CHAPTER 6

Teachers and Instruction

Chapter 6 presents information about mathematics teachers and instruction. Teachers' reports are given on their educational background, teaching preparation, and instructional practices. Information is also provided about how teachers spend their time related to teaching tasks, the materials used in instruction, the activities students do in class, the use of calculators and computers in mathematics lessons, the role of homework, and the reliance on different types of assessment.

Teachers and the instructional approaches they use determine the mathematics students learn. They structure the content and pace of lessons, introducing new material, selecting various instructional activities, and monitoring students' developing understanding of the concepts 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 may also assign homework and conduct formal and informal assessments to evaluate achievement. Chapter 6 presents mathematics teachers' reports on some of these issues.

Because the sampling for the teacher questionnaires was based on participating students, teachers' responses do not necessarily represent all eighth-grade mathematics teachers in each participating entity. Rather, they represent teachers of the representative samples of students assessed. It is important to note that when information from the teacher questionnaire is reported, the student is always the unit of analysis. That is, the data shown are the percentages of *students* whose teachers reported on various characteristics or instructional strategies. Using the student as the unit of analysis makes it possible to describe the mathematics instruction received by representative samples of students. Although this perspective may differ from that obtained by simply collecting information from teachers, it is consistent with the TIMSS goals of examining the educational contexts and performance of students.

The teachers who completed the questionnaires were the mathematics teachers of the students who took the TIMSS 1999 test. The general sampling procedure was to sample a mathematics class from each participating school, administer the test to those students, and ask their teacher to complete the questionnaire. Thus, the information about instruction is tied directly to the students tested. Sometimes, however, teachers did not complete the questionnaire assigned to them, so most entities had some percentage of students for whom no teacher questionnaire information is available. The exhibits in this chapter have special notations on this point. For a TIMSS 1999 participating entity (country, state, district, or consortium) where teacher responses are available for 70 to 84 percent of the students, an "r" is included next to the data. Where teacher responses are available for 50 to 69 percent of students, an "s" is included; where they are available for less than 50 percent, an "x" replaces the data.

What Preparation Do Teachers Have for Teaching Mathematics?

This section presents information about background characteristics of

Exhibit 6.2 presents teachers' reports about their major areas of study during their post-secondary teacher preparation programs. Teachers'

inequalities). There were three possible responses: very well prepared was assigned a value of three, somewhat prepared two, and not well prepared one. Students were assigned to the high level of the index if their teachers reported feeling very well prepared, on average, across the 12 topics (2.75 or higher). The medium level indicates that teachers reported being somewhat to well prepared (averages from 2.25 to 2.75), and the low level that they felt only somewhat prepared or less (averages less than 2.25).

The results show that average mathematics achievement is related to how well prepared teachers felt they were to teach mathematics, with higher achievement related to higher levels of teachers' confidence. On average internationally, teachers reported relatively high degrees of confidence, with 63 percent of students taught by teachers who believed they were very well prepared. Interestingly, for the United States as a whole and most Benchmarking entities, more students were taught mathematics by teachers confident about their preparation than in almost all the comparison countries. Interpreting these results should take several factors into account. For example, cultural issues may dictate that teachers in the high-scoring Asian countries are more reserved about reporting their strengths and abilities. Also, when the mathematics curriculum is more challenging, teachers may feel less confident in their academic and pedagogical preparation. Nevertheless, it appears that in relation to both high- and low-performing countries around the world, teachers in many Benchmarking entities and in the United States overall may be overconfident about their preparation to teach eighth-grade mathematics.

Exhibit R3.1 in the reference section provides the detail for the 12 topics comprising the confidence in preparation index. On average across countries, the topics having the most students (from 79 to 82 percent) taught by teachers who felt very well prepared were "fractions, decimals, and percentages;" "ratios and proportions;" "perimeter, area, and volume;" "evaluate and perform operations on algebraic expressions;" and "solving linear equations and inequalities." Teachers reported being least well prepared to teach "simple probabilities – understanding and calculations;" just more than half the students internationally (55 percent on average) were taught by teachers who felt very well prepared to teach this topic.

For the Benchmarking jurisdictions, almost all students had teachers confident in their preparation to teach the two number topics that were included in the TIMSS questionnaire: "fractions, decimals, and percentages;" and "ratios and proportions." Similarly, in algebra 90 percent or more of students in most Benchmarking entities were taught

Teachers' beliefs about mathematics learning and instruction are to some degree related to their preparation. Exhibits R3.3 and R3.4 in the reference section show the percentages of eighth-grade students whose mathematics teachers reported certain beliefs about mathematics, the way mathematics should be taught, and the importance of various cognitive skills in achieving success in the discipline. In general, more students in the Benchmarking entities than internationally were taught by teachers agreeing that mathematics is primarily a formal way of representing the real world. Conversely, more students internationally than in the Benchmarking entities had teachers who agreed that some students have a natural talent for mathematics, and that an effective teaching approach is to give students having difficulty more practice by themselves during class. There was nearly complete agreement by teachers throughout the Benchmarking jurisdictions and around the world that more than one representation should be used in teaching a mathematics topic. Views varied substantially, for both the countries and the Benchmarking entities, regarding the importance of being able to remember formulas and procedures. Less than one-quarter of the students in the Delaware Science Coalition (similar to Chinese Taipei and Korea) were taught by teachers who believed remembering formulas and procedures was very important for students' success in mathematics. In contrast, more than half the students in Idaho, South Carolina, Guilford County, Jersey City, and Rochester (similar to the Russian Federation) had teachers who believed this to be the case.

How teachers spend their time in school is determined mainly by school and district policies and practices, but the perspectives they gain during their teacher preparation can also have an effect. Across countries, students' mathematics teachers spent only about 60 percent of their formally scheduled school time teaching mathematics (see Exhibit R3.5 in the reference section). Additionally, about 10 percent was spent teaching subjects other than mathematics, about 10 percent on curriculum planning, and about 20 percent on various administrative and other duties. The results for the United States as a whole and for most of the Benchmarking entities were very similar to the international profile.

	Percentage of Students by Age of Teachers				Percentage of Students by Gender of Teachers	
	29 Years or Under	30-39 Years	40-49 Years	50 Years or Older	Female	Male
Countries						
United States	11 (2.0)	25 (3.5)	37 (3.9)	27 (2.9)	60 (3.0)	40 (3.0)
Belgium (Flemish)	20 (2.7)	15 (2.4)	38 (3.0)	27 (3.1)	66 (4.8)	34 (4.8)
Canada	17 (2.4)	33 (2.7)	25 (3.1)	26 (3.0)	53 (3.0)	47 (3.0)
Chinese Taipei	10 (2.6)	34 (4.0)	30 (4.0)	26 (3.4)	51 (4.1)	49 (4.1)
Czech Republic	7 (2.5)	29 (4.8)	22 (5.0)	43 (5.6)	73 (4.0)	27 (4.0)
England	s 20 (2.9)	23 (3.5)	35 (3.6)	22 (2.7)	s 48 (3.8)	52 (3.8)
Hong Kong, SAR	32 (4.2)	38 (4.5)	19 (3.3)	11 (2.6)	44 (4.1)	56 (4.1)
Italy	0 (0.0)	8 (2.0)	58 (4.1)	34 (3.8)	76 (3.1)	24 (3.1)
Japan	21 (3.3)	39 (4.3)	33 (3.7)	7 (2.1)	27 (3.6)	73 (3.6)
Korea, Rep. of	19 (3.0)	53 (3.7)	15 (2.5)	13 (2.8)	59 (3.4)	41 (3.4)
Netherlands	r 15 (4.3)	17 (3.9)	41 (5.4)	26 (5.3)	28 (5.0)	72 (5.0)
Russian Federation	8 (2.0)	32 (3.7)	29 (2.9)	31 (4.0)	93 (2.6)	7 (2.6)
Singapore	37 (4.4)	25 (4.0)	15 (3.2)	23 (3.6)	75 (4.1)	25 (4.1)
States						
Connecticut	r 17 (5.9)	18 (4.1)	35 (7.4)	30 (7.6)	r 77 (6.7)	23 (6.7)
Idaho	r 7 (3.0)	28 (6.6)	43 (7.4)	22 (6.3)	r 56 (6.1)	44 (6.1)
Illinois	22 (5.7)	17 (3.8)	31 (5.9)	30 (7.1)	75 (4.7)	25 (4.7)
Indiana	26 (7.5)	18 (4.2)	26 (6.3)	30 (6.2)	57 (6.9)	43 (6.9)
Maryland	r 24 (5.0)	19 (4.1)	32 (5.7)	26 (6.0)	r 69 (4.8)	31 (4.8)
Massachusetts	17 (5.2)	18 (3.8)	27 (4.6)	38 (5.1)	57 (5.7)	43 (5.7)
Michigan	19 (3.7)	33 (5.7)	29 (5.2)	19 (4.6)	60 (5.7)	40 (5.7)
Missouri	11 (4.0)	40 (5.9)	29 (6.4)	20 (4.4)	66 (6.7)	34 (6.7)
North Carolina	29 (5.6)	23 (5.9)	35 (6.6)	13 (4.4)	75 (4.2)	25 (4.2)
Oregon	19 (3.2)	16 (4.3)	36 (6.7)	29 (6.6)	57 (5.0)	43 (5.0)
Pennsylvania	25 (6.9)	19 (4.4)	32 (5.6)	24 (5.7)	54 (5.4)	46 (5.4)
South Carolina	23 (5.7)	32 (4.8)	19 (3.5)	27 (5.7)	85 (5.1)	15 (5.1)
Texas	17 (5.0)	25 (4.3)	38 (6.1)	21 (4.1)	67 (5.6)	33 (5.6)
Districts and Consortia						
Academy School Dist. #20, CO	0 (0.0)	18 (0.3)	48 (0.4)	35 (0.3)	67 (0.4)	33 (0.4)
Chicago Public Schools, IL	9 (3.4)	25 (10.1)	39 (8.6)	27 (7.9)	70 (10.4)	30 (10.4)
Delaware Science Coalition, DE	r 22 (6.5)	27 (5.9)	26 (4.2)	26 (5.2)	r 57 (4.9)	43 (4.9)
First in the World Consort., IL	27 (6.8)	19 (8.4)	26 (9.3)	28 (5.6)	84 (4.7)	16 (4.7)
Fremont/Lincoln/WestSide PS, NE	28 (8.5)	39 (7.3)	7 (0.2)	25 (6.4)	78 (6.8)	22 (6.8)
Guilford County, NC	29 (6.7)	29 (4.8)	31 (3.6)	10 (4.5)	89 (3.5)	11 (3.5)
Jersey City Public Schools, NJ	0 (0.0)	23 (3.0)	37 (3.8)	40 (4.3)	57 (4.4)	43 (4.4)
Miami-Dade County PS, FL	s 14 (6.1)	21 (7.8)	32 (8.1)	34 (7.9)	s 68 (11.5)	32 (11.5)
Michigan Invitational Group, MI	25 (4.7)	12 (4.6)	32 (6.6)	32 (7.5)	49 (8.6)	51 (8.6)
Montgomery County, MD	s 25 (7.5)	11 (1.7)	29 (8.2)	35 (11.2)	s 84 (3.8)	16 (3.8)
Naperville Sch. Dist. #203, IL	22 (3.5)	18 (3.2)	30 (3.8)	30 (3.0)	25 (5.1)	75 (5.1)
Project SMART Consortium, OH	15 (5.1)	16 (5.0)	34 (5.8)	34 (6.3)	50 (5.4)	50 (5.4)
Rochester City Sch. Dist., NY	24 (5.2)	14 (4.2)	36 (3.8)	26 (4.5)	54 (5.4)	46 (5.4)
SW Math/Sci. Collaborative, PA	10 (2.9)	16 (5.2)	32 (6.4)	42 (5.5)	42 (5.2)	58 (5.2)
International Avg. (All Countries)	16 (0.5)	30 (0.6)	33 (0.6)	21 (0.5)	60 (0.6)	40 (0.6)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by teachers.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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.

	Percentage of Students Whose Teachers Reported Having the Major Area of Study[1]				
	Mathematics	Mathematics Education	Science or Science Education	Education	Other
Countries					
United States	41 (3.4)	37 (3.4)	16 (2.4)	54 (3.4)	r 46 (3.6)
Belgium (Flemish)	89 (2.6)	38 (3.8)	73 (3.5)	42 (2.9)	37 (3.5)
Canada	22 (2.7)	19 (2.2)	24 (2.8)	49 (3.2)	68 (2.9)
Chinese Taipei	82 (3.7)	39 (4.2)	11 (2.1)	32 (3.6)	23 (3.9)
Czech Republic	85 (3.8)	34 (5.6)	53 (6.0)	34 (5.5)	53 (4.9)
England	47 (3.3)	32 (2.9)	s 20 (2.6)	s 44 (3.4)	s 41 (3.5)
Hong Kong, SAR	57 (4.2)	30 (3.9)	38 (4.4)	36 (3.8)	47 (4.5)
Italy	22 (3.3)	0 (0.0)	66 (3.4)	0 (0.0)	16 (3.1)
Japan	79 (3.6)	27 (3.6)	4 (1.7)	15 (3.2)	21 (3.5)
Korea, Rep. of	55 (4.2)	61 (4.0)	4 (1.5)	19 (3.2)	9 (2.2)
Netherlands	68 (4.9)	16 (4.2)	25 (5.0)	12 (4.3)	14 (4.4)
Russian Federation	89 (2.9)	83 (3.1)	39 (4.0)	81 (3.1)	67 (3.9)
Singapore	78 (3.6)	32 (4.0)	38 (4.2)	48 (4.8)	47 (4.3)
States					
Connecticut	31 (5.2)	29 (5.3)	r 6 (3.2)	r 69 (5.2)	s 40 (7.4)
Idaho	28 (5.2)	34 (7.2)	r 17 (5.3)	r 68 (5.9)	r 43 (7.4)
Illinois	61 (4.8)	55 (6.5)	13 (5.1)	71 (5.0)	43 (4.6)
Indiana	55 (7.3)	48 (5.0)	17 (5.1)	63 (5.0)	26 (5.5)
Maryland	40 (5.7)	35 (6.0)	r 8 (2.7)	r 63 (6.6)	r 37 (5.2)
Massachusetts	60 (5.1)	35 (4.9)	9 (2.9)	59 (4.7)	29 (5.5)
Michigan	51 (5.9)	53 (6.9)	32 (6.4)	64 (6.3)	52 (6.1)
Missouri	61 (6.4)	49 (5.2)	14 (5.2)	79 (4.3)	32 (5.9)
North Carolina	50 (5.0)	50 (6.6)	26 (4.1)	61 (5.6)	31 (5.0)
Oregon	39 (4.8)	39 (6.4)	21 (4.6)	66 (6.1)	49 (5.9)
Pennsylvania	58 (6.0)	53 (4.7)	8 (3.3)	61 (5.8)	r 33 (4.4)
South Carolina	53 (6.1)	45 (6.0)	6 (2.7)	61 (6.3)	25 (6.0)
Texas	50 (6.5)	29 (6.0)	r 18 (5.5)	r 47 (8.1)	r 51 (6.2)
Districts and Consortia					
Academy School Dist. #20, CO	55 (0.4)	39 (0.4)	20 (0.4)	66 (0.4)	12 (0.2)
Chicago Public Schools, IL	37 (9.4)	51 (9.8)	13 (2.8)	74 (9.5)	r 59 (9.1)
Delaware Science Coalition, DE	23 (5.2)	36 (6.5)	r 12 (4.6)	r 65 (6.6)	r 59 (7.4)
First in the World Consort., IL	73 (7.2)	75 (7.8)	21 (5.0)	77 (3.4)	38 (7.9)
Fremont/Lincoln/WestSide PS, NE	65 (3.1)	56 (6.0)	5 (0.2)	57 (9.1)	58 (5.5)
Guilford County, NC	59 (4.8)	64 (6.4)	13 (4.3)	47 (5.8)	37 (5.7)
Jersey City Public Schools, NJ	16 (4.9)	18 (2.6)	4 (2.7)	79 (5.0)	r 55 (6.4)
Miami-Dade County PS, FL	31 (7.9)	27 (8.8)	s 18 (8.7)	s 55 (9.3)	s 84 (6.0)
Michigan Invitational Group, MI	64 (7.6)	36 (8.9)	29 (4.0)	55 (10.0)	47 (8.0)
Montgomery County, MD	27 (6.1)	28 (7.3)	s 6 (1.2)	s 76 (7.1)	s 37 (6.2)
Naperville Sch. Dist. #203, IL	73 (5.4)	30 (2.8)	2 (0.5)	50 (5.9)	57 (4.8)
Project SMART Consortium, OH	67 (4.6)	61 (6.4)	11 (4.5)	61 (7.7)	47 (5.3)
Rochester City Sch. Dist., NY	70 (3.6)	58 (5.0)	6 (1.7)	56 (5.5)	38 (4.0)
SW Math/Sci. Collaborative, PA	63 (4.9)	61 (6.5)	12 (5.3)	64 (7.7)	r 31 (7.4)
International Avg. (All Countries)	71 (0.6)	31 (0.6)	35 (0.6)	32 (0.6)	32 (0.6)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by teachers.

1 Teachers who responded that they majored in more than one area are reflected in all categories that apply.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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.

Index of Teachers' Confidence in Preparation to Teach Mathematics

Index based on teachers' responses to 12 questions about how prepared they feel to teach different mathematics topics (see reference exhibit R3.1) based on a 3-point scale: 1 = not well prepared; 2 = somewhat prepared; 3 = very well prepared. Average is computed across the 12 items for items for which the teacher did not respond do not teach. High level indicates average is greater than or equal to 2.75. Medium level indicates average is greater than or equal to 2.25 and less than 2.75. Low level indicates average is less than 2.25.

	High CPTM		Medium CPTM		Low CPTM	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Jersey City Public Schools, NJ	97 (2.7)	479 (9.0)	3 (2.7)	351 (4.6)	0 (0.0)	~ ~
Naperville Sch. Dist. #203, IL	95 (1.9)	570 (3.0)	5 (1.9)	529 (8.9)	0 (0.0)	~ ~
Michigan Invitational Group, MI	94 (2.1)	530 (5.0)	6 (2.1)	519 (27.2)	0 (0.0)	~ ~
SW Math/Sci. Collaborative, PA	94 (3.4)	519 (8.1)	5 (3.4)	508 (20.0)	1 (0.0)	~ ~
Rochester City Sch. Dist., NY	93 (2.0)	444 (7.3)	7 (2.0)	406 (16.9)	0 (0.0)	~ ~
First in the World Consort., IL	93 (5.5)	564 (6.4)	7 (5.5)	491 (11.8)	0 (0.0)	~ ~
Academy School Dist. #20, CO	92 (0.2)	531 (1.9)	0 (0.0)	~ ~	8 (0.2)	495 (5.0)
Maryland r	92 (3.0)	489 (5.6)	8 (3.0)	444 (28.1)	0 (0.0)	~ ~
Missouri	92 (3.3)	492 (5.8)	6 (2.6)	476 (13.2)	2 (1.6)	~ ~
South Carolina	92 (3.6)	506 (8.4)	8 (3.6)	472 (22.6)	0 (0.0)	~ ~
Pennsylvania	92 (5.0)	512 (7.2)	4 (1.7)	496 (27.7)	5 (4.7)	501 (6.7)
Michigan	91 (3.3)	525 (6.9)	8 (3.3)	479 (17.0)	1 (0.6)	~ ~
Project SMART Consortium, OH	90 (4.1)	526 (8.1)	10 (4.1)	476 (16.7)	0 (0.0)	~ ~
North Carolina	88 (4.1)	497 (7.0)	11 (4.0)	479 (13.7)	1 (0.9)	~ ~
United States	87 (2.4)	505 (4.2)	11 (2.3)	489 (7.0)	2 (1.0)	~ ~
Connecticut r	87 (5.9)	519 (10.5)	11 (5.7)	526 (16.6)	1 (1.4)	~ ~
Illinois	87 (5.0)	516 (6.3)	12 (5.0)	479 (25.8)	1 (0.7)	~ ~
Massachusetts	87 (3.9)	513 (7.2)	10 (3.1)	535 (24.9)	3 (2.3)	486 (8.0)
Texas r	87 (4.5)	525 (9.4)	12 (4.3)	485 (22.4)	1 (1.2)	~ ~
Chicago Public Schools, IL	87 (6.7)	470 (7.4)	13 (6.6)	452 (13.5)	1 (0.8)	~ ~
Indiana	86 (4.8)	513 (7.3)	11 (4.6)	545 (22.0)	2 (1.7)	~ ~
Miami-Dade County PS, FL s	86 (5.2)	425 (11.9)	11 (5.2)	435 (53.0)	3 (2.5)	269 (37.9)
Guilford County, NC	85 (5.3)	517 (10.0)	13 (5.0)	490 (26.3)	2 (0.1)	~ ~
Montgomery County, MD s	85 (6.5)	543 (5.2)	14 (6.6)	501 (9.9)	1 (0.1)	~ ~
Czech Republic	85 (3.6)	521 (5.1)	14 (3.8)	519 (9.5)	1 (1.3)	~ ~
Delaware Science Coalition, DE r	85 (5.6)	480 (11.5)	12 (5.1)	499 (22.2)	3 (2.3)	417 (38.5)
Fremont/Lincoln/WestSide PS, NE	81 (4.9)	492 (10.6)	13 (4.9)	440 (24.3)	5 (0.2)	534 (5.0)
Netherlands	81 (6.2)	542 (7.1)	10 (3.0)	514 (22.4)	9 (5.8)	514 (58.7)
Oregon	78 (4.3)	516 (7.3)	18 (4.7)	506 (15.3)	4 (1.6)	480 (22.4)
Idaho r	75 (4.9)	508 (8.2)	18 (6.1)	461 (12.3)	7 (3.8)	447 (34.9)
Chinese Taipei	71 (3.6)	586 (4.5)	15 (3.1)	587 (10.9)	14 (2.7)	572 (6.8)
Canada	71 (2.7)	537 (3.3)	21 (3.0)	530 (6.6)	8 (1.8)	515 (14.6)
Singapore	66 (4.2)	603 (7.1)	24 (3.7)	619 (12.0)	10 (2.8)	578 (20.8)
Belgium (Flemish)	65 (3.2)	559 (5.8)	32 (3.1)	561 (5.6)	3 (1.4)	558 (27.1)
Hong Kong, SAR	61 (4.3)	579 (5.5)	28 (3.9)	591 (8.2)	11 (2.7)	571 (12.0)
Italy	60 (3.9)	479 (5.5)	27 (3.5)	481 (7.2)	13 (2.3)	479 (12.4)
Korea, Rep. of	48 (3.9)	585 (3.2)	31 (3.8)	590 (4.1)	21 (3.0)	588 (3.5)
Japan	8 (2.1)	584 (6.1)	24 (3.6)	589 (4.2)	68 (4.0)	573 (2.6)
England	– –	– –	– –	– –	– –	– –
Russian Federation	– –	– –	– –	– –	– –	– –
International Avg. (All Countries)	63 (0.6)	489 (1.1)	23 (0.6)	481 (1.7)	14 (0.5)	473 (2.9)

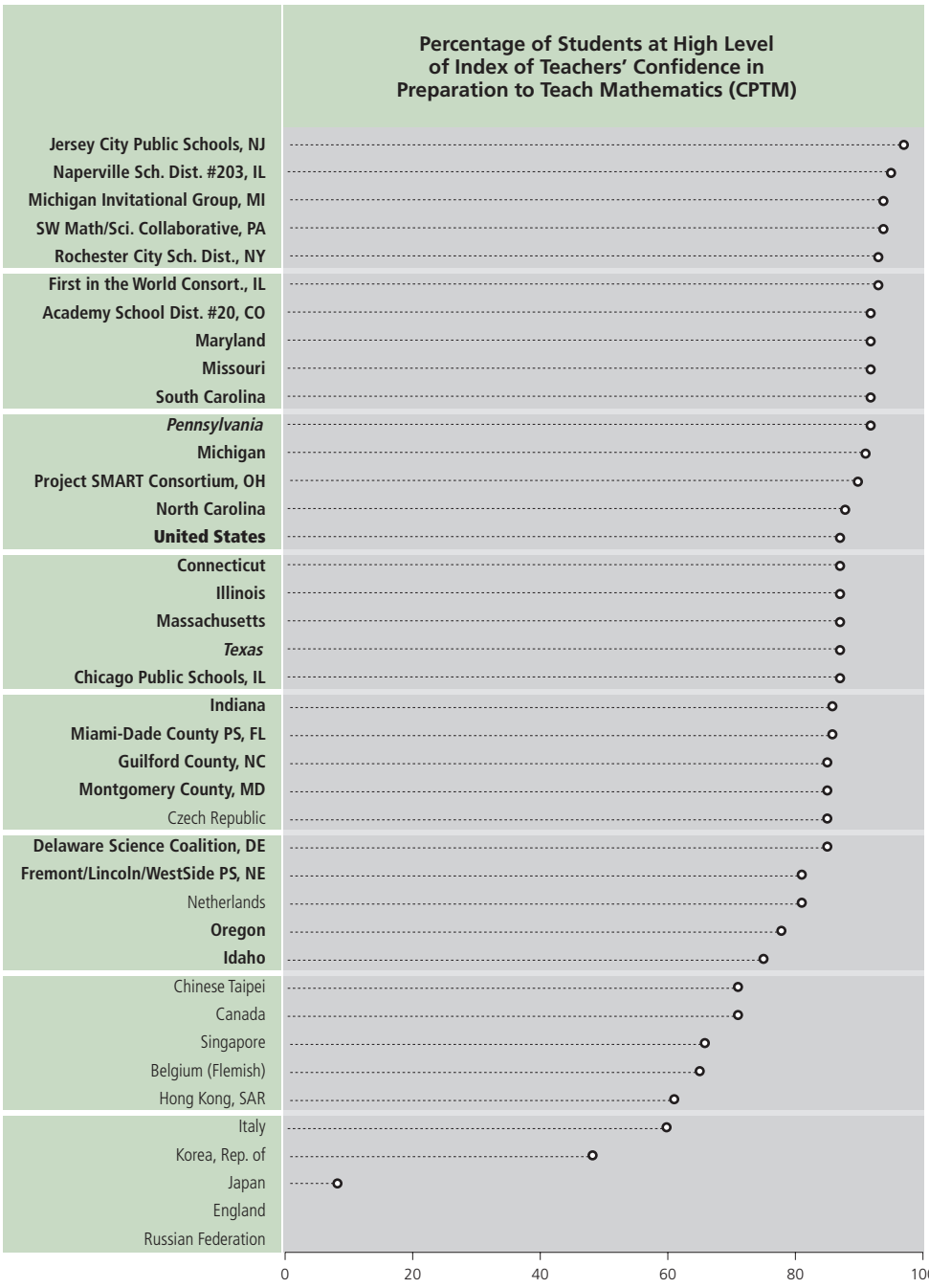
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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), 1998-1999.

Videotapes of mathematics classes in the United States and Japan in TIMSS 1995 revealed that outside interruptions like those for announcements or to conduct administrative tasks can affect the flow of the lesson and detract from instructional time.[2] As shown in Exhibit 6.6, on average internationally about one-fifth of the students (21 percent) were in mathematics classes that were interrupted pretty often or almost always, and 28 percent were in classes that were never interrupted. In Japan and Korea, more than half the students were in mathematics classes that were never interrupted – compared with only 10 percent in the United States. In the United States, nearly one-third of the eighth graders were in mathematics classes that were interrupted pretty often or almost always. If anything, the teachers in most of the Benchmarking jurisdictions reported even more interruptions than did teachers in the U.S. nationally. The jurisdictions with more than 15 percent of students in classrooms that were never interrupted were Illinois, the First in the World Consortium, Montgomery County, and Naperville. Conversely, the jurisdictions with the highest percentages of students in classrooms almost always interrupted (17 to 18 percent) were the public school systems of Chicago, Jersey City, Miami-Dade, and Rochester. Students in mathematics classrooms that were frequently interrupted had substantially lower achievement than their counterparts in classrooms with fewer interruptions.

2 Stigler, J.W., Gonzales, P., Kawanaka, T., Knoll, S., and Serrano, A. (1999), *The TIMSS Videotape Classroom Study: Methods and Findings from an Exploratory Research Project on Eighth-Grade Mathematics Instruction in Germany, Japan, and the United States*, NCES 1999-074, Washington, DC: National Center for Education Statistics.

	Students' Average Yearly Mathematics Instructional Time in Hours	Mathematics Instructional Time as a Percent of Total Instructional Time[1]
Jersey City Public Schools, NJ	s 238 (9.8)	x x
South Carolina	r 189 (10.6)	x x
North Carolina	r 182 (8.9)	s 18 (1.1)
Delaware Science Coalition, DE	s 167 (17.8)	x x
Fremont/Lincoln/WestSide PS, NE	s 152 (15.3)	x x
Canada	r 150 (2.3)	r 15 (0.2)
Hong Kong, SAR	r 149 (5.4)	s 15 (0.5)
Oregon	r 148 (10.5)	s 14 (0.6)
Guilford County, NC	s 146 (6.2)	s 13 (0.4)
United States	s 144 (4.5)	x x
Texas	s 143 (10.3)	x x
Rochester City Sch. Dist., NY	r 143 (9.1)	s 13 (1.0)
Russian Federation	r 142 (3.3)	s 17 (0.6)
Missouri	r 142 (8.2)	s 14 (0.7)
Massachusetts	s 141 (4.9)	x x
Maryland	s 141 (6.9)	s 13 (0.6)
Czech Republic	139 (2.4)	15 (0.2)
Academy School Dist. #20, CO	138 (0.2)	x x
Indiana	r 135 (10.7)	s 11 (0.5)
Michigan	r 135 (5.3)	x x
Idaho	s 135 (9.0)	x x
Italy	130 (3.2)	12 (0.3)
Michigan Invitational Group, MI	r 129 (8.6)	s 13 (0.8)
Illinois	r 128 (8.7)	s 13 (1.0)
Japan	127 (1.8)	12 (0.2)
Chicago Public Schools, IL	s 127 (8.2)	x x
Chinese Taipei	126 (1.9)	9 (0.1)
Singapore	126 (3.8)	15 (0.5)
Project SMART Consortium, OH	r 124 (5.5)	x x
Pennsylvania	r 122 (7.6)	s 11 (0.7)
SW Math/Sci. Collaborative, PA	119 (3.8)	r 12 (0.4)
Korea, Rep. of	118 (3.5)	11 (0.3)
Belgium (Flemish)	116 (3.5)	12 (0.4)
England	s 115 (2.7)	s 12 (0.3)
Naperville Sch. Dist. #203, IL	114 (0.3)	12 (0.0)
First in the World Consort., IL	s 114 (9.8)	s 11 (1.2)
Netherlands	s 94 (1.6)	s 9 (0.1)
Connecticut	x x	x x
Miami-Dade County PS, FL	x x	x x
Montgomery County, MD	x x	x x
International Avg. (All Countries)	129 (0.7)	13 (0.1)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Mathematics instructional time provided by teachers, and total instructional time provided by schools.

1 Computed as the ratio of mathematics instructional time to total instructional time averaged across students.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

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

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

Exhibit 6.5 Number of Hours Mathematics Is Taught Weekly

8th Grade Mathematics

	5 Hours or More		3.5 Hours to < 5		2 Hours to < 3.5		Less Than 2 Hours	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Countries								
United States	16 (2.2)	490 (9.2)	56 (3.4)	501 (4.9)	17 (2.6)	528 (11.6)	11 (2.3)	491 (14.5)
Belgium (Flemish)	4 (1.0)	590 (11.7)	40 (2.8)	595 (4.1)	43 (3.8)	544 (7.7)	13 (3.4)	502 (18.9)
Canada r	17 (2.2)	520 (6.4)	55 (3.2)	544 (3.9)	26 (2.7)	523 (6.1)	3 (0.9)	503 (6.3)
Chinese Taipei	1 (1.1)	~ ~	48 (4.4)	592 (5.8)	51 (4.5)	577 (5.5)	0 (0.0)	~ ~
Czech Republic	4 (2.1)	600 (28.1)	52 (4.4)	517 (5.3)	44 (4.4)	517 (6.4)	0 (0.0)	~ ~
England s	2 (1.2)	~ ~	3 (1.4)	481 (10.2)	95 (2.0)	512 (5.3)	0 (0.2)	~ ~
Hong Kong, SAR	9 (2.3)	579 (15.2)	71 (4.0)	583 (5.6)	17 (3.1)	587 (11.1)	3 (1.5)	553 (16.7)
Italy	9 (2.1)	469 (11.5)	55 (3.8)	483 (5.3)	29 (4.0)	475 (7.4)	6 (1.8)	484 (10.3)
Japan	1 (1.3)	~ ~	2 (1.3)	~ ~	95 (2.0)	577 (2.1)	2 (0.9)	~ ~
Korea, Rep. of	2 (0.9)	~ ~	3 (1.1)	602 (9.6)	93 (1.8)	587 (2.1)	3 (1.1)	587 (11.7)
Netherlands	0 (0.0)	~ ~	0 (0.0)	~ ~	100 (0.5)	537 (7.2)	0 (0.0)	~ ~
Russian Federation	11 (2.5)	553 (13.4)	57 (4.1)	528 (7.7)	32 (3.8)	513 (8.5)	0 (0.0)	~ ~
Singapore	9 (2.3)	592 (24.7)	37 (3.8)	586 (11.2)	48 (4.0)	623 (7.5)	5 (2.0)	608 (20.0)
States								
Connecticut r	5 (2.5)	534 (14.7)	58 (6.1)	515 (11.1)	36 (6.7)	532 (15.2)	1 (0.1)	~ ~
Idaho r	13 (4.4)	488 (18.4)	65 (7.6)	499 (9.2)	13 (4.4)	512 (13.6)	10 (4.8)	454 (15.2)
Illinois	6 (2.2)	500 (9.6)	44 (6.6)	522 (9.3)	38 (6.5)	489 (11.0)	12 (5.1)	540 (8.5)
Indiana	7 (3.5)	565 (33.6)	55 (7.5)	509 (8.6)	26 (7.8)	517 (16.4)	12 (4.0)	517 (8.2)
Maryland r	17 (5.3)	474 (16.2)	60 (6.4)	489 (6.9)	10 (4.1)	504 (16.7)	13 (4.0)	472 (18.3)
Massachusetts r	12 (4.7)	513 (8.9)	69 (6.1)	511 (7.8)	15 (4.7)	522 (14.4)	3 (2.2)	549 (26.4)
Michigan	8 (3.1)	512 (18.6)	64 (5.4)	525 (9.5)	15 (4.0)	521 (13.3)	14 (2.9)	528 (11.4)
Missouri	7 (3.2)	479 (43.4)	65 (6.0)	491 (6.8)	22 (5.1)	493 (11.0)	6 (3.2)	502 (13.1)
North Carolina	48 (5.2)	493 (8.8)	37 (5.6)	498 (13.7)	7 (2.9)	492 (12.3)	8 (2.1)	491 (42.5)
Oregon	9 (3.8)	545 (13.7)	64 (6.6)	519 (6.5)	19 (4.7)	483 (18.4)	8 (2.4)	510 (30.5)
Pennsylvania	11 (5.1)	515 (11.1)	47 (5.0)	518 (9.9)	29 (3.8)	504 (7.3)	13 (5.5)	496 (17.7)
South Carolina	40 (6.2)	512 (7.6)	41 (5.5)	494 (15.0)	13 (4.7)	523 (24.2)	6 (2.5)	469 (36.9)
Texas r	16 (6.2)	530 (19.4)	59 (6.6)	528 (10.6)	12 (3.8)	520 (27.5)	12 (3.3)	488 (20.9)
Districts and Consortia								
Academy School Dist. #20, CO	9 (0.2)	527 (4.6)	75 (0.3)	535 (2.1)	8 (0.2)	529 (5.5)	8 (0.2)	513 (4.7)
Chicago Public Schools, IL	6 (3.6)	460 (32.4)	19 (7.8)	465 (14.0)	69 (7.6)	469 (7.9)	5 (3.0)	430 (23.3)
Delaware Science Coalition, DE r	20 (6.9)	507 (27.1)	56 (7.3)	464 (13.3)	21 (5.1)	510 (11.7)	3 (2.3)	417 (25.8)
First in the World Consort., IL	2 (2.4)	~ ~	60 (1.5)	564 (7.0)	26 (4.3)	539 (6.2)	12 (5.1)	559 (21.5)
Fremont/Lincoln/WestSide PS, NE	8 (5.2)	493 (28.5)	77 (3.8)	494 (10.1)	12 (1.2)	477 (4.5)	3 (0.1)	323 (9.2)
Guilford County, NC	15 (3.8)	500 (16.6)	64 (5.2)	513 (11.3)	6 (3.7)	524 (25.9)	15 (3.7)	502 (22.1)
Jersey City Public Schools, NJ r	69 (6.0)	467 (5.7)	31 (6.0)	495 (22.3)	0 (0.0)	~ ~	0 (0.0)	~ ~
Miami-Dade County PS, FL s	20 (7.6)	371 (26.6)	45 (10.7)	443 (18.3)	16 (8.1)	415 (22.3)	19 (7.0)	442 (33.6)
Michigan Invitational Group, MI	10 (2.6)	519 (4.7)	64 (7.8)	532 (7.6)	7 (1.1)	516 (28.3)	19 (6.9)	552 (10.7)
Montgomery County, MD s	3 (1.1)	598 (17.6)	67 (12.6)	539 (7.1)	20 (11.8)	533 (13.1)	11 (7.3)	503 (11.6)
Naperville Sch. Dist. #203, IL	2 (0.1)	~ ~	0 (0.0)	~ ~	89 (0.4)	571 (3.2)	9 (0.4)	549 (3.6)
Project SMART Consortium, OH	7 (2.1)	536 (40.9)	51 (6.0)	519 (11.2)	31 (5.5)	525 (13.1)	11 (3.2)	505 (10.1)
Rochester City Sch. Dist., NY	6 (3.3)	509 (31.2)	59 (3.9)	427 (7.7)	35 (2.9)	454 (12.9)	0 (0.0)	~ ~
SW Math/Sci. Collaborative, PA	5 (3.2)	511 (29.8)	41 (6.9)	524 (12.1)	44 (7.6)	505 (10.6)	10 (3.3)	551 (27.2)
International Avg. (All Countries)	9 (0.3)	481 (3.5)	34 (0.5)	492 (2.3)	53 (0.5)	490 (1.9)	4 (0.3)	485 (4.7)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by teachers.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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.

	Never		Once in a While		Pretty Often		Almost Always	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Countries								
United States	10 (0.4)	494 (8.2)	59 (0.9)	522 (3.9)	20 (0.5)	488 (3.9)	11 (0.6)	455 (5.1)
Belgium (Flemish)	24 (1.1)	557 (5.9)	62 (1.1)	566 (2.9)	9 (0.7)	562 (6.8)	5 (0.8)	505 (20.3)
Canada	9 (0.4)	528 (4.2)	64 (1.0)	540 (2.4)	18 (0.7)	517 (3.9)	9 (0.7)	502 (7.8)
Chinese Taipei	22 (1.1)	580 (6.1)	56 (1.0)	594 (4.4)	17 (0.9)	580 (5.4)	6 (0.6)	563 (9.0)
Czech Republic	33 (1.7)	520 (4.0)	59 (1.3)	524 (4.7)	4 (0.5)	517 (11.4)	4 (0.8)	472 (13.7)
England	10 (0.8)	508 (9.5)	66 (1.2)	509 (4.2)	19 (1.1)	474 (6.0)	6 (0.6)	437 (8.9)
Hong Kong, SAR	36 (1.0)	585 (4.4)	54 (0.8)	588 (4.0)	8 (0.6)	552 (8.9)	2 (0.2)	~ ~
Italy	16 (1.0)	480 (5.5)	54 (1.2)	488 (4.0)	18 (1.0)	477 (5.3)	11 (0.8)	450 (7.6)
Japan	53 (1.4)	580 (2.7)	42 (1.3)	581 (2.5)	4 (0.3)	559 (5.9)	1 (0.2)	~ ~
Korea, Rep. of	57 (0.9)	581 (2.0)	38 (0.8)	598 (3.0)	4 (0.2)	579 (7.5)	1 (0.1)	~ ~
Netherlands	39 (1.3)	539 (7.7)	55 (1.3)	544 (8.3)	4 (0.5)	524 (14.0)	2 (0.4)	~ ~
Russian Federation	17 (1.5)	538 (11.1)	64 (1.5)	533 (5.2)	10 (0.9)	506 (7.5)	9 (0.7)	497 (6.9)
Singapore	16 (0.8)	592 (8.9)	64 (1.0)	614 (5.9)	14 (0.6)	585 (7.4)	6 (0.4)	579 (9.5)
States								
Connecticut	10 (1.1)	529 (12.6)	59 (2.3)	529 (8.7)	18 (1.7)	488 (9.1)	12 (1.3)	471 (12.3)
Idaho	11 (0.9)	484 (14.8)	60 (1.7)	510 (6.0)	18 (1.1)	475 (8.9)	11 (1.0)	463 (9.1)
Illinois	16 (1.2)	521 (9.7)	61 (1.5)	519 (7.0)	15 (1.1)	487 (8.2)	9 (0.9)	472 (7.8)
Indiana	10 (1.2)	511 (9.8)	66 (1.6)	527 (7.3)	16 (1.1)	495 (7.5)	7 (0.8)	471 (11.3)
Maryland	12 (0.9)	494 (9.8)	60 (1.6)	513 (5.4)	17 (1.0)	475 (7.2)	11 (1.0)	465 (9.8)
Massachusetts	11 (0.7)	521 (10.0)	62 (1.3)	526 (5.8)	19 (1.2)	495 (6.8)	8 (0.8)	464 (7.7)
Michigan	11 (1.3)	509 (12.2)	61 (2.0)	534 (6.4)	18 (1.6)	501 (8.1)	11 (1.3)	476 (6.7)
Missouri	10 (0.8)	483 (9.3)	58 (1.8)	500 (5.6)	20 (0.9)	489 (6.4)	12 (1.3)	454 (9.4)
North Carolina	7 (0.5)	474 (13.6)	60 (2.0)	513 (7.2)	21 (1.1)	485 (6.6)	12 (1.3)	448 (7.5)
Oregon	11 (0.9)	491 (8.0)	59 (1.6)	532 (5.9)	19 (0.9)	499 (6.5)	11 (0.8)	486 (9.0)
Pennsylvania	13 (1.4)	506 (10.4)	59 (1.7)	522 (6.1)	18 (1.0)	494 (5.2)	10 (1.0)	462 (10.7)
South Carolina	9 (1.1)	482 (11.4)	56 (2.2)	523 (7.7)	23 (2.1)	485 (8.3)	12 (1.0)	461 (9.8)
Texas	12 (0.8)	497 (17.0)	55 (2.1)	536 (9.0)	22 (1.5)	517 (8.1)	11 (1.0)	485 (11.2)
Districts and Consortia								
Academy School Dist. #20, CO	4 (0.6)	504 (12.0)	57 (1.2)	536 (2.6)	26 (1.3)	531 (4.6)	12 (1.1)	506 (6.6)
Chicago Public Schools, IL	7 (1.0)	435 (14.8)	49 (4.3)	478 (6.4)	27 (2.6)	456 (8.3)	17 (2.8)	447 (10.8)
Delaware Science Coalition, DE	11 (0.9)	466 (9.2)	59 (2.6)	500 (9.9)	17 (1.2)	472 (8.2)	13 (1.5)	453 (10.8)
First in the World Consort., IL	17 (1.3)	559 (12.1)	66 (1.5)	568 (5.9)	14 (1.4)	530 (10.3)	4 (0.6)	521 (12.0)
Fremont/Lincoln/WestSide PS, NE	8 (1.1)	484 (16.5)	56 (2.1)	513 (9.3)	20 (2.2)	471 (9.0)	15 (1.4)	430 (11.5)
Guilford County, NC	10 (0.8)	498 (10.9)	65 (1.5)	525 (8.0)	19 (1.2)	499 (9.2)	6 (0.8)	473 (18.8)
Jersey City Public Schools, NJ	5 (0.8)	467 (13.5)	51 (2.0)	489 (7.8)	27 (1.9)	475 (11.3)	18 (1.3)	450 (12.0)
Miami-Dade County PS, FL	11 (1.0)	411 (15.6)	49 (1.7)	449 (10.3)	23 (0.8)	411 (9.8)	17 (1.4)	394 (16.0)
Michigan Invitational Group, MI	11 (1.4)	550 (6.9)	64 (2.6)	543 (6.4)	18 (1.9)	511 (8.1)	8 (1.1)	487 (12.5)
Montgomery County, MD	16 (1.2)	547 (9.3)	60 (1.7)	550 (3.8)	15 (1.6)	509 (8.3)	9 (0.9)	500 (8.7)
Naperville Sch. Dist. #203, IL	22 (1.3)	570 (5.9)	66 (1.5)	575 (3.2)	8 (0.8)	552 (8.1)	4 (0.5)	521 (9.6)
Project SMART Consortium, OH	10 (1.0)	511 (7.7)	60 (1.9)	533 (8.1)	20 (1.5)	507 (9.8)	10 (0.9)	495 (12.1)
Rochester City Sch. Dist., NY r	11 (0.9)	428 (12.6)	52 (2.5)	479 (7.4)	19 (1.8)	444 (9.8)	18 (1.7)	417 (8.5)
SW Math/Sci. Collaborative, PA	15 (2.1)	517 (10.7)	66 (1.7)	524 (6.3)	13 (1.2)	505 (12.4)	6 (1.0)	475 (15.4)
International Avg. (All Countries)	28 (0.2)	487 (1.2)	52 (0.2)	499 (0.8)	13 (0.1)	474 (1.4)	8 (0.1)	442 (1.8)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by students.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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.

What Activities Do Students Do in Their Mathematics Lessons?

Because it can affect pedagogical strategies, class size is shown in Exhibit 6.7. Teachers' reports on the size of their eighth-grade mathematics class reveal that across countries the average was 31 students, but there was considerable variation even among the higher-performing countries – from 42 students in Korea to 19 in Belgium (Flemish). Average class size was relatively uniform across all of the Benchmarking entities, ranging from 22 to 30 students. The relationship between class size and achievement is difficult to disentangle, given the variety of policies and practices and the fact that smaller classes can be used for both advanced and remedial learning. It makes sense, however, that teachers may have an easier time managing and conducting more student-centered instructional activities with smaller classes.

Extensive research about class size in relation to achievement indicates that the existence of such a relationship is dependent on the situation.[3] 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 behaviors. Also, the research is more consistent in suggesting that reductions in class size have the potential to help students in the primary grades. The TIMSS 1999 data support the complexity of this issue. The five highest-performing countries – Singapore, Korea, Chinese Taipei, Hong Kong, and Japan – were among those with the largest mathematics classes. Within countries, several show little or no relationship between achievement and class size, often because students are mostly all in classes of similar size. Within other countries, there appears to be a curvilinear relationship, or those 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 or for those students in the less-advanced tracks.

Exhibit 6.8 presents a profile of the activities most commonly encountered in mathematics classes around the world, as reported by mathematics teachers. As can be seen from the international averages, the two predominant activities, accounting for nearly half of class time

As might be anticipated, students reported that use of the board was an extremely common presentational mode in mathematics class (see Exhibit 6.10). On average internationally, 92 percent of students reported that teachers used the board at least pretty often, and 60 percent reported that students did so. Using the board seems to be less common in the United States, especially for students (37 percent). In the United States, use of an overhead projector is a popular presentational mode, especially for teachers – 59 percent compared with 19 percent internationally. This mode was used frequently for more than 80 percent of the students in Maryland, North Carolina, Oregon, the Academy School District, the Fremont/Lincoln/Westside Public Schools, Guilford County, Montgomery County, and Naperville.

Educators, parents, employers, and most of the public support the goal of improving students' capacity for mathematics problem-solving. To examine the emphasis placed on that goal, TIMSS created an index of teachers' emphasis on mathematics reasoning and problem-solving (EMRPS). As shown in Exhibit 6.11, the index is based on teachers' responses about how often they asked students to explain the reasoning behind an idea, represent and analyze relationships using tables, charts, or graphs, work on problems for which there was no immediate solution, and write equations to represent relationships. Students were placed in the high category if, on average, they were asked to do these activities in most of their lessons. The medium level represents students asked to do these activities in some to most lessons, and students in the low category did them only in some lessons or rarely.

Nearly half the Japanese students were at the high index level, compared with the international average of 15 percent. Across countries, most students (61 percent on average) were in the medium category. An emphasis on problem-solving was related to performance, with students at the high and medium levels having higher average achievement than those at the low level, both internationally and for most entities. There was tremendous variation among the Benchmarking participants on this index. From 41 to 46 percent of the students were in the high category in Jersey City, First in the World, and the Michigan Invitational Group, compared with eight to nine percent in Chicago and Oregon.

Exhibit R3.7 in the reference section shows the percentages of students asked in most or every lesson to engage in each of the activities included in the problem-solving index. For comparison purposes, the exhibit also shows the percentages of students asked to practice computational skills in most or every lesson. According to their teachers,

	Overall Average Class Size	1 - 20 Students		21 - 35 Students		36 or More Students	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Countries							
United States r	26 (0.7)	21 (2.6)	507 (8.4)	73 (3.0)	504 (4.9)	6 (1.4)	488 (26.2)
Belgium (Flemish)	19 (0.4)	58 (3.5)	541 (6.8)	42 (3.5)	582 (4.4)	0 (0.0)	~ ~
Canada	27 (0.3)	11 (2.1)	522 (6.7)	87 (2.3)	534 (2.9)	2 (1.0)	~ ~
Chinese Taipei	39 (0.5)	0 (0.0)	~ ~	14 (2.9)	578 (11.5)	86 (3.0)	586 (4.6)
Czech Republic r	24 (0.4)	18 (4.2)	504 (6.9)	82 (4.2)	524 (6.0)	0 (0.0)	~ ~
England	x x	x x	x x	x x	x x	x x	x x
Hong Kong, SAR	37 (0.5)	7 (1.8)	521 (20.0)	15 (3.0)	530 (10.5)	78 (3.4)	597 (4.3)
Italy	20 (0.3)	55 (3.9)	472 (5.3)	44 (3.9)	489 (6.5)	1 (0.0)	~ ~
Japan	36 (0.2)	1 (0.0)	~ ~	41 (3.4)	572 (2.9)	58 (3.3)	582 (2.3)
Korea, Rep. of	42 (0.5)	0 (0.0)	~ ~	12 (2.2)	584 (6.7)	88 (2.2)	587 (2.1)
Netherlands r	25 (0.5)	13 (4.1)	459 (18.8)	87 (4.1)	546 (8.2)	0 (0.0)	~ ~
Russian Federation	24 (0.5)	19 (3.2)	492 (10.0)	81 (3.2)	534 (5.9)	0 (0.0)	~ ~
Singapore	37 (0.3)	1 (0.4)	~ ~	32 (3.8)	602 (11.6)	68 (3.8)	607 (6.4)
States							
Connecticut s	24 (1.4)	29 (6.1)	501 (16.8)	64 (7.1)	525 (11.6)	6 (5.5)	559 (3.4)
Idaho r	22 (1.7)	43 (7.0)	481 (14.3)	52 (5.8)	503 (8.8)	6 (4.4)	488 (17.8)
Illinois	24 (0.6)	24 (5.3)	511 (10.8)	76 (5.2)	513 (7.9)	1 (0.0)	~ ~
Indiana r	22 (1.3)	40 (6.8)	517 (13.7)	59 (6.7)	512 (9.6)	1 (0.1)	~ ~
Maryland s	28 (1.2)	11 (3.4)	497 (23.2)	84 (4.7)	488 (6.3)	5 (2.6)	419 (23.6)
Massachusetts r	24 (1.1)	32 (5.1)	488 (11.6)	66 (4.8)	528 (7.4)	3 (1.5)	453 (30.5)
Michigan r	27 (1.3)	17 (3.6)	519 (8.0)	80 (3.7)	526 (9.2)	3 (2.0)	536 (29.8)
Missouri	23 (0.8)	36 (5.6)	477 (8.1)	61 (5.7)	497 (6.7)	3 (2.1)	571 (22.7)
North Carolina r	24 (0.7)	22 (5.4)	482 (17.1)	77 (5.4)	497 (7.7)	1 (0.8)	~ ~
Oregon r	24 (0.4)	26 (3.9)	500 (14.8)	74 (3.9)	521 (7.5)	0 (0.0)	~ ~
Pennsylvania	23 (0.6)	31 (4.4)	498 (11.3)	68 (4.4)	513 (6.9)	1 (0.6)	~ ~
South Carolina r	24 (1.0)	35 (5.7)	484 (13.6)	64 (5.5)	513 (12.4)	2 (1.7)	~ ~
Texas r	22 (0.9)	41 (6.1)	518 (16.9)	58 (6.0)	532 (8.4)	1 (0.9)	~ ~
Districts and Consortia							
Academy School Dist. #20, CO	27 (0.0)	9 (0.2)	474 (5.6)	88 (0.2)	541 (1.7)	3 (0.1)	508 (11.8)
Chicago Public Schools, IL	26 (1.2)	16 (7.2)	478 (27.9)	80 (6.6)	464 (6.3)	4 (0.5)	444 (5.1)
Delaware Science Coalition, DE r	29 (0.9)	9 (3.7)	417 (31.9)	78 (4.4)	480 (13.1)	13 (4.2)	559 (19.9)
First in the World Consort., IL	24 (0.6)	28 (4.3)	575 (15.6)	72 (4.3)	552 (4.9)	0 (0.0)	~ ~
Fremont/Lincoln/WestSide PS, NE	24 (0.6)	22 (4.8)	455 (19.9)	78 (4.8)	499 (11.9)	0 (0.0)	~ ~
Guilford County, NC r	24 (0.5)	15 (4.1)	494 (13.5)	85 (4.1)	512 (11.3)	0 (0.0)	~ ~
Jersey City Public Schools, NJ r	28 (3.1)	17 (4.8)	440 (21.3)	71 (4.0)	482 (11.8)	12 (4.6)	524 (31.9)
Miami-Dade County PS, FL s	30 (1.6)	16 (6.6)	369 (40.3)	56 (11.0)	427 (18.3)	28 (10.6)	437 (24.6)
Michigan Invitational Group, MI	26 (0.6)	23 (4.6)	534 (16.1)	75 (4.6)	528 (5.9)	2 (0.1)	~ ~
Montgomery County, MD s	25 (0.7)	16 (3.3)	495 (15.2)	84 (3.4)	539 (4.7)	0 (0.0)	~ ~
Naperville Sch. Dist. #203, IL	28 (0.4)	6 (2.8)	508 (23.3)	94 (2.8)	572 (3.0)	0 (0.0)	~ ~
Project SMART Consortium, OH r	24 (0.7)	23 (6.2)	533 (18.3)	77 (6.2)	523 (8.2)	0 (0.0)	~ ~
Rochester City Sch. Dist., NY	24 (0.6)	22 (4.8)	452 (13.8)	78 (4.8)	439 (7.9)	0 (0.0)	~ ~
SW Math/Sci. Collaborative, PA	24 (1.2)	35 (6.3)	507 (10.1)	62 (6.4)	521 (10.5)	3 (3.0)	455 (6.5)
International Avg. (All Countries)	31 (0.1)	17 (0.4)	468 (2.4)	53 (0.6)	488 (1.4)	30 (0.4)	471 (4.3)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by teachers.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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.

	Average Percentage of Class Time Spent in a Typical Month of Lessons							
	Administrative Tasks	Homework Review	Lecture-Style Presentation by Teacher	Teacher-Guided Student Practice	Re-teaching and Clarification of Content/ Procedures	Student Independent Practice	Tests and Quizzes	Other
Countries								
United States	r 6 (0.3)	r 15 (0.4)	r 20 (0.7)	r 18 (0.4)	r 12 (0.5)	r 17 (0.9)	r 11 (0.4)	r 4 (0.5)
Belgium (Flemish)	4 (0.3)	7 (0.4)	24 (1.1)	29 (1.0)	10 (0.4)	14 (0.9)	10 (0.3)	2 (0.4)
Canada	r 5 (0.2)	r 14 (0.4)	r 20 (0.9)	r 18 (0.8)	r 10 (0.3)	r 20 (0.7)	r 10 (0.3)	r 3 (0.6)
Chinese Taipei	3 (0.6)	12 (0.5)	39 (1.3)	15 (0.5)	11 (0.6)	9 (0.5)	10 (0.5)	2 (0.4)
Czech Republic	3 (0.3)	5 (0.4)	23 (0.7)	29 (1.2)	10 (0.5)	19 (1.0)	9 (0.6)	3 (0.4)
England	s 3 (0.2)	s 6 (0.5)	s 18 (0.9)	s 27 (1.2)	s 11 (0.4)	s 24 (1.5)	s 8 (0.4)	s 3 (0.7)
Hong Kong, SAR	5 (0.7)	12 (0.7)	32 (1.6)	18 (0.8)	8 (0.4)	14 (0.8)	8 (0.4)	3 (0.4)
Italy	2 (0.2)	14 (0.5)	25 (0.7)	22 (0.7)	13 (0.4)	12 (0.5)	12 (0.5)	1 (0.2)
Japan	2 (0.5)	5 (0.4)	34 (1.6)	26 (1.3)	16 (0.9)	9 (0.7)	7 (0.5)	2 (0.3)
Korea, Rep. of	3 (0.6)	6 (0.3)	33 (1.4)	22 (0.8)	14 (0.8)	14 (0.8)	7 (0.3)	3 (0.4)
Netherlands	5 (0.4)	15 (1.5)	9 (1.2)	5 (1.0)	18 (1.1)	32 (2.0)	11 (0.6)	5 (1.0)
Russian Federation	2 (0.1)	10 (0.4)	25 (0.6)	17 (0.7)	11 (0.4)	17 (0.6)	12 (0.6)	5 (0.4)
Singapore	6 (0.6)	13 (0.7)	28 (1.5)	20 (1.2)	9 (0.3)	12 (0.8)	8 (0.4)	3 (0.3)
States								
Connecticut	r 5 (0.6)	r 15 (0.8)	r 20 (1.7)	r 22 (1.7)	r 12 (1.0)	r 14 (1.4)	r 13 (1.0)	s 3 (0.9)
Idaho	r 5 (0.6)	r 12 (0.6)	r 16 (1.2)	r 17 (1.8)	r 12 (0.7)	r 23 (2.3)	r 11 (0.7)	r 3 (0.5)
Illinois	5 (0.4)	15 (0.6)	21 (1.5)	19 (1.2)	11 (0.5)	15 (0.9)	12 (0.7)	3 (0.4)
Indiana	4 (0.4)	14 (0.9)	22 (1.6)	17 (1.3)	12 (0.7)	15 (1.2)	12 (0.6)	3 (0.7)
Maryland	r 6 (0.7)	r 13 (0.8)	r 20 (1.6)	r 18 (1.2)	r 12 (1.1)	r 15 (1.1)	r 12 (0.7)	r 4 (0.6)
Massachusetts	4 (0.4)	17 (1.0)	19 (1.1)	19 (0.9)	15 (1.0)	13 (0.7)	12 (0.6)	r 4 (1.0)
Michigan	5 (0.6)	16 (0.8)	18 (1.0)	19 (1.6)	11 (1.0)	16 (1.0)	10 (0.6)	5 (1.7)
Missouri	5 (0.5)	12 (0.6)	21 (1.2)	19 (1.2)	12 (0.8)	18 (1.2)	10 (0.6)	3 (0.7)
North Carolina	5 (0.4)	14 (1.0)	20 (1.2)	20 (1.2)	12 (0.5)	16 (1.0)	11 (0.6)	3 (0.4)
Oregon	5 (0.5)	12 (1.0)	19 (1.3)	17 (1.2)	11 (0.6)	21 (1.2)	9 (0.6)	5 (1.7)
Pennsylvania	4 (0.3)	16 (0.9)	24 (1.5)	19 (1.1)	10 (0.5)	13 (1.1)	10 (0.6)	3 (0.4)
South Carolina	5 (0.6)	13 (0.8)	23 (1.7)	19 (1.2)	12 (0.8)	15 (1.0)	11 (0.7)	3 (0.5)
Texas	r 7 (0.7)	r 12 (0.8)	r 17 (1.4)	r 21 (1.2)	r 12 (0.7)	r 17 (1.2)	r 12 (0.7)	r 4 (0.7)
Districts and Consortia								
Academy School Dist. #20, CO	5 (0.0)	18 (0.0)	20 (0.1)	14 (0.0)	12 (0.0)	16 (0.0)	13 (0.1)	r 3 (0.0)
Chicago Public Schools, IL	6 (0.7)	11 (1.1)	20 (2.2)	20 (2.0)	13 (1.0)	16 (1.7)	12 (1.1)	3 (1.0)
Delaware Science Coalition, DE	r 5 (0.5)	r 13 (0.8)	r 21 (1.1)	r 22 (1.8)	r 10 (0.6)	r 13 (1.1)	r 10 (0.5)	r 6 (1.3)
First in the World Consort., IL	3 (0.4)	17 (1.2)	24 (1.6)	16 (1.1)	11 (0.4)	12 (1.2)	11 (0.7)	7 (2.7)
Fremont/Lincoln/WestSide PS, NE	6 (0.7)	19 (1.7)	19 (2.7)	18 (1.9)	10 (0.6)	16 (1.0)	11 (1.1)	2 (0.7)
Guilford County, NC	5 (0.4)	13 (0.5)	18 (1.5)	20 (1.1)	11 (0.7)	16 (1.0)	11 (0.7)	5 (1.2)
Jersey City Public Schools, NJ	5 (0.7)	9 (0.5)	18 (1.2)	17 (0.5)	13 (0.7)	21 (1.2)	10 (0.4)	r 7 (0.7)
Miami-Dade County PS, FL	s 5 (0.8)	s 14 (1.2)	s 19 (1.7)	s 19 (1.4)	s 12 (1.1)	s 13 (1.1)	s 12 (1.1)	s 5 (0.7)
Michigan Invitational Group, MI	3 (0.3)	18 (2.3)	16 (1.8)	18 (2.4)	11 (1.2)	17 (1.0)	13 (0.7)	6 (2.1)
Montgomery County, MD	s 5 (0.4)	s 14 (1.0)	s 18 (0.6)	s 20 (1.5)	s 14 (0.8)	s 14 (0.8)	s 12 (0.8)	s 4 (0.8)
Naperville Sch. Dist. #203, IL	5 (0.5)	26 (0.7)	22 (0.8)	14 (0.7)	9 (0.3)	12 (0.9)	12 (0.5)	1 (0.3)
Project SMART Consortium, OH	5 (0.5)	15 (1.2)	21 (1.1)	19 (1.0)	11 (0.6)	16 (1.2)	11 (0.5)	2 (0.4)
Rochester City Sch. Dist., NY	5 (0.4)	14 (0.8)	22 (0.8)	17 (0.8)	13 (0.9)	15 (0.5)	10 (0.6)	3 (0.5)
SW Math/Sci. Collaborative, PA	5 (0.8)	15 (1.3)	24 (2.3)	17 (1.3)	11 (0.6)	14 (1.2)	12 (0.8)	2 (0.5)
International Avg. (All Countries)	5 (0.1)	12 (0.1)	23 (0.2)	22 (0.2)	13 (0.1)	15 (0.2)	11 (0.1)	4 (0.1)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by teachers.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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.

	Percentage of Students Reporting Almost Always or Pretty Often				
	We Discuss Our Completed Homework	Teacher Shows Us How to Do Mathematics Problems	We Work on Worksheets or Textbooks on Our Own	We Work on Mathematics Projects	We Begin Our Homework
Countries					
United States	79 (1.2)	94 (0.6)	86 (0.7)	29 (1.3)	74 (1.6)
Belgium (Flemish)	43 (1.4)	69 (0.9)	64 (1.0)	16 (1.1)	20 (1.4)
Canada	62 (1.4)	92 (0.5)	92 (0.5)	28 (1.1)	82 (1.2)
Chinese Taipei	55 (1.0)	91 (0.5)	59 (1.2)	55 (1.2)	34 (1.0)
Czech Republic	42 (1.8)	86 (1.1)	51 (2.4)	8 (0.6)	16 (1.6)
England	62 (1.5)	93 (0.7)	88 (1.5)	35 (1.4)	27 (1.6)
Hong Kong, SAR	35 (1.1)	91 (0.6)	69 (1.2)	67 (1.4)	40 (1.1)
Italy	64 (1.4)	80 (1.2)	34 (1.2)	22 (1.3)	39 (2.3)
Japan	19 (1.2)	88 (0.7)	38 (1.5)	6 (0.7)	20 (1.3)
Korea, Rep. of	10 (0.5)	85 (0.8)	29 (0.7)	46 (1.2)	17 (0.7)
Netherlands	68 (3.7)	70 (2.7)	92 (1.1)	3 (0.7)	89 (1.5)
Russian Federation	53 (1.4)	78 (1.2)	62 (1.3)	19 (0.9)	10 (0.8)
Singapore	61 (1.0)	97 (0.4)	75 (0.9)	15 (1.1)	60 (1.9)
States					
Connecticut	87 (1.3)	94 (1.3)	88 (1.0)	33 (3.0)	67 (2.2)
Idaho	70 (2.4)	94 (1.1)	88 (1.2)	31 (1.9)	89 (1.3)
Illinois	78 (2.2)	97 (0.5)	87 (1.0)	31 (2.2)	82 (2.5)
Indiana	80 (1.7)	95 (1.1)	88 (0.8)	30 (2.5)	84 (2.6)
Maryland	81 (1.9)	93 (1.0)	87 (1.1)	28 (2.1)	57 (3.1)
Massachusetts	82 (2.2)	94 (0.9)	85 (1.1)	22 (1.6)	63 (3.4)
Michigan	84 (1.9)	95 (0.7)	89 (0.8)	28 (2.3)	83 (2.4)
Missouri	74 (2.5)	92 (1.1)	90 (1.2)	30 (2.2)	85 (2.1)
North Carolina	89 (1.4)	98 (0.5)	90 (0.8)	31 (1.9)	79 (2.1)
Oregon	74 (2.4)	93 (1.1)	90 (1.2)	34 (2.2)	90 (1.8)
Pennsylvania	85 (1.8)	95 (0.9)	83 (1.2)	24 (2.0)	71 (3.2)
South Carolina	84 (2.0)	95 (0.9)	87 (1.6)	30 (2.2)	79 (2.2)
Texas	75 (2.9)	94 (1.3)	84 (1.4)	25 (2.1)	78 (2.4)
Districts and Consortia					
Academy School Dist. #20, CO	82 (0.9)	92 (0.9)	90 (0.9)	19 (0.9)	72 (1.1)
Chicago Public Schools, IL	74 (4.3)	96 (1.1)	81 (1.4)	34 (3.3)	53 (4.6)
Delaware Science Coalition, DE	85 (1.6)	95 (0.9)	88 (1.3)	25 (1.8)	74 (2.0)
First in the World Consort., IL	91 (1.5)	94 (1.5)	92 (1.6)	18 (2.8)	63 (3.6)
Fremont/Lincoln/WestSide PS, NE	83 (1.5)	91 (1.0)	91 (1.2)	38 (3.7)	83 (2.9)
Guilford County, NC	88 (1.4)	96 (1.0)	93 (0.8)	24 (2.2)	80 (2.5)
Jersey City Public Schools, NJ	76 (2.0)	97 (0.6)	85 (2.2)	63 (2.3)	43 (2.7)
Miami-Dade County PS, FL	71 (4.7)	92 (2.2)	83 (2.4)	34 (2.8)	58 (3.3)
Michigan Invitational Group, MI	86 (1.3)	92 (1.2)	86 (1.7)	22 (1.3)	84 (3.0)
Montgomery County, MD	83 (1.4)	93 (1.2)	92 (0.9)	24 (2.4)	69 (1.5)
Naperville Sch. Dist. #203, IL	91 (0.9)	96 (0.7)	92 (0.9)	15 (1.8)	87 (1.6)
Project SMART Consortium, OH	84 (1.9)	93 (1.5)	88 (1.2)	25 (1.8)	84 (2.5)
Rochester City Sch. Dist., NY	r 82 (1.8)	r 95 (0.8)	r 86 (1.2)	r 35 (2.9)	r 68 (3.0)
SW Math/Sci. Collaborative, PA	85 (2.1)	95 (1.0)	83 (1.9)	22 (2.2)	79 (3.3)
International Avg. (All Countries)	55 (0.2)	86 (0.2)	59 (0.2)	36 (0.2)	42 (0.2)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by students.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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.

	Percentage of Students Reporting Almost Always or Pretty Often				
	Teacher Uses the Board	Teacher Uses an Overhead Projector	Teacher Uses a Computer to Demonstrate Ideas in Mathematics	Students Use the Board	Students Use an Overhead Projector
Countries					
United States	80 (1.9)	59 (3.3)	9 (0.7)	37 (1.9)	16 (1.0)
Belgium (Flemish)	96 (0.7)	11 (1.7)	2 (0.5)	42 (1.8)	2 (0.8)
Canada	91 (0.9)	42 (2.7)	5 (0.5)	25 (1.2)	7 (0.8)
Chinese Taipei	96 (0.4)	4 (0.4)	2 (0.2)	48 (1.6)	2 (0.3)
Czech Republic	97 (0.4)	9 (1.6)	2 (0.4)	91 (1.7)	4 (0.5)
England	94 (1.5)	19 (2.6)	6 (0.8)	13 (1.0)	3 (0.6)
Hong Kong, SAR	96 (0.4)	9 (0.8)	3 (0.4)	46 (1.7)	3 (0.4)
Italy	94 (0.5)	8 (0.9)	5 (0.6)	84 (1.1)	7 (0.6)
Japan	99 (0.2)	4 (0.8)	1 (0.4)	50 (2.5)	1 (0.3)
Korea, Rep. of	93 (0.5)	10 (0.8)	7 (0.9)	38 (1.7)	3 (0.3)
Netherlands	90 (1.6)	7 (1.4)	2 (0.3)	9 (1.2)	2 (0.3)
Russian Federation	96 (0.4)	7 (1.0)	1 (0.2)	92 (0.6)	4 (0.5)
Singapore	96 (1.3)	75 (2.1)	11 (1.2)	52 (2.0)	21 (1.1)
States					
Connecticut	85 (3.4)	57 (4.5)	8 (1.4)	43 (3.4)	18 (2.7)
Idaho	81 (2.9)	59 (4.1)	9 (1.5)	30 (2.7)	12 (1.2)
Illinois	75 (5.2)	64 (5.5)	8 (1.3)	37 (4.8)	16 (1.9)
Indiana	78 (3.8)	61 (5.4)	8 (1.1)	42 (3.7)	16 (1.7)
Maryland	74 (3.2)	86 (2.5)	10 (1.0)	44 (3.8)	32 (1.9)
Massachusetts	87 (2.4)	47 (5.1)	7 (1.3)	46 (3.4)	17 (2.3)
Michigan	77 (3.6)	64 (4.6)	7 (1.1)	30 (2.2)	18 (2.1)
Missouri	81 (3.2)	55 (5.0)	8 (0.9)	39 (3.0)	15 (2.0)
North Carolina	76 (2.5)	84 (2.7)	10 (1.2)	51 (3.0)	33 (2.6)
Oregon	63 (3.3)	83 (3.0)	9 (0.9)	22 (1.8)	28 (2.5)
Pennsylvania	92 (1.8)	44 (3.5)	5 (0.6)	65 (2.9)	16 (2.6)
South Carolina	63 (3.8)	80 (4.3)	10 (1.4)	32 (3.0)	16 (1.7)
Texas	71 (3.2)	72 (3.7)	9 (1.5)	32 (3.4)	22 (1.9)
Districts and Consortia					
Academy School Dist. #20, CO	70 (1.0)	85 (0.8)	6 (0.7)	30 (1.0)	23 (1.1)
Chicago Public Schools, IL	79 (6.2)	41 (9.2)	10 (1.9)	50 (4.5)	18 (4.5)
Delaware Science Coalition, DE	80 (2.8)	72 (4.2)	10 (1.1)	38 (2.8)	27 (2.7)
First in the World Consort., IL	79 (5.8)	70 (2.6)	5 (1.3)	43 (6.2)	28 (3.6)
Fremont/Lincoln/WestSide PS, NE	61 (3.7)	92 (1.0)	15 (1.4)	23 (2.7)	29 (2.8)
Guilford County, NC	67 (3.3)	89 (2.5)	6 (0.9)	35 (2.5)	25 (2.2)
Jersey City Public Schools, NJ	93 (1.9)	65 (2.8)	17 (1.9)	50 (3.2)	22 (2.5)
Miami-Dade County PS, FL	80 (4.9)	63 (6.8)	16 (1.9)	46 (6.4)	19 (2.3)
Michigan Invitational Group, MI	84 (3.4)	74 (2.8)	7 (0.9)	35 (2.2)	26 (3.3)
Montgomery County, MD	60 (3.3)	92 (1.7)	9 (0.9)	32 (2.7)	32 (2.8)
Naperville Sch. Dist. #203, IL	73 (2.3)	90 (0.6)	5 (0.7)	43 (1.9)	25 (1.6)
Project SMART Consortium, OH	80 (2.7)	66 (4.1)	11 (1.5)	45 (3.2)	25 (2.9)
Rochester City Sch. Dist., NY	r 64 (2.8)	r 74 (4.0)	r 16 (2.1)	r 35 (3.0)	r 36 (3.0)
SW Math/Sci. Collaborative, PA	95 (1.7)	40 (5.1)	5 (0.7)	57 (4.2)	10 (2.0)
International Avg. (All Countries)	92 (0.1)	19 (0.3)	5 (0.1)	60 (0.2)	9 (0.1)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by students.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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.

Exhibit 6.11

Index of Teachers' Emphasis on Mathematics Reasoning and Problem-Solving

Index based on teachers' responses to four questions about how often they ask students to: 1) explain the reasoning behind an idea; 2) represent and analyze relationships using tables, charts, or graphs; 3) work on problems for which there is no immediately obvious method of solution; 4) write equations to represent relationships (see reference exhibit R3.7). Average is computed across the four items based on a 4-point scale: 1 = never or almost never; 2 = some lessons; 3 = most lessons; 4 = every lesson. High level indicates average is greater than or equal to 3. Medium level indicates average is greater than or equal to 2.25 and less than 3. Low level indicates average is less than 2.25.

		High EMRPS		Medium EMRPS		Low EMRPS	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Japan		49 (4.1)	584 (2.6)	45 (4.1)	574 (2.5)	7 (2.1)	562 (6.2)
Jersey City Public Schools, NJ	r	46 (6.4)	481 (11.1)	50 (6.0)	482 (15.3)	4 (2.5)	372 (7.2)
First in the World Consort., IL		42 (8.8)	536 (8.1)	54 (8.8)	581 (10.4)	4 (3.0)	492 (12.6)
Michigan Invitational Group, MI		41 (9.6)	521 (5.0)	52 (10.2)	549 (9.4)	7 (3.5)	484 (17.2)
Italy		30 (3.1)	484 (6.9)	58 (3.6)	479 (5.7)	12 (2.6)	472 (8.7)
Naperville Sch. Dist. #203, IL		29 (4.9)	569 (9.9)	67 (4.8)	571 (5.1)	4 (2.6)	524 (15.0)
Academy School Dist. #20, CO		26 (0.3)	552 (3.4)	53 (0.4)	533 (2.2)	21 (0.4)	504 (3.2)
Connecticut	r	26 (5.2)	554 (23.7)	57 (6.8)	509 (10.4)	17 (5.9)	508 (17.0)
Miami-Dade County PS, FL	s	25 (8.3)	443 (29.9)	55 (8.9)	410 (13.8)	21 (6.6)	425 (31.4)
Maryland	r	25 (5.6)	491 (14.9)	55 (6.3)	491 (8.4)	20 (4.2)	460 (14.7)
Czech Republic		21 (4.2)	539 (8.4)	73 (4.6)	516 (5.6)	6 (2.6)	502 (10.3)
Guilford County, NC		21 (5.4)	521 (24.3)	66 (5.9)	503 (9.8)	13 (3.5)	527 (13.4)
Michigan		21 (4.7)	558 (16.9)	60 (5.2)	516 (7.6)	19 (4.8)	510 (11.8)
Korea, Rep. of		21 (3.0)	588 (4.0)	66 (3.3)	586 (2.6)	13 (2.4)	594 (4.6)
Texas		20 (5.5)	552 (18.2)	61 (5.2)	512 (12.8)	19 (3.9)	511 (18.9)
Delaware Science Coalition, DE	r	20 (4.2)	490 (14.5)	59 (7.4)	492 (14.5)	21 (6.7)	445 (14.6)
United States		18 (2.5)	519 (12.4)	57 (2.9)	502 (4.1)	24 (2.7)	489 (6.4)
Montgomery County, MD	s	18 (6.7)	582 (11.6)	61 (6.6)	533 (7.1)	21 (5.2)	493 (7.1)
Indiana		17 (4.6)	512 (12.8)	64 (5.2)	524 (9.1)	19 (5.4)	491 (11.8)
SW Math/Sci. Collaborative, PA		17 (4.9)	517 (19.0)	62 (6.0)	527 (10.6)	21 (5.7)	492 (8.4)
Massachusetts		15 (4.2)	543 (15.7)	70 (6.5)	506 (7.1)	15 (4.9)	506 (14.8)
South Carolina		15 (3.3)	545 (26.8)	62 (5.5)	505 (8.6)	24 (4.2)	474 (17.4)
Idaho	r	14 (5.1)	511 (14.9)	52 (5.0)	500 (9.1)	34 (5.6)	479 (15.3)
Chinese Taipei		13 (2.4)	571 (7.5)	58 (4.2)	594 (6.0)	29 (3.8)	573 (6.9)
Project SMART Consortium, OH		13 (2.0)	540 (13.6)	60 (5.8)	516 (10.2)	27 (5.6)	522 (16.6)
Illinois		13 (3.6)	522 (19.6)	56 (5.8)	513 (9.2)	31 (6.8)	505 (9.8)
Canada		13 (2.0)	550 (8.1)	62 (3.4)	537 (3.5)	26 (3.0)	518 (4.9)
Fremont/Lincoln/WestSide PS, NE	r	13 (1.1)	491 (21.9)	66 (1.7)	498 (12.8)	22 (1.1)	459 (21.4)
Netherlands		12 (3.5)	561 (12.7)	60 (6.1)	528 (10.3)	28 (5.2)	547 (9.5)
Russian Federation		11 (2.5)	557 (12.8)	74 (3.9)	523 (6.6)	15 (3.6)	518 (10.5)
Pennsylvania		10 (3.3)	512 (21.2)	67 (5.4)	518 (9.0)	22 (5.8)	489 (9.2)
Missouri		10 (3.9)	503 (26.1)	55 (5.9)	495 (6.8)	35 (5.4)	483 (10.3)
Rochester City Sch. Dist., NY		10 (2.9)	443 (19.4)	73 (3.7)	444 (8.3)	17 (2.1)	429 (12.3)
North Carolina		10 (2.7)	522 (19.0)	69 (4.6)	493 (8.7)	21 (4.3)	476 (13.8)
Chicago Public Schools, IL		9 (5.7)	447 (9.3)	67 (8.5)	476 (6.5)	23 (9.1)	448 (13.0)
Oregon		8 (2.7)	561 (16.1)	64 (5.0)	518 (6.0)	28 (4.9)	494 (12.8)
Singapore		7 (2.1)	617 (25.9)	47 (4.0)	607 (8.8)	47 (4.4)	599 (8.2)
Hong Kong, SAR		6 (2.2)	597 (13.7)	56 (3.6)	591 (5.7)	38 (3.7)	570 (8.1)
England		3 (1.4)	533 (24.8)	66 (3.5)	519 (7.2)	31 (3.4)	490 (7.6)
Belgium (Flemish)		1 (0.4)	~ ~	39 (3.1)	592 (4.9)	61 (3.1)	540 (5.4)
International Avg. (All Countries)		15 (0.5)	493 (3.5)	61 (0.7)	490 (1.0)	24 (0.6)	479 (1.5)

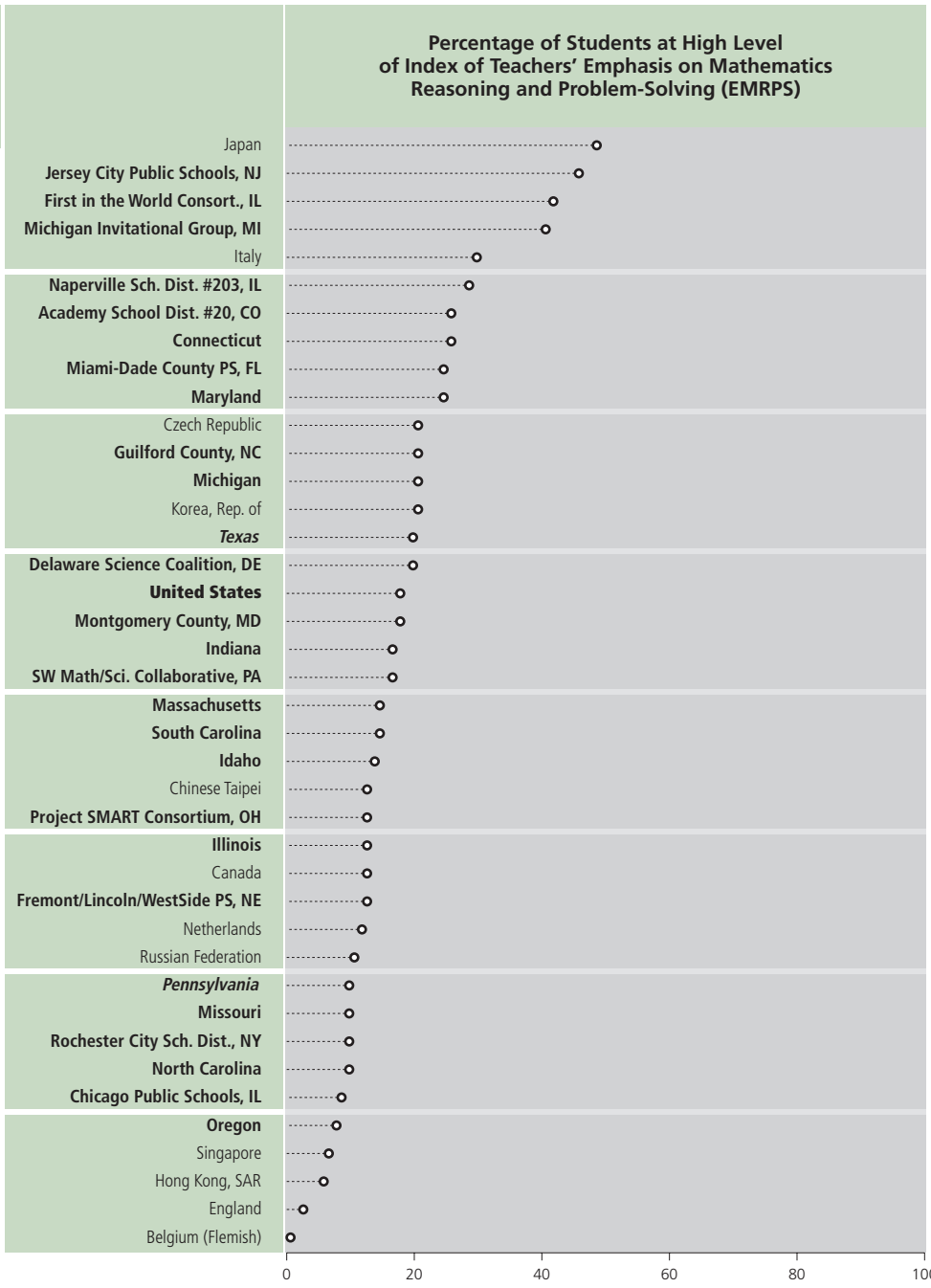
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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.



SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

How Are Calculators and Computers Used?

Exhibit 6

	Percentage of Students Having Access to Calculators in Class	Policy on Use of Calculators During Mathematics Lessons for Students Having Access					
		Unrestricted Use		Restricted Use		Calculators Not Permitted	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Countries							
United States	96 (1.2)	34 (3.3)	524 (6.7)	66 (3.3)	493 (4.5)	0 (0.2)	~ ~
Belgium (Flemish)	94 (2.6)	13 (2.3)	580 (8.7)	87 (2.4)	560 (5.6)	1 (0.4)	~ ~
Canada	96 (1.1)	40 (3.3)	537 (4.5)	60 (3.3)	531 (4.5)	0 (0.0)	~ ~
Chinese Taipei	51 (4.6)	13 (3.9)	576 (13.0)	85 (4.3)	577 (5.7)	3 (2.0)	599 (76.8)
Czech Republic	94 (2.4)	7 (2.7)	517 (13.4)	91 (3.1)	522 (4.7)	2 (1.5)	~ ~
England	s 100 (0.3)	s 14 (2.2)	547 (16.0)	86 (2.2)	504 (5.2)	0 (0.0)	~ ~
Hong Kong, SAR	99 (0.5)	67 (4.3)	579 (5.2)	32 (4.2)	590 (6.6)	1 (0.0)	~ ~
Italy	87 (2.0)	10 (2.6)	467 (12.0)	84 (3.1)	482 (4.6)	6 (1.6)	465 (16.9)
Japan	34 (4.3)	13 (3.9)	579 (5.4)	85 (4.4)	579 (5.1)	2 (0.2)	~ ~
Korea, Rep. of	28 (3.4)	5 (3.3)	601 (9.0)	77 (6.3)	589 (4.6)	18 (5.7)	586 (9.0)
Netherlands	100 (0.0)	85 (4.1)	540 (7.8)	15 (4.1)	522 (18.5)	0 (0.0)	~ ~
Russian Federation	– –	12 (2.5)	547 (16.2)	78 (3.4)	520 (6.2)	10 (2.3)	546 (8.7)
Singapore	100 (0.0)	31 (4.7)	622 (11.0)	69 (4.7)	597 (6.2)	0 (0.0)	~ ~
States							
Connecticut	r 96 (2.2)	r 37 (7.4)	548 (13.2)	63 (7.4)	512 (9.7)	0 (0.0)	~ ~
Idaho	r 90 (5.1)	r 23 (6.5)	510 (13.4)	75 (6.6)	490 (10.4)	2 (0.2)	~ ~
Illinois	94 (3.9)	34 (5.4)	529 (8.8)	65 (5.4)	510 (7.2)	0 (0.0)	~ ~
Indiana	94 (2.6)	22 (5.2)	519 (10.7)	75 (5.6)	519 (9.2)	3 (2.0)	492 (7.4)
Maryland	r 100 (0.1)	r 42 (6.2)	509 (7.9)	58 (6.2)	468 (7.4)	0 (0.0)	~ ~
Massachusetts	97 (2.0)	36 (6.2)	537 (9.2)	64 (6.2)	498 (6.5)	0 (0.0)	~ ~
Michigan	99 (0.7)	55 (6.3)	530 (7.3)	45 (6.3)	517 (11.2)	0 (0.0)	~ ~
Missouri	95 (3.2)	45 (6.6)	492 (8.4)	55 (6.6)	494 (6.9)	0 (0.0)	~ ~
North Carolina	99 (0.8)	29 (6.2)	485 (14.1)	70 (6.3)	496 (7.1)	1 (0.8)	~ ~
Oregon	100 (0.3)	52 (6.2)	526 (8.9)	48 (6.2)	502 (6.7)	0 (0.0)	~ ~
Pennsylvania	89 (5.9)	32 (4.6)	554 (9.9)	66 (4.8)	495 (8.0)	2 (0.2)	~ ~
South Carolina	89 (4.8)	12 (3.5)	539 (29.9)	83 (4.9)	504 (8.1)	5 (2.9)	457 (26.6)
Texas	93 (2.8)	19 (4.0)	562 (16.1)	77 (5.1)	514 (11.2)	5 (2.7)	475 (52.8)
Districts and Consortia							
Academy School Dist. #20, CO	99 (0.2)	57 (0.4)	560 (2.0)	43 (0.4)	497 (2.8)	0 (0.0)	~ ~
Chicago Public Schools, IL	94 (3.9)	6 (3.6)	473 (29.3)	91 (4.7)	468 (6.9)	3 (0.3)	473 (3.3)
Delaware Science Coalition, DE	r 95 (3.5)	r 39 (6.0)	458 (18.1)	59 (6.3)	497 (12.4)	2 (0.1)	~ ~
First in the World Consort., IL	100 (0.0)	65 (4.7)	569 (6.6)	35 (4.7)	538 (8.9)	0 (0.0)	~ ~
Fremont/Lincoln/WestSide PS, NE	100 (0.0)	26 (9.5)	470 (12.6)	74 (9.5)	493 (11.9)	0 (0.0)	~ ~
Guilford County, NC	97 (0.6)	22 (3.9)	547 (12.4)	78 (3.9)	497 (10.7)	0 (0.0)	~ ~
Jersey City Public Schools, NJ	100 (0.0)	93 (5.0)	469 (7.0)	7 (5.0)	601 (5.3)	0 (0.0)	~ ~
Miami-Dade County PS, FL	s 88 (7.8)	s 25 (7.4)	446 (33.3)	75 (7.4)	404 (16.3)	0 (0.0)	~ ~
Michigan Invitational Group, MI	98 (1.7)	68 (6.5)	535 (6.7)	32 (6.5)	533 (7.5)	0 (0.0)	~ ~
Montgomery County, MD	s 100 (0.0)	s 69 (5.8)	547 (8.2)	31 (5.8)	505 (10.9)	0 (0.0)	~ ~
Naperville Sch. Dist. #203, IL	100 (0.0)	60 (3.1)	572 (5.2)	40 (3.1)	563 (6.7)	0 (0.0)	~ ~
Project SMART Consortium, OH	88 (4.8)	25 (5.6)	567 (21.0)	70 (6.3)	517 (8.6)	5 (3.3)	478 (10.1)
Rochester City Sch. Dist., NY	83 (3.1)	12 (5.1)	521 (24.6)	83 (6.1)	431 (5.6)	5 (3.8)	533 (8.2)
SW Math/Sci. Collaborative, PA	100 (0.0)	45 (7.1)	541 (9.8)	55 (7.1)	498 (10.7)	0 (0.0)	~ ~
International Avg. (All Countries)	73 (0.5)	21 (0.5)	490 (2.2)	67 (0.7)	488 (1.2)	12 (0.6)	464 (3.5)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by teachers.

* The use of calculators on TIMSS was not allowed in 1995 or in 1999.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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.

Index of Emphasis on Calculators in Mathematics Class

Index based on students' reports of the frequency of using calculators in mathematics lessons and teachers' reports of students' use of calculators in mathematics class for five activities: checking answers; tests and exams; routine computation; solving complex problems; and exploring number concepts (see reference exhibits R3.9-R3.10). High level indicates the student reported using calculators in mathematics lessons always or pretty often, and the teacher reported students use calculators at least once or twice a week for any of the tasks. Low level indicates the student reported using calculators once in a while or never, and the teacher reported students use calculators never or hardly ever for all of the tasks. Medium level includes all other possible combinations of responses.

		High ECMC		Medium ECMC		Low ECMC	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Netherlands		95 (1.1)	538 (7.2)	5 (1.1)	512 (23.5)	0 (0.0)	~ ~
Jersey City Public Schools, NJ	r	93 (0.8)	485 (9.8)	7 (0.8)	432 (12.3)	0 (0.0)	~ ~
Naperville Sch. Dist. #203, IL		92 (0.8)	570 (2.8)	8 (0.8)	549 (14.2)	0 (0.0)	~ ~
Montgomery County, MD	s	90 (3.6)	540 (7.5)	10 (3.6)	484 (17.8)	0 (0.0)	~ ~
Academy School Dist. #20, CO		90 (0.8)	540 (1.8)	8 (0.8)	461 (5.7)	1 (0.3)	~ ~
Michigan Invitational Group, MI		90 (3.2)	536 (5.0)	9 (2.8)	506 (8.8)	2 (0.1)	~ ~
Oregon		87 (2.3)	521 (5.2)	13 (2.2)	485 (9.1)	0 (0.0)	~ ~
First in the World Consort., IL		86 (2.4)	560 (5.8)	14 (2.4)	547 (17.7)	0 (0.0)	~ ~
Singapore		85 (1.6)	611 (6.3)	15 (1.6)	567 (7.1)	0 (0.0)	~ ~
Fremont/Lincoln/WestSide PS, NE		83 (4.2)	492 (12.0)	17 (4.2)	463 (9.8)	0 (0.0)	~ ~
England	s	80 (2.3)	524 (5.7)	19 (2.2)	462 (6.5)	1 (0.7)	~ ~
North Carolina		79 (3.6)	500 (5.7)	20 (3.6)	480 (11.8)	1 (0.6)	~ ~
Canada	r	79 (1.9)	537 (3.0)	18 (1.7)	523 (4.7)	3 (0.9)	548 (6.8)
Michigan		78 (3.3)	530 (6.8)	21 (3.1)	507 (7.6)	1 (0.9)	~ ~
Missouri		78 (4.1)	497 (5.4)	17 (4.5)	476 (14.9)	5 (3.1)	461 (77.6)
Connecticut	r	76 (5.1)	528 (9.1)	19 (3.7)	505 (14.6)	5 (2.0)	497 (43.9)
Hong Kong, SAR		75 (1.9)	586 (4.4)	25 (1.8)	577 (6.3)	0 (0.2)	~ ~
Guilford County, NC		73 (5.5)	506 (9.6)	25 (5.4)	512 (15.5)	2 (0.4)	~ ~
Illinois		72 (4.7)	526 (6.2)	22 (3.4)	487 (7.8)	7 (3.8)	436 (7.8)
SW Math/Sci. Collaborative, PA		70 (5.4)	528 (7.6)	29 (5.1)	499 (11.1)	1 (0.7)	~ ~
Maryland	r	66 (5.3)	503 (4.7)	33 (5.3)	459 (9.3)	1 (0.5)	~ ~
United States	r	65 (3.2)	515 (4.5)	31 (2.9)	489 (6.4)	5 (1.2)	476 (10.8)
Massachusetts		64 (5.3)	518 (7.5)	33 (4.9)	505 (8.2)	3 (1.8)	497 (84.9)
Pennsylvania		63 (6.1)	521 (8.3)	25 (3.6)	497 (8.5)	12 (5.7)	492 (8.5)
Idaho	r	61 (6.2)	499 (9.6)	30 (3.4)	488 (13.8)	9 (4.6)	495 (12.5)
Delaware Science Coalition, DE	r	58 (4.1)	486 (11.9)	39 (3.8)	484 (14.3)	4 (2.6)	527 (29.9)
Indiana		56 (4.8)	523 (8.4)	39 (4.2)	513 (9.1)	5 (2.4)	492 (20.5)
Italy		52 (2.4)	486 (4.6)	37 (2.3)	474 (5.7)	11 (1.8)	483 (12.0)
Project SMART Consortium, OH		50 (2.9)	545 (11.6)	39 (4.3)	502 (8.3)	10 (3.5)	483 (8.9)
Miami-Dade County PS, FL	s	46 (7.6)	419 (16.1)	43 (5.3)	420 (12.5)	11 (7.3)	475 (56.9)
South Carolina		45 (5.2)	525 (10.4)	43 (4.6)	491 (12.4)	12 (3.4)	477 (21.9)
Belgium (Flemish)		39 (2.7)	571 (6.3)	54 (2.7)	562 (6.9)	7 (2.6)	532 (27.9)
Texas	r	37 (4.4)	550 (10.7)	52 (4.7)	504 (13.0)	12 (4.5)	519 (17.2)
Czech Republic		35 (3.2)	528 (7.1)	60 (3.5)	517 (4.7)	5 (2.0)	507 (26.2)
Chicago Public Schools, IL		32 (4.6)	471 (8.4)	53 (6.3)	471 (8.6)	15 (8.3)	446 (10.8)
Russian Federation		29 (2.3)	522 (9.3)	60 (2.1)	528 (6.3)	12 (2.4)	539 (13.3)
Rochester City Sch. Dist., NY	r	24 (4.9)	458 (19.4)	60 (4.4)	449 (6.3)	16 (3.6)	448 (16.9)
Chinese Taipei		2 (0.4)	~ ~	48 (4.0)	576 (4.8)	50 (4.2)	598 (5.4)
Korea, Rep. of		0 (0.3)	~ ~	29 (3.3)	587 (4.0)	71 (3.3)	587 (2.4)
Japan		0 (0.1)	~ ~	21 (3.2)	573 (6.4)	79 (3.2)	579 (2.2)
International Avg. (All Countries)		32 (0.3)	481 (1.8)	42 (0.5)	484 (1.2)	26 (0.5)	481 (3.3)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

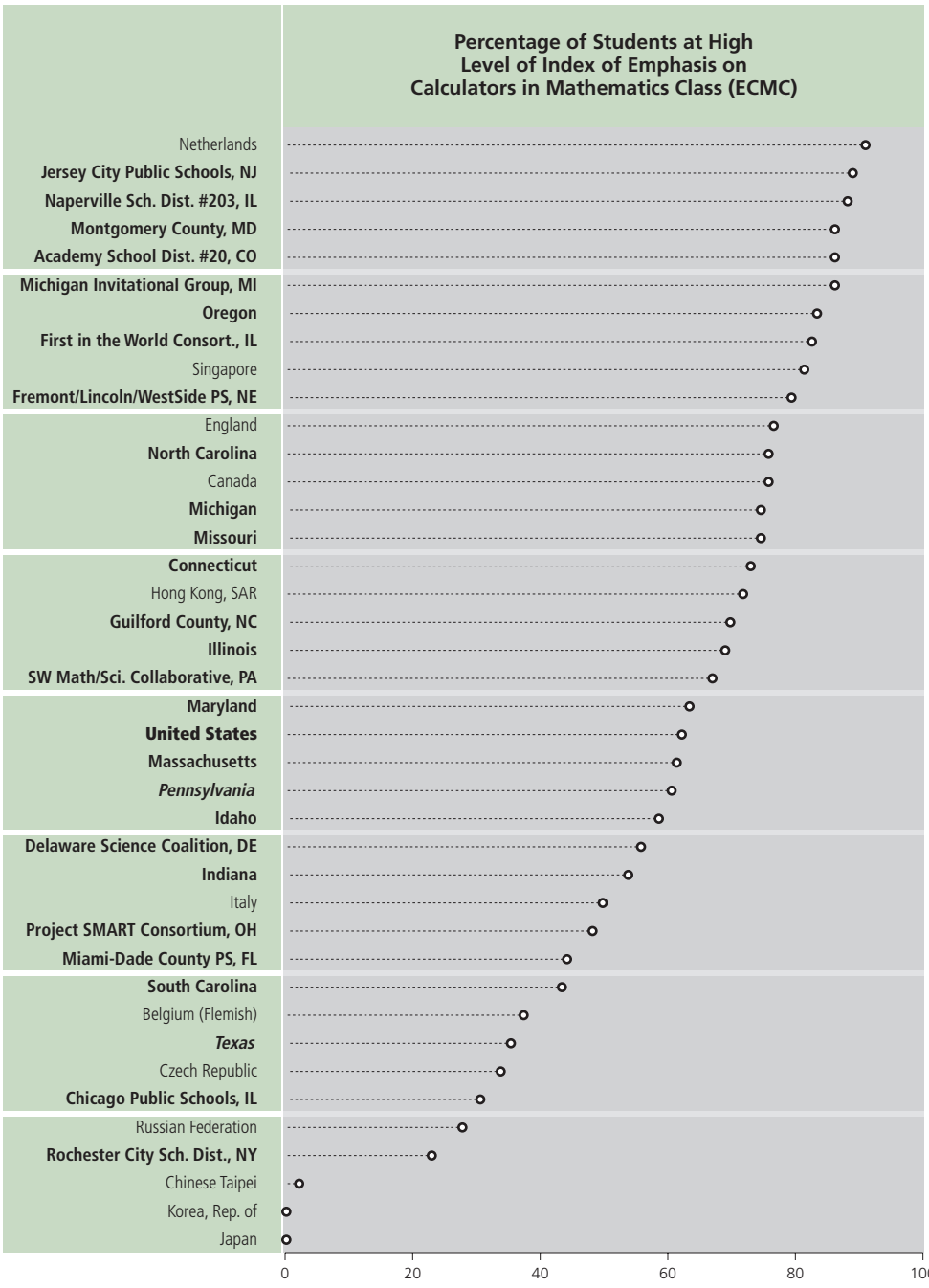
* The use of calculators on TIMSS was not allowed in 1995 or in 1999.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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 and/or student response data available for 70-84% of students. An "s" indicates teacher and/or student response data available for 50-69% of students.



SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Exhibit 6.14 Frequency of Computer Use in Mathematics Class

8th Grade Mathematics

	Almost Always or Pretty Often		Once in a While		Never	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Countries						
United States	12 (1.1)	463 (7.3)	27 (2.0)	520 (5.2)	61 (2.7)	506 (4.0)
Belgium (Flemish)	1 (0.4)	~ ~	5 (1.2)	536 (17.4)	93 (1.3)	562 (3.1)
Canada	8 (0.7)	507 (7.1)	25 (1.5)	534 (3.8)	67 (1.6)	534 (2.5)
Chinese Taipei	13 (0.6)	548 (7.5)	21 (0.6)	564 (5.2)	66 (0.9)	601 (3.8)
Czech Republic	2 (0.7)	~ ~	14 (2.4)	526 (8.4)	84 (2.6)	520 (3.8)
England	11 (1.7)	466 (10.4)	43 (2.2)	512 (5.1)	46 (2.7)	492 (5.2)
Hong Kong, SAR	8 (0.5)	561 (9.5)	18 (0.8)	577 (6.2)	75 (1.1)	587 (4.1)
Italy	11 (1.3)	464 (7.4)	17 (1.6)	489 (5.5)	72 (2.3)	482 (4.0)
Japan	2 (0.5)	~ ~	21 (2.3)	576 (3.7)	76 (2.7)	581 (2.0)
Korea, Rep. of	3 (0.3)	567 (7.9)	13 (0.7)	596 (3.9)	83 (0.8)	587 (2.2)
Netherlands	1 (0.2)	~ ~	19 (3.2)	543 (9.6)	80 (3.2)	541 (8.2)
Russian Federation	1 (0.2)	~ ~	3 (0.4)	513 (11.1)	97 (0.4)	530 (5.7)
Singapore	11 (0.8)	590 (11.0)	43 (2.5)	625 (6.8)	46 (2.7)	589 (6.1)
States						
Connecticut	12 (1.9)	483 (9.6)	31 (2.9)	529 (9.7)	57 (3.8)	513 (9.9)
Idaho	7 (0.9)	434 (15.0)	17 (1.5)	507 (8.5)	76 (2.1)	498 (7.1)
Illinois	12 (1.8)	474 (7.7)	36 (2.8)	521 (8.6)	52 (4.0)	510 (7.9)
Indiana	10 (1.8)	479 (16.5)	25 (3.6)	517 (9.9)	65 (5.1)	522 (7.0)
Maryland	13 (1.7)	447 (11.1)	36 (2.0)	504 (7.5)	51 (2.5)	507 (6.8)
Massachusetts	13 (2.7)	488 (9.5)	24 (2.7)	530 (7.5)	64 (4.3)	513 (5.7)
Michigan	9 (1.3)	467 (9.6)	28 (3.4)	540 (10.6)	63 (3.6)	518 (6.8)
Missouri	9 (1.7)	453 (7.7)	20 (2.6)	489 (7.5)	71 (3.4)	496 (6.1)
North Carolina	13 (2.2)	456 (10.0)	34 (2.4)	500 (8.0)	53 (3.6)	503 (7.6)
Oregon	12 (1.3)	482 (11.1)	26 (1.9)	534 (6.4)	62 (2.5)	515 (5.8)
Pennsylvania	8 (1.0)	465 (11.3)	22 (2.4)	524 (7.7)	70 (3.0)	509 (6.5)
South Carolina	11 (1.5)	444 (8.4)	25 (2.4)	514 (10.5)	64 (3.5)	509 (7.6)
Texas	14 (3.0)	489 (16.3)	33 (3.1)	533 (10.3)	52 (4.8)	522 (10.2)
Districts and Consortia						
Academy School Dist. #20, CO	9 (0.9)	506 (10.1)	32 (1.2)	547 (3.4)	59 (1.4)	523 (2.9)
Chicago Public Schools, IL	15 (3.4)	437 (12.8)	28 (4.1)	469 (8.4)	58 (7.1)	467 (6.8)
Delaware Science Coalition, DE	9 (1.0)	415 (9.0)	16 (1.7)	495 (16.3)	75 (1.9)	492 (9.0)
First in the World Consort., IL	8 (1.4)	518 (23.4)	44 (3.8)	571 (6.0)	48 (4.3)	556 (8.5)
Fremont/Lincoln/WestSide PS, NE	13 (1.2)	463 (13.0)	37 (3.5)	513 (13.9)	51 (4.1)	478 (6.8)
Guilford County, NC	7 (0.9)	478 (11.7)	43 (1.7)	526 (8.1)	50 (2.1)	510 (10.0)
Jersey City Public Schools, NJ	24 (2.5)	462 (15.5)	41 (1.7)	483 (7.7)	35 (2.8)	480 (11.9)
Miami-Dade County PS, FL	14 (2.1)	361 (16.3)	16 (2.0)	428 (17.3)	70 (3.3)	439 (7.6)
Michigan Invitational Group, MI	7 (0.9)	502 (20.5)	24 (1.9)	543 (6.2)	69 (2.2)	533 (5.9)
Montgomery County, MD	10 (0.9)	488 (9.9)	37 (2.2)	546 (6.2)	53 (2.4)	542 (5.3)
Naperville Sch. Dist. #203, IL	8 (0.7)	549 (9.9)	44 (2.5)	579 (5.2)	48 (2.9)	565 (4.6)
Project SMART Consortium, OH	17 (2.6)	494 (9.7)	36 (3.2)	536 (10.2)	47 (3.9)	521 (8.6)
Rochester City Sch. Dist., NY r	14 (1.6)	444 (6.2)	14 (1.9)	450 (14.2)	72 (2.8)	457 (7.3)
SW Math/Sci. Collaborative, PA	8 (1.6)	486 (17.9)	28 (4.3)	530 (11.1)	64 (4.9)	516 (7.6)
International Avg. (All Countries)	5 (0.1)	455 (2.8)	14 (0.2)	488 (1.5)	80 (0.3)	498 (0.7)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by students.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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.

Exhibit 6.15 Access to the Internet and Use of the Internet for Mathematics Projects

8th Grade Mathematics

	Percentage of Students				
	Have Access to the Internet			Use the Internet for Mathematics Projects at Least Once a Month	
	At Home	At School	Elsewhere	Use E-mail to Work with Students in Other Schools	Use the World Wide Web to Access Information
Countries					
United States	59 (1.7)	76 (3.2)	81 (0.9)	13 (0.5)	17 (0.8)
Belgium (Flemish)	27 (0.9)	44 (2.7)	64 (1.1)	5 (0.5)	9 (0.9)
Canada	57 (1.3)	87 (1.5)	84 (0.8)	8 (0.4)	12 (0.5)
Chinese Taipei	32 (1.1)	61 (3.2)	41 (0.8)	10 (0.4)	12 (0.5)
Czech Republic	7 (0.7)	16 (2.6)	39 (1.6)	3 (0.4)	5 (0.4)
England	36 (1.1)	65 (3.1)	53 (1.3)	8 (0.7)	18 (0.9)
Hong Kong, SAR	34 (1.1)	26 (2.2)	34 (0.8)	10 (0.6)	11 (0.6)
Italy	13 (0.7)	20 (2.2)	27 (1.1)	7 (0.6)	8 (0.7)
Japan	r 13 (0.9)	6 (1.6)	s 2 (0.3)	8 (0.8)	7 (0.8)
Korea, Rep. of	23 (0.7)	6 (1.2)	36 (1.0)	4 (0.3)	6 (0.3)
Netherlands	41 (1.8)	53 (5.4)	74 (1.8)	6 (0.7)	6 (0.9)
Russian Federation	3 (0.3)	1 (0.4)	17 (0.9)	3 (0.3)	4 (0.4)
Singapore	47 (1.9)	48 (3.2)	39 (0.9)	9 (0.7)	15 (0.8)
States					
Connecticut	71 (2.5)	85 (2.3)	85 (0.8)	14 (1.2)	20 (1.5)
Idaho	53 (2.7)	84 (4.1)	78 (1.4)	11 (0.9)	12 (1.0)
Illinois	56 (2.3)	79 (3.6)	79 (1.5)	12 (0.8)	16 (1.2)
Indiana	59 (2.0)	70 (5.8)	85 (1.5)	10 (1.0)	13 (1.1)
Maryland	66 (1.8)	77 (3.2)	83 (0.8)	13 (0.8)	18 (1.0)
Massachusetts	68 (2.1)	78 (3.6)	83 (1.3)	14 (1.0)	18 (1.1)
Michigan	61 (2.4)	80 (3.7)	83 (1.2)	10 (0.9)	12 (1.1)
Missouri	49 (1.5)	77 (5.3)	82 (1.0)	11 (0.8)	15 (0.7)
North Carolina	51 (2.0)	80 (2.7)	82 (0.9)	13 (0.9)	19 (1.3)
Oregon	61 (2.1)	85 (4.4)	82 (1.7)	11 (0.6)	14 (1.1)
Pennsylvania	64 (2.7)	69 (4.0)	82 (0.9)	11 (0.8)	16 (1.5)
South Carolina	52 (2.2)	92 (1.5)	81 (1.3)	12 (0.9)	19 (1.3)
Texas	54 (3.5)	82 (3.5)	79 (2.2)	14 (1.1)	19 (1.2)
Districts and Consortia					
Academy School Dist. #20, CO	84 (1.1)	93 (0.7)	78 (1.2)	12 (0.9)	17 (1.1)
Chicago Public Schools, IL	35 (2.4)	32 (6.8)	72 (1.9)	10 (1.2)	16 (1.6)
Delaware Science Coalition, DE	66 (2.3)	88 (1.5)	84 (1.0)	17 (1.3)	20 (1.7)
First in the World Consort., IL	82 (1.0)	98 (0.6)	86 (1.7)	13 (1.1)	19 (1.3)
Fremont/Lincoln/WestSide PS, NE	61 (1.9)	91 (1.4)	85 (1.6)	11 (1.3)	16 (1.8)
Guilford County, NC	64 (1.9)	89 (1.0)	89 (1.1)	12 (1.2)	19 (1.5)
Jersey City Public Schools, NJ	38 (2.2)	92 (1.2)	71 (2.1)	19 (1.4)	33 (2.3)
Miami-Dade County PS, FL	47 (3.1)	59 (6.7)	73 (2.4)	20 (2.5)	22 (1.8)
Michigan Invitational Group, MI	62 (2.1)	90 (1.3)	83 (1.4)	7 (0.8)	14 (1.4)
Montgomery County, MD	77 (1.8)	92 (1.0)	74 (2.2)	13 (1.2)	18 (1.2)
Naperville Sch. Dist. #203, IL	86 (1.0)	98 (0.4)	87 (0.8)	10 (0.8)	14 (1.3)
Project SMART Consortium, OH	63 (1.8)	83 (1.1)	91 (0.7)	12 (1.2)	15 (0.9)
Rochester City Sch. Dist., NY	31 (2.3)	31 (1.6)	74 (2.0)	13 (1.7)	15 (1.0)
SW Math/Sci. Collaborative, PA	58 (2.7)	80 (4.7)	83 (1.6)	10 (0.8)	14 (1.3)
International Avg. (All Countries)	19 (0.2)	27 (0.4)	43 (0.2)	8 (0.1)	10 (0.1)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by students.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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. An "s" indicates a 50-69% student response rate.

One theme in recommendations for educational reform is to make assessment a continuous process that relies on a variety of methods and sources of data, rather than on a few high-stakes tests. Exhibit 6.17 shows teachers' reports about the weight given to various types of assessment. Teachers in the United States as a whole and in most of the Benchmarking jurisdictions reported placing less weight on informal assessment approaches than did teachers internationally. On average internationally, the most emphasis was placed on students' responses in class, which were given quite a lot or a great deal of weight for 77 percent of the students. The next heaviest weight internationally was given to teacher-made tests requiring explanations (67 percent of students on average) and to observations of students (64 percent). While the use of teacher-made tests requiring explanations was similar to the international average in many Benchmarking jurisdictions, students' responses in class and observations of students were given less weight in the United States as a whole and in most Benchmarking entities (generally for about half the students or less). Exceptions included Jersey City and Miami-Dade, as well as Chicago to some extent.

Internationally, the least weight reportedly was given to external standardized tests, teacher-made objective tests, and projects or practical exercises. On average across countries, about two-fifths of the students (from 37 to 42 percent) had mathematics teachers who reported giving quite a lot or a great deal of weight to such assessments. Across the Benchmarking entities, generally even less weight than internationally was given to external standardized tests. The jurisdictions more similar to the international average were Michigan, North Carolina, Texas, the Academy School District, and Jersey City.

As shown in Exhibit R3.13 in the reference section, eighth-grade students reported substantial variation in the frequency of testing in mathematics class. On average internationally, students were split about in half, with 57 percent reporting having a quiz or test in class almost always or pretty often and 43 percent reporting such testing only once in a while or never. At least three-fourths of the students reported frequent testing in Belgium (Flemish), Canada, the Russian Federation, and the United States. Across the Benchmarking jurisdictions about 80 to 90 percent of the students reported frequent testing. In contrast, about half or more reported infrequent testing in the Czech Republic, Hong Kong, Italy, Japan, and Korea. Within participating entities, there was a tendency for the most frequent testing to be associated with lower-achieving students. One could argue that these students can least afford time diverted from their instructional program. However, teachers may provide shorter lessons and follow-up quizzes for lower-achieving students to monitor their grasp of the subject matter more closely.

Index of Teachers' Emphasis on Mathematics Homework

Index based on teachers' responses to two questions about how often they usually assign mathematics homework and how many minutes of mathematics homework they usually assign students (see reference exhibit R3.11). High level indicates the assignment of more than 30 minutes of homework at least once or twice a week. Low level indicates the assignment of less than 30 minutes of homework less than once a week or never assigning homework. Medium level includes all other possible combinations of responses.

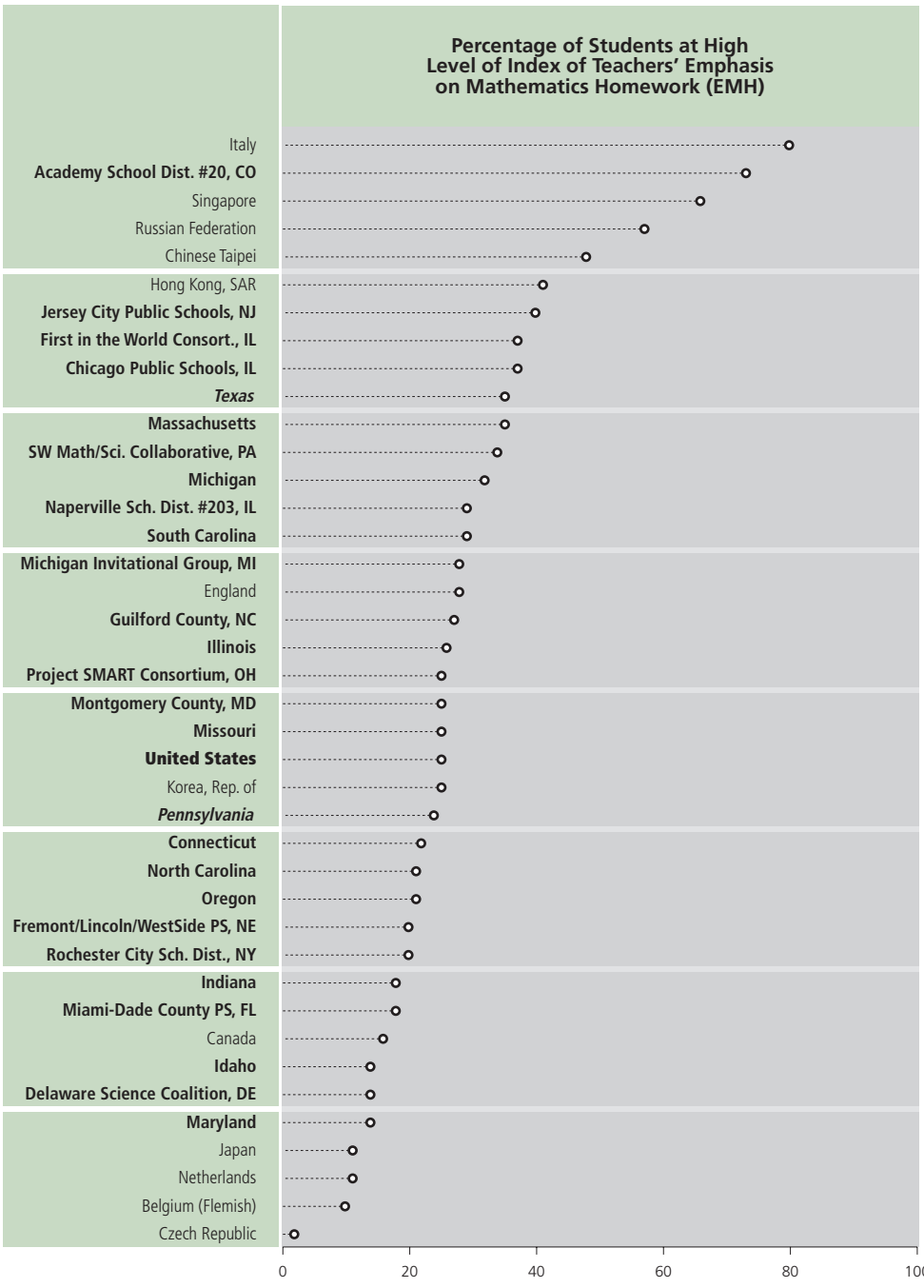
	High EMH		Medium EMH		Low EMH	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Italy	80 (3.0)	479 (4.9)	20 (2.9)	479 (7.9)	0 (0.0)	~ ~
Academy School Dist. #20, CO	73 (0.4)	546 (1.6)	25 (0.4)	483 (4.0)	2 (0.1)	~ ~
Singapore	66 (4.6)	613 (6.9)	34 (4.6)	587 (10.6)	0 (0.0)	~ ~
Russian Federation	57 (4.6)	527 (6.7)	43 (4.6)	525 (7.8)	0 (0.0)	~ ~
Chinese Taipei	48 (3.6)	593 (6.4)	50 (3.7)	580 (5.5)	2 (1.1)	~ ~
Hong Kong, SAR	41 (4.3)	580 (5.9)	57 (4.4)	585 (5.8)	2 (1.2)	~ ~
Jersey City Public Schools, NJ	40 (5.7)	492 (16.0)	60 (5.7)	464 (8.3)	0 (0.0)	~ ~
First in the World Consort., IL	37 (5.1)	595 (12.0)	63 (5.1)	533 (7.2)	0 (0.0)	~ ~
Chicago Public Schools, IL	37 (9.1)	472 (12.9)	63 (9.1)	457 (7.5)	0 (0.0)	~ ~
Texas	35 (6.2)	546 (16.3)	63 (6.7)	500 (9.0)	2 (1.5)	~ ~
Massachusetts	35 (6.5)	525 (9.9)	65 (6.5)	506 (6.9)	0 (0.0)	~ ~
SW Math/Sci. Collaborative, PA	34 (5.3)	552 (13.5)	65 (5.3)	501 (8.8)	1 (0.9)	~ ~
Michigan	32 (4.3)	549 (15.0)	68 (4.3)	502 (7.0)	0 (0.0)	~ ~
Naperville Sch. Dist. #203, IL	29 (2.3)	588 (3.5)	68 (2.3)	559 (4.1)	2 (0.1)	~ ~
South Carolina	29 (6.2)	527 (14.1)	71 (6.2)	491 (8.8)	0 (0.0)	~ ~
Michigan Invitational Group, MI	28 (6.9)	570 (14.9)	72 (6.9)	517 (5.3)	0 (0.0)	~ ~
England	28 (2.9)	529 (8.2)	71 (3.0)	485 (4.7)	1 (0.5)	~ ~
Guilford County, NC	27 (6.0)	539 (13.1)	71 (6.5)	504 (11.0)	2 (0.1)	~ ~
Illinois	26 (5.4)	530 (11.6)	74 (5.4)	502 (7.6)	0 (0.0)	~ ~
Project SMART Consortium, OH	25 (5.7)	567 (16.1)	75 (5.7)	505 (6.8)	0 (0.0)	~ ~
Montgomery County, MD	25 (4.1)	569 (10.5)	74 (4.1)	526 (3.4)	0 (0.1)	~ ~
Missouri	25 (5.7)	498 (15.8)	74 (5.6)	487 (5.7)	1 (1.1)	~ ~
United States	25 (2.1)	528 (9.6)	75 (2.0)	495 (3.8)	1 (0.6)	~ ~
Korea, Rep. of	25 (3.4)	587 (4.2)	62 (3.6)	586 (2.9)	14 (2.6)	593 (4.4)
Pennsylvania	24 (5.2)	535 (12.6)	76 (5.2)	499 (6.3)	0 (0.0)	~ ~
Connecticut	22 (5.1)	545 (20.3)	78 (5.1)	503 (9.3)	0 (0.0)	~ ~
North Carolina	21 (5.1)	534 (13.1)	75 (5.0)	486 (6.8)	4 (2.2)	463 (27.7)
Oregon	21 (4.5)	558 (12.0)	76 (4.8)	506 (6.0)	3 (2.0)	453 (68.7)
Fremont/Lincoln/WestSide PS, NE	20 (2.9)	541 (29.6)	80 (2.9)	475 (7.1)	0 (0.0)	~ ~
Rochester City Sch. Dist., NY	20 (5.1)	502 (11.5)	80 (5.1)	430 (6.4)	0 (0.0)	~ ~
Indiana	18 (4.8)	560 (11.2)	82 (4.8)	504 (7.4)	0 (0.0)	~ ~
Miami-Dade County PS, FL	18 (4.6)	411 (15.3)	82 (4.6)	424 (10.5)	0 (0.0)	~ ~
Canada	16 (2.3)	527 (6.2)	83 (2.4)	532 (2.8)	1 (0.6)	~ ~
Idaho	14 (3.2)	516 (20.7)	83 (3.4)	492 (7.1)	3 (1.0)	476 (38.3)
Delaware Science Coalition, DE	14 (4.4)	528 (18.5)	86 (4.4)	472 (9.4)	0 (0.0)	~ ~
Maryland	14 (2.5)	524 (16.6)	85 (2.8)	491 (6.5)	2 (1.5)	~ ~
Japan	11 (2.5)	578 (3.9)	55 (4.3)	580 (2.8)	34 (4.3)	574 (5.3)
Netherlands	11 (2.6)	555 (14.6)	88 (2.6)	538 (8.0)	1 (0.5)	~ ~
Belgium (Flemish)	10 (2.0)	582 (8.6)	73 (3.6)	557 (5.5)	17 (3.2)	548 (15.0)
Czech Republic	2 (1.2)	~ ~	85 (3.8)	520 (4.8)	13 (3.6)	513 (9.9)
International Avg. (All Countries)	35 (0.6)	491 (1.8)	62 (0.6)	485 (1.0)	4 (0.2)	484 (4.0)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

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

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



SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

	Percentage of Students by Type of Assessment						
	External Standardized Tests	Teacher-Made Tests Requiring Explanations	Teacher-Made Objective Tests	Homework Assignments	Projects or Practical Exercises	Observations of Students	Students' Responses in Class
Countries							
United States	28 (3.0)	55 (3.3)	28 (3.5)	56 (4.3)	33 (3.5)	40 (3.2)	41 (3.6)
Belgium (Flemish)	12 (3.0)	94 (1.4)	11 (2.4)	23 (3.0)	12 (2.1)	17 (3.4)	52 (4.4)
Canada	21 (3.1)	61 (3.0)	r 26 (2.8)	r 51 (3.8)	r 38 (2.7)	r 34 (3.2)	42 (3.4)
Chinese Taipei	36 (4.0)	43 (4.0)	76 (3.4)	81 (3.2)	17 (3.4)	68 (3.1)	72 (3.6)
Czech Republic	53 (5.4)	97 (1.8)	9 (2.6)	26 (5.0)	23 (5.2)	80 (4.2)	98 (1.5)
England	s 51 (4.1)	s 35 (3.6)	s 7 (1.4)	s 81 (2.2)	s 41 (3.4)	s 78 (2.9)	s 78 (2.7)
Hong Kong, SAR	17 (3.2)	52 (4.2)	47 (3.6)	44 (4.0)	10 (2.6)	38 (4.3)	44 (4.3)
Italy	22 (3.2)	92 (2.2)	63 (3.8)	67 (3.6)	75 (3.1)	96 (1.4)	99 (0.6)
Japan	15 (2.9)	55 (4.4)	25 (3.9)	47 (4.0)	41 (4.0)	67 (4.1)	65 (4.3)
Korea, Rep. of	37 (3.8)	48 (3.7)	45 (3.7)	32 (3.6)	43 (3.3)	50 (4.1)	61 (4.1)
Netherlands	29 (5.5)	96 (1.8)	20 (5.8)	18 (4.7)	8 (2.6)	28 (4.7)	27 (5.4)
Russian Federation	– –	98 (1.0)	54 (4.4)	68 (3.7)	59 (3.8)	91 (2.2)	86 (2.5)
Singapore	36 (4.2)	22 (3.9)	5 (2.0)	61 (4.5)	37 (4.2)	46 (4.6)	52 (4.2)
States							
Connecticut	s 11 (3.7)	s 56 (7.3)	s 21 (6.8)	s 45 (5.6)	s 61 (8.5)	s 49 (8.6)	s 53 (7.3)
Idaho	r 25 (5.1)	r 37 (6.1)	r 21 (5.7)	r 79 (5.7)	r 27 (6.3)	r 29 (6.9)	r 33 (7.5)
Illinois	24 (4.4)	47 (5.9)	32 (5.7)	60 (5.9)	28 (5.5)	23 (4.6)	27 (5.4)
Indiana	28 (6.6)	61 (4.9)	27 (5.8)	60 (5.6)	23 (4.3)	33 (5.8)	29 (6.2)
Maryland	r 26 (6.0)	r 61 (5.5)	r 19 (4.9)	r 47 (6.0)	r 28 (3.5)	r 41 (6.4)	r 42 (6.4)
Massachusetts	19 (4.6)	64 (4.7)	20 (4.1)	56 (6.2)	41 (5.2)	53 (6.1)	57 (5.8)
Michigan	36 (7.3)	48 (5.8)	27 (6.2)	54 (6.0)	33 (5.4)	25 (5.1)	32 (5.2)
Missouri	21 (4.5)	60 (5.7)	24 (4.7)	73 (5.2)	45 (5.7)	42 (5.9)	36 (5.2)
North Carolina	39 (6.1)	44 (5.0)	48 (5.3)	58 (6.4)	34 (5.0)	46 (5.8)	48 (4.4)
Oregon	14 (3.9)	60 (6.4)	27 (6.4)	76 (6.0)	33 (6.2)	44 (6.3)	40 (6.1)
Pennsylvania	18 (4.3)	58 (5.3)	20 (5.4)	47 (6.5)	24 (5.1)	39 (6.7)	42 (6.6)
South Carolina	13 (2.6)	66 (7.3)	44 (5.6)	36 (5.4)	35 (6.8)	48 (5.9)	42 (5.4)
Texas	42 (6.0)	r 49 (6.1)	55 (6.9)	53 (6.9)	r 33 (5.9)	52 (6.6)	52 (6.1)
Districts and Consortia							
Academy School Dist. #20, CO	43 (0.4)	33 (0.3)	6 (0.2)	72 (0.3)	38 (0.4)	39 (0.4)	43 (0.4)
Chicago Public Schools, IL	26 (8.6)	51 (10.2)	60 (10.6)	59 (10.0)	41 (12.8)	56 (12.6)	71 (10.7)
Delaware Science Coalition, DE	r 23 (5.7)	r 64 (6.7)	r 13 (4.9)	r 41 (6.9)	r 37 (5.0)	r 41 (7.1)	r 43 (6.1)
First in the World Consort., IL	r 10 (3.5)	r 77 (4.9)	r 35 (7.4)	r 17 (4.4)	r 38 (5.3)	r 26 (8.2)	r 31 (4.8)
Fremont/Lincoln/WestSide PS, NE	8 (5.5)	42 (9.7)	37 (8.6)	49 (9.2)	20 (5.3)	29 (1.7)	r 19 (3.3)
Guilford County, NC	22 (4.1)	57 (5.2)	47 (5.9)	57 (6.7)	39 (7.1)	46 (5.9)	39 (6.5)
Jersey City Public Schools, NJ	63 (6.5)	96 (3.8)	58 (6.0)	40 (5.0)	82 (4.5)	82 (3.7)	82 (3.7)
Miami-Dade County PS, FL	s 21 (6.1)	s 66 (8.2)	s 35 (8.9)	s 67 (9.5)	s 51 (7.6)	s 67 (9.7)	s 77 (8.3)
Michigan Invitational Group, MI	11 (2.6)	74 (4.7)	9 (6.3)	59 (7.9)	41 (6.6)	41 (8.9)	35 (7.6)
Montgomery County, MD	s 24 (7.0)	s 77 (3.1)	s 16 (5.6)	s 40 (6.0)	s 28 (6.6)	s 26 (7.5)	s 21 (5.8)
Naperville Sch. Dist. #203, IL	16 (2.8)	54 (4.5)	16 (4.5)	48 (3.7)	33 (3.9)	39 (6.0)	29 (5.7)
Project SMART Consortium, OH	21 (5.4)	62 (6.5)	28 (6.5)	47 (6.2)	41 (6.6)	45 (7.6)	45 (7.2)
Rochester City Sch. Dist., NY	1 (0.0)	60 (4.2)	36 (6.6)	50 (5.8)	29 (5.7)	30 (5.2)	34 (6.2)
SW Math/Sci. Collaborative, PA	22 (5.7)	59 (6.8)	17 (5.0)	44 (7.6)	23 (5.8)	42 (4.6)	49 (5.7)
International Avg. (All Countries)	37 (0.6)	67 (0.6)	39 (0.6)	60 (0.6)	42 (0.6)	64 (0.6)	77 (0.5)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by teachers.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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.

In What Types of Professional Development Activities Do U.S. Mathematics Teachers Participate?

As a TIMSS 1999 national option, the United States asked mathematics teachers to describe their professional development during the 1998-99 school year, defined as June 1998 to May 1999. Since no other countries asked these questions, cross-country comparisons are not possible. Comparisons, however, can be made to the United States as a whole and among the Benchmarking jurisdictions. Teachers were asked both how often they observed and were observed by other teachers (see Exhibit 6.18). In the U.S. overall, these observations of and by teachers were reported by the mathematics teachers of 25 and 35 percent of the students, respectively. Among the Benchmarking states, the results for classroom observation as a professional development approach resembled the national results. Among districts and consortia, observations were used most extensively in the First in the World Consortium and Montgomery County with more than half the students having teachers who reported both observing and being observed by other teachers.

The professional development activities teachers were asked about include the following school- and district-based activities: immersion or internship activities; receiving mentoring, coaching, lead teaching, or observation; teacher resource centers; committees or task forces; and teacher study groups. As shown in Exhibit 6.19, participation on committees or task forces was the most frequently used of these activities. It was reported nationally by the mathematics teachers of more than half the eighth graders (55

	Observation of Other Teachers[1]		Observation by Other Teachers[2]	
	Percent of Students	Number of Class Periods Observed Averaged Across Students[3]	Percent of Students	Number of Class Periods Observed Averaged Across Students[3]
States				
Connecticut	r 29 (6.9)	5 (1.1)	r 51 (8.0)	5 (1.7)
Idaho	r 12 (4.8)	2 (0.2)	r 34 (8.5)	7 (2.6)
Illinois	9 (3.5)	3 (0.4)	23 (5.5)	10 (3.1)
Indiana	10 (3.4)	11 (4.8)	33 (6.2)	7 (1.9)
Maryland	r 29 (5.1)	6 (1.9)	r 45 (6.1)	4 (0.5)
Massachusetts	24 (5.1)	4 (0.8)	34 (5.4)	8 (2.8)
Michigan	14 (4.0)	6 (1.2)	26 (5.4)	10 (3.3)
Missouri	19 (5.2)	4 (1.9)	25 (6.0)	4 (1.5)
North Carolina	31 (6.4)	5 (1.0)	47 (7.7)	4 (0.7)
Oregon	23 (4.0)	5 (1.7)	23 (5.1)	5 (2.6)
Pennsylvania	25 (4.6)	4 (0.5)	42 (5.7)	5 (1.3)
South Carolina	28 (5.6)	3 (0.4)	47 (5.7)	4 (0.6)
Texas	r 39 (5.3)	6 (0.9)	r 51 (6.1)	4 (0.9)
Districts and Consortia				
Academy School Dist. #20, CO	18 (0.3)	2 (0.0)	40 (0.4)	10 (0.1)
Chicago Public Schools, IL	2 (2.2)	~ ~	31 (12.0)	10 (3.0)
Delaware Science Coalition, DE	r 16 (5.5)	5 (1.3)	r 23 (4.7)	9 (3.5)
First in the World Consort., IL	66 (4.5)	11 (0.9)	59 (3.4)	12 (2.4)
Fremont/Lincoln/WestSide PS, NE	27 (8.4)	17 (4.9)	51 (10.5)	20 (3.4)
Guilford County, NC	52 (6.3)	4 (0.5)	41 (5.9)	8 (2.3)
Jersey City Public Schools, NJ	5 (1.5)	3 (0.4)	22 (2.3)	5 (0.4)
Miami-Dade County PS, FL	s 33 (6.3)	3 (0.8)	s 35 (7.5)	2 (0.4)
Michigan Invitational Group, MI	18 (7.3)	3 (0.5)	17 (5.9)	3 (0.7)
Montgomery County, MD	s 51 (5.7)	8 (1.0)	s 85 (5.0)	4 (0.6)
Naperville Sch. Dist. #203, IL	21 (3.5)	5 (1.0)	34 (4.4)	4 (0.7)
Project SMART Consortium, OH	37 (6.0)	9 (2.5)	47 (6.7)	9 (2.1)
Rochester City Sch. Dist., NY	s 14 (1.8)	2 (0.5)	s 47 (6.9)	11 (1.7)
SW Math/Sci. Collaborative, PA	25 (4.8)	4 (1.0)	37 (7.2)	7 (2.1)
United States	25 (3.0)	4 (0.8)	35 (3.3)	5 (1.0)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by teachers.

1 Based on complete class periods teachers observed other teachers in their school teach mathematics from the beginning of the 1998-99 school year until the time of testing.

2 Based on complete class periods teachers were observed while teaching mathematics by other teachers in their school from the beginning of the 1998-99 school year until the time of testing.

3 Teachers who did not participate in the professional development activity were not included in the average.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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 average number of class periods.

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

	Immersion or Internship Activities		Receipt of Mentoring or Observation		Teacher Resource Center		Committees or Task Forces		Teacher Study Groups	
	Percent of Students	Teacher Hours Averaged Across Students[1]	Percent of Students	Teacher Hours Averaged Across Students[1]	Percent of Students	Teacher Hours Averaged Across Students[1]	Percent of Students	Teacher Hours Averaged Across Students[1]	Percent of Students	Teacher Hours Averaged Across Students[1]
States										
Connecticut	r 3 (0.3)	2 (0.0)	r 32 (7.5)	11 (3.3)	r 9 (5.0)	3 (0.8)	r 55 (6.6)	9 (1.5)	r 26 (4.8)	8 (1.3)
Idaho	r 3 (2.6)	17 (3.3)	r 24 (5.3)	8 (3.3)	r 8 (5.0)	10 (9.6)	r 51 (6.9)	15 (2.1)	r 26 (6.4)	4 (1.0)
Illinois	4 (1.8)	5 (1.4)	20 (4.4)	11 (3.5)	14 (4.1)	12 (3.9)	55 (6.5)	16 (2.9)	23 (6.0)	9 (1.7)
Indiana	5 (3.3)	45 (20.6)	14 (5.4)	10 (7.1)	3 (1.7)	3 (1.1)	61 (5.9)	9 (1.2)	21 (5.8)	7 (2.4)
Maryland	r 6 (3.3)	18 (17.6)	r 33 (6.4)	4 (0.7)	r 21 (4.7)	7 (2.8)	r 35 (6.9)	14 (3.0)	r 22 (6.1)	12 (3.9)
Massachusetts	7 (2.2)	14 (8.4)	32 (5.9)	5 (0.7)	16 (4.7)	4 (0.8)	61 (5.9)	12 (1.4)	46 (7.8)	10 (1.9)
Michigan	0 (0.0)	~ ~	21 (4.7)	4 (0.7)	11 (3.7)	6 (3.7)	54 (7.0)	12 (2.0)	18 (4.9)	12 (1.7)
Missouri	6 (2.6)	23 (9.8)	27 (5.7)	4 (0.7)	6 (3.3)	4 (0.6)	60 (6.3)	10 (1.9)	20 (4.5)	5 (1.3)
North Carolina	2 (1.8)	~ ~	41 (5.4)	11 (2.7)	14 (3.9)	7 (1.2)	56 (5.3)	7 (0.9)	29 (5.8)	12 (3.6)
Oregon	5 (2.3)	7 (3.5)	35 (5.2)	7 (2.5)	11 (3.7)	10 (3.8)	68 (3.3)	15 (3.0)	29 (5.4)	11 (2.3)
Pennsylvania	14 (3.1)	10 (2.3)	30 (5.6)	8 (2.4)	15 (3.6)	9 (2.7)	58 (6.2)	10 (1.3)	20 (4.3)	6 (0.9)
South Carolina	4 (2.4)	14 (8.7)	23 (5.5)	12 (3.9)	25 (5.1)	9 (2.6)	46 (6.6)	14 (2.6)	21 (5.4)	10 (1.6)
Texas	r 18 (6.6)	12 (4.5)	r 39 (6.7)	13 (4.9)	r 24 (4.3)	5 (0.8)	r 61 (6.8)	13 (2.0)	r 42 (6.7)	16 (4.5)
Districts and Consortia										
Academy School Dist. #20, CO	18 (0.3)	9 (0.1)	49 (0.4)	7 (0.1)	15 (0.3)	3 (0.0)	48 (0.4)	16 (0.1)	40 (0.4)	7 (0.1)
Chicago Public Schools, IL	9 (5.3)	3 (0.9)	25 (8.8)	21 (9.9)	29 (9.8)	12 (2.0)	34 (9.5)	11 (2.3)	22 (7.8)	15 (6.0)
Delaware Science Coalition, DE	r 0 (0.0)	~ ~	r 28 (6.7)	11 (2.8)	r 36 (5.5)	4 (0.7)	r 71 (5.6)	10 (1.2)	r 24 (5.4)	9 (2.6)
First in the World Consort., IL	5 (0.3)	5 (0.0)	r 51 (5.5)	24 (2.9)	23 (6.3)	5 (1.0)	82 (7.9)	10 (1.6)	30 (9.7)	15 (3.4)
Fremont/Lincoln/WestSide PS, NE	0 (0.0)	~ ~	33 (8.5)	22 (7.6)	12 (4.0)	4 (0.5)	49 (7.0)	6 (1.6)	22 (4.1)	5 (0.6)
Guilford County, NC	6 (0.9)	10 (0.0)	47 (5.6)	18 (2.3)	43 (5.4)	9 (1.2)	58 (6.8)	15 (2.6)	31 (5.0)	15 (3.3)
Jersey City Public Schools, NJ	3 (0.2)	15 (0.0)	r 35 (3.5)	10 (0.7)	14 (2.8)	4 (0.3)	r 45 (4.9)	11 (0.8)	30 (4.5)	25 (5.3)
Miami-Dade County PS, FL	s 9 (5.3)	17 (6.3)	s 24 (4.9)	8 (5.2)	s 42 (10.2)	8 (2.7)	s 56 (10.3)	15 (3.5)	s 54 (10.3)	19 (5.0)
Michigan Invitational Group, MI	0 (0.0)	~ ~	25 (8.6)	6 (1.4)	5 (0.2)	2 (0.0)	59 (7.0)	10 (0.9)	32 (4.7)	11 (0.8)
Montgomery County, MD	s 8 (3.5)	11 (2.6)	s 50 (6.3)	3 (0.8)	s 22 (7.2)	5 (0.9)	s 57 (6.7)	19 (2.2)	s 12 (2.4)	25 (17.7)
Naperville Sch. Dist. #203, IL	0 (0.0)	~ ~	26 (5.6)	6 (1.1)	17 (2.8)	4 (0.1)	64 (4.5)	46 (2.7)	25 (2.8)	30 (9.4)
Project SMART Consortium, OH	6 (2.8)	33 (14.7)	25 (6.8)	5 (0.7)	23 (6.5)	4 (0.7)	64 (6.5)	13 (1.4)	19 (4.7)	6 (0.8)
Rochester City Sch. Dist., NY	s 0 (0.0)	~ ~	s 34 (6.8)	8 (1.6)	s 47 (8.2)	6 (0.8)	s 39 (7.8)	10 (2.3)	s 31 (7.1)	8 (0.8)
SW Math/Sci. Collaborative, PA	5 (3.3)	4 (0.7)	18 (5.2)	12 (7.5)	11 (4.8)	6 (1.2)	42 (6.9)	11 (1.7)	16 (4.5)	7 (0.8)
United States	6 (2.1)	14 (3.6)	27 (3.2)	5 (0.6)	12 (2.4)	5 (1.5)	55 (3.2)	12 (1.5)	30 (3.4)	11 (2.5)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by teachers.

* Based on participation in professional development activities from June 1998 until the time of testing.

1 Teachers who did not participate in the professional development activity were not included in the average.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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 average hours.

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

Students Taught by Teachers Who Participated in Professional Development – Workshops, Conferences, and Networks*

	Within-District Workshops/ Institutes		Out-of-District Workshops/ Institutes		Teacher Collaborative or Networks		Out-of-District Conferences		Other Organized Professional Development	
	Percent of Students	Teacher Hours Averaged Across Students[1]	Percent of Students	Teacher Hours Averaged Across Students[1]	Percent of Students	Teacher Hours Averaged Across Students[1]	Percent of Students	Teacher Hours Averaged Across Students[1]	Percent of Students	Teacher Hours Averaged Across Students[1]
States										
Connecticut	r 82 (5.8)	14 (1.7)	r 33 (7.2)	15 (2.0)	r 30 (6.9)	12 (3.3)	r 41 (7.5)	12 (2.2)	r 11 (5.1)	6 (1.7)
Idaho	r 64 (5.7)	12 (1.4)	r 34 (4.9)	25 (5.0)	r 14 (4.2)	7 (1.0)	r 37 (7.5)	15 (2.4)	r 12 (3.7)	6 (1.8)
Illinois	81 (5.0)	10 (1.3)	53 (6.1)	9 (1.6)	12 (3.1)	7 (1.4)	38 (6.5)	11 (2.1)	22 (6.3)	10 (3.1)
Indiana	76 (7.5)	11 (1.3)	33 (6.8)	9 (1.4)	18 (4.2)	6 (0.9)	30 (7.1)	8 (0.9)	15 (3.9)	18 (9.1)
Maryland	r 79 (4.8)	18 (1.7)	r 30 (5.6)	13 (2.8)	r 30 (5.6)	12 (3.0)	r 23 (5.5)	12 (3.2)	r 23 (4.8)	9 (1.2)
Massachusetts	82 (4.7)	14 (2.0)	45 (5.4)	11 (2.1)	23 (5.8)	7 (1.3)	35 (6.1)	8 (1.5)	r 39 (6.1)	11 (3.3)
Michigan	70 (6.3)	15 (1.6)	32 (6.1)	13 (2.3)	13 (3.4)	6 (1.3)	30 (5.3)	10 (1.9)	13 (4.4)	7 (1.7)
Missouri	76 (6.1)	12 (2.0)	41 (6.6)	13 (3.5)	19 (4.7)	5 (1.1)	49 (6.7)	16 (2.7)	17 (3.6)	9 (2.4)
North Carolina	87 (3.5)	14 (1.5)	27 (4.2)	17 (6.3)	27 (5.7)	12 (3.8)	37 (5.2)	10 (1.6)	r 19 (4.6)	15 (5.7)
Oregon	83 (4.2)	13 (1.5)	42 (5.9)	10 (1.2)	23 (5.6)	7 (0.9)	39 (5.5)	16 (1.7)	19 (4.3)	15 (3.6)
Pennsylvania	75 (4.8)	13 (1.9)	47 (6.2)	8 (1.2)	20 (4.5)	10 (1.6)	29 (5.5)	11 (2.8)	19 (4.7)	11 (3.3)
South Carolina	75 (4.0)	19 (2.4)	27 (6.4)	15 (2.9)	16 (4.6)	5 (1.2)	35 (4.7)	19 (4.7)	26 (5.0)	13 (3.5)
Texas	r 94 (3.0)	26 (4.1)	r 62 (5.8)	20 (2.9)	r 27 (7.3)	14 (5.3)	r 39 (6.6)	21 (3.9)	r 32 (5.3)	22 (4.7)
Districts and Consortia										
Academy School Dist. #20, CO	67 (0.4)	10 (0.1)	37 (0.4)	13 (0.1)	r 0 (0.0)	~ ~	24 (0.3)	7 (0.0)	6 (0.2)	8 (0.0)
Chicago Public Schools, IL	67 (11.4)	11 (2.5)	22 (7.9)	8 (2.8)	30 (11.8)	8 (2.2)	23 (8.7)	11 (2.4)	16 (8.2)	7 (2.0)
Delaware Science Coalition, DE	r 79 (4.6)	15 (1.4)	r 39 (6.5)	11 (3.1)	r 29 (6.0)	8 (1.5)	r 33 (5.7)	11 (4.0)	r 16 (4.9)	11 (4.3)
First in the World Consort., IL	68 (4.7)	12 (2.1)	64 (6.0)	12 (1.7)	69 (6.0)	13 (3.9)	54 (8.7)	14 (1.9)	r 24 (6.2)	10 (1.5)
Fremont/Lincoln/WestSide PS, NE	97 (0.2)	13 (2.1)	29 (5.3)	15 (3.1)	15 (1.8)	2 (0.0)	35 (8.6)	15 (2.2)	r 34 (6.1)	12 (1.3)
Guilford County, NC	78 (4.8)	23 (3.1)	16 (3.4)	23 (10.3)	26 (6.3)	6 (1.4)	29 (5.1)	10 (1.5)	r 15 (4.7)	9 (1.3)
Jersey City Public Schools, NJ	85 (2.7)	11 (0.3)	41 (4.4)	16 (0.8)	16 (2.2)	22 (2.7)	26 (4.1)	11 (1.0)	45 (3.3)	7 (0.1)
Miami-Dade County PS, FL	s 88 (6.2)	24 (3.2)	s 16 (8.5)	5 (0.8)	s 35 (12.3)	8 (1.8)	s 11 (7.6)	3 (0.8)	s 33 (8.5)	12 (4.8)
Michigan Invitational Group, MI	74 (4.9)	12 (2.4)	39 (8.0)	18 (4.5)	33 (5.0)	8 (2.3)	27 (8.7)	10 (2.3)	10 (6.0)	6 (0.6)
Montgomery County, MD	s 86 (5.1)	27 (1.7)	s 34 (6.7)	13 (3.9)	s 29 (5.8)	20 (9.9)	s 28 (6.9)	8 (0.7)	s 25 (6.2)	7 (2.2)
Naperville Sch. Dist. #203, IL	72 (5.7)	24 (1.1)	45 (3.9)	6 (0.2)	18 (3.6)	11 (1.0)	38 (4.5)	7 (0.2)	20 (2.6)	7 (0.1)
Project SMART Consortium, OH	83 (6.0)	15 (1.3)	53 (5.8)	7 (0.8)	29 (5.5)	8 (1.7)	30 (6.3)	11 (2.6)	16 (6.5)	8 (3.4)
Rochester City Sch. Dist., NY	s 97 (3.5)	11 (1.9)	s 44 (8.2)	19 (3.3)	s 43 (5.8)	12 (1.8)	s 2 (0.2)	~ ~	s 27 (6.5)	10 (1.2)
SW Math/Sci. Collaborative, PA	74 (7.4)	16 (2.0)	42 (7.6)	10 (1.4)	24 (6.4)	12 (2.8)	20 (4.8)	10 (3.6)	6 (3.5)	5 (0.9)
United States	79 (3.1)	15 (1.3)	37 (3.2)	16 (1.9)	21 (2.7)	10 (1.6)	34 (2.7)	13 (1.6)	r 18 (2.5)	11 (1.7)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by teachers.

* Based on participation in professional development activities from June 1998 until the time of testing.

1 Teachers who did not participate in the professional development activity were not included in the average.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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 average hours.

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

	Courses for College Credit[1]		Individual Research Projects		Individual Learning		Other Individual Professional Development	
	Percent of Students	Teacher Hours Averaged Across Students[2]	Percent of Students	Teacher Hours Averaged Across Students[2]	Percent of Students	Teacher Hours Averaged Across Students[2]	Percent of Students	Teacher Hours Averaged Across Students[2]
States								
Connecticut	r 15 (4.4)	27 (7.2)	r 35 (6.3)	23 (4.5)	r 84 (5.6)	25 (2.7)	s 31 (6.4)	18 (5.3)
Idaho	r 54 (8.2)	27 (2.9)	r 22 (4.1)	23 (5.4)	r 68 (5.6)	27 (3.9)	r 29 (7.1)	31 (8.8)
Illinois	36 (7.0)	24 (5.7)	33 (7.3)	23 (6.4)	88 (4.0)	23 (3.9)	19 (5.3)	21 (9.2)
Indiana	21 (4.5)	40 (9.1)	21 (4.7)	13 (2.8)	84 (5.5)	19 (1.7)	20 (4.8)	19 (5.5)
Maryland	r 31 (4.5)	40 (6.9)	r 25 (5.2)	26 (5.9)	r 79 (6.1)	23 (2.2)	r 26 (6.0)	24 (4.6)
Massachusetts	27 (5.5)	43 (4.2)	36 (6.3)	19 (3.6)	84 (4.0)	26 (3.4)	r 37 (7.4)	21 (5.0)
Michigan	17 (4.7)	22 (5.9)	37 (6.1)	15 (4.2)	85 (4.2)	18 (2.9)	r 39 (6.3)	16 (4.7)
Missouri	23 (4.3)	19 (6.5)	20 (4.6)	43 (11.6)	83 (4.7)	20 (2.4)	15 (4.7)	17 (4.4)
North Carolina	17 (4.8)	30 (7.6)	39 (5.6)	18 (3.7)	80 (3.5)	16 (2.1)	r 20 (4.8)	19 (4.5)
Oregon	28 (4.2)	28 (5.6)	36 (4.6)	18 (4.2)	86 (3.6)	24 (2.6)	34 (5.5)	28 (8.1)
Pennsylvania	31 (5.5)	34 (6.2)	36 (6.6)	12 (2.5)	93 (3.0)	23 (3.2)	r 23 (4.6)	13 (1.9)
South Carolina	47 (6.3)	33 (5.8)	36 (6.3)	17 (5.4)	86 (3.8)	25 (3.6)	24 (4.4)	17 (5.7)
Texas	r 16 (4.1)	36 (9.7)	r 34 (6.4)	22 (2.8)	r 81 (2.9)	28 (3.5)	r 41 (7.0)	19 (3.6)
Districts and Consortia								
Academy School Dist. #20, CO	40 (0.4)	18 (0.7)	r 44 (0.4)	17 (0.1)	92 (0.2)	25 (0.3)	r 11 (0.3)	2 (0.0)
Chicago Public Schools, IL	28 (10.7)	16 (7.1)	25 (8.8)	27 (7.7)	75 (8.9)	22 (5.3)	r 17 (9.2)	10 (2.9)
Delaware Science Coalition, DE	r 28 (6.1)	46 (9.4)	r 41 (6.0)	19 (3.5)	r 81 (4.0)	31 (5.1)	r 36 (6.2)	23 (3.6)
First in the World Consort., IL	11 (3.5)	12 (3.8)	42 (6.0)	28 (9.5)	100 (0.0)	26 (5.0)	s 18 (4.6)	8 (1.4)
Fremont/Lincoln/WestSide PS, NE	31 (7.2)	52 (6.3)	40 (9.1)	14 (4.4)	91 (1.2)	25 (3.0)	r 35 (3.4)	21 (2.6)
Guilford County, NC	14 (4.6)	29 (5.3)	30 (4.6)	22 (7.6)	74 (3.5)	23 (2.3)	23 (3.0)	12 (1.0)
Jersey City Public Schools, NJ	r 13 (3.7)	33 (5.3)	39 (3.7)	20 (2.0)	85 (2.4)	35 (1.8)	r 31 (5.6)	13 (2.1)
Miami-Dade County PS, FL	s 39 (8.4)	18 (7.6)	s 56 (8.5)	15 (5.1)	s 78 (5.3)	20 (4.3)	x x	x x
Michigan Invitational Group, MI	23 (1.3)	20 (1.2)	19 (5.1)	5 (0.6)	76 (2.9)	22 (2.6)	7 (2.6)	33 (8.8)
Montgomery County, MD	s 39 (5.8)	39 (6.7)	s 46 (6.7)	29 (3.6)	s 90 (3.4)	25 (2.5)	s 34 (6.5)	19 (6.1)
Naperville Sch. Dist. #203, IL	22 (2.5)	56 (10.3)	39 (2.6)	24 (1.5)	85 (4.2)	23 (1.3)	21 (2.6)	9 (0.1)
Project SMART Consortium, OH	38 (5.5)	24 (7.0)	34 (6.6)	25 (4.8)	81 (5.4)	26 (1.4)	25 (5.5)	14 (3.6)
Rochester City Sch. Dist., NY	s 19 (3.6)	90 (0.0)	s 45 (8.2)	10 (1.5)	s 92 (0.9)	23 (4.8)	s 44 (6.7)	10 (1.5)
SW Math/Sci. Collaborative, PA	10 (4.6)	50 (7.2)	27 (6.4)	23 (8.4)	83 (5.4)	24 (2.7)	23 (6.6)	21 (5.4)
United States	27 (2.9)	35 (4.8)	r 33 (3.7)	21 (2.2)	84 (2.3)	26 (2.3)	r 25 (3.7)	18 (2.1)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by teachers.

* Based on participation in professional development activities from June 1998 until the time of testing.

1 The response range had a maximum of 90 hours spent in courses for college credit.

2 Teachers who did not participate in the professional development activity were not included in the average.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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% of students.

Exhibit 6.22 Professional Development Topics Emphasized Quite a Lot or A Great Deal

8th Grade Mathematics

	Percentage of Students Whose Teachers Reported That the Topic is Emphasized Quite a Lot or A Great Deal in Their Professional Development[1]						
	Content Knowledge	Curriculum	General Instruction/ Pedagogy	Subject-Specific Instruction/ Pedagogy	Assessment	Instructional Technology	Leadership Development
States							
Connecticut	r 22 (6.4)	r 57 (7.2)	r 43 (6.1)	r 37 (7.7)	r 35 (6.4)	r 48 (7.0)	r 11 (4.2)
Idaho	r 28 (6.1)	r 37 (5.3)	r 41 (6.3)	r 32 (6.0)	r 26 (4.9)	r 42 (6.7)	r 11 (2.8)
Illinois	20 (5.3)	62 (5.8)	50 (5.8)	33 (5.6)	45 (7.2)	60 (6.8)	14 (5.5)
Indiana	9 (4.1)	56 (6.9)	35 (5.8)	29 (5.6)	23 (5.7)	27 (6.1)	13 (5.2)
Maryland	r 28 (4.2)	r 55 (6.1)	r 55 (4.9)	r 45 (5.9)	r 42 (5.4)	r 63 (4.9)	r 12 (3.3)
Massachusetts	32 (5.0)	66 (5.8)	52 (5.2)	50 (7.3)	35 (5.4)	43 (5.4)	20 (5.0)
Michigan	24 (5.5)	57 (5.5)	60 (5.0)	41 (6.2)	33 (5.8)	35 (6.5)	15 (4.3)
Missouri	14 (3.1)	58 (6.9)	50 (5.5)	44 (6.4)	48 (5.8)	34 (6.4)	8 (2.8)
North Carolina	19 (3.8)	64 (7.3)	57 (4.6)	45 (4.8)	34 (5.0)	62 (5.4)	19 (5.2)
Oregon	23 (5.2)	64 (4.7)	42 (6.1)	30 (6.0)	57 (5.3)	16 (5.7)	17 (4.4)
Pennsylvania	26 (5.8)	63 (6.3)	44 (6.0)	39 (5.4)	34 (4.7)	42 (5.2)	24 (4.1)
South Carolina	24 (5.0)	78 (4.9)	43 (6.7)	55 (6.9)	31 (5.7)	44 (7.0)	21 (5.8)
Texas	r 26 (6.1)	r 77 (6.1)	r 66 (5.8)	r 57 (6.9)	r 41 (6.9)	r 64 (6.0)	r 25 (5.9)
Districts and Consortia							
Academy School Dist. #20, CO	26 (0.3)	52 (0.4)	30 (0.3)	46 (0.4)	30 (0.3)	54 (0.4)	9 (0.2)
Chicago Public Schools, IL	r 30 (8.7)	r 63 (8.9)	r 73 (12.0)	r 44 (10.4)	r 49 (9.3)	r 44 (9.1)	r 24 (9.4)
Delaware Science Coalition, DE	r 23 (5.3)	r 79 (6.2)	r 32 (7.4)	r 54 (8.3)	r 28 (6.1)	r 46 (7.0)	r 14 (5.5)
First in the World Consort., IL	42 (8.8)	87 (5.3)	70 (4.6)	51 (4.9)	34 (7.5)	53 (7.7)	7 (1.0)
Fremont/Lincoln/WestSide PS, NE	39 (5.4)	72 (7.3)	38 (3.3)	45 (8.5)	45 (7.4)	28 (4.2)	22 (3.5)
Guilford County, NC	31 (6.5)	76 (5.3)	79 (4.7)	49 (5.6)	46 (6.6)	46 (5.8)	24 (4.3)
Jersey City Public Schools, NJ	49 (3.7)	57 (5.0)	70 (5.7)	59 (5.1)	53 (2.4)	51 (4.3)	15 (1.7)
Miami-Dade County PS, FL	s 56 (9.2)	s 65 (9.9)	s 58 (9.7)	s 64 (7.3)	s 49 (8.2)	s 68 (7.5)	s 32 (7.6)
Michigan Invitational Group, MI	19 (7.9)	57 (3.4)	30 (5.8)	41 (7.4)	26 (9.0)	28 (6.5)	19 (7.8)
Montgomery County, MD	s 24 (4.9)	s 77 (4.7)	s 52 (6.1)	s 47 (6.7)	s 56 (8.5)	s 85 (5.2)	s 23 (4.9)
Naperville Sch. Dist. #203, IL	0 (0.0)	49 (4.4)	34 (3.6)	23 (2.6)	35 (4.3)	57 (3.8)	19 (2.5)
Project SMART Consortium, OH	19 (5.0)	52 (4.7)	53 (5.9)	49 (7.3)	43 (5.9)	46 (6.5)	20 (4.9)
Rochester City Sch. Dist., NY	s 35 (8.0)	s 69 (5.4)	s 53 (7.9)	s 62 (6.6)	s 62 (8.2)	s 18 (6.9)	s 29 (6.0)
SW Math/Sci. Collaborative, PA	21 (5.2)	59 (6.8)	39 (7.4)	31 (6.1)	30 (7.0)	39 (7.2)	11 (4.4)
United States	r 28 (3.3)	63 (3.3)	45 (3.1)	47 (3.9)	r 33 (3.1)	45 (3.7)	r 15 (2.5)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by teachers.

1 Based on participation in professional development activities from June 1998 until the time of testing. Does not include students whose teachers reported that they do not teach the topic.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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.

	Percentage of Students Whose Teachers Reported That the Content Area is Focused On in Their Professional Development[1]									
	Fractions and Number Sense		Measurement		Data Representation, Analysis, and Probability		Geometry		Algebra	
States										
Connecticut	r	32 (7.6)	r	29 (7.2)	r	42 (6.5)	r	32 (7.4)	r	44 (7.1)
Idaho	r	40 (6.9)	r	34 (6.5)	r	33 (5.4)	r	24 (5.8)	r	37 (5.5)
Illinois		46 (5.7)		39 (6.5)		49 (6.8)		39 (5.6)		46 (5.4)
Indiana		40 (6.2)		32 (6.2)		37 (6.8)		26 (6.0)		41 (6.0)
Maryland	r	46 (6.5)	r	41 (7.3)	r	65 (5.7)	r	40 (6.0)	r	58 (6.8)
Massachusetts		52 (5.6)		52 (6.4)		52 (5.0)		43 (5.7)		53 (5.5)
Michigan		39 (5.6)		29 (5.3)		44 (7.0)		38 (6.8)		48 (6.6)
Missouri		47 (6.4)		51 (6.3)		54 (6.1)		47 (5.2)		52 (4.7)
North Carolina		53 (6.6)		53 (6.7)		53 (5.9)		53 (7.1)		56 (5.9)
Oregon		42 (7.0)		41 (5.8)		46 (5.1)		38 (5.6)		45 (5.5)
Pennsylvania	r	37 (5.6)	r	35 (5.6)	r	41 (6.6)	r	24 (4.4)	r	37 (6.2)
South Carolina		52 (6.8)		45 (5.5)		56 (7.2)		42 (6.0)		58 (6.4)
Texas	r	59 (7.0)	r	47 (7.0)	r	56 (6.8)	r	45 (7.1)	r	64 (7.0)
Districts and Consortia										
Academy School Dist. #20, CO		42 (0.4)		28 (0.4)		30 (0.4)		17 (0.4)		37 (0.4)
Chicago Public Schools, IL	r	41 (11.0)	r	37 (9.5)	r	41 (12.2)	r	34 (9.0)	r	40 (11.0)
Delaware Science Coalition, DE	r	61 (6.5)	r	63 (7.1)	r	59 (6.1)	r	52 (6.3)	r	64 (6.7)
First in the World Consort., IL		46 (6.4)		52 (9.0)		37 (6.5)		77 (6.7)		66 (9.7)
Fremont/Lincoln/WestSide PS, NE		52 (8.6)		33 (5.4)		55 (8.0)		39 (1.4)		52 (8.6)
Guilford County, NC		45 (6.3)		36 (6.4)		34 (6.3)		40 (6.2)		51 (5.7)
Jersey City Public Schools, NJ		53 (5.2)		58 (5.2)		46 (3.9)		50 (4.3)		54 (5.7)
Miami-Dade County PS, FL	s	57 (8.5)	s	66 (7.6)	s	68 (7.7)	s	60 (8.4)	s	59 (7.1)
Michigan Invitational Group, MI		39 (4.8)		34 (4.7)		45 (4.6)		35 (8.0)		48 (4.1)
Montgomery County, MD	s	34 (6.3)	s	18 (3.6)	s	72 (9.1)	s	48 (7.3)	s	64 (9.1)
Naperville Sch. Dist. #203, IL		26 (2.8)		17 (2.8)		47 (5.2)		22 (0.7)		40 (4.5)
Project SMART Consortium, OH		36 (5.9)		41 (4.6)		47 (5.7)		34 (4.4)		46 (6.6)
Rochester City Sch. Dist., NY	s	76 (5.5)	s	86 (6.9)	s	84 (6.3)	s	76 (6.2)	s	81 (6.8)
SW Math/Sci. Collaborative, PA		30 (4.8)		34 (5.7)		38 (7.0)		36 (5.6)		36 (7.9)
United States		54 (3.3)		45 (3.3)	r	50 (3.0)	r	45 (2.4)	r	56 (3.1)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by teachers.

1 Content areas are focused on in professional development if 80% or more of the TIMSS topics in the content area are reported by teachers to have been focused on in their professional development from June 1998 until the time of testing.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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.

	Percentage of Students Whose Teachers Reported Being Fairly Familiar or Very Familiar with the Curriculum Document					
	National Council of Teachers of Mathematics (NCTM) *Professional Standards for Teaching Mathematics*	State Education Department Curriculum Guide	School District Curriculum Guide	School Curriculum Guide	National Assessment of Educational Progress (NAEP) Assessment Frameworks/ Specifications	State Education Department Assessment Specifications
States						
Connecticut	r 96 (2.3)	r 73 (5.5)	r 95 (2.6)	r 98 (1.2)	r 38 (6.7)	r 64 (7.1)
Idaho	r 71 (4.0)	r 60 (5.7)	r 84 (5.4)	r 87 (4.4)	r 8 (3.9)	r 39 (7.6)
Illinois	84 (3.8)	58 (7.5)	95 (2.7)	82 (3.2)	14 (3.0)	r 56 (8.7)
Indiana	92 (3.9)	92 (3.3)	98 (1.7)	97 (2.2)	12 (3.8)	59 (6.4)
Maryland	r 94 (3.0)	r 63 (7.0)	r 96 (3.0)	s 89 (2.5)	r 35 (4.6)	s 62 (5.6)
Massachusetts	85 (4.4)	86 (4.2)	94 (2.2)	94 (2.9)	40 (5.5)	74 (5.9)
Michigan	90 (3.6)	72 (5.3)	94 (2.9)	90 (4.1)	12 (3.9)	57 (6.8)
Missouri	90 (3.1)	73 (5.1)	97 (2.5)	96 (3.2)	46 (6.0)	76 (5.9)
North Carolina	87 (3.5)	98 (1.3)	97 (1.8)	91 (2.6)	28 (4.2)	46 (5.7)
Oregon	78 (3.8)	93 (2.2)	92 (3.9)	92 (3.1)	16 (4.3)	82 (5.0)
Pennsylvania	88 (5.5)	57 (4.0)	87 (5.9)	78 (3.8)	29 (4.2)	r 56 (4.3)
South Carolina	98 (1.3)	98 (2.3)	100 (0.0)	97 (0.4)	62 (5.7)	76 (4.6)
Texas	r 79 (5.8)	r 62 (7.2)	r 97 (2.0)	r 94 (3.3)	r 29 (6.9)	r 69 (6.4)
Districts and Consortia						
Academy School Dist. #20, CO	88 (0.4)	100 (0.0)	100 (0.0)	100 (0.0)	17 (0.3)	64 (0.4)
Chicago Public Schools, IL	62 (10.1)	70 (9.3)	90 (5.9)	r 100 (0.0)	22 (8.2)	33 (5.9)
Delaware Science Coalition, DE	r 92 (4.6)	r 88 (4.3)	r 91 (3.0)	r 91 (3.7)	r 40 (6.9)	r 65 (6.5)
First in the World Consort., IL	95 (5.1)	80 (6.7)	96 (2.7)	98 (1.8)	36 (10.6)	59 (10.3)
Fremont/Lincoln/WestSide PS, NE	97 (0.1)	76 (4.5)	97 (3.0)	100 (0.0)	30 (5.9)	41 (7.4)
Guilford County, NC	84 (3.3)	99 (1.4)	96 (3.1)	97 (3.3)	32 (3.6)	66 (4.9)
Jersey City Public Schools, NJ	97 (0.4)	97 (3.0)	100 (0.0)	100 (0.0)	63 (4.4)	82 (5.1)
Miami-Dade County PS, FL	s 86 (4.9)	s 90 (5.0)	s 85 (7.6)	s 95 (4.0)	s 39 (10.5)	s 59 (10.5)
Michigan Invitational Group, MI	91 (2.5)	61 (5.5)	95 (0.2)	92 (0.5)	25 (3.0)	62 (7.6)
Montgomery County, MD	s 91 (3.5)	s 76 (4.6)	s 98 (2.1)	x x	s 39 (7.2)	s 67 (6.8)
Naperville Sch. Dist. #203, IL	90 (3.7)	62 (3.7)	92 (0.9)	95 (1.1)	32 (4.1)	62 (4.0)
Project SMART Consortium, OH	94 (2.0)	68 (5.4)	95 (0.3)	97 (2.8)	10 (4.3)	40 (4.6)
Rochester City Sch. Dist., NY	82 (1.6)	68 (4.5)	100 (0.0)	89 (4.9)	19 (4.7)	61 (5.0)
SW Math/Sci. Collaborative, PA	90 (4.9)	54 (7.7)	85 (5.5)	86 (5.6)	16 (4.6)	66 (7.7)
United States	82 (2.6)	74 (3.8)	91 (2.2)	91 (2.1)	27 (3.0)	51 (3.8)

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

Background data provided by teachers.

States in *italics* did not fully satisfy guidelines for sample participation rates (see Appendix A for details).

( ) 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% of students.