)	597 (8.5)	26 (4.9)	586 (7.3)	34 (5.1)	579 (7.9)
Hungary	8 (2.6)	550 (15.1)	12 (2.9)	538 (12.3)	42 (4.7)	547 (4.9)	38 (4.7)	554 (6.4)
Iceland	23 (4.3)	470 (3.2)	24 (5.1)	471 (6.5)	31 (5.3)	488 (5.8)	21 (4.1)	468 (4.7)
Iran, Islamic Rep.	33 (4.1)	416 (9.7)	19 (3.9)	427 (7.2)	40 (4.6)	435 (7.4)	8 (2.6)	456 (9.8)
Ireland	10 (2.9)	537 (19.1)	14 (3.4)	533 (8.7)	32 (4.1)	548 (5.1)	44 (4.6)	560 (5.3)
Israel	s 18 (5.1)	535 (9.2)	13 (5.0)	510 (14.2)	35 (7.2)	532 (5.9)	34 (7.5)	538 (7.5)
Japan	11 (2.8)	589 (7.5)	10 (2.5)	585 (5.5)	57 (3.6)	601 (2.8)	22 (3.0)	596 (4.0)
Korea	12 (2.6)	608 (7.4)	23 (3.4)	611 (4.2)	27 (3.5)	612 (4.8)	38 (3.8)	611 (4.1)
Kuwait	r 30 (4.6)	397 (6.7)	35 (5.1)	397 (5.1)	28 (4.5)	411 (3.9)	7 (2.7)	398 (12.5)
Latvia (LSS)	13 (3.4)	509 (13.2)	18 (3.6)	514 (9.0)	33 (4.7)	523 (8.2)	36 (4.8)	537 (8.9)
Netherlands	14 (2.5)	568 (9.3)	11 (2.9)	564 (8.9)	39 (3.9)	582 (4.2)	36 (4.8)	581 (6.6)
New Zealand	23 (3.8)	491 (9.9)	16 (3.0)	505 (8.9)	38 (4.5)	496 (8.0)	23 (3.4)	513 (7.1)
Norway	11 (3.0)	517 (7.7)	10 (3.2)	492 (9.2)	32 (4.3)	498 (4.4)	47 (5.7)	502 (5.0)
Portugal	6 (2.0)	440 (20.9)	9 (2.0)	461 (8.9)	15 (3.0)	471 (8.0)	70 (3.9)	481 (4.6)
Scotland	25 (3.8)	511 (8.8)	19 (3.3)	535 (9.0)	33 (4.3)	517 (9.3)	23 (3.9)	529 (8.9)
Singapore	30 (3.8)	640 (10.2)	9 (2.6)	625 (19.9)	14 (2.7)	637 (17.3)	48 (3.6)	615 (6.7)
Slovenia	10 (2.7)	553 (12.0)	14 (3.5)	553 (9.3)	32 (4.9)	549 (6.1)	44 (4.9)	550 (5.2)
Thailand	r 25 (4.4)	463 (8.3)	16 (4.2)	503 (14.9)	39 (5.3)	482 (7.6)	19 (3.9)	522 (10.8)
United States	21 (2.9)	537 (5.5)	18 (3.0)	557 (6.4)	29 (2.4)	556 (6.0)	32 (3.0)	546 (5.8)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.

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

What Are Teachers' Perceptions About Mathematics?

Figure 5.1 depicts the percentages of fourth-grade students whose mathematics teachers reported certain beliefs about mathematics and the way mathematics should be taught. Teachers in many countries indicated a fairly practical view of mathematics, seeing it essentially as a way of modeling the real world. However, there was variation across countries in the amount of agreement with this view of the nature of mathematics. In Thailand, nearly all students had teachers who agreed or strongly agreed that mathematics is primarily a formal way of representing the real world, while in several countries (the Czech Republic, Slovenia, the Netherlands, Iceland, and Hungary), about 40% or fewer of the students had mathematics teachers who agreed with this view.

There also appeared to be nearly uniform agreement by teachers across countries about the inherent nature of mathematical abilities. In most countries, 80% or more of the students had teachers who agreed that some students have a natural talent for mathematics. However, again there was some variation. For example, only about 60% or so of the students in Korea and Hong Kong had teachers that agreed with this premise.

Regarding perceptions about how to teach mathematics, teachers' opinions varied across countries on whether more individual practice during class is an effective approach to help students having difficulty. At least 90% of the fourth-grade students in Cyprus, Greece, Iran, Portugal, the Czech Republic, and Latvia (LSS) had teachers who agreed or strongly agreed with this approach. Conversely, fewer than 20% of the students in the United States and Norway had teachers who agreed that having students practice on their own was an effective approach.

There was nearly complete agreement by teachers across countries that more than one representation should be used in teaching a mathematics topic. More than 90% of the fourth-grade students in every country had teachers who agreed with this approach. This instructional strategy is particularly useful in helping students with different learning styles understand key ideas. Also, using data in different formats reinforces the idea of mathematics as a network of interconnected concepts and procedures.

TIMSS also queried teachers about the cognitive demands of mathematics, asking them to rate the importance of various skills for success in the discipline. Figure 5.2 shows the percentages of students whose teachers rated each of four different skills as very important. Across the participating countries, the fewest students had teachers who believed that the ability to remember formulas and procedures was very important. There was a range, however, with teachers of approximately 80% of the fourth-grade students in Kuwait rating this ability as very important, compared with the teachers of 20% or fewer of the students in Portugal, Cyprus, Slovenia, and Austria.

Figure 5.1

Percent of Students Whose Mathematics Teachers Agree or Strongly Agree with Statements About the Nature of Mathematics and Mathematics Teaching Upper Grade (Fourth Grade*)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.
Israel omitted from the questions about mathematics being a formal way of representing the real world and students having a natural talent for mathematics; teacher response data available for <50% of students.
England and Scotland did not ask these questions. Hungary did not ask teachers their opinions about the effectiveness of more individual practice.

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

Figure 5.1 (Continued)

Percent of Students Whose Mathematics Teachers Agree or Strongly Agree with Statements About the Nature of Mathematics and Mathematics Teaching Upper Grade (Fourth Grade*)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.
Israel omitted from the questions about mathematics being a formal way of representing the real world and students having a natural talent for mathematics; teacher response data available for <50% of students.
England and Scotland did not ask these questions. Hungary did not ask teachers their opinions about the effectiveness of more individual practice.

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

Figure 5.2

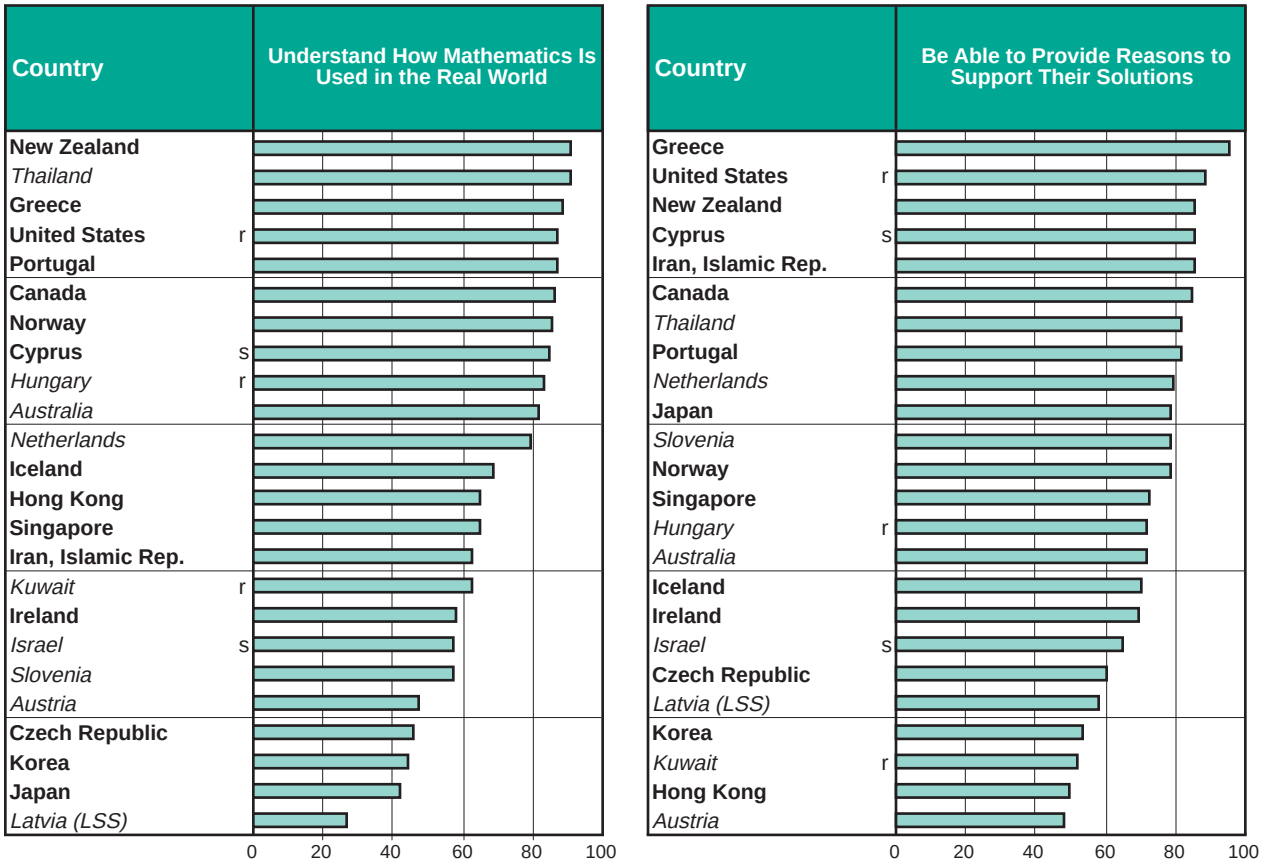
Percent of Students Whose Mathematics Teachers Think Particular Abilities Are Very Important for Students' Success in Mathematics in School Upper Grade (Fourth Grade*)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.
England and Scotland did not ask these questions.

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

Figure 5.2 (Continued)

Percent of Students Whose Mathematics Teachers Think Particular Abilities Are Very Important for Students' Success in Mathematics in School Upper Grade (Fourth Grade*)



*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.
England and Scotland did not ask these questions.

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

Internationally, most mathematics teachers indicated that it was very important for students to be able to think creatively, to understand how mathematics is used in the real world, and to be able to provide reasons to support their solutions. However, there was some variation across countries. Fewer than 40% of the fourth-grade students in Ireland and Austria had teachers who felt it was very important to think creatively, and fewer than 40% in Latvia (LSS) had teachers who felt it was very important to understand how mathematics is used in the real world. In all countries except Austria, the majority of students had teachers who felt it was very important to be able to provide reasons to support mathematical solutions. Still, with the current calls from business and industry for helping students improve their ability to apply mathematics and solve practical problems in job-related situations, it seems rather surprising that teachers do not place more importance on these three aspects of mathematics.

How Do Mathematics Teachers Spend Their School-Related Time?

As shown in Table 5.4, teachers in most countries reported that mathematics classes typically meet for three or four hours a week, on average. However, more than 5 hours of weekly class time was reported for 50% or more of the fourth-grade students in the Netherlands, Portugal, Singapore, and Thailand. The data reveal no clear pattern among the number of in-class instructional hours and mathematics achievement either across or between countries. Common sense and research both support the idea that increased time on task can yield commensurate increases in achievement, yet this time also can be spent outside of school on homework or in special tutoring. Further, the time in class may not be used effectively. The ability to use straightforward analyses such as these to disentangle complicated relationships also is made difficult by the practice of providing additional in-school instruction for lower-performing students.

In many countries around the world, primary school classes are taught by a single teacher who is responsible for teaching all subjects in the curriculum. As shown in Figure 5.3, most students also were taught science by the same teachers who taught them mathematics. However, this was not the case for all students in a number of countries. In Hong Kong, Israel, and Kuwait, all or nearly all of the students had different teachers for mathematics and science.

In addition to the time spent in class on mathematics instruction, teachers were asked about the number of hours per week spent on selected school-related activities outside the regular school day. Table 5.5 presents the results. For example, on average, fourth-grade students in Australia had mathematics teachers who spent 1.2 hours per week preparing or grading tests, and another 2.8 hours per week reading and grading papers. Their teachers spent 2.9 hours per week on lesson planning and 1.5 hours combined on meetings with students and parents. They spent 1.4 hours on professional reading and development and 4.3 hours on record-keeping and administrative tasks combined. Across countries, teachers reported that grading student work and lesson planning were the most time consuming activities, often averaging about five to six hours per week. In general, teachers also reported several hours per week spent on keeping students' records and other administrative tasks.

Table 5.4

Teachers' Reports on Average Number of Hours Mathematics Is Taught Weekly to Their Mathematics Classes - Upper Grade (Fourth Grade*)

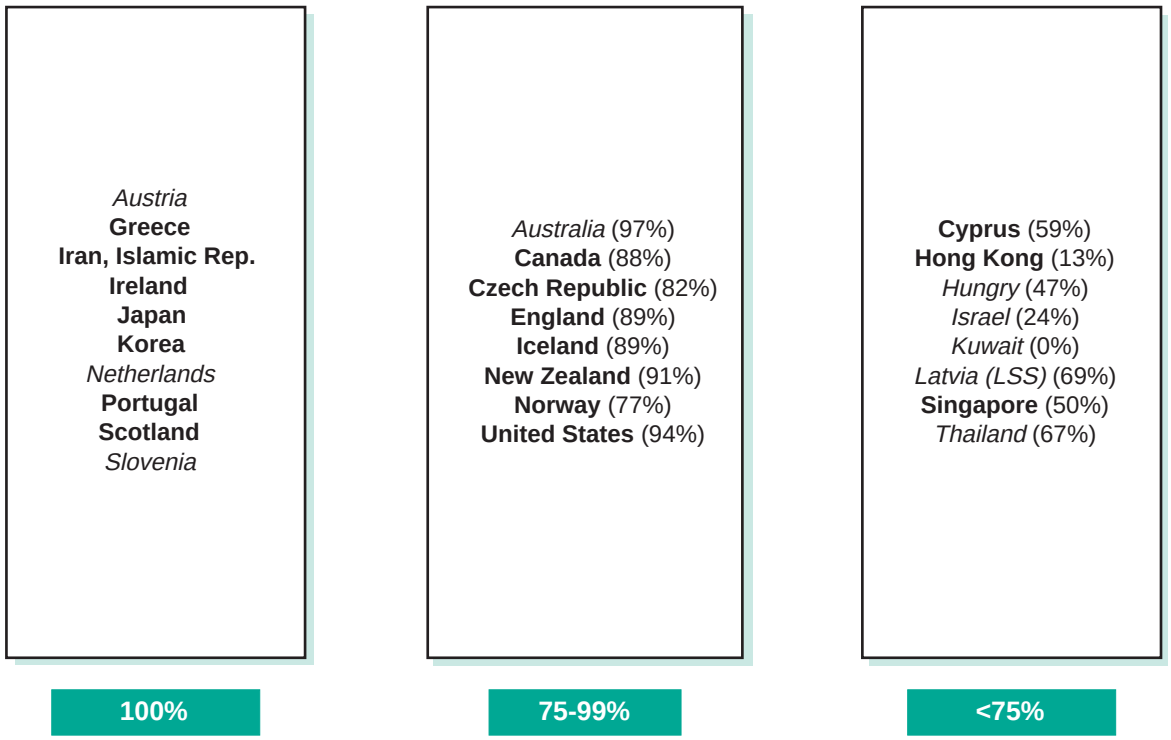
Country	Less than 2 Hours		2 Hours to < 3.5		3.5 Hours to < 5		5 Hours or More		Average Hours
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	
Australia	r 0 (0.3)	~ ~	24 (2.7)	536 (7.0)	37 (3.7)	537 (5.5)	38 (3.4)	561 (5.8)	r 4.2 (0.06)
Austria	0 (0.0)	~ ~	92 (2.4)	562 (3.6)	8 (2.4)	532 (13.7)	0 (0.0)	~ ~	3.4 (0.02)
Canada	3 (1.2)	541 (28.9)	19 (2.2)	526 (5.1)	39 (3.6)	529 (6.0)	39 (3.6)	539 (6.0)	4.4 (0.09)
Cyprus	s 0 (0.0)	~ ~	4 (2.5)	497 (25.8)	88 (5.3)	507 (3.9)	9 (4.9)	503 (39.2)	s 4.1 (0.08)
Czech Republic	3 (1.4)	587 (11.3)	0 (0.3)	~ ~	94 (2.0)	566 (3.5)	3 (1.4)	565 (8.3)	3.7 (0.05)
England	0 (0.2)	~ ~	11 (2.8)	508 (10.9)	48 (4.8)	513 (5.9)	41 (5.0)	518 (6.0)	4.6 (0.10)
Greece	- -	- -	- -	- -	- -	- -	- -	- -	- -
Hong Kong	6 (2.0)	591 (13.4)	11 (2.9)	576 (16.8)	76 (4.2)	590 (5.3)	7 (2.3)	586 (12.6)	3.8 (0.10)
Hungary	0 (0.0)	~ ~	72 (4.4)	549 (4.1)	25 (4.2)	548 (9.1)	3 (1.5)	541 (28.2)	3.3 (0.06)
Iceland	0 (0.1)	~ ~	89 (3.4)	476 (3.1)	9 (3.2)	460 (4.9)	2 (1.2)	~ ~	3.2 (0.06)
Iran, Islamic Rep.	- -	- -	- -	- -	- -	- -	- -	- -	- -
Ireland	6 (1.9)	538 (20.2)	19 (3.4)	544 (7.0)	34 (4.5)	549 (5.3)	41 (4.8)	557 (6.9)	4.2 (0.11)
Israel	x x	x x	x x	x x	x x	x x	x x	x x	x x
Japan	1 (0.5)	~ ~	6 (2.2)	595 (4.2)	92 (2.3)	597 (2.2)	2 (1.1)	~ ~	3.7 (0.03)
Korea	0 (0.0)	~ ~	93 (2.0)	612 (2.3)	6 (1.7)	586 (12.7)	2 (1.0)	~ ~	2.9 (0.04)
Kuwait	r 1 (1.0)	~ ~	99 (1.0)	401 (3.0)	0 (0.0)	~ ~	0 (0.0)	~ ~	r 2.9 (0.03)
Latvia (LSS)	0 (0.5)	~ ~	82 (3.6)	524 (5.3)	13 (3.4)	530 (17.9)	4 (1.3)	501 (24.6)	3.5 (0.05)
Netherlands	0 (0.0)	~ ~	5 (2.2)	564 (15.5)	39 (4.6)	578 (5.1)	56 (4.7)	578 (5.1)	4.7 (0.06)
New Zealand	7 (2.2)	502 (11.4)	34 (4.1)	496 (8.6)	45 (4.2)	505 (6.0)	14 (3.1)	503 (11.0)	3.6 (0.09)
Norway	6 (2.2)	510 (10.0)	77 (3.6)	501 (3.6)	16 (2.8)	501 (9.1)	1 (1.1)	~ ~	3.0 (0.07)
Portugal	0 (0.0)	~ ~	8 (2.4)	476 (8.7)	10 (2.7)	479 (9.8)	81 (3.4)	474 (4.2)	5.7 (0.15)
Scotland	r 2 (0.9)	~ ~	17 (3.3)	509 (8.5)	39 (4.7)	518 (7.3)	42 (4.9)	529 (8.4)	r 4.3 (0.10)
Singapore	0 (0.0)	~ ~	0 (0.0)	~ ~	2 (1.2)	~ ~	98 (1.2)	624 (5.3)	5.5 (0.01)
Slovenia	1 (0.8)	~ ~	2 (1.3)	~ ~	93 (2.6)	550 (3.6)	5 (2.2)	569 (13.2)	3.8 (0.05)
Thailand	r 2 (0.7)	~ ~	4 (1.5)	447 (18.2)	38 (5.2)	505 (8.6)	56 (5.7)	485 (8.3)	r 4.6 (0.09)
United States	r 12 (2.4)	539 (10.2)	9 (2.4)	554 (6.6)	33 (3.6)	557 (5.8)	46 (4.1)	542 (4.8)	r 4.2 (0.11)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates data are not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.
An "x" indicates teacher response data available for <50% of students.

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

Figure 5.3

Percent of Students Who Are Taught Both Mathematics and Science by a Single Classroom Teacher[1] - Upper Grade (Fourth Grade*)



*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
[1]Based on information provided by schools. Teachers were classified as teaching: (1) mathematics, (2) science, or (3) both mathematics and science to the sampled classes. Percentages reflect those students taught by category (3) teachers.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

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

Table 5.5

Average Number of Hours [1] Students' Teachers Spend on Various School-Related Activities Outside the Formal School Day During the School Week Mathematics - Upper Grade (Fourth Grade*)

Country	Preparing or Grading Tests	Reading and Grading Student Work	Planning Lessons by Self	Meeting with Students Outside Classroom Time	Meeting with Parents	Professional Reading and Development	Keeping Students' Records	Administrative Tasks
Australia	1.2 (0.1)	2.8 (0.1)	2.9 (0.1)	r 0.7 (0.1)	0.8 (0.1)	1.4 (0.1)	1.3 (0.1)	3.0 (0.1)
Austria	2.6 (0.2)	4.0 (0.1)	3.3 (0.1)	0.3 (0.0)	0.8 (0.1)	1.5 (0.1)	1.1 (0.1)	1.5 (0.1)
Canada	1.7 (0.1)	2.9 (0.1)	2.9 (0.1)	1.0 (0.1)	0.6 (0.0)	1.1 (0.1)	1.4 (0.1)	2.4 (0.1)
Cyprus	s 2.2 (0.1)	s 2.6 (0.1)	s 3.3 (0.2)	s 0.3 (0.2)	s 0.8 (0.2)	s 1.4 (0.2)	s 1.0 (0.1)	s 1.6 (0.2)
Czech Republic	2.7 (0.1)	3.0 (0.1)	3.4 (0.1)	1.2 (0.1)	0.5 (0.0)	1.8 (0.1)	1.1 (0.1)	1.0 (0.1)
England	r 1.0 (0.1)	4.0 (0.1)	3.4 (0.1)	1.0 (0.1)	0.8 (0.1)	1.2 (0.1)	1.5 (0.1)	3.2 (0.1)
Greece	2.5 (0.1)	2.1 (0.1)	r 1.9 (0.1)	r 0.3 (0.0)	0.9 (0.0)	1.9 (0.1)	r 0.5 (0.1)	r 1.1 (0.1)
Hong Kong	2.7 (0.2)	3.9 (0.2)	1.9 (0.1)	1.8 (0.2)	0.6 (0.1)	0.8 (0.1)	0.4 (0.0)	1.1 (0.1)
Hungary	2.5 (0.1)	2.6 (0.1)	3.5 (0.1)	1.7 (0.1)	0.8 (0.0)	1.9 (0.1)	0.8 (0.1)	2.3 (0.1)
Iceland	1.0 (0.1)	3.1 (0.2)	3.7 (0.1)	0.6 (0.1)	0.7 (0.1)	1.2 (0.1)	1.3 (0.1)	2.3 (0.2)
Iran, Islamic Rep.	2.2 (0.1)	2.2 (0.1)	2.0 (0.1)	1.2 (0.1)	1.3 (0.1)	1.0 (0.1)	1.7 (0.1)	1.1 (0.1)
Ireland	1.2 (0.1)	2.1 (0.2)	1.6 (0.1)	0.3 (0.0)	0.4 (0.0)	0.6 (0.1)	0.8 (0.1)	1.0 (0.1)
Israel	s 3.1 (0.3)	s 2.7 (0.2)	s 3.3 (0.2)	s 1.4 (0.2)	s 1.1 (0.1)	x x	x x	s 2.0 (0.2)
Japan	2.4 (0.1)	3.0 (0.1)	2.7 (0.1)	1.3 (0.1)	0.4 (0.0)	2.1 (0.1)	1.7 (0.1)	2.4 (0.1)
Korea	1.5 (0.1)	2.2 (0.1)	2.1 (0.1)	1.4 (0.1)	0.5 (0.0)	1.5 (0.1)	1.3 (0.1)	2.0 (0.1)
Kuwait	r 2.1 (0.1)	r 1.6 (0.1)	r 1.9 (0.1)	s 0.3 (0.1)	r 0.7 (0.1)	r 0.9 (0.1)	r 1.2 (0.1)	r 1.3 (0.1)
Latvia (LSS)	2.0 (0.1)	2.8 (0.2)	2.8 (0.2)	2.1 (0.2)	1.0 (0.1)	1.5 (0.2)	1.0 (0.1)	1.2 (0.1)
Netherlands	1.5 (0.1)	3.8 (0.1)	2.6 (0.1)	0.9 (0.1)	0.8 (0.0)	1.1 (0.1)	0.9 (0.1)	2.8 (0.1)
New Zealand	1.3 (0.1)	2.7 (0.1)	3.1 (0.1)	0.7 (0.1)	0.7 (0.0)	1.5 (0.1)	1.7 (0.1)	3.3 (0.1)
Norway	1.3 (0.1)	2.3 (0.1)	3.8 (0.2)	0.6 (0.0)	0.8 (0.1)	0.7 (0.1)	0.8 (0.1)	1.8 (0.1)
Portugal	2.4 (0.1)	2.7 (0.1)	2.4 (0.1)	0.6 (0.1)	0.7 (0.0)	1.4 (0.1)	0.9 (0.1)	1.5 (0.1)
Scotland	r 0.8 (0.1)	r 3.2 (0.1)	3.3 (0.1)	0.2 (0.0)	r 0.4 (0.0)	1.1 (0.1)	1.1 (0.1)	2.5 (0.1)
Singapore	3.2 (0.1)	4.2 (0.1)	2.4 (0.1)	2.3 (0.1)	0.6 (0.0)	1.5 (0.1)	1.2 (0.1)	2.3 (0.1)
Slovenia	2.3 (0.1)	2.1 (0.1)	3.7 (0.2)	1.1 (0.1)	1.3 (0.1)	2.2 (0.2)	0.8 (0.1)	1.9 (0.1)
Thailand	r 2.5 (0.2)	r 2.4 (0.2)	r 2.8 (0.2)	r 1.9 (0.2)	1.7 (0.2)	r 2.2 (0.2)	r 1.7 (0.2)	2.0 (0.2)
United States	2.2 (0.1)	3.1 (0.1)	2.5 (0.1)	0.9 (0.1)	0.7 (0.0)	1.3 (0.1)	1.4 (0.1)	2.2 (0.1)

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

[1] Average hours based on: No time = 0, Less than 1 hour = .5, 1-2 hours = 1.5; 3-4 hours = 3.5; More than 4 hours = 5.

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).

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

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

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

An "x" indicates teacher response data available for <50% students.

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

Table 5.6

Teachers' Reports on How Often They Meet with Other Teachers in Their Subject Area to Discuss and Plan Curriculum or Teaching Approaches Mathematics - Upper Grade (Fourth Grade*)

Country		Percent of Students Taught by Teachers			
		Meeting Never or Once/Twice a Year	Meeting Monthly or Every Other Month	Meeting Once, Twice, or Three Times a Week	Meeting Almost Every Day
Australia		7 (1.8)	33 (3.5)	50 (3.8)	10 (2.7)
Austria		19 (4.4)	23 (4.6)	36 (4.6)	22 (4.1)
Canada		32 (3.6)	33 (3.4)	29 (2.9)	7 (1.8)
Cyprus	s	9 (2.7)	13 (4.3)	65 (5.4)	13 (4.2)
Czech Republic		5 (1.7)	13 (2.5)	33 (4.0)	49 (4.5)
England		4 (1.6)	11 (3.1)	72 (4.4)	13 (3.1)
Greece		32 (3.9)	26 (3.3)	26 (3.7)	16 (3.3)
Hong Kong		66 (5.2)	23 (4.1)	9 (3.8)	1 (1.0)
Hungary		3 (2.0)	13 (3.0)	42 (4.9)	42 (4.6)
Iceland		16 (1.6)	15 (4.3)	67 (4.1)	2 (1.2)
Iran, Islamic Rep.		4 (1.5)	26 (4.3)	54 (4.9)	16 (3.2)
Ireland		46 (5.0)	42 (4.7)	7 (2.0)	5 (1.5)
Israel	s	8 (4.2)	36 (7.7)	47 (8.6)	9 (4.3)
Japan		5 (1.7)	14 (3.0)	61 (4.2)	20 (3.9)
Korea		17 (3.0)	24 (3.5)	41 (4.2)	18 (3.2)
Kuwait	r	4 (2.0)	2 (1.1)	76 (4.4)	19 (4.3)
Latvia (LSS)		9 (2.8)	25 (3.9)	36 (4.9)	29 (4.3)
Netherlands		36 (4.4)	33 (4.4)	29 (3.8)	2 (1.5)
New Zealand		11 (2.7)	17 (3.2)	60 (4.3)	12 (2.6)
Norway		5 (1.7)	7 (2.4)	80 (3.6)	8 (2.8)
Portugal		10 (2.6)	62 (4.4)	17 (3.4)	11 (2.8)
Scotland		9 (2.3)	37 (4.3)	40 (4.0)	14 (2.9)
Singapore		9 (2.1)	68 (4.2)	21 (3.4)	3 (1.5)
Slovenia		4 (2.3)	33 (4.9)	31 (4.4)	32 (4.7)
Thailand	r	54 (5.8)	29 (5.6)	16 (4.7)	1 (0.5)
United States		19 (3.4)	20 (3.3)	50 (3.7)	11 (2.1)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.

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

Opportunities to meet with colleagues to plan curriculum or teaching approaches enable teachers to expand their views of mathematics, their resources for teaching, and their repertoire of teaching and learning skills. Table 5.6 contains teachers' reports on how often they meet with other teachers in their subject area to discuss and plan curriculum or teaching approaches. Teachers of the majority of the students reported weekly or daily planning meetings in Australia, Austria, Cyprus, the Czech Republic, England, Hungary, Iceland, Iran, Israel, Japan, Korea, Kuwait, Latvia (LSS), New Zealand, Norway, Scotland, Slovenia, and the United States. In the remaining countries, however, most students had mathematics teachers who reported only limited opportunities to plan curriculum or teaching approaches with other teachers (monthly or even yearly meetings).

How Are Mathematics Classes Organized?

Instructional organization can subsume many factors, including the diversity of the students placed into classrooms, the availability of instructional resources, the typical size of classes, and practices regarding in-class grouping. Often, how instruction is organized can influence the implemented curriculum and the opportunities of students.

Figure 5.4 presents teachers' reports about several factors that might limit how they teach their mathematics classes. The results are presented visually via pie graphs. The percentage of students whose teachers reported that a particular factor limited how they teach mathematics either "quite a lot" or "a great deal" also is shown next to each graph. Since tracking or streaming is relatively rare in the primary grades, it is perhaps not surprising that many teachers reported that the differing academic abilities of their students limited how they teach mathematics. Eighty percent or more of the students in Greece, Hungary, Iceland, and Iran had mathematics teachers who so reported. In general, fewer teachers reported that students with special needs or disruptive students limited their mathematics instruction. However, 60% or more of the students in Greece, Iran, and Portugal were in mathematics classes where instruction was reportedly limited by students with special needs, and similar percentages of students in Korea and Portugal were in classes where disruptive students limited instruction.

The availability of instructional resources also can affect the organization of instruction. Except in Austria, the Netherlands, and Scotland, one-fourth or more of the students had teachers who reported shortages of equipment for use in demonstrations and other exercises. The majority of the students were in such classrooms in Cyprus, Greece, Iran, Korea, Kuwait, Latvia (LSS), Portugal, Slovenia, and Thailand. In Greece, Iran, Latvia (LSS), and Thailand, teachers also reported that the majority of students were in situations where inadequate physical facilities limited their mathematics teaching.

Teachers reported that high student/teacher ratios were a limiting instructional factor for the majority of students in more than half of the countries. The exceptions were Austria, Canada, the Czech Republic, Hungary, Japan, Latvia (LSS), the Netherlands, Norway, Scotland, Thailand, and the United States. Even for these countries, however, only the teachers in Austria and Latvia (LSS) reported that student/teachers ratios affected instruction for fewer than 20% of the students.

Figure 5.4

Teachers' Reports on What Factors Limit How They Teach Class Mathematics - Upper Grade (Fourth Grade*)

Country	Percent of Students Whose Teachers Report Each Factor Limiting How They Teach Class "Quite A Lot" or "A Great Deal"					
	Students with Different Academic Abilities	Students with Special Needs	Disruptive Students	Shortage of Equipment for Use in Demonstrations and Other Exercises	Inadequate Physical Facilities	High Student/Teacher Ratio
Australia	r 45	r 27	r 38	r 31	r 24	r 51
Austria	47	1	10	7	7	15
Canada	47	28	46	31	26	46
Cyprus	s 77	s 56	s 53	s 55	s 35	s 82
Czech Republic	64	22	39	48	28	38
Greece	81	r 60	44	r 65	50	64
Hong Kong	53	16	22	26	25	57
Hungary	92	55	44	42	32	37
Iceland	87	r 51	53	49	r 44	67
Iran, Islamic Rep.	81	75	45	79	55	58
Ireland	69	28	37	28	20	54
Japan	60	-	-	28	-	41

Percent for "Quite a Lot" or "A Great Deal" →

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
A dash (-) indicates data are not available.
Countries where data were not available or where teacher response data were available for <50% of students are omitted from the figure (England and Israel).
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.

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

Figure 5.4 (Continued)

Teachers' Reports on What Factors Limit How They Teach Class Mathematics - Upper Grade (Fourth Grade*)

Country	Percent of Students Whose Teachers Report Each Factor Limiting How They Teach Class "Quite A Lot" or "A Great Deal"					
	Students with Different Academic Abilities	Students with Special Needs	Disruptive Students	Shortage of Equipment for Use in Demonstrations and Other Exercises	Inadequate Physical Facilities	High Student/Teacher Ratio
Korea	69	41	64	54	27	62
Kuwait	r 57	r 56	r 40	r 62	r 39	r 78
Latvia (LSS)	r 25	r 16	r 22	r 77	r 60	r 14
Netherlands	63	21	31	18	19	r 35
New Zealand	45	26	27	31	25	59
Norway	58	35	26	41	14	48
Portugal	74	66	74	59	23	r 53
Scotland	63	32	31	11	21	39
Singapore	66	22	42	25	17	60
Slovenia	24	16	50	61	46	52
Thailand	68	36	21	67	r 65	48
United States	r 41	r 19	r 31	r 25	r 15	r 38

Percent for "Quite a Lot" or "A Great Deal" →

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
A dash (-) indicates data are not available.
Countries where data were not available or where teacher response data were available for <50% of students are omitted from the figure (England and Israel).
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.

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

Table 5.7 presents teachers' reports about the size of fourth-grade mathematics classes for the TIMSS countries. The data reveal rather large variations from country to country, with the average class size ranging from 19 in Norway to 43 in Korea. According to teachers, mathematics classes were relatively small in a number of countries. For example, 90% or more of the students were in mathematics classes of 30 or fewer students in Austria, Canada, the Czech Republic, Greece, Hungary, Iceland, Latvia (LSS), Norway, Portugal, Slovenia, and the United States. At the other end of the spectrum, 69% of the students in Korea were in mathematics classes with more than 40 students and 93% were in classes with more than 30 students. Similarly, 98% of the students in Singapore, 87% in Hong Kong, and 68% in Japan were in classes with more than 30 students.

Extensive research about class size in relation to achievement indicates that the existence of such a relationship is dependent on the situation. Dramatic reductions in class size can be related to gains in achievement, but the chief effects of smaller classes often are in relation to teacher attitudes and instructional strategies. The TIMSS data support the complexity of this issue. Across countries, the four highest-performing countries at the fourth grade – Singapore, Korea, Japan, and Hong Kong – are among those with the largest mathematics classes. Within countries, several show little or no relationship between achievement and class size, often because students are almost all in classes of similar size. Within other countries, there appears to be a curvilinear relationship, or the students with higher achievement appear to be in larger classes. In some countries, larger classes may represent the more usual situation for mathematics teaching, with smaller classes used primarily for students needing remediation.

Teachers can adopt a variety of organizational and interactive approaches in mathematics class. Whole-class instruction can be very efficient because it requires less time on management functions and provides more time for developing mathematics concepts. Teachers can make presentations, conduct discussions, or demonstrate procedures and applications to all students simultaneously. Both whole-class and independent work have been standard features of mathematics classrooms. Students also can benefit from the type of cooperative learning that occurs with effective use of small-group work. Because they can help each other, students in groups can often handle challenging situations beyond their individual capabilities. Further, the positive affective impact of working together mirrors the use of mathematics in the workplace.

Figure 5.5 provides a pictorial view of the emphasis on individual, small-group, and whole-class work as reported by the mathematics teachers in the TIMSS countries. Because learning may be enhanced with teacher guidance and monitoring of individual and small-group activities, the frequency of lessons using each of these organizational approaches is shown both with and without assistance of the teacher. Internationally, teachers reported that students working together as a class with the teacher teaching the whole class is a frequently used instructional approach. In many countries, approximately 50% or even more of the fourth-grade students were taught this way during most or all lessons. In contrast, students working together as a class and responding to each other appeared to be a much less common approach, used for about one-third or fewer of the students on a frequent basis, except in Japan and Korea.

Table 5.7

Teachers' Reports on Average Size of Mathematics Class
Upper Grade (Fourth Grade*)

Country	1 - 20 Students		21 - 30 Students		31 - 40 Students		41 or More Students		Average Number of Students
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	
Australia	r 17 (3.1)	551 (5.6)	64 (4.8)	546 (5.4)	19 (4.7)	543 (10.0)	0 (0.0)	~ ~	r 25 (0.6)
Austria	50 (5.0)	567 (5.5)	50 (5.0)	553 (4.0)	0 (0.0)	~ ~	0 (0.0)	~ ~	20 (0.5)
Canada	18 (2.4)	552 (9.3)	75 (2.7)	529 (3.7)	6 (1.3)	525 (7.8)	0 (0.2)	~ ~	24 (0.3)
Cyprus	s 6 (1.7)	514 (8.5)	66 (5.2)	505 (4.2)	28 (5.4)	510 (12.4)	0 (0.0)	~ ~	s 28 (0.5)
Czech Republic	32 (3.6)	552 (4.8)	65 (3.7)	572 (3.6)	3 (1.4)	641 (42.8)	0 (0.0)	~ ~	22 (0.4)
England	9 (2.7)	534 (21.7)	56 (4.8)	512 (4.4)	35 (4.8)	515 (7.0)	0 (0.0)	~ ~	28 (0.5)
Greece	45 (3.9)	490 (7.1)	53 (4.0)	497 (5.1)	2 (1.1)	~ ~	0 (0.0)	~ ~	21 (0.4)
Hong Kong	0 (0.4)	~ ~	13 (4.1)	573 (22.5)	74 (4.8)	590 (5.1)	13 (3.2)	608 (8.7)	36 (0.5)
Hungary	38 (3.4)	539 (5.2)	58 (3.5)	554 (5.0)	4 (1.7)	565 (24.6)	0 (0.0)	~ ~	22 (0.4)
Iceland	46 (5.0)	475 (4.9)	54 (5.0)	476 (3.4)	0 (0.0)	~ ~	0 (0.0)	~ ~	20 (0.4)
Iran, Islamic Rep.	17 (3.7)	396 (7.0)	24 (3.9)	424 (8.0)	38 (4.2)	447 (7.4)	21 (3.7)	434 (6.5)	32 (0.9)
Ireland	27 (2.8)	555 (5.5)	33 (4.3)	541 (7.3)	41 (4.7)	557 (5.2)	0 (0.0)	~ ~	26 (0.6)
Israel	x x	x x	x x	x x	x x	x x	x x	x x	x x
Japan	3 (0.8)	593 (5.3)	29 (3.5)	595 (3.3)	67 (3.6)	598 (2.7)	1 (1.1)	~ ~	32 (0.4)
Korea	2 (1.0)	~ ~	6 (1.6)	583 (9.7)	24 (3.6)	602 (5.1)	69 (3.5)	617 (2.8)	43 (0.6)
Kuwait	r 0 (0.0)	~ ~	36 (4.5)	408 (5.5)	63 (4.7)	397 (3.7)	1 (1.3)	~ ~	r 32 (0.3)
Latvia (LSS)	53 (3.8)	518 (7.1)	44 (3.5)	535 (6.5)	3 (1.6)	532 (18.4)	0 (0.0)	~ ~	20 (0.4)
Netherlands	29 (4.0)	576 (7.5)	52 (5.5)	573 (4.8)	19 (4.4)	588 (4.6)	0 (0.0)	~ ~	24 (0.7)
New Zealand	13 (2.6)	500 (11.5)	37 (4.3)	490 (8.6)	50 (4.5)	507 (5.9)	0 (0.0)	~ ~	29 (0.5)
Norway	59 (4.4)	504 (4.2)	41 (4.4)	496 (4.6)	0 (0.0)	~ ~	0 (0.0)	~ ~	19 (0.4)
Portugal	39 (3.8)	468 (6.3)	60 (3.7)	479 (4.8)	1 (0.6)	~ ~	0 (0.0)	~ ~	21 (0.4)
Scotland	15 (2.3)	545 (6.3)	70 (3.5)	515 (5.2)	14 (3.3)	521 (8.6)	1 (1.0)	~ ~	26 (0.5)
Singapore	0 (0.0)	~ ~	2 (0.8)	~ ~	68 (3.3)	620 (5.8)	30 (3.2)	646 (11.0)	39 (0.2)
Slovenia	32 (4.5)	540 (7.7)	68 (4.5)	556 (4.1)	0 (0.0)	~ ~	0 (0.0)	~ ~	23 (0.4)
Thailand	28 (4.1)	490 (5.4)	29 (4.9)	493 (10.9)	36 (5.7)	495 (11.4)	7 (5.2)	445 (1.7)	27 (2.0)
United States	r 23 (3.6)	544 (5.7)	67 (3.8)	555 (4.3)	9 (1.7)	517 (7.8)	1 (0.5)	~ ~	r 24 (0.5)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.
An "x" indicates teacher response data available for <50% of students.

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

Figure 5.5

Teachers' Reports About Classroom Organization During Mathematics Lessons Upper Grade (Fourth Grade*)

Country	Percent of Students Whose Teachers Report Using Each Organizational Approach "Most or Every Lesson"					
	Work Together as a Class with Students Responding to One Another	Work Together as a Class with Teacher Teaching the Whole Class	Work Individually with Assistance from Teacher	Work Individually without Assistance from Teacher	Work in Pairs or Small Groups with Assistance from Teacher	Work in Pairs or Small Groups without Assistance from Teacher
Australia	r 17	r 31	r 47	r 24	r 20	r 10
Austria	8	38	60	39	21	21
Canada	18	37	49	23	24	10
Cyprus	s 10	s 41	s 29	s 28	s 31	s 24
Czech Republic	12	49	52	71	8	6
England	10	11	55	12	21	7
Greece	r 9	r 61	54	r 21	17	5
Hong Kong	5	39	49	1	3	1
Hungary	10	53	78	40	16	6
Iceland	0	32	66	35	9	5
Iran, Islamic Rep.	31	72	57	7	32	10
Ireland	16	61	55	46	9	4
Japan	50	78	34	25	7	2

Percent for "Most or Every Lesson" →

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
Israel omitted from the figure; teacher response data available for <50% of students.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.

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

Figure 5.5 (Continued)

Teachers' Reports About Classroom Organization During Mathematics Lessons Upper Grade (Fourth Grade*)

Country	Percent of Students Whose Teachers Report Using Each Organizational Approach "Most or Every Lesson"					
	Work Together as a Class with Students Responding to One Another	Work Together as a Class with Teacher Teaching the Whole Class	Work Individually with Assistance from Teacher	Work Individually without Assistance from Teacher	Work in Pairs or Small Groups with Assistance from Teacher	Work in Pairs or Small Groups without Assistance from Teacher
Korea	50	77	57	37	30	20
Kuwait	s 3	s 47	r 55	r 26	r 10	r 3
Latvia (LSS)	34	89	77	78	21	13
Netherlands	34	60	56	44	5	5
New Zealand	20	16	47	25	47	24
Norway	18	64	77	7	16	5
Portugal	14	68	69	25	32	5
Scotland	2	3	44	17	25	6
Singapore	23	68	37	41	25	10
Slovenia	17	47	79	53	45	27
Thailand	10	52	r 57	18	40	7
United States	r 32	r 54	r 55	r 15	r 20	r 11

Percent for "Most or Every Lesson" →

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
Israel omitted from the figure; teacher response data available for <50% of students.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.

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

Perhaps even more popular than having students working together as a class with the teacher teaching the whole class was having students work individually with assistance from the teacher. Group work was reported to be the least frequent approach, but when such an approach was indicated, it was more often with than without the assistance of the teacher. Group work both with and without teacher assistance was reported most often for students in Cyprus, Iran, Korea, New Zealand, and Slovenia. In general, however, having students work without the assistance of the teacher, either individually or in groups, was not common in most countries, except the Czech Republic and Latvia (LSS).

What Activities Do Students Do in Their Mathematics Lessons?

Most educational systems provide curriculum guides on either a national or a regional basis to ensure that teachers, parents, and other interested parties have a clear understanding of what is intended to be taught in each subject. Teachers' implementation of the intended curriculum, as represented by these national or regional educational policies and instructional objectives, can be determined by their knowledge of the relevant documents. The degree of teachers' familiarity with these documents can influence planning as well as the content delivered and the instructional methods used. Table 5.8 presents teachers' reports about their relative familiarity with the official national and/or regional curriculum guides in mathematics. Most commonly, teachers for the majority of the students reported being "fairly" familiar with these curriculum guides. In Austria, Hungary, Kuwait, and Slovenia, 80% or more of the fourth graders were taught mathematics by teachers who reported being "very" familiar with these documents.

As shown in Table 5.9, mathematics teachers in the participating countries generally reported heavier reliance on curriculum guides than textbooks or examination specifications in deciding which topics to teach. The exceptions were Greece, Iran, Ireland, Japan, Korea, the Netherlands, Norway, and Thailand, where teachers reported using textbooks more for this purpose than other sources of information. Often in countries with a national curriculum, the textbooks are prepared in close accordance with the curriculum guidelines. In almost all countries, the textbook was the major written source mathematics teachers used in deciding how to present a topic to their classes. Internationally, the textbook appears to play a role in mathematics classrooms in many countries. For nearly all students in all countries, teachers reported using a textbook in their mathematics classes (see Figure 5.6).

Table 5.8

Teachers' Reports on Their Familiarity With National and Regional Mathematics Curriculum Guides
Mathematics - Upper Grade (Fourth Grade*)

Country	Percent of Students by Teachers' Familiarity With					
	National Curriculum Guide			Regional Curriculum Guide		
	Not Familiar	Fairly Familiar	Very Familiar	Not Familiar	Fairly Familiar	Very Familiar
Australia	27 (3.9)	53 (4.6)	20 (3.1)	r 16 (3.3)	53 (4.6)	31 (4.2)
Austria	0 (0.0)	11 (2.9)	89 (2.9)	40 (4.9)	28 (4.3)	32 (4.9)
Canada	- -	- -	- -	10 (2.4)	38 (3.9)	52 (3.6)
Cyprus	s 1 (1.0)	33 (5.9)	66 (5.7)	- -	- -	- -
Czech Republic	42 (4.5)	42 (4.0)	16 (3.1)	91 (2.8)	8 (2.6)	1 (0.8)
England	- -	- -	- -	- -	- -	- -
Greece	r 22 (3.2)	52 (4.0)	26 (3.6)	- -	- -	- -
Hong Kong	21 (4.1)	66 (5.4)	14 (4.4)	- -	- -	- -
Hungary	0 (0.0)	12 (3.2)	88 (3.2)	- -	- -	- -
Iceland	9 (3.9)	69 (5.6)	22 (4.3)	- -	- -	- -
Iran, Islamic Rep.	32 (4.5)	51 (5.0)	17 (3.6)	- -	- -	- -
Ireland	4 (2.0)	58 (4.7)	38 (4.5)	- -	- -	- -
Israel	s 11 (4.6)	41 (7.7)	48 (8.3)	x x	x x	x x
Japan	35 (3.8)	64 (3.9)	1 (0.8)	58 (4.1)	41 (4.2)	1 (1.0)
Korea	19 (3.2)	63 (3.7)	19 (3.3)	56 (3.8)	37 (3.9)	7 (2.2)
Kuwait	r 6 (2.2)	15 (3.8)	80 (4.1)	- -	- -	- -
Latvia (LSS)	1 (0.8)	22 (3.6)	77 (3.7)	r 51 (5.2)	18 (3.7)	31 (4.8)
Netherlands	11 (3.0)	61 (4.7)	27 (4.4)	- -	- -	- -
New Zealand	3 (1.3)	55 (3.8)	42 (3.5)	76 (3.6)	19 (3.3)	5 (1.6)
Norway	6 (2.5)	66 (4.2)	27 (4.0)	58 (4.0)	30 (4.3)	12 (2.8)
Portugal	31 (4.5)	18 (3.4)	51 (4.4)	- -	- -	- -
Scotland	- -	- -	- -	- -	- -	- -
Singapore	1 (0.8)	40 (3.9)	60 (3.9)	- -	- -	- -
Slovenia	47 (4.8)	35 (5.0)	18 (3.6)	3 (2.1)	11 (3.7)	86 (4.2)
Thailand	4 (2.2)	21 (4.7)	76 (5.3)	r 56 (7.2)	33 (7.1)	11 (3.5)
United States	- -	- -	- -	r 36 (2.9)	38 (2.7)	26 (3.2)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates data are not available.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.
An "x" indicates teacher response data available for <50% of students.

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

Table 5.9

Teachers' Reports on Their Main Sources of Written Information When Deciding Which Topics to Teach and How to Present a Topic[1] Mathematics - Upper Grade (Fourth Grade*)

Country	Percent of Students Taught by Teachers						
	Deciding Which Topics to Teach			Deciding How to Present a Topic			
	Curriculum Guide	Textbook	Examination Specifications	Curriculum Guide	Textbook	Examination Specifications
Australia	r 81 (4.1)	19 (4.1)	- -	r 35 (4.3)	65 (4.3)	- -
Austria	r 61 (5.0)	39 (5.0)	0 (0.0)	26 (4.3)	74 (4.3)	0 (0.0)
Canada	- -	- -	- -	- -	- -	- -
Cyprus	s 91 (2.5)	9 (2.5)	0 (0.0)	s 25 (3.8)	75 (3.8)	0 (0.0)
Czech Republic	79 (3.3)	21 (3.3)	- -	7 (2.2)	93 (2.2)	- -
England	77 (4.5)	23 (4.5)	- -	24 (4.8)	76 (4.8)	- -
Greece	r 42 (4.3)	58 (4.3)	- -	r 2 (1.2)	98 (1.2)	- -
Hong Kong	63 (5.6)	35 (5.5)	2 (1.1)	27 (5.3)	73 (5.3)	0 (0.0)
Hungary	86 (2.9)	10 (2.8)	4 (1.7)	22 (4.1)	78 (4.0)	1 (0.7)
Iceland	53 (4.5)	44 (4.6)	3 (2.0)	9 (3.0)	91 (3.0)	0 (0.0)
Iran, Islamic Rep.	41 (4.4)	54 (4.4)	5 (1.9)	34 (5.1)	62 (5.1)	4 (1.5)
Ireland	36 (5.0)	64 (5.0)	- -	13 (3.2)	87 (3.2)	- -
Israel	x x	x x	x x	x x	x x	x x
Japan	33 (4.1)	67 (4.1)	0 (0.0)	16 (3.2)	84 (3.2)	0 (0.0)
Korea	37 (3.9)	58 (3.9)	5 (1.8)	32 (3.8)	67 (3.9)	1 (0.6)
Kuwait	s - -	- -	- -	s - -	- -	- -
Latvia (LSS)	56 (4.9)	43 (4.9)	1 (0.9)	11 (3.0)	89 (3.0)	0 (0.0)
Netherlands	12 (3.0)	88 (3.0)	- -	6 (2.2)	94 (2.2)	- -
New Zealand	89 (3.0)	11 (3.0)	- -	31 (4.0)	69 (4.0)	- -
Norway	r 29 (4.9)	71 (4.9)	- -	3 (1.7)	97 (1.7)	- -
Portugal	95 (1.8)	5 (1.8)	- -	73 (4.0)	27 (4.0)	- -
Scotland	r 88 (3.1)	12 (3.1)	- -	r 22 (3.3)	78 (3.3)	- -
Singapore	77 (3.4)	22 (3.3)	2 (1.1)	2 (1.1)	98 (1.1)	0 (0.0)
Slovenia	89 (3.0)	10 (2.9)	1 (1.0)	14 (3.9)	83 (4.0)	2 (1.7)
Thailand	s 42 (7.8)	57 (7.7)	2 (1.0)	r 35 (6.9)	64 (6.9)	1 (0.8)
United States	r 67 (4.1)	27 (4.2)	6 (1.4)	r 14 (3.1)	84 (3.1)	1 (0.5)

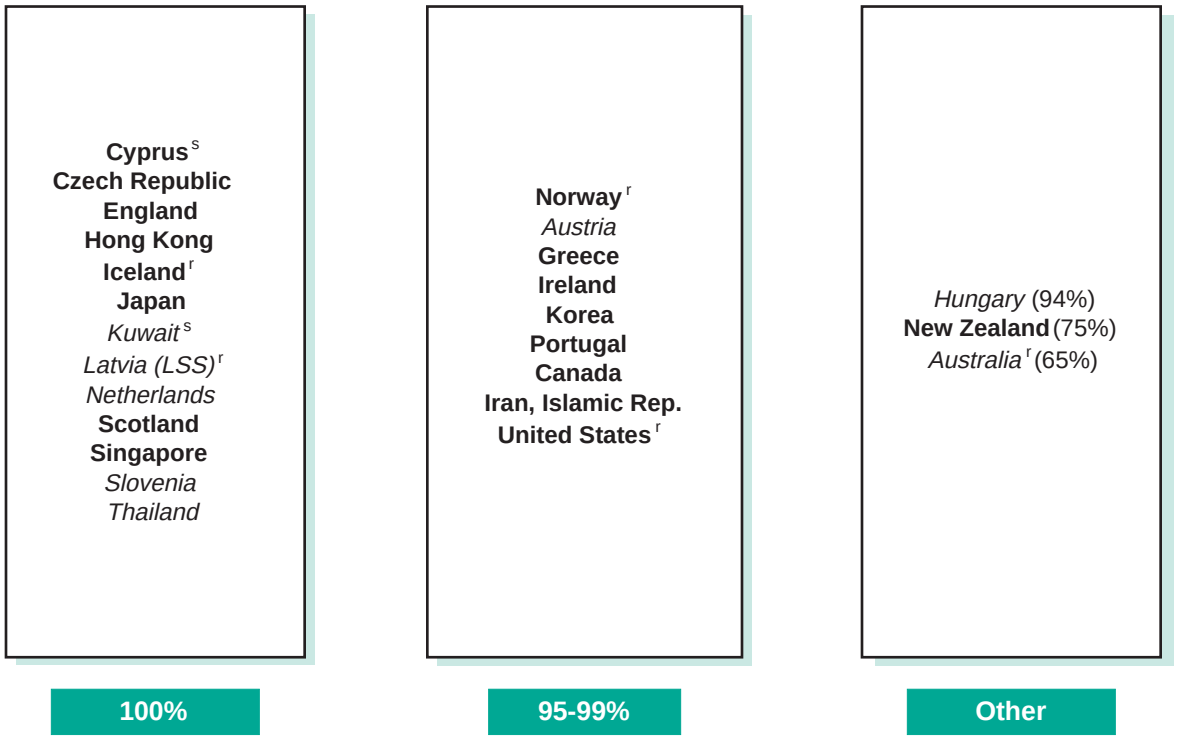
*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
[1]Curriculum Guides include national, regional, and school curriculum guides; Textbooks include teacher and student editions, as well as other resource books; and Examination Specifications include national and regional levels.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates data are not available.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.
An "x" indicates teacher response data available for <50% of students.

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

Figure 5.6

Teachers' Reports About Using a Textbook in Teaching Mathematics Upper Grade (Fourth Grade*)

Countries are classified by percentage of students whose teachers reported that they use a textbook in teaching their mathematics class.



*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.
Israel omitted from the figure; teacher response data available for <50% of students.

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

Table 5.10

Teachers' Reports on How Often They Ask Students to Practice Computational Skills - Mathematics - Upper Grade (Fourth Grade*)

Country	Never or Almost Never		Some Lessons		Most Lessons		Every Lesson	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
Australia	r 5 (2.2)	548 (24.0)	41 (4.2)	550 (6.1)	46 (4.15)	545.6 (5.3)	8 (2.1)	523.8 (10.0)
Austria	0 (0.0)	~ ~	9 (2.8)	581 (6.2)	51 (5.0)	564 (6.2)	39 (5.1)	551 (4.3)
Canada	1 (1.0)	~ ~	27 (3.2)	525 (8.5)	55 (3.3)	535 (4.7)	17 (3.1)	539 (6.7)
Cyprus	s 3 (1.7)	496 (10.6)	30 (5.0)	499 (6.2)	51 (6.7)	510 (5.8)	16 (4.9)	509 (20.6)
Czech Republic	0 (0.0)	~ ~	2 (1.0)	~ ~	20 (3.4)	563 (7.8)	78 (3.5)	569 (3.8)
England	- -	- -	- -	- -	- -	- -	- -	- -
Greece	- -	- -	- -	- -	- -	- -	- -	- -
Hong Kong	2 (1.3)	~ ~	37 (5.0)	597 (7.6)	36 (4.4)	586 (8.6)	25 (4.4)	575 (5.0)
Hungary	1 (0.7)	~ ~	1 (0.7)	~ ~	21 (3.8)	553 (7.0)	78 (3.7)	549 (4.6)
Iceland	0 (0.0)	~ ~	8 (3.0)	484 (7.7)	59 (5.7)	475 (4.3)	33 (5.0)	473 (4.2)
Iran, Islamic Rep.	15 (3.8)	433 (12.5)	59 (4.2)	426 (4.7)	21 (3.7)	435 (11.9)	5 (1.7)	419 (11.9)
Ireland	2 (0.9)	~ ~	15 (3.2)	552 (8.5)	52 (4.2)	549 (5.3)	32 (4.5)	554 (6.9)
Israel	x x	x x	x x	x x	x x	x x	x x	x x
Japan	- -	- -	- -	- -	- -	- -	- -	- -
Korea	8 (2.4)	601 (12.0)	45 (4.5)	611 (3.5)	39 (4.2)	613 (3.5)	8 (2.3)	609 (10.2)
Kuwait	r 1 (0.6)	~ ~	8 (2.2)	392 (8.6)	52 (5.0)	395 (3.6)	39 (4.8)	409 (5.8)
Latvia (LSS)	- -	- -	- -	- -	- -	- -	- -	- -
Netherlands	0 (0.0)	~ ~	6 (2.2)	570 (12.2)	53 (4.5)	578 (5.4)	41 (4.5)	578 (5.2)
New Zealand	2 (1.6)	~ ~	33 (4.3)	504 (7.3)	37 (4.5)	505 (7.2)	27 (3.7)	499 (9.6)
Norway	0 (0.0)	~ ~	22 (4.4)	503 (6.2)	59 (5.0)	504 (4.2)	18 (4.1)	492 (5.9)
Portugal	7 (2.2)	464 (17.7)	29 (4.3)	470 (8.7)	49 (4.9)	480 (4.8)	14 (3.2)	482 (13.1)
Scotland	- -	- -	- -	- -	- -	- -	- -	- -
Singapore	5 (1.8)	622 (15.6)	28 (2.8)	625 (8.4)	45 (3.9)	618 (6.5)	22 (3.4)	647 (12.8)
Slovenia	1 (0.9)	~ ~	1 (0.7)	~ ~	62 (5.1)	551 (4.2)	36 (5.2)	549 (7.0)
Thailand	r 1 (0.5)	~ ~	23 (5.3)	476 (13.1)	24 (4.4)	492 (7.6)	53 (5.9)	500 (8.2)
United States	r 2 (1.1)	~ ~	26 (3.4)	550 (5.6)	50 (4.2)	547 (4.1)	22 (4.2)	544 (7.9)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates data are not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.
An "x" indicates teacher response data available for <50% students.

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

The types of activities teachers asked fourth-grade students to do, however, varied from country to country. Teachers were asked how often they had students practice computational skills, and the responses are shown in Table 5.10. It appears that in most countries, the majority of the students practice computation in most all lessons. In most countries, there was no relationship between the frequency with which teachers asked students to practice computation and average mathematics achievement. However, in several countries, students who practiced more frequently had higher achievement and, in several other countries, they had lower achievement.

The data in Table 5.11 reveal that the majority of students in most countries were asked to do some type of mathematics reasoning task in most or all lessons. The activities TIMSS asked about included explaining the reasoning behind an idea; using tables, charts, or graphs to represent and analyze relationships; working on problems for which there is no immediately obvious solution; and writing equations to represent relationships. In Japan, 45% or more of the students were asked to do at least one of these types of reasoning task in every lesson. In about one-third of the countries, students who were asked to do reasoning tasks in every lesson had higher average mathematics achievement than those asked to do reasoning tasks in only some lessons. This indicates that sometimes the better-performing students are asked to do more reasoning in their lessons, when in actuality students at all levels of performance need opportunities to reason mathematically. In most countries, however, there was little relationship between frequency of students being asked to do reasoning tasks and average mathematics achievement.

Teachers were not asked about the emphasis placed on using things from everyday life in solving mathematics problems, but students were (see Table 5.12). According to fourth-grade students, such mathematics problems typically are done in some lessons rather than most lessons, although in many countries about one-fourth to one-third of the students reported this activity in every lesson. Across countries, relatively small percentages of students (about one-third or fewer) reported never being asked to do these types of problems. The relationship between average mathematics achievement and being asked to do these types of problems was inconsistent across countries.

Table 5.11

Teachers' Reports on How Often They Ask Students to Do Reasoning Tasks[1] Mathematics - Upper Grade (Fourth Grade*)

Country	Never or Almost Never		Some Lessons		Most Lessons		Every Lesson	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
Australia	r 1 (1.2)	~ ~	35 (3.9)	539 (7.8)	54 (3.8)	549 (4.6)	10 (2.4)	552 (10.0)
Austria	0 (0.4)	~ ~	17 (3.2)	571 (9.4)	61 (4.3)	558 (4.3)	22 (3.2)	558 (7.1)
Canada	0 (0.0)	~ ~	32 (3.8)	534 (6.2)	49 (4.0)	529 (4.3)	19 (3.1)	540 (10.5)
Cyprus	s 0 (0.0)	~ ~	4 (1.9)	479 (9.6)	64 (6.2)	504 (5.6)	32 (6.0)	512 (7.6)
Czech Republic	0 (0.0)	~ ~	5 (1.7)	548 (14.7)	63 (3.9)	565 (3.8)	32 (3.9)	575 (7.2)
England	- -	- -	- -	- -	- -	- -	- -	- -
Greece	0 (0.5)	~ ~	22 (3.7)	507 (11.6)	43 (4.1)	495 (5.5)	34 (4.0)	487 (6.3)
Hong Kong	6 (2.9)	584 (9.8)	73 (5.1)	586 (4.6)	19 (4.4)	598 (12.0)	2 (1.3)	~ ~
Hungary	0 (0.0)	~ ~	7 (2.5)	548 (13.5)	65 (4.4)	544 (4.5)	28 (4.0)	561 (6.7)
Iceland	3 (1.7)	471 (13.4)	71 (5.0)	478 (3.5)	23 (4.4)	464 (4.8)	2 (2.0)	~ ~
Iran, Islamic Rep.	0 (0.0)	~ ~	31 (4.4)	438 (9.3)	57 (4.9)	426 (5.6)	12 (2.6)	418 (5.2)
Ireland	1 (1.1)	~ ~	33 (4.5)	545 (5.6)	47 (4.4)	548 (5.4)	19 (3.9)	564 (7.4)
Israel	x x	x x	x x	x x	x x	x x	x x	x x
Japan	0 (0.0)	~ ~	10 (2.7)	593 (4.5)	46 (4.1)	596 (3.1)	45 (4.1)	599 (3.2)
Korea	0 (0.0)	~ ~	16 (3.1)	608 (6.1)	53 (4.1)	610 (3.0)	31 (3.9)	613 (4.4)
Kuwait	r 5 (2.3)	402 (8.7)	51 (4.9)	396 (4.4)	36 (4.3)	402 (5.7)	7 (2.4)	430 (14.1)
Latvia (LSS)	0 (0.4)	~ ~	21 (3.6)	529 (14.7)	59 (4.6)	524 (5.8)	20 (3.7)	522 (11.1)
Netherlands	0 (0.0)	~ ~	15 (3.2)	568 (9.9)	70 (4.5)	577 (4.3)	14 (3.1)	583 (7.5)
New Zealand	0 (0.0)	~ ~	21 (3.7)	502 (9.9)	61 (4.6)	500 (5.8)	18 (3.5)	513 (8.7)
Norway	1 (0.8)	~ ~	50 (4.8)	504 (4.1)	36 (4.4)	498 (5.5)	12 (3.3)	507 (9.3)
Portugal	0 (0.0)	~ ~	16 (3.4)	472 (10.3)	62 (4.0)	471 (5.0)	22 (3.6)	491 (8.6)
Scotland	- -	- -	- -	- -	- -	- -	- -	- -
Singapore	3 (1.5)	605 (4.8)	28 (4.0)	622 (9.2)	52 (3.8)	623 (7.1)	17 (2.9)	644 (12.3)
Slovenia	0 (0.0)	~ ~	18 (3.9)	550 (5.5)	68 (4.5)	548 (4.4)	14 (3.3)	563 (6.7)
Thailand	2 (2.4)	~ ~	34 (5.6)	483 (10.3)	47 (6.4)	499 (8.9)	16 (4.3)	484 (10.0)
United States	r 0 (0.0)	~ ~	26 (3.8)	543 (4.7)	54 (3.8)	549 (4.2)	20 (2.6)	547 (7.1)

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

[1] Based on most frequent response for: explain reasoning behind an idea; represent and analyze relationships using tables, charts or graphs; work on problems for which there is no immediately obvious method of solution; and write equations to represent relationships.

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).

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

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

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

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

An "x" indicates teacher response data available for <50% students.

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

Table 5.12

Students' Reports on Using Things from Everyday Life in Solving Mathematics Problems - Upper Grade (Fourth Grade*)

Country	Never		Some Lessons		Most Lessons	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
Australia	12 (0.7)	544 (4.4)	65 (1.0)	553 (4.0)	24 (0.8)	544 (4.2)
Austria	23 (1.3)	564 (4.2)	57 (1.8)	563 (3.7)	20 (1.2)	551 (5.9)
Canada	17 (1.5)	531 (4.6)	59 (1.8)	539 (4.3)	24 (1.0)	526 (4.4)
Cyprus	22 (1.4)	506 (4.4)	44 (2.1)	515 (3.7)	34 (2.1)	497 (4.7)
Czech Republic	16 (1.3)	558 (5.1)	53 (2.4)	573 (3.6)	31 (2.5)	567 (5.3)
England	31 (1.8)	511 (4.9)	59 (1.7)	526 (3.9)	11 (0.6)	472 (5.4)
Greece	27 (1.3)	503 (4.3)	38 (1.5)	505 (4.4)	34 (1.7)	487 (5.1)
Hong Kong	27 (1.5)	579 (5.5)	56 (1.9)	598 (4.2)	17 (2.3)	569 (5.3)
Hungary	31 (1.1)	571 (4.6)	49 (1.1)	552 (4.2)	20 (1.1)	517 (4.9)
Iceland	34 (1.8)	490 (2.9)	50 (1.9)	478 (3.8)	16 (1.2)	447 (4.3)
Iran, Islamic Rep.	r 7 (1.0)	446 (7.4)	24 (1.6)	441 (5.3)	69 (1.7)	435 (5.0)
Ireland	27 (1.4)	559 (4.3)	51 (1.4)	560 (3.4)	22 (1.4)	525 (5.6)
Israel	r 18 (1.1)	540 (6.4)	49 (1.6)	533 (4.0)	34 (1.6)	532 (4.6)
Japan	20 (0.9)	598 (2.8)	71 (1.2)	598 (2.3)	9 (1.0)	589 (4.8)
Korea	19 (0.8)	602 (3.5)	52 (1.0)	616 (2.3)	29 (0.9)	612 (3.3)
Kuwait	13 (0.9)	409 (3.9)	47 (2.3)	407 (2.8)	40 (2.3)	394 (4.1)
Latvia (LSS)	10 (0.8)	502 (7.5)	43 (2.1)	535 (7.9)	47 (2.0)	528 (4.4)
Netherlands	31 (1.8)	581 (5.7)	59 (2.2)	582 (3.7)	11 (1.3)	570 (7.5)
New Zealand	11 (0.9)	487 (8.6)	61 (1.3)	512 (4.3)	28 (1.2)	485 (6.0)
Norway	32 (1.3)	512 (3.3)	54 (1.3)	514 (3.0)	14 (1.1)	476 (6.4)
Portugal	10 (0.9)	480 (5.4)	50 (2.2)	491 (3.6)	40 (2.0)	463 (5.0)
Scotland	11 (1.0)	523 (6.9)	67 (1.6)	529 (4.4)	22 (1.4)	507 (5.4)
Singapore	17 (1.0)	639 (8.1)	56 (1.7)	631 (5.2)	27 (1.6)	614 (6.8)
Slovenia	14 (1.3)	554 (6.8)	58 (1.7)	559 (3.6)	28 (1.6)	541 (4.3)
Thailand	28 (1.3)	492 (3.6)	52 (1.3)	496 (5.1)	20 (1.2)	467 (6.6)
United States	15 (0.7)	539 (3.7)	50 (0.7)	557 (3.2)	35 (0.9)	535 (3.4)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
An "r" indicates a 70-84% student response rate.

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

How Are Calculators and Computers Used?

As shown in Table 5.13, nearly all fourth-grade students reported having a calculator in the home, except in Greece (61%), Iran (49%), Israel (43%), and Thailand (43%). Internationally, fewer students reported a computer in the home, even though more than three-fourths did so in England, Iceland, Ireland, the Netherlands, and Scotland. Between 50% and 75% so reported in Australia, Austria, Canada, Israel, Kuwait, New Zealand, Norway, and the United States. Fewer than 10% of the fourth-grade students reported home computers in Iran and Thailand.

Table 5.14 provides teachers' reports about how often calculators are used in fourth-grade mathematics classes. Even though calculators appear to be widely available in most countries, teachers reported considerable variation from country to country in the frequency of calculator use in mathematics classrooms. Using calculators can take the drudgery out of mathematics and free the learner to concentrate on higher-order problem-solving skills. However, another point of view, especially at the primary grades, is that permitting unrestricted use of calculators may damage students' mastery of basic skills in mathematics. For example, even though calculators are quite widespread in Korea they generally are forbidden for use in mathematics classes.[1]

According to teachers in many of the TIMSS countries, most fourth-grade students never or hardly ever use calculators in their mathematics classes. The exceptions, where there is at least weekly use of calculators for the majority of the students, include Australia, England, and New Zealand. Moderate use (monthly or weekly) also was reported in Canada and the United States for the majority of the students. As revealed in Table 5.15, when calculators were used, teachers reported that students used them for a variety of purposes. Across the countries with at least moderate calculator use, no single use seemed to predominate, although checking answers appeared to be a relatively frequent purpose, and using calculators on tests and exams was often less frequent than other uses.

Students' reports about the frequency of calculator use in mathematics classes are presented in Table 5.16. Because different response categories were used for the student and teacher versions of the question, a direct comparison is difficult. However, comparing the least frequent and most frequent columns yields a fair degree of agreement between teachers' and students' reports.

Table 5.17 contains teachers' reports about how often computers are used in mathematics class to solve exercises or problems, and Table 5.18 contains students' responses to a similar question. In about half the countries, substantial percentages of teachers and students agreed that the computer is almost never used in most students' mathematics lessons. Teachers and students agreed on moderate use of computers (more than 30% of the students in at least some lessons) in Australia, Canada, the Netherlands, New Zealand, Singapore, and the United States. Even though teacher data are not available, students in England, Israel, and Scotland also reported moderate use of computers.

[1] 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.

Table 5.13

Students' Reports on Having a Calculator and Computer in the Home Mathematics - Upper Grade (Fourth Grade*)

Country	Calculator				Computer			
	Yes		No		Yes		No	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
Australia	88 (0.8)	555 (3.1)	12 (0.8)	485 (6.1)	63 (1.1)	556 (3.1)	37 (1.1)	530 (4.2)
Austria	91 (0.7)	563 (2.9)	9 (0.7)	520 (10.0)	61 (1.5)	558 (3.3)	39 (1.5)	562 (4.4)
Canada	87 (0.7)	540 (3.2)	13 (0.7)	476 (4.5)	52 (1.1)	546 (3.5)	48 (1.1)	516 (4.4)
Cyprus	82 (1.1)	512 (3.0)	18 (1.1)	471 (5.2)	35 (1.0)	511 (4.2)	65 (1.0)	502 (3.4)
Czech Republic	95 (0.5)	569 (3.3)	5 (0.5)	534 (6.9)	33 (1.3)	582 (4.6)	67 (1.3)	561 (3.2)
England	93 (0.6)	518 (3.3)	7 (0.6)	447 (6.2)	88 (0.9)	513 (3.5)	12 (0.9)	512 (5.4)
Greece	61 (1.1)	505 (3.8)	39 (1.1)	480 (5.0)	23 (1.1)	500 (4.5)	77 (1.1)	495 (4.3)
Hong Kong	92 (0.6)	589 (4.2)	8 (0.6)	558 (9.1)	37 (1.2)	594 (5.2)	63 (1.2)	583 (4.3)
Hungary	88 (0.9)	557 (3.6)	12 (0.9)	498 (6.4)	37 (1.4)	569 (5.5)	63 (1.4)	538 (3.4)
Iceland	84 (1.3)	485 (3.0)	16 (1.3)	432 (4.2)	81 (1.1)	478 (3.0)	19 (1.1)	464 (3.6)
Iran, Islamic Rep.	r 49 (1.7)	451 (5.3)	52 (1.7)	420 (3.9)	r 8 (0.8)	428 (7.4)	92 (0.8)	435 (4.2)
Ireland	86 (0.8)	557 (3.1)	14 (0.8)	512 (6.8)	79 (0.9)	553 (3.4)	21 (0.9)	542 (5.4)
Israel	r 43 (1.5)	543 (5.0)	57 (1.5)	527 (3.8)	r 70 (1.9)	540 (3.8)	30 (1.9)	521 (5.2)
Japan	- -	- -	- -	- -	- -	- -	- -	- -
Korea	87 (0.8)	613 (2.2)	13 (0.8)	593 (4.5)	23 (1.0)	628 (4.2)	77 (1.0)	606 (2.2)
Kuwait	75 (1.0)	404 (3.2)	25 (1.0)	393 (2.4)	66 (1.3)	405 (3.0)	34 (1.3)	395 (2.8)
Latvia (LSS)	78 (1.4)	529 (5.0)	22 (1.4)	515 (6.1)	21 (1.3)	517 (5.9)	79 (1.3)	528 (5.3)
Netherlands	93 (0.7)	582 (3.5)	7 (0.7)	545 (6.0)	80 (1.2)	585 (3.7)	20 (1.2)	560 (4.3)
New Zealand	90 (1.0)	508 (3.8)	10 (1.0)	428 (7.4)	53 (1.5)	517 (4.1)	47 (1.5)	479 (5.1)
Norway	76 (1.3)	510 (3.2)	24 (1.3)	480 (4.0)	56 (1.3)	511 (3.5)	44 (1.3)	492 (3.5)
Portugal	83 (1.2)	484 (3.1)	17 (1.2)	434 (6.4)	34 (1.7)	495 (4.0)	66 (1.7)	467 (4.2)
Scotland	90 (0.7)	528 (3.8)	10 (0.7)	467 (5.6)	89 (0.6)	523 (4.0)	11 (0.6)	511 (6.0)
Singapore	93 (0.4)	633 (5.3)	7 (0.4)	528 (6.6)	44 (1.3)	649 (6.1)	56 (1.3)	607 (4.8)
Slovenia	78 (1.7)	564 (3.2)	22 (1.7)	517 (4.7)	43 (1.3)	560 (4.0)	57 (1.3)	547 (3.4)
Thailand	43 (2.4)	506 (4.6)	57 (2.4)	476 (4.8)	3 (0.6)	488 (22.8)	97 (0.6)	489 (4.3)
United States	95 (0.5)	549 (2.9)	5 (0.5)	475 (6.5)	56 (1.6)	559 (3.1)	44 (1.6)	528 (3.3)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates data are not available.
An "r" indicates a 70-84% student response rate.

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

Table 5.14

Teachers' Reports on Frequency of Students' Use of Calculators in Mathematics Class[1] – Upper Grade (Fourth Grade*)

Country	Never or Hardly Ever		Once or Twice a Month		Once or Twice a Week		Almost Every Day	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
Australia	r 11 (2.6)	547 (8.9)	33 (3.6)	535 (7.0)	43 (3.9)	557 (4.8)	13 (2.5)	536 (10.3)
Austria	98 (1.7)	560 (3.5)	1 (1.1)	~ ~	1 (1.4)	~ ~	0 (0.0)	~ ~
Canada	37 (3.4)	534 (4.2)	35 (3.0)	527 (6.0)	25 (4.2)	539 (9.1)	4 (1.1)	536 (11.9)
Cyprus	s 63 (6.1)	506 (5.5)	11 (4.2)	502 (13.0)	15 (4.2)	524 (9.9)	11 (4.2)	489 (22.5)
Czech Republic	54 (4.3)	570 (5.0)	25 (3.8)	566 (6.1)	17 (3.4)	562 (8.2)	4 (1.7)	559 (7.5)
England	8 (2.3)	511 (11.2)	39 (4.6)	520 (7.3)	42 (5.2)	513 (5.4)	11 (3.1)	508 (15.0)
Greece	94 (2.1)	497 (3.5)	2 (1.1)	~ ~	3 (1.4)	521 (35.6)	2 (1.1)	~ ~
Hong Kong	95 (2.2)	589 (4.2)	1 (1.0)	~ ~	2 (1.3)	~ ~	1 (1.4)	~ ~
Hungary	s 78 (5.3)	552 (5.5)	9 (3.3)	546 (16.6)	2 (1.3)	~ ~	12 (4.1)	562 (14.8)
Iceland	65 (5.7)	472 (3.5)	17 (4.3)	482 (6.9)	16 (4.6)	480 (6.6)	2 (1.5)	~ ~
Iran, Islamic Rep.	76 (4.2)	426 (4.7)	14 (3.6)	443 (12.9)	7 (2.7)	429 (8.1)	3 (1.5)	418 (20.0)
Ireland	88 (2.8)	552 (3.8)	5 (1.8)	549 (20.4)	4 (1.7)	552 (21.0)	3 (1.3)	508 (9.5)
Israel	x x	x x	x x	x x	x x	x x	x x	x x
Japan	94 (2.0)	597 (2.2)	5 (2.0)	590 (6.6)	1 (0.6)	~ ~	0 (0.0)	~ ~
Korea	86 (3.1)	611 (2.3)	8 (2.6)	608 (6.5)	4 (1.6)	613 (20.5)	2 (1.2)	~ ~
Kuwait	r 75 (3.7)	405 (3.4)	8 (2.8)	400 (14.7)	13 (3.3)	378 (11.7)	4 (2.2)	385 (3.9)
Latvia (LSS)	r 91 (3.1)	525 (5.9)	6 (2.6)	548 (36.0)	2 (1.5)	~ ~	1 (0.8)	~ ~
Netherlands	85 (3.1)	576 (4.0)	11 (2.8)	594 (7.3)	2 (1.2)	~ ~	2 (1.4)	~ ~
New Zealand	5 (1.9)	466 (24.0)	22 (3.1)	502 (9.3)	42 (4.1)	504 (5.9)	30 (4.1)	500 (8.9)
Norway	93 (2.6)	502 (3.3)	7 (2.5)	494 (11.4)	1 (0.8)	~ ~	0 (0.0)	~ ~
Portugal	58 (4.3)	474 (4.7)	13 (2.8)	473 (13.1)	7 (2.3)	497 (14.5)	22 (3.8)	473 (9.7)
Scotland	- -	- -	- -	- -	- -	- -	- -	- -
Singapore	97 (1.3)	626 (5.5)	2 (1.1)	~ ~	1 (0.9)	~ ~	0 (0.0)	~ ~
Slovenia	88 (3.2)	549 (3.7)	8 (2.7)	560 (12.5)	4 (2.0)	547 (27.0)	1 (0.8)	~ ~
Thailand	r 93 (3.3)	492 (5.9)	0 (0.0)	~ ~	3 (1.2)	483 (20.3)	4 (3.1)	457 (41.8)
United States	r 29 (4.4)	539 (7.2)	32 (3.1)	541 (5.1)	28 (3.5)	553 (5.5)	11 (2.3)	575 (7.8)

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

[1] Based on most frequent response for: checking answers, tests and exams, routine computations, solving complex problems, and exploring number concepts.

Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).

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

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

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

An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students. An "x" indicates teacher response data available for <50% students.

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

Table 5.15

Teachers' Reports on Ways in Which Calculators Are Used at Least Once or Twice a Week - Mathematics - Upper Grade (Fourth Grade*)

Country	Percent of Students by Type of Use					
	Never or Hardly Ever Use Calculators	Checking Answers	Tests and Exams	Routine Computations	Solving Complex Problems	Exploring Number Concepts
Australia	r 11 (2.6)	r 45 (3.4)	r 2 (1.1)	r 29 (3.6)	r 35 (3.5)	r 33 (4.0)
Austria	98 (1.7)	1 (1.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Canada	37 (3.4)	16 (3.3)	1 (0.4)	15 (3.5)	23 (4.0)	14 (2.4)
Cyprus	s 63 (6.1)	s 18 (5.0)	s 1 (0.5)	s 16 (4.8)	s 13 (4.6)	s 7 (3.1)
Czech Republic	54 (4.3)	18 (3.3)	2 (1.1)	4 (1.6)	8 (2.4)	3 (1.6)
England	8 (2.3)	36 (4.2)	r 4 (2.1)	33 (4.7)	28 (4.2)	24 (3.9)
Greece	94 (2.1)	3 (1.5)	r 1 (0.7)	r 2 (1.1)	r 2 (1.2)	2 (1.1)
Hong Kong	95 (2.2)	4 (2.0)	0 (0.0)	2 (1.7)	2 (1.7)	1 (1.4)
Hungary	s 78 (5.3)	s 13 (4.3)	x x	s 8 (3.9)	s 5 (3.2)	s 8 (3.7)
Iceland	65 (5.7)	12 (4.3)	0 (0.0)	5 (2.4)	4 (2.1)	6 (2.9)
Iran, Islamic Rep.	76 (4.2)	1 (0.4)	4 (2.2)	5 (2.0)	5 (2.3)	5 (2.3)
Ireland	88 (2.8)	6 (2.1)	0 (0.0)	3 (1.4)	3 (1.1)	3 (1.4)
Israel	x x	x x	x x	x x	x x	x x
Japan	94 (2.0)	1 (0.6)	1 (0.6)	1 (0.6)	1 (0.6)	0 (0.0)
Korea	86 (3.1)	1 (0.9)	1 (0.9)	6 (2.0)	3 (1.5)	1 (0.9)
Kuwait	r 75 (3.7)	r 7 (2.4)	r 0 (0.0)	r 9 (3.1)	r 7 (2.7)	r 6 (2.4)
Latvia (LSS)	r 91 (3.1)	r 2 (1.4)	r 1 (1.2)	r 1 (1.2)	r 3 (1.7)	r 2 (1.4)
Netherlands	85 (3.1)	2 (1.3)	0 (0.0)	2 (1.3)	2 (1.3)	1 (0.9)
New Zealand	5 (1.9)	61 (3.5)	7 (2.6)	50 (4.1)	50 (4.0)	49 (3.9)
Norway	93 (2.6)	1 (0.8)	0 (0.0)	1 (0.8)	1 (0.8)	1 (0.8)
Portugal	58 (4.3)	27 (3.9)	2 (1.1)	17 (3.2)	11 (2.9)	10 (2.8)
Scotland	- -	- -	- -	- -	- -	- -
Singapore	97 (1.3)	0 (0.0)	0 (0.0)	0 (0.5)	1 (0.9)	0 (0.0)
Slovenia	88 (3.2)	4 (2.0)	0 (0.0)	2 (1.1)	0 (0.0)	0 (0.0)
Thailand	r 93 (3.3)	r 5 (3.2)	r 2 (1.1)	r 5 (3.1)	r 4 (3.1)	r 5 (3.2)
United States	r 29 (4.4)	r 25 (3.5)	r 2 (0.6)	r 24 (3.8)	r 26 (4.6)	r 21 (3.3)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates data are not available.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.
An "x" indicates teacher response data available for <50% students.

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

Table 5.16

Students' Reports on Frequency of Using Calculators in Mathematics Class Upper Grade (Fourth Grade*)

Country	Never		Some Lessons		Most Lessons	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
Australia	25 (2.6)	545 (4.1)	67 (2.4)	556 (3.9)	8 (0.6)	512 (4.6)
Austria	96 (0.6)	563 (3.1)	2 (0.5)	~ ~	1 (0.3)	~ ~
Canada	51 (3.1)	532 (3.7)	43 (3.0)	546 (4.9)	6 (0.8)	493 (7.4)
Cyprus	86 (1.6)	514 (2.9)	9 (1.4)	478 (8.3)	4 (0.4)	431 (8.5)
Czech Republic	63 (3.3)	571 (4.2)	32 (3.1)	568 (4.0)	4 (0.8)	529 (10.0)
England	15 (1.8)	510 (7.0)	74 (1.8)	524 (3.9)	11 (1.1)	474 (6.2)
Greece	91 (0.9)	504 (3.3)	6 (0.6)	449 (11.1)	4 (0.6)	425 (15.2)
Hong Kong	95 (0.7)	593 (4.0)	3 (0.5)	492 (7.5)	2 (0.3)	~ ~
Hungary	90 (1.3)	553 (3.6)	7 (1.2)	549 (13.4)	3 (0.5)	476 (11.1)
Iceland	76 (3.2)	480 (2.5)	21 (3.0)	478 (7.4)	3 (0.6)	430 (7.4)
Iran, Islamic Rep.	r 64 (2.2)	450 (5.3)	15 (1.3)	415 (5.2)	21 (1.6)	413 (4.4)
Ireland	91 (1.0)	557 (3.4)	6 (0.8)	516 (10.5)	3 (0.3)	480 (12.0)
Israel	r 24 (2.6)	522 (5.1)	60 (2.3)	541 (4.2)	16 (1.5)	525 (6.8)
Japan	89 (0.9)	602 (2.0)	11 (0.9)	561 (4.2)	1 (0.1)	~ ~
Korea	93 (0.5)	616 (2.0)	5 (0.4)	579 (7.2)	2 (0.3)	~ ~
Kuwait	73 (1.4)	412 (2.3)	12 (0.8)	383 (4.4)	15 (1.0)	374 (4.1)
Latvia (LSS)	83 (1.8)	533 (5.3)	13 (1.5)	513 (9.0)	4 (0.6)	469 (9.3)
Netherlands	90 (2.1)	579 (3.5)	10 (2.1)	592 (8.1)	0 (0.2)	~ ~
New Zealand	18 (2.0)	495 (6.4)	61 (1.8)	512 (4.2)	21 (1.3)	475 (8.0)
Norway	89 (1.5)	510 (2.8)	8 (1.3)	498 (8.3)	3 (0.5)	429 (12.6)
Portugal	73 (3.1)	482 (3.0)	20 (2.5)	487 (9.3)	8 (1.0)	440 (8.3)
Scotland	5 (0.6)	489 (7.6)	82 (1.3)	533 (3.7)	13 (1.1)	469 (5.9)
Singapore	96 (0.4)	634 (5.2)	3 (0.3)	511 (9.0)	1 (0.2)	~ ~
Slovenia	92 (0.9)	559 (3.2)	6 (0.9)	497 (9.0)	2 (0.3)	~ ~
Thailand	82 (1.5)	498 (4.4)	13 (1.1)	458 (5.5)	5 (0.7)	428 (6.9)
United States	34 (3.7)	534 (4.9)	53 (3.2)	565 (3.4)	13 (1.1)	507 (6.5)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates a 70-84% student response rate.

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

Table 5.17

Teachers' Reports on Frequency of Using Computers in Mathematics Class to Solve Exercises or Problems - Upper Grade (Fourth Grade*)

Country		Never or Almost Never		Some Lessons		Most or Every Lesson	
		Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
Australia	r	66 (4.5)	548 (5.3)	33 (4.6)	542 (7.2)	1 (0.8)	~ ~
Austria		98 (1.6)	560 (3.5)	2 (1.6)	~ ~	0 (0.0)	~ ~
Canada		58 (4.0)	540 (4.5)	40 (4.0)	522 (6.3)	2 (1.2)	~ ~
Cyprus	s	86 (5.1)	508 (4.2)	14 (5.1)	494 (21.8)	1 (0.6)	~ ~
Czech Republic		97 (1.7)	568 (3.3)	3 (1.7)	561 (20.7)	0 (0.0)	~ ~
England		- -	- -	- -	- -	- -	- -
Greece		99 (1.4)	495 (4.1)	1 (1.4)	~ ~	0 (0.0)	~ ~
Hong Kong		99 (0.8)	589 (4.3)	1 (0.8)	~ ~	0 (0.0)	~ ~
Hungary		- -	- -	- -	- -	- -	- -
Iceland		- -	- -	- -	- -	- -	- -
Iran, Islamic Rep.		99 (1.1)	428 (4.1)	0 (0.5)	~ ~	1 (1.0)	~ ~
Ireland		90 (3.2)	549 (3.7)	10 (3.2)	570 (10.8)	0 (0.0)	~ ~
Israel		- -	- -	- -	- -	- -	- -
Japan		93 (2.3)	598 (2.1)	5 (2.0)	590 (7.8)	2 (1.2)	~ ~
Korea		96 (1.7)	610 (2.2)	4 (1.5)	616 (8.2)	1 (0.6)	~ ~
Kuwait	r	98 (1.3)	401 (3.4)	2 (1.3)	~ ~	0 (0.0)	~ ~
Latvia (LSS)		95 (2.0)	522 (5.0)	3 (1.5)	534 (10.5)	2 (1.3)	~ ~
Netherlands		65 (5.0)	581 (4.9)	33 (4.7)	570 (4.9)	2 (1.3)	~ ~
New Zealand		69 (3.8)	499 (4.6)	30 (3.7)	512 (10.1)	1 (0.8)	~ ~
Norway		80 (3.7)	502 (3.6)	20 (3.7)	499 (6.4)	1 (0.7)	~ ~
Portugal		98 (1.2)	475 (3.7)	2 (1.2)	~ ~	0 (0.0)	~ ~
Scotland		- -	- -	- -	- -	- -	- -
Singapore		66 (4.2)	627 (5.7)	33 (4.2)	621 (9.8)	1 (0.7)	~ ~
Slovenia		92 (2.8)	549 (3.5)	6 (2.5)	565 (22.8)	2 (1.3)	~ ~
Thailand	r	96 (2.6)	491 (5.3)	1 (0.7)	~ ~	3 (2.5)	547 (61.2)
United States	r	60 (4.1)	546 (4.7)	37 (4.2)	551 (4.2)	3 (1.0)	532 (12.2)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates data are not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.

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

Table 5.18

Students' Reports on Frequency of Using Computers in Mathematics Class Upper Grade (Fourth Grade*)

Country	Never		Some Lessons		Most Lessons	
	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement	Percent of Students	Mean Achievement
Australia	56 (2.1)	564 (2.9)	37 (1.9)	538 (4.8)	7 (0.8)	502 (11.9)
Austria	97 (0.6)	562 (3.2)	3 (0.6)	514 (18.6)	1 (0.2)	~ ~
Canada	62 (2.3)	546 (4.0)	30 (2.0)	528 (4.7)	8 (0.8)	474 (7.6)
Cyprus	87 (1.7)	513 (2.9)	8 (1.6)	483 (11.2)	5 (0.5)	439 (7.3)
Czech Republic	93 (1.4)	570 (3.3)	6 (1.3)	561 (12.1)	1 (0.2)	~ ~
England	40 (2.3)	531 (5.5)	51 (2.1)	516 (3.8)	9 (0.9)	457 (5.3)
Greece	91 (0.9)	505 (3.3)	5 (0.5)	453 (8.5)	4 (0.5)	401 (10.9)
Hong Kong	95 (0.9)	593 (4.1)	3 (0.7)	516 (25.0)	2 (0.3)	~ ~
Hungary	92 (0.8)	554 (3.6)	6 (0.6)	523 (10.9)	3 (0.4)	469 (9.2)
Iceland	80 (2.1)	481 (2.9)	17 (2.0)	472 (5.3)	3 (0.5)	421 (6.8)
Iran, Islamic Rep.	r 74 (1.8)	446 (5.1)	11 (1.0)	409 (5.3)	14 (1.3)	412 (4.1)
Ireland	83 (2.4)	559 (3.3)	12 (2.0)	536 (8.8)	4 (0.8)	484 (13.6)
Israel	r 41 (3.4)	542 (5.1)	38 (2.6)	536 (4.7)	21 (2.0)	514 (5.8)
Japan	90 (1.7)	601 (2.1)	10 (1.8)	572 (7.5)	1 (0.1)	~ ~
Korea	92 (0.9)	615 (2.1)	6 (0.8)	589 (6.4)	2 (0.4)	~ ~
Kuwait	74 (1.6)	412 (2.4)	11 (0.9)	381 (3.9)	15 (1.1)	375 (3.8)
Latvia (LSS)	93 (0.8)	532 (5.1)	4 (0.6)	498 (7.8)	3 (0.5)	443 (8.0)
Netherlands	51 (3.7)	581 (4.7)	45 (3.5)	581 (3.6)	4 (0.9)	555 (10.6)
New Zealand	61 (2.2)	516 (4.3)	29 (1.9)	496 (6.2)	11 (1.0)	432 (7.5)
Norway	71 (3.1)	511 (3.2)	25 (2.8)	505 (4.6)	4 (0.8)	467 (16.5)
Portugal	92 (0.9)	484 (3.1)	5 (0.8)	455 (11.2)	3 (0.4)	392 (10.7)
Scotland	33 (1.8)	544 (4.7)	58 (1.9)	522 (4.4)	9 (1.2)	458 (6.1)
Singapore	60 (3.3)	636 (6.0)	35 (3.0)	621 (7.5)	4 (0.6)	559 (23.5)
Slovenia	93 (0.9)	558 (3.2)	5 (0.8)	503 (9.5)	2 (0.3)	~ ~
Thailand	88 (1.3)	495 (4.2)	8 (0.9)	450 (7.9)	4 (0.5)	435 (7.0)
United States	59 (2.5)	555 (2.9)	28 (2.0)	552 (6.1)	13 (1.1)	501 (6.7)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates a 70-84% student response rate.

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

What Homework Are Students Assigned?

Although teachers often give students time to begin or review homework assignments in class, homework is generally considered a method of extending the time spent on regular classroom lessons. Table 5.19 presents teachers' reports about how often they assigned homework and the typical lengths of such assignments. Internationally, most fourth-grade students were assigned homework at least once or twice a week, if not three times a week or more often. The pattern for the Netherlands differed substantially from other countries, with teachers reporting that 86% of the students were assigned homework less than once a week, and of those, half were never assigned homework. Typically, for the majority of students the assignments were 30 minutes or less in length. Homework assignments were more than 30 minutes for about one-third of students or more in Hong Kong, Iran, Korea, Singapore, and Thailand.

Homework generally has its biggest impact when it is commented on and graded by teachers. Table 5.20 presents teachers' reports about their use of students' written mathematics homework. In all participating countries, for at least 70% of the students, teachers reported at least sometimes, if not always, correcting homework assignments and returning those assignments to students.

Many teachers do not count mathematics homework directly in determining grades, but use it more as a method to monitor students' understanding and to correct misconceptions. In general, for the TIMSS countries, teachers reported that mathematics homework assignments contributed only rarely or sometimes to students' grades or marks. In some countries, homework had even less impact on grades. According to their teachers, homework never or only rarely contributed to the grades for the majority of the students in the Czech Republic, Hong Kong, Japan, and Singapore.

Table 5.19

Teachers' Reports About the Amount of Mathematics Homework Assigned Upper Grade (Fourth Grade*)

Country		Percent of Students Taught by Teachers						
		Never Assigning Homework	Assigning Homework Less Than Once a Week		Assigning Homework Once or Twice a Week		Assigning Homework Three Times a Week or More Often	
			30 Minutes or Less	More Than 30 Minutes	30 Minutes or Less	More Than 30 Minutes	30 Minutes or Less	More Than 30 Minutes
Australia	r	4 (1.5)	13 (2.8)	2 (1.6)	50 (4.0)	5 (1.9)	25 (3.9)	2 (0.9)
Austria		1 (1.4)	0 (0.0)	0 (0.0)	19 (3.3)	0 (0.0)	67 (4.5)	13 (3.4)
Canada		14 (2.1)	9 (2.4)	0 (0.4)	45 (3.7)	0 (0.3)	29 (3.9)	1 (0.6)
Cyprus		0 (0.0)	0 (0.0)	0 (0.0)	2 (1.4)	0 (0.0)	83 (5.0)	16 (4.8)
Czech Republic		0 (0.0)	6 (1.9)	0 (0.0)	66 (3.6)	0 (0.0)	29 (3.6)	0 (0.0)
England		- -	- -	- -	- -	- -	- -	- -
Greece		0 (0.0)	2 (1.0)	0 (0.0)	22 (3.3)	5 (2.2)	61 (4.1)	10 (2.7)
Hong Kong		0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	63 (5.3)	37 (5.3)
Hungary		0 (0.0)	1 (0.8)	0 (0.0)	1 (0.9)	1 (0.5)	93 (2.5)	4 (2.1)
Iceland		0 (0.0)	3 (1.6)	0 (0.0)	42 (7.2)	10 (3.6)	45 (6.6)	1 (0.1)
Iran, Islamic Rep.		0 (0.0)	2 (1.0)	0 (0.1)	11 (2.8)	6 (2.1)	51 (4.3)	30 (4.1)
Ireland		0 (0.0)	0 (0.3)	0 (0.0)	6 (1.9)	0 (0.3)	91 (2.4)	2 (1.3)
Israel		x x	x x	x x	x x	x x	x x	x x
Japan		1 (0.8)	9 (2.6)	0 (0.0)	25 (3.8)	0 (0.0)	57 (4.4)	7 (2.3)
Korea		0 (0.0)	1 (0.7)	2 (1.6)	13 (2.8)	6 (1.7)	42 (3.9)	36 (3.8)
Kuwait	r	1 (0.7)	5 (2.2)	0 (0.0)	46 (4.3)	3 (1.9)	43 (4.3)	3 (1.7)
Latvia (LSS)		0 (0.0)	0 (0.0)	0 (0.0)	1 (1.4)	0 (0.0)	96 (2.1)	3 (1.6)
Netherlands		50 (4.8)	36 (4.8)	0 (0.0)	12 (3.3)	3 (1.8)	0 (0.0)	0 (0.0)
New Zealand		4 (1.2)	32 (4.4)	0 (0.0)	43 (4.5)	3 (1.5)	18 (3.4)	0 (0.0)
Norway		0 (0.0)	0 (0.0)	0 (0.0)	21 (4.2)	2 (1.4)	71 (4.8)	5 (2.2)
Portugal		0 (0.0)	1 (0.7)	0 (0.0)	12 (3.1)	0 (0.0)	70 (3.5)	17 (3.7)
Scotland		11 (2.9)	29 (4.6)	0 (0.4)	44 (4.7)	0 (0.0)	15 (3.6)	0 (0.0)
Singapore		0 (0.0)	1 (0.8)	1 (0.9)	5 (1.6)	7 (2.0)	39 (4.0)	47 (4.1)
Slovenia		0 (0.0)	0 (0.0)	0 (0.0)	4 (2.3)	0 (0.0)	88 (3.2)	7 (2.1)
Thailand		0 (0.0)	0 (0.0)	0 (0.0)	3 (1.1)	6 (2.2)	20 (4.4)	72 (4.8)
United States	r	3 (1.7)	3 (1.8)	0 (0.0)	20 (3.7)	2 (0.8)	66 (4.2)	5 (1.1)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates data are not available.
An "r" indicates teacher response data available for 70-84% of students.
An "x" indicates teacher response data available for <50% students.

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

Table 5.20

Teachers' Reports on Their Use of Students' Written Mathematics Homework[1] Upper Grade (Fourth Grade*)

Country	Percent of Students Taught by Teachers							
	Collecting, Correcting, and Then Returning Assignments to Students				Using Homework to Contribute Towards Students' Grades or Marks			
	Never	Rarely	Sometimes	Always	Never	Rarely	Sometimes	Always
Australia	r 1 (0.6)	9 (2.8)	32 (3.8)	58 (4.5)	r 30 (4.3)	29 (4.9)	33 (4.4)	8 (2.4)
Austria	2 (1.2)	6 (2.4)	33 (4.7)	59 (4.8)	36 (5.0)	52 (5.4)	10 (2.9)	1 (0.8)
Canada	3 (1.7)	7 (2.3)	45 (4.1)	44 (4.3)	23 (3.0)	16 (3.0)	45 (4.3)	16 (2.9)
Cyprus	s 1 (1.0)	9 (3.5)	49 (6.6)	40 (5.9)	s 28 (5.6)	21 (5.7)	37 (5.7)	14 (4.4)
Czech Republic	3 (1.4)	3 (1.2)	30 (3.8)	65 (4.1)	55 (4.4)	26 (3.7)	14 (3.0)	5 (1.9)
England	- -	- -	- -	- -	- -	- -	- -	- -
Greece	r 5 (2.0)	6 (2.4)	16 (3.0)	73 (3.6)	26 (3.3)	26 (3.6)	31 (3.6)	16 (3.0)
Hong Kong	1 (0.7)	1 (0.7)	7 (2.9)	91 (3.0)	61 (5.3)	25 (5.0)	11 (4.3)	2 (1.2)
Hungary	r 5 (2.1)	17 (3.7)	52 (5.1)	26 (4.4)	r 19 (3.5)	36 (4.8)	28 (4.2)	17 (3.2)
Iceland	1 (1.2)	5 (3.0)	24 (4.9)	70 (5.8)	46 (5.1)	13 (4.1)	32 (4.3)	9 (2.0)
Iran, Islamic Rep.	3 (2.0)	5 (2.2)	24 (4.3)	68 (4.3)	13 (3.1)	20 (3.9)	51 (4.9)	16 (3.5)
Ireland	3 (1.4)	4 (1.5)	29 (4.3)	65 (4.8)	39 (4.2)	24 (4.0)	30 (4.5)	7 (2.3)
Israel	x x	x x	x x	x x	x x	x x	x x	x x
Japan	12 (2.6)	17 (3.1)	20 (3.6)	51 (4.4)	71 (4.1)	19 (3.1)	8 (2.6)	2 (1.4)
Korea	1 (1.0)	6 (1.9)	54 (4.3)	39 (4.1)	7 (2.1)	24 (3.3)	59 (3.8)	10 (2.6)
Kuwait	r 0 (0.0)	4 (1.8)	20 (4.6)	76 (4.9)	r 2 (1.1)	14 (3.7)	51 (4.9)	33 (4.5)
Latvia (LSS)	2 (1.4)	4 (1.8)	17 (3.6)	77 (4.2)	30 (3.6)	24 (3.8)	26 (4.1)	20 (3.8)
Netherlands	r 10 (3.6)	1 (0.8)	22 (5.6)	67 (6.6)	r 35 (6.1)	13 (3.9)	43 (6.1)	9 (3.8)
New Zealand	13 (3.0)	11 (2.8)	33 (4.2)	43 (4.6)	49 (4.5)	27 (4.3)	22 (4.1)	2 (1.4)
Norway	2 (1.3)	2 (1.3)	32 (4.5)	64 (4.5)	9 (3.0)	19 (4.1)	61 (5.3)	10 (3.0)
Portugal	3 (1.6)	6 (2.2)	31 (4.4)	59 (4.9)	41 (4.8)	31 (4.7)	22 (3.5)	6 (1.8)
Scotland	- -	- -	- -	- -	- -	- -	- -	- -
Singapore	0 (0.0)	0 (0.0)	12 (2.3)	88 (2.3)	50 (3.9)	24 (3.4)	23 (3.4)	3 (1.2)
Slovenia	1 (1.0)	6 (2.4)	53 (5.2)	40 (4.6)	44 (4.6)	34 (4.5)	20 (4.2)	1 (1.3)
Thailand	r 1 (0.6)	0 (0.0)	5 (2.2)	94 (2.2)	r 22 (4.8)	9 (4.1)	48 (6.8)	21 (4.5)
United States	r 3 (0.9)	7 (1.7)	42 (3.7)	48 (4.1)	r 10 (2.3)	13 (1.8)	52 (3.7)	24 (2.8)

*Fourth grade in most countries; see Table 2 for more information about the grades tested in each country.
[1]Based on those teachers who assign homework.
Countries shown in italics did not satisfy one or more guidelines for sample participation rates, age/grade specifications, or classroom sampling procedures (see Figure A.3).
Because population coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates data are not available.
An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.
An "x" indicates teacher response data available for <50% students.

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