Chapter 7

Classroom Characteristics and Instruction

Although the school provides the general context for learning, it is in the classroom setting and through guidance by the teacher that most instruction and learning take place. To provide information about the environment of mathematics classrooms and the instruction that takes place, Chapter 7 presents teachers' reports from the second part of the teacher questionnaire about their mathematics classrooms and instructional practices, as well as students' reports about the classroom activities they do in learning mathematics. Data are presented about class size, various limitations on instruction, instructional time, instructional emphases given different mathematics topics, and classroom activities. Information also is presented about the use of calculators and computers in mathematics lessons, the role of homework, and the reliance on different types of assessment approaches.

Teachers and the instructional approaches they use ultimately determine the mathematics students learn. Teachers structure the content and pace of lessons, introducing new material, selecting various instructional activities, and monitoring students' developing understanding of the mathematics concepts being studied. Teachers may help students use technology and tools to investigate mathematical ideas, analyze students' work for misconceptions, and promote positive

attitudes toward mathematics. They may also assign homework and conduct informal as well as formal assessments to evaluate achievement outcomes.

How Do the Characteristics of Mathematics Classrooms Impact Instruction?

Because it can affect pedagogical strategies, class size data are shown in Exhibit 7.1. Teachers' reports about the sizes of their eighth-grade mathematics classes reveal that across countries the average class size was 30 students, but there was considerable variation – from more than 54 students in the Philippines to 20 students in Belgium (Flemish). At the fourth grade, classes typically were smaller. The average class size for the TIMSS participants was 26 students, ranging from 40 in the Philippines to 20 in Belgium (Flemish), Italy and Slovenia.

The relationship between class size and achievement is difficult to disentangle, given the variety of policies and practices that countries have in determining class size. For example, countries and schools cannot always control class size. Because of this, the ability to cap class sizes can indicate the availability of more resources in general. As another complicating factor, smaller classes can be used for advanced or practical classes such as computer laboratories on one hand, and for remedial learning or students with special needs on the other. The complexity of this issue is evidenced in the TIMSS results that show a curvilinear relationship, on average, between class size and mathematics achievement at both the eighth and fourth grades.

At the eighth grade, mathematics teachers were asked about the instructional impact of six characteristics of their students – differing academic abilities, range in backgrounds, students with special needs, uninterested students, low morale among students, and disruptive students. Responses were given on a four-point scale; "not at all," "a little," "some," and "a lot." TIMSS used the teachers' responses to construct an index and the results are presented in Exhibit 7.2.

Students were placed in the high category, if, on average, teachers reported their classrooms were impacted only a little (or less) and in the low category, if, on average, these factors impacted instruction at least somewhat. The remaining students fell in the medium category. The results show that average mathematics achievement is related to the impact of student characteristics on classroom instruction, with lower achievement related to having more instructionally challenging and diverse students in the class. On average, internationally, 20 percent of the students were in such classrooms.

Exhibit 7.1: Class Size for Mathematics Instruction

Countries		Overall Average Class Size	1 - 24 Students		25 - 32 Students		33 - 40 Students		41 or More Students	
			Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	r	27 (0.9)	39 (4.4)	474 (5.6)	43 (4.3)	485 (5.0)	7 (1.8)	460 (9.9)	11 (2.8)	462 (8.4)
Australia		26 (0.5)	31 (4.2)	482 (9.4)	65 (4.7)	518 (5.9)	4 (2.2)	492 (14.2)	0 (0.4)	~ ~
Bahrain		32 (0.1)	6 (0.7)	451 (5.8)	52 (2.7)	402 (2.1)	40 (2.6)	395 (3.5)	3 (0.0)	412 (3.8)
Belgium (Flemish)		20 (0.3)	90 (2.3)	538 (3.3)	10 (2.3)	553 (10.5)	0 (0.0)	~ ~	0 (0.0)	~ ~
Botswana		37 (0.4)	1 (0.7)	~ ~	14 (2.6)	392 (9.1)	60 (4.3)	360 (3.7)	25 (4.1)	362 (4.1)
Bulgaria		22 (0.5)	64 (4.2)	468 (4.9)	32 (3.9)	503 (8.0)	3 (2.4)	423 (5.0)	1 (0.0)	~ ~
Chile		35 (0.4)	9 (1.5)	385 (17.0)	22 (2.6)	384 (8.1)	47 (3.6)	390 (5.7)	23 (3.0)	389 (6.9)
Chinese Taipei		37 (0.4)	4 (1.5)	598 (28.9)	14 (2.8)	567 (11.5)	65 (4.0)	575 (4.7)	17 (3.2)	636 (8.7)
Cyprus		26 (0.1)	21 (1.9)	463 (3.2)	79 (1.9)	460 (2.0)	0 (0.0)	~ ~	0 (0.0)	~ ~
Egypt		38 (0.6)	3 (1.2)	422 (13.8)	9 (2.1)	428 (11.3)	61 (4.1)	403 (4.3)	27 (3.7)	407 (7.5)
Estonia		27 (0.5)	32 (3.4)	523 (5.1)	41 (4.2)	530 (4.3)	27 (3.8)	550 (5.4)	0 (0.0)	~ ~
Ghana	r	37 (1.0)	16 (2.7)	232 (7.4)	18 (3.1)	249 (8.9)	29 (4.0)	292 (9.0)	37 (4.7)	289 (9.1)
Hong Kong, SAR		39 (0.3)	3 (1.1)	504 (28.1)	6 (1.6)	513 (21.3)	49 (4.1)	575 (5.7)	43 (4.1)	612 (4.7)
Hungary		22 (0.4)	64 (3.9)	522 (4.2)	35 (4.0)	540 (6.5)	2 (0.9)	~ ~	0 (0.0)	~ ~
Indonesia		40 (0.5)	3 (1.7)	413 (8.6)	10 (2.8)	366 (20.0)	38 (4.1)	413 (8.3)	48 (4.3)	421 (6.7)
Iran, Islamic Rep. of		29 (0.4)	23 (2.9)	397 (5.7)	50 (4.0)	413 (4.5)	25 (3.3)	420 (6.0)	3 (1.4)	431 (13.7)
Israel	r	34 (0.4)	9 (2.2)	512 (18.3)	23 (3.7)	500 (9.2)	64 (4.5)	490 (4.9)	4 (1.7)	531 (4.5)
Italy		22 (0.3)	78 (3.1)	483 (3.4)	22 (3.1)	488 (8.3)	0 (0.0)	~ ~	0 (0.0)	~ ~
Japan		35 (0.2)	3 (1.2)	561 (6.1)	18 (2.6)	557 (4.5)	78 (2.6)	571 (2.7)	1 (1.0)	~ ~
Jordan		35 (0.7)	14 (2.8)	430 (9.4)	26 (3.6)	424 (13.3)	32 (4.4)	417 (5.9)	28 (3.8)	428 (7.4)
Korea, Rep. of	s	37 (0.4)	1 (0.9)	~ ~	20 (3.0)	569 (4.6)	57 (4.6)	594 (2.9)	22 (3.5)	600 (7.0)
Latvia		24 (0.7)	52 (3.5)	497 (4.4)	42 (3.4)	519 (5.5)	3 (1.0)	527 (20.3)	3 (1.7)	506 (12.6)
Lebanon		29 (0.9)	32 (3.9)	429 (6.0)	44 (4.8)	429 (5.1)	16 (3.1)	443 (10.4)	8 (3.1)	464 (8.7)
Lithuania		25 (0.3)	39 (3.2)	486 (4.2)	61 (3.2)	510 (3.0)	0 (0.0)	~ ~	0 (0.0)	~ ~
Macedonia, Rep. of		28 (0.4)	24 (3.5)	439 (9.2)	58 (4.3)	435 (5.9)	17 (3.6)	429 (13.7)	1 (1.0)	~ ~
Malaysia		37 (0.4)	1 (0.7)	~ ~	18 (3.3)	514 (11.0)	56 (4.4)	503 (5.1)	25 (3.5)	515 (8.8)
Moldova, Rep. of	r	24 (0.5)	56 (4.5)	449 (6.0)	38 (4.6)	460 (7.0)	5 (2.5)	485 (25.2)	1 (0.6)	~ ~
Morocco		x x	x x	x x	x x	x x	x x	x x	x x	x x
Netherlands		26 (0.3)	33 (3.9)	514 (9.4)	66 (4.1)	546 (5.8)	1 (1.0)	~ ~	0 (0.0)	~ ~
New Zealand		27 (0.4)	22 (3.0)	469 (8.9)	72 (4.1)	500 (5.7)	6 (3.2)	538 (17.8)	0 (0.0)	~ ~
Norway		25 (0.3)	34 (3.8)	467 (4.3)	65 (3.6)	460 (3.5)	1 (0.7)	~ ~	1 (0.7)	~ ~
Palestinian Nat'l Auth.		39 (0.6)	6 (2.0)	398 (20.0)	17 (2.8)	393 (7.4)	27 (3.9)	394 (8.9)	50 (3.7)	385 (4.2)
Philippines		54 (0.7)	1 (0.6)	~ ~	1 (0.7)	~ ~	7 (2.0)	448 (23.4)	91 (2.1)	372 (5.4)
Romania		24 (0.5)	51 (4.5)	469 (6.7)	46 (4.5)	480 (7.4)	3 (1.4)	534 (34.7)	1 (0.0)	~ ~
Russian Federation		24 (0.6)	47 (4.2)	500 (5.1)	47 (3.6)	515 (5.0)	6 (3.4)	533 (11.0)	0 (0.0)	~ ~
Saudi Arabia		28 (0.9)	36 (5.3)	333 (7.5)	26 (4.8)	340 (8.1)	29 (5.8)	330 (5.6)	8 (3.0)	325 (4.1)
Scotland	r	27 (0.5)	33 (3.9)	457 (7.2)	56 (4.4)	520 (6.2)	11 (3.4)	548 (10.1)	1 (0.7)	~ ~
Serbia		26 (0.4)	38 (3.7)	464 (4.4)	51 (4.0)	483 (3.8)	11 (2.9)	489 (8.2)	0 (0.0)	~ ~
Singapore		38 (0.2)	2 (0.6)	~ ~	8 (1.6)	613 (18.0)	63 (2.7)	606 (5.0)	26 (2.5)	607 (5.7)
Slovak Republic		25 (0.4)	42 (4.6)	498 (4.7)	53 (4.7)	512 (5.4)	5 (1.8)	543 (19.7)	0 (0.0)	~ ~
Slovenia		22 (0.3)	70 (4.1)	491 (3.0)	30 (4.1)	500 (4.1)	0 (0.0)	~ ~	0 (0.0)	~ ~
South Africa	s	45 (1.3)	4 (1.2)	309 (35.8)	14 (3.0)	290 (23.8)	30 (3.7)	265 (11.7)	52 (4.1)	249 (8.7)
Sweden		21 (0.4)	71 (3.6)	491 (3.3)	27 (3.7)	522 (5.5)	1 (1.0)	~ ~	0 (0.5)	~ ~
Tunisia		34 (0.3)	1 (1.0)	~ ~	26 (3.3)	404 (3.6)	71 (3.5)	412 (3.2)	2 (1.1)	~ ~
United States	r	24 (0.4)	56 (2.9)	504 (3.9)	39 (2.7)	510 (5.1)	4 (1.2)	531 (16.4)	1 (0.7)	~ ~
‡ England	s	27 (0.5)	33 (5.1)	479 (11.6)	57 (5.8)	511 (8.7)	10 (3.6)	552 (16.5)	0 (0.0)	~ ~
International Avg.		30 (0.1)	29 (0.5)	461 (1.9)	35 (0.5)	473 (1.4)	24 (0.5)	470 (2.1)	13 (0.3)	448 (1.7)
Benchmarking Participants										
Basque Country, Spain		24 (0.4)	49 (3.6)	483 (4.2)	47 (4.2)	492 (4.3)	4 (2.5)	504 (2.6)	0 (0.0)	~ ~
Indiana State, US		24 (1.0)	65 (6.5)	505 (6.3)	31 (5.8)	512 (8.0)	0 (0.0)	~ ~	4 (2.5)	517 (36.6)
Ontario Province, Can.		26 (0.4)	31 (4.0)	515 (5.2)	66 (4.1)	523 (3.7)	3 (2.0)	514 (7.3)	0 (0.0)	~ ~
Quebec Province, Can.		29 (0.3)	14 (2.8)	530 (5.6)	69 (3.9)	539 (4.2)	18 (3.0)	573 (7.9)	0 (0.0)	~ ~

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

( ) 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 data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Exhibit 7.1: Class Size for Mathematics Instruction

MATHEMATICS Grade 4

Countries		Overall Average Class Size	1 - 19 Students		20 - 26 Students		27 - 32 Students		33 or More Students	
			Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	s	29 (1.5)	22 (4.1)	467 (8.6)	33 (4.2)	462 (7.6)	19 (4.3)	456 (9.6)	26 (4.8)	457 (8.2)
Australia		26 (0.6)	16 (3.0)	495 (9.6)	29 (3.8)	503 (6.7)	53 (4.3)	504 (5.6)	2 (1.5)	~ ~
Belgium (Flemish)		20 (0.4)	43 (3.4)	550 (3.6)	50 (3.6)	551 (2.3)	6 (2.0)	549 (4.9)	1 (0.0)	~ ~
Chinese Taipei		32 (0.3)	2 (0.7)	~ ~	7 (2.0)	546 (14.2)	37 (4.0)	565 (3.2)	54 (3.7)	567 (2.0)
Cyprus		23 (0.3)	18 (2.2)	502 (4.0)	56 (4.0)	513 (3.9)	25 (4.2)	508 (4.7)	0 (0.0)	~ ~
England	r	28 (0.8)	11 (2.7)	514 (16.4)	29 (4.7)	528 (7.5)	40 (4.1)	534 (6.3)	20 (4.4)	539 (13.1)
Hong Kong, SAR		34 (0.4)	2 (0.9)	~ ~	4 (1.7)	544 (14.8)	30 (4.0)	566 (4.5)	64 (4.3)	584 (4.3)
Hungary		24 (0.4)	19 (3.0)	508 (6.3)	54 (4.1)	523 (4.5)	26 (4.0)	550 (7.4)	1 (0.9)	~ ~
Iran, Islamic Rep. of		27 (0.6)	16 (2.7)	368 (9.8)	28 (3.6)	390 (6.4)	26 (4.1)	383 (10.4)	30 (4.0)	404 (6.7)
Italy		20 (0.3)	45 (3.4)	508 (4.8)	53 (3.4)	499 (5.2)	1 (0.7)	~ ~	0 (0.0)	~ ~
Japan		32 (0.3)	4 (0.9)	572 (7.2)	13 (2.3)	560 (4.6)	28 (3.0)	566 (3.0)	55 (2.9)	564 (2.4)
Latvia		23 (0.4)	31 (3.1)	521 (6.2)	38 (3.8)	529 (5.2)	27 (2.9)	561 (4.5)	5 (1.9)	561 (10.2)
Lithuania		21 (0.4)	30 (3.0)	506 (6.6)	59 (3.5)	544 (3.3)	11 (2.5)	548 (7.6)	0 (0.3)	~ ~
Moldova, Rep. of	r	25 (0.5)	16 (3.1)	491 (9.6)	49 (4.7)	503 (8.0)	30 (3.8)	520 (8.9)	5 (1.8)	506 (25.6)
Morocco		x x	x x	x x	x x	x x	x x	x x	x x	x x
Netherlands		23 (0.4)	24 (3.4)	544 (3.5)	41 (4.6)	540 (4.3)	33 (4.2)	542 (3.6)	2 (1.5)	~ ~
New Zealand		27 (0.3)	10 (1.6)	474 (8.9)	24 (2.7)	487 (5.4)	56 (3.0)	501 (3.2)	9 (2.2)	492 (9.6)
Norway		21 (0.4)	38 (3.2)	446 (4.8)	47 (3.5)	451 (3.3)	13 (3.2)	464 (4.8)	2 (1.3)	~ ~
Philippines		40 (1.0)	3 (1.0)	336 (28.7)	7 (2.4)	350 (20.2)	16 (3.8)	388 (34.2)	75 (4.2)	353 (6.9)
Russian Federation		21 (0.3)	33 (3.2)	524 (6.5)	45 (3.6)	539 (7.7)	20 (2.5)	523 (8.2)	1 (0.9)	~ ~
Scotland	s	26 (0.5)	18 (3.5)	482 (8.3)	27 (4.5)	489 (6.2)	48 (4.5)	498 (4.4)	7 (2.5)	505 (13.9)
Singapore		38 (0.2)	0 (0.1)	~ ~	2 (0.8)	~ ~	3 (1.0)	506 (39.2)	96 (1.2)	598 (5.4)
Slovenia		20 (0.4)	45 (4.1)	477 (4.7)	49 (4.4)	480 (4.0)	6 (2.2)	477 (7.8)	0 (0.0)	~ ~
Tunisia	r	31 (0.4)	5 (1.5)	319 (25.3)	15 (2.9)	331 (14.6)	41 (4.2)	341 (7.7)	38 (4.3)	344 (9.0)
United States		23 (0.3)	23 (2.5)	519 (5.7)	56 (3.0)	523 (3.2)	18 (2.3)	509 (6.1)	3 (1.1)	513 (13.7)
International Avg.		26 (0.1)	20 (0.6)	482 (2.5)	34 (0.7)	495 (1.8)	26 (0.7)	503 (2.6)	21 (0.5)	499 (3.0)
Benchmarking Participants										
Indiana State, US		22 (0.5)	23 (5.3)	533 (7.8)	71 (5.8)	535 (3.6)	4 (2.0)	534 (9.0)	3 (2.2)	522 (19.7)
Ontario Province, Can.		25 (0.5)	11 (2.8)	503 (8.2)	48 (5.5)	520 (6.0)	37 (5.2)	503 (5.5)	3 (1.5)	497 (7.7)
Quebec Province, Can.		26 (0.3)	5 (1.6)	518 (9.5)	48 (4.6)	503 (3.7)	46 (4.6)	509 (3.8)	0 (0.0)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by teachers.

( ) 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 data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

Exhibit 7.2: Index of Teachers' Reports on Teaching Mathematics Classes with Few or No Limitations on Instruction Due to Student Factors (MCFL)

MATHEMATICS Grade 8

Index of Teachers' Reports on Teaching Mathematics Classes with Few or No Limitations on Instruction Due to Student Factors

Index based on teachers' responses to six statements about student factors limiting mathematics instruction: 1) Students with different academic abilities; 2) Students who come from a wide range of backgrounds; 3) Students with special needs; 4) Uninterested students; 5) Low morale among students; 6) Disruptive students. Average is computed across the six statements based on a 4-point scale: 1. Not at all/Not applicable; 2. A little; 3. Some; 4. A lot. High level indicates average is less than or equal to 2. Medium level indicates average is greater than 2 and less than 3. Low level indicates average is greater than or equal to 3.

Countries	High MCFL		Medium MCFL		Low MCFL	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Netherlands	81 (3.7)	549 (4.6)	16 (3.3)	482 (11.2)	3 (1.9)	477 (18.4)
Egypt	80 (3.0)	410 (4.2)	19 (2.9)	392 (6.8)	1 (0.0)	~ ~
Belgium (Flemish)	73 (2.8)	556 (3.6)	20 (2.5)	506 (7.3)	7 (1.7)	454 (18.3)
Lithuania	71 (3.6)	508 (3.3)	29 (3.6)	484 (5.4)	0 (0.0)	~ ~
Bahrain	68 (3.6)	400 (2.2)	31 (3.6)	403 (3.7)	1 (0.7)	~ ~
Scotland	65 (4.3)	519 (5.2)	29 (3.8)	475 (6.5)	6 (2.0)	439 (10.9)
Japan	63 (4.1)	574 (3.1)	33 (3.7)	565 (3.0)	5 (1.7)	547 (12.4)
Sweden	62 (3.2)	512 (3.6)	30 (3.2)	485 (4.3)	8 (1.7)	456 (7.7)
Hungary	54 (3.7)	544 (4.0)	43 (3.7)	513 (5.6)	2 (1.3)	~ ~
Estonia	54 (4.3)	543 (3.4)	36 (4.2)	522 (4.6)	10 (2.5)	497 (7.7)
Malaysia	53 (3.8)	529 (6.3)	39 (3.9)	487 (5.8)	8 (2.1)	472 (14.4)
Iran, Islamic Rep. of	53 (4.0)	413 (3.7)	45 (4.0)	410 (4.2)	3 (1.2)	411 (10.4)
United States	51 (2.9)	530 (3.9)	30 (2.8)	492 (5.3)	19 (2.1)	474 (7.7)
Latvia	50 (4.1)	515 (5.0)	40 (4.6)	505 (3.9)	10 (2.9)	480 (7.8)
Australia	42 (4.1)	538 (6.0)	42 (4.4)	497 (7.5)	16 (3.2)	448 (13.4)
New Zealand	40 (4.6)	510 (8.4)	39 (4.9)	491 (7.2)	21 (3.6)	482 (11.5)
Israel	40 (3.5)	519 (6.1)	36 (3.9)	490 (5.9)	24 (3.4)	468 (9.3)
Lebanon	39 (4.6)	437 (6.0)	47 (4.6)	433 (5.3)	13 (2.7)	435 (9.7)
Russian Federation	37 (2.8)	516 (6.2)	41 (3.1)	502 (5.6)	23 (3.0)	506 (8.3)
Slovenia	36 (4.0)	494 (4.5)	42 (3.8)	491 (3.4)	22 (3.6)	497 (4.1)
Moldova, Rep. of r	36 (4.5)	463 (8.3)	43 (5.0)	457 (7.4)	22 (3.8)	454 (9.6)
Singapore	35 (2.5)	633 (5.4)	41 (2.9)	607 (6.0)	24 (2.8)	566 (6.8)
Indonesia	35 (4.0)	437 (8.8)	40 (4.7)	399 (8.5)	25 (4.2)	392 (9.4)
Macedonia, Rep. of	34 (4.2)	442 (7.6)	49 (4.2)	424 (6.1)	18 (3.1)	452 (10.1)
Serbia	34 (3.9)	478 (4.1)	45 (4.3)	474 (4.3)	21 (3.3)	479 (6.8)
Romania	32 (3.7)	490 (8.7)	43 (4.2)	470 (7.1)	25 (3.4)	463 (7.7)
Hong Kong, SAR	32 (4.3)	612 (7.0)	35 (3.9)	577 (5.7)	33 (4.2)	569 (8.4)
Philippines	31 (4.3)	380 (11.2)	47 (4.6)	381 (9.2)	21 (3.8)	368 (11.0)
Korea, Rep. of s	31 (3.0)	598 (5.0)	54 (3.3)	587 (3.3)	15 (2.7)	585 (5.9)
Bulgaria	29 (3.7)	492 (7.4)	45 (4.1)	468 (7.2)	25 (3.7)	466 (7.1)
Armenia r	29 (4.0)	476 (5.7)	45 (3.9)	478 (5.2)	26 (3.4)	479 (5.9)
South Africa r	29 (3.8)	269 (13.6)	44 (4.4)	265 (8.7)	27 (3.4)	249 (8.7)
Chile	28 (3.3)	407 (6.8)	36 (3.4)	389 (5.8)	36 (3.6)	370 (5.2)
Norway	27 (3.8)	473 (4.3)	58 (4.2)	459 (3.5)	15 (3.2)	453 (5.6)
Ghana	26 (4.0)	289 (9.6)	45 (4.4)	271 (7.1)	29 (4.1)	262 (7.6)
Slovak Republic	26 (3.2)	529 (7.7)	51 (4.7)	502 (4.8)	23 (3.8)	496 (5.6)
Saudi Arabia	25 (5.1)	341 (8.6)	46 (5.3)	330 (5.3)	29 (5.3)	334 (7.1)
Italy	24 (3.4)	500 (8.2)	52 (4.0)	481 (4.2)	24 (3.0)	472 (6.1)
Tunisia	23 (3.4)	408 (5.7)	44 (3.9)	411 (2.7)	32 (3.7)	410 (4.5)
Palestinian Nat'l Auth.	21 (3.2)	388 (7.1)	46 (4.1)	388 (5.7)	33 (4.3)	394 (6.5)
Jordan	20 (3.6)	450 (8.5)	53 (4.6)	422 (6.2)	27 (3.7)	411 (6.8)
Cyprus	20 (2.7)	476 (3.8)	36 (2.7)	461 (2.7)	44 (2.4)	452 (2.7)
Chinese Taipei	19 (3.1)	623 (8.8)	44 (3.8)	590 (6.5)	37 (3.9)	559 (7.1)
Botswana	19 (3.4)	374 (6.5)	41 (4.6)	366 (5.5)	41 (4.6)	362 (3.7)
Morocco s	5 (3.1)	383 (17.9)	51 (7.1)	384 (5.1)	44 (7.6)	394 (5.9)
‡ England r	52 (5.8)	540 (8.4)	42 (5.7)	479 (9.7)	6 (2.2)	417 (11.9)
International Avg.	40 (0.6)	480 (1.1)	41 (0.6)	460 (0.9)	20 (0.5)	449 (1.4)
Benchmarking Participants						
Basque Country, Spain	20 (4.4)	496 (5.5)	42 (5.1)	490 (4.3)	37 (4.6)	480 (5.4)
Indiana State, US	42 (5.5)	539 (9.5)	45 (5.3)	489 (6.4)	13 (3.8)	479 (15.8)
Ontario Province, Can.	55 (5.2)	530 (3.8)	33 (4.7)	517 (4.2)	11 (3.2)	488 (7.1)
Quebec Province, Can.	64 (4.1)	556 (4.3)	30 (4.2)	526 (4.4)	6 (2.1)	497 (7.6)

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

( ) 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 data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

How Much School Time Is Devoted to Mathematics Instruction?

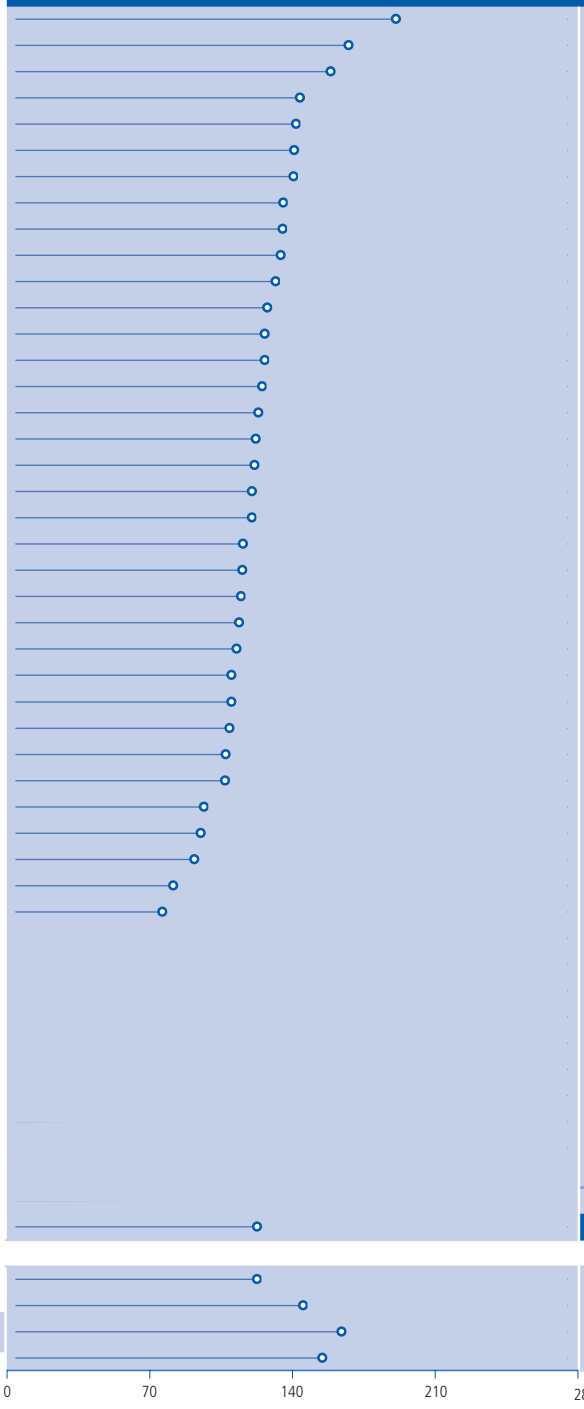
Exhibit 7.3 presents information about the amount of mathematics instruction given to students at the eighth and fourth grades. Since different systems have school years of different lengths and different arrangements of weekly and daily instruction, the comparisons are given in terms of the average number of hours of mathematics instruction over the school year as reported by mathematics teachers. At the eighth grade, countries providing 150 or more hours per year were the Philippines, Indonesia, and Chile. Countries providing fewer than 100 hours were Bulgaria, the Netherlands, Sweden, Macedonia, and Cyprus. The percentage of instructional time at the eighth grade that was devoted to mathematics ranged from 17 percent in the Philippines to 8 percent in Cyprus.

At the fourth grade, even with fewer participating countries than at the eighth grade, a substantial number of countries provided 150 or more hours of mathematics instruction, including Italy, Belgium (Flemish), Scotland, the Netherlands, Australia, Singapore, and the Philippines. Even though Chinese Taipei was at 99 hours, the rest of the countries provided at least 110 hours of mathematics instruction per year. The percentage of instructional time at the fourth grade that was devoted to mathematics ranged from 21 percent in Italy to 12 percent in Chinese Taipei.

Exhibit 7.4 provides teachers' reports about how mathematics instructional time is allocated across the five major content areas assessed by TIMSS 2003. At the eighth grade, on average, internationally, the two areas receiving about one-fourth of the instructional time each were algebra with 27 percent and geometry with 26 percent. Number was next with 21 percent. Measurement and data each were given 10 percent and other topics 6 percent. At the fourth grade, the profile was much different. As would be anticipated, number received the largest amount of mathematics instructional time – 38 percent, on average, internationally. Patterns and relationships (beginning algebra), measurement, and geometry each were given 15 to 16 percent, data 9 percent, and other 6 percent.

Exhibit 7.3: Mathematics Instructional Time

Countries	Students' Average Yearly Mathematics Instructional Time in Hours	Mathematics Instructional Time as a Percent of Total Instructional Time[1]
Philippines	193 (3.6)	17 (0.4)
Indonesia	s 169 (4.4)	13 (0.4)
Chile	r 160 (4.1)	r 14 (0.4)
Hong Kong, SAR	s 145 (5.2)	15 (0.5)
Scotland	s 142 (2.2)	14 (0.2)
Bahrain	142 (0.8)	16 (0.1)
Chinese Taipei	141 (2.0)	13 (0.2)
Australia	r 136 (2.9)	r 13 (0.3)
New Zealand	136 (1.7)	14 (0.2)
United States	s 135 (2.2)	13 (0.2)
Italy	r 132 (1.7)	r 13 (0.2)
Russian Federation	r 128 (2.1)	r 15 (0.3)
Palestinian Nat'l Auth.	s 127 (2.3)	14 (0.3)
Slovak Republic	r 126 (1.9)	r 14 (0.3)
Estonia	125 (1.2)	12 (0.2)
Belgium (Flemish)	s 123 (2.2)	13 (0.3)
Latvia	s 122 (1.4)	13 (0.3)
Lithuania	r 122 (0.9)	r 11 (0.2)
Romania	r 120 (2.1)	r 13 (0.3)
Malaysia	120 (1.4)	12 (0.1)
Slovenia	116 (1.3)	11 (0.1)
Iran, Islamic Rep. of	s 115 (3.5)	12 (0.4)
Singapore	114 (1.6)	13 (0.2)
Norway	114 (2.3)	13 (0.3)
Hungary	s 112 (2.0)	11 (0.2)
Jordan	110 (0.9)	12 (0.2)
Saudi Arabia	s 110 (1.0)	11 (0.2)
Korea, Rep. of	s 109 (1.2)	9 (0.1)
Serbia	s 107 (1.5)	13 (0.2)
Japan	107 (2.6)	10 (0.2)
Bulgaria	r 96 (1.7)	r 11 (0.2)
Netherlands	s 94 (1.4)	9 (0.1)
Sweden	r 91 (1.6)	r 10 (0.2)
Macedonia, Rep. of	r 80 (1.2)	r 9 (0.2)
Cyprus	s 75 (0.4)	8 (0.1)
Armenia	x x	x x
Botswana	x x	x x
Egypt	x x	x x
Ghana	x x	x x
Israel	x x	x x
Lebanon	x x	x x
Moldova, Rep. of	x x	x x
Morocco	x x	x x
South Africa	x x	x x
Tunisia	x x	x x
‡ England	x x	x x
International Avg.	123 (0.4)	12 (0.0)
Benchmarking Participants		
Basque Country, Spain	123 (2.4)	12 (0.3)
Indiana State, US	146 (3.2)	13 (0.3)
Ontario Province, Can.	r 166 (4.3)	r 17 (0.5)
Quebec Province, Can.	r 156 (3.8)	r 17 (0.4)



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

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

1 Computed as the ratio of mathematics instructional time to the total instructional time averaged across students (1 hour = 60 minutes).

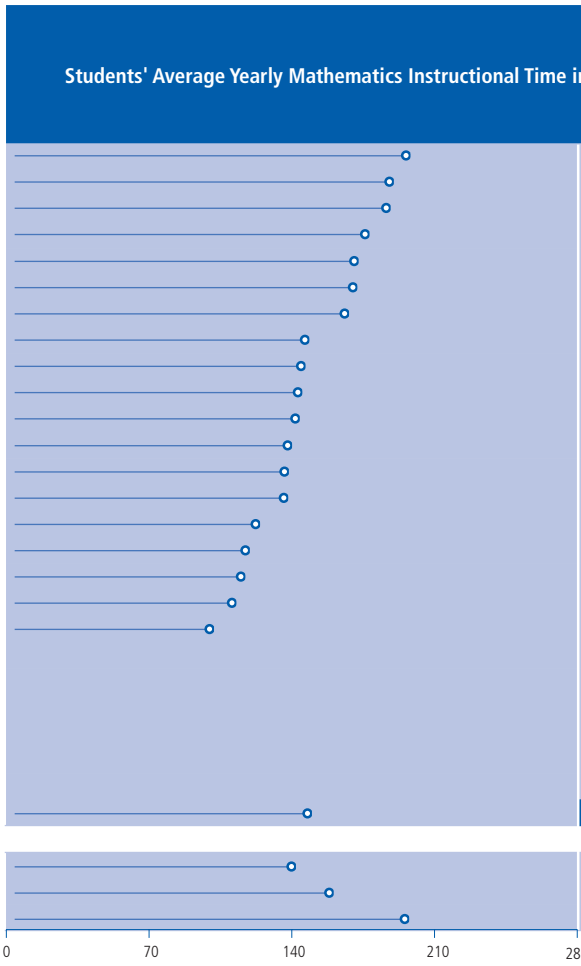
‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

Exhibit 7.3: Mathematics Instructional Time

MATHEMATICS Grade 4



Countries	Students' Average Yearly Mathematics Instructional Time in Hours	Mathematics Instructional Time as a Percent of Total Instructional Time[1]
Italy	r 199 (4.4)	r 21 (0.5)
Belgium (Flemish)	190 (2.0)	20 (0.2)
Scotland	s 189 (4.0)	s 20 (0.4)
Netherlands	s 178 (5.2)	s 18 (0.5)
Australia	r 172 (4.2)	r 18 (0.4)
Singapore	172 (1.0)	19 (0.2)
Philippines	167 (5.5)	15 (0.5)
United States	s 147 (3.2)	s 14 (0.4)
Cyprus	s 145 (1.8)	s 17 (0.2)
Slovenia	r 144 (1.2)	r 18 (0.2)
New Zealand	143 (2.7)	15 (0.3)
Lithuania	r 139 (1.6)	r 16 (0.2)
Hong Kong, SAR	s 137 (3.7)	s 15 (0.4)
Japan	137 (1.5)	13 (0.2)
Hungary	s 122 (1.7)	s 14 (0.2)
Russian Federation	s 117 (1.7)	s 16 (0.3)
Latvia	r 115 (1.1)	r 15 (0.2)
Norway	110 (1.8)	13 (0.2)
Chinese Taipei	99 (1.7)	12 (0.2)
Armenia	x x	x x
England	x x	x x
Iran, Islamic Rep. of	x x	x x
Moldova, Rep. of	x x	x x
Morocco	x x	x x
Tunisia	x x	x x
International Avg.	149 (0.7)	16 (0.1)
Benchmarking Participants		
Indiana State, US	140 (5.6)	14 (0.6)
Ontario Province, Can.	r 160 (3.4)	r 16 (0.3)
Quebec Province, Can.	r 198 (5.7)	r 22 (0.7)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

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

1 Computed as the ratio of mathematics instructional time to the total instructional time averaged across students (1 hour = 60 minutes).

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

Exhibit 7.4: Percentage of Time in Mathematics Class Devoted to TIMSS Content Areas During the School Year

MATHEMATICS Grade 8

Countries	Number	Algebra	Measurement	Geometry	Data	Other
Armenia	s 32 (1.7)	s 21 (1.1)	s 9 (0.5)	s 20 (1.0)	s 11 (0.6)	s 7 (0.8)
Australia	25 (0.8)	23 (0.6)	16 (0.5)	18 (0.8)	14 (0.6)	4 (0.7)
Bahrain	23 (0.5)	26 (0.6)	9 (0.4)	27 (0.4)	11 (0.3)	5 (0.4)
Belgium (Flemish)	30 (1.1)	20 (0.8)	6 (0.4)	36 (0.6)	5 (0.3)	2 (0.5)
Botswana	29 (1.4)	20 (0.7)	r 16 (0.9)	16 (0.8)	12 (0.8)	r 9 (0.9)
Bulgaria	10 (0.8)	38 (1.2)	6 (0.6)	37 (1.1)	4 (0.5)	5 (1.0)
Chile	39 (1.1)	15 (0.6)	10 (0.6)	24 (0.7)	9 (0.6)	4 (0.7)
Chinese Taipei	16 (1.0)	35 (1.0)	7 (0.5)	38 (1.4)	3 (0.4)	1 (0.5)
Cyprus	27 (0.6)	27 (0.5)	11 (0.4)	22 (0.5)	5 (0.4)	r 8 (0.7)
Egypt	20 (0.6)	21 (0.6)	13 (0.4)	22 (0.5)	13 (0.4)	10 (0.7)
Estonia	15 (0.9)	39 (1.1)	9 (0.4)	26 (0.7)	7 (0.4)	5 (0.8)
Ghana	21 (0.8)	19 (0.6)	14 (0.5)	20 (0.7)	19 (0.7)	7 (0.6)
Hong Kong, SAR	16 (0.7)	32 (0.8)	12 (0.7)	28 (0.8)	10 (0.6)	2 (0.6)
Hungary	22 (0.7)	26 (0.7)	9 (0.3)	28 (0.5)	10 (0.4)	5 (0.5)
Indonesia	19 (0.6)	23 (0.7)	13 (0.4)	24 (0.6)	15 (0.4)	6 (0.7)
Iran, Islamic Rep. of	20 (0.7)	22 (0.8)	11 (0.4)	27 (0.5)	11 (0.5)	9 (0.8)
Israel	15 (0.9)	34 (1.1)	9 (0.7)	28 (0.9)	10 (0.5)	r 5 (0.8)
Italy	14 (0.5)	33 (0.6)	10 (0.5)	28 (0.7)	11 (0.4)	4 (0.9)
Japan	17 (1.0)	31 (1.0)	4 (0.5)	34 (0.6)	12 (0.9)	2 (0.5)
Jordan	24 (0.9)	23 (0.6)	13 (0.5)	21 (0.8)	14 (0.5)	5 (0.7)
Korea, Rep. of	s 18 (0.6)	s 27 (0.6)	s 12 (0.5)	s 26 (0.6)	s 15 (0.4)	s 2 (0.3)
Latvia	14 (0.8)	39 (1.3)	s 6 (0.6)	30 (0.7)	6 (0.5)	5 (1.1)
Lebanon	s 21 (1.1)	s 21 (0.9)	s 9 (0.8)	s 35 (1.2)	s 11 (0.8)	s 3 (0.6)
Lithuania	18 (0.7)	34 (0.9)	9 (0.3)	23 (0.6)	11 (0.4)	4 (0.5)
Macedonia, Rep. of	13 (0.9)	26 (1.1)	8 (1.1)	38 (1.8)	7 (0.5)	8 (1.5)
Malaysia	25 (0.9)	22 (0.6)	14 (0.5)	20 (0.6)	14 (0.5)	6 (0.9)
Moldova, Rep. of	s 17 (0.9)	s 29 (0.8)	s 10 (0.7)	s 30 (0.9)	s 9 (0.6)	s 6 (0.9)
Morocco	x x	x x	x x	x x	x x	x x
Netherlands	16 (0.7)	29 (1.2)	13 (0.7)	22 (0.8)	14 (0.6)	5 (0.8)
New Zealand	25 (0.6)	23 (0.8)	17 (0.6)	19 (0.4)	14 (0.7)	3 (0.6)
Norway	27 (0.7)	17 (0.7)	12 (0.4)	24 (0.6)	13 (0.5)	8 (0.8)
Palestinian Nat'l Auth.	19 (0.7)	21 (0.7)	10 (0.5)	24 (0.7)	17 (0.6)	11 (0.9)
Philippines	21 (1.1)	42 (1.9)	12 (0.6)	12 (0.7)	10 (0.6)	3 (0.7)
Romania	18 (0.7)	27 (0.7)	9 (0.5)	33 (0.9)	8 (0.4)	4 (0.7)
Russian Federation	10 (0.8)	49 (0.9)	– –	35 (0.6)	3 (0.4)	2 (0.5)
Saudi Arabia	29 (0.9)	21 (0.6)	8 (0.8)	29 (1.0)	8 (0.6)	6 (0.8)
Scotland	– –	– –	– –	– –	– –	– –
Serbia	17 (1.0)	25 (1.0)	6 (0.6)	r 28 (1.8)	6 (0.6)	r 19 (2.3)
Singapore	13 (0.4)	34 (0.7)	13 (0.4)	21 (0.4)	11 (0.3)	8 (0.5)
Slovak Republic	16 (0.8)	37 (1.1)	7 (0.6)	25 (1.0)	7 (0.4)	8 (1.1)
Slovenia	38 (1.3)	19 (0.8)	11 (0.6)	17 (0.9)	8 (0.5)	7 (1.2)
South Africa	r 23 (0.7)	r 23 (0.8)	r 13 (0.6)	r 23 (0.7)	r 14 (0.5)	r 4 (0.4)
Sweden	34 (0.8)	20 (0.7)	12 (0.5)	21 (0.4)	10 (0.5)	4 (0.6)
Tunisia	34 (0.9)	13 (0.6)	7 (0.4)	33 (0.7)	7 (0.5)	r 6 (0.7)
United States	22 (0.7)	41 (1.3)	10 (0.4)	15 (0.6)	12 (0.5)	r 2 (0.3)
‡ England	– –	– –	– –	– –	– –	– –
International Avg.	21 (0.1)	27 (0.1)	10 (0.1)	26 (0.1)	10 (0.1)	6 (0.1)
Benchmarking Participants						
Basque Country, Spain	34 (1.1)	29 (1.0)	10 (0.7)	17 (0.7)	8 (0.6)	2 (0.5)
Indiana State, US	27 (1.3)	38 (1.6)	10 (0.4)	13 (1.2)	10 (0.6)	1 (0.3)
Ontario Province, Can.	27 (0.7)	20 (0.4)	18 (0.4)	18 (0.4)	16 (0.4)	1 (0.4)
Quebec Province, Can.	23 (0.7)	29 (0.7)	12 (0.5)	28 (0.8)	8 (0.5)	r 2 (0.5)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

Exhibit 7.4: Percentage of Time in Mathematics Class Devoted to TIMSS Content Areas During the School Year

MATHEMATICS Grade 4

Countries	Number	Patterns and Relationships	Measurement	Geometry	Data	Other
Armenia	r 35 (1.3)	r 21 (0.8)	r 13 (0.5)	r 13 (0.5)	r 10 (0.5)	r 8 (0.8)
Australia	40 (1.9)	18 (0.9)	17 (0.6)	12 (0.6)	11 (0.4)	3 (0.5)
Belgium (Flemish)	44 (1.1)	14 (0.6)	16 (0.3)	14 (0.4)	11 (0.5)	2 (0.4)
Chinese Taipei	39 (1.2)	15 (0.6)	17 (0.4)	16 (0.4)	11 (0.4)	3 (0.4)
Cyprus	35 (1.0)	18 (0.5)	14 (0.4)	14 (0.4)	14 (0.4)	6 (0.8)
England	– –	– –	– –	– –	– –	– –
Hong Kong, SAR	53 (1.7)	13 (0.8)	11 (0.5)	12 (0.6)	11 (0.5)	1 (0.4)
Hungary	42 (1.1)	20 (0.6)	15 (0.4)	11 (0.4)	7 (0.3)	6 (0.9)
Iran, Islamic Rep. of	22 (1.0)	17 (0.6)	16 (0.7)	18 (0.8)	16 (0.6)	12 (1.0)
Italy	33 (0.8)	13 (0.4)	19 (0.4)	18 (0.4)	11 (0.4)	6 (0.6)
Japan	40 (0.9)	18 (0.8)	13 (0.5)	17 (0.5)	12 (0.5)	1 (0.3)
Latvia	s 38 (1.6)	s 19 (1.1)	s 13 (0.6)	s 12 (0.6)	s 10 (0.6)	s 9 (1.0)
Lithuania	38 (1.3)	16 (0.6)	16 (0.5)	12 (0.5)	12 (0.5)	6 (0.8)
Moldova, Rep. of	r 30 (1.3)	r 18 (0.6)	r 14 (0.5)	r 14 (0.5)	r 13 (0.6)	r 11 (1.0)
Morocco	x x	x x	x x	x x	x x	x x
Netherlands	52 (1.6)	13 (0.8)	14 (0.6)	7 (0.4)	11 (0.6)	3 (0.5)
New Zealand	49 (1.1)	13 (0.4)	13 (0.4)	12 (0.4)	11 (0.3)	3 (0.5)
Norway	57 (1.3)	10 (0.4)	14 (0.6)	9 (0.4)	7 (0.4)	3 (0.5)
Philippines	29 (1.3)	20 (0.6)	16 (0.5)	15 (0.6)	15 (0.7)	6 (0.7)
Russian Federation	– –	– –	– –	– –	– –	– –
Scotland	– –	– –	– –	– –	– –	– –
Singapore	49 (1.3)	14 (0.7)	13 (0.5)	11 (0.5)	9 (0.3)	5 (0.7)
Slovenia	21 (1.2)	18 (1.1)	22 (0.9)	10 (0.5)	11 (0.5)	18 (1.5)
Tunisia	r 25 (1.3)	r 19 (0.8)	r 20 (0.6)	r 18 (0.6)	r 13 (0.6)	r 5 (0.7)
United States	38 (0.9)	19 (0.4)	13 (0.3)	13 (0.3)	15 (0.4)	4 (0.5)
International Avg.	38 (0.3)	16 (0.2)	15 (0.1)	13 (0.1)	11 (0.1)	6 (0.2)
Benchmarking Participants						
Indiana State, US	44 (2.2)	18 (1.3)	12 (0.7)	11 (0.6)	11 (0.7)	3 (0.8)
Ontario Province, Can.	34 (1.0)	16 (0.4)	17 (0.4)	16 (0.4)	15 (0.4)	2 (0.5)
Quebec Province, Can.	40 (1.4)	16 (0.8)	15 (0.4)	16 (0.5)	9 (0.5)	4 (0.7)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by teachers.

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

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

What Activities Do Students Do in Their Mathematics Lessons?

Exhibits 7.5 and 7.6 present information about the frequency of students doing particular content related activities, as reported by the students themselves and by their mathematics teachers, respectively. The data presented are for doing the activities in half of their lessons or more. At the eighth grade, the activities were: 1) practicing numerical operations without a calculator, 2) working on fractions and decimals, 3) interpreting data in tables, charts, or graphs, and 4) writing equations and functions to represent relationships. According to the eighth-grade students, internationally, on average, considerable effort was devoted to working on the two activities most likely related to the number content area. Fifty-seven percent of the students reported being asked to practice numerical operations in at least half of their lessons and another 51 percent reported working on fractions and decimals at least this frequently. Fifty-five percent reported writing equations and functions in half their lessons. The smallest percentage of students spent time on data interpretation tasks in at least half their lessons (41%). Teachers' reports agreed with that of their students when it came to the emphasis on number activities. For doing the activities in at least half of the lessons, teachers reported the largest percentages of students for practicing operations (62%) and working on fractions and decimals (43%). In contrast to students' views, teachers reported less emphasis on writing equations (30%) and far less on data interpretation (17%).

At the fourth grade, the activities were: 1) practicing operations, 2) working on fractions and decimals, 3) measuring things, 4) making tables charts or graphs, and 5) learning about shapes such as circles, triangles, rectangles, and cubes. Similar to the eighth-grade reports, students reported a much more balanced approach. The international averages were two-thirds of the students practicing operations in at least half the lessons and more than half (54%) working on fractions and decimals and learning about shapes. According to the students, 39 percent, on average, were making graphs in more than half their

lessons, and one-fourth were measuring things. In contrast, teachers reported an overwhelming emphasis on having students practice numerical operations. The teachers said they asked 82 percent of the students, on average, internationally, to practice adding, subtracting, multiplying, or dividing in half of the lessons or more. They reported asking 29 percent, on average, internationally, to work on fractions and decimals this frequently. According to teachers, measuring things, making graphs, and learning about shapes were relatively infrequent activities for more than 80 percent of the fourth-grade students.

Exhibit 7.5: Students' Reports on Mathematics Content Related Emphasis in Classroom Activities

Countries	Percentage of Students Who Reported Doing the Activity About Half of the Lessons or More			
	Practice Adding, Subtracting, Multiplying, and Dividing Without Using Calculator	Work on Fractions and Decimals	Interpret Data in Tables, Charts, or Graphs	Write Equations and Functions to Represent Relationships
Armenia	55 (1.0)	56 (1.1)	45 (1.0)	60 (1.3)
Australia	49 (1.5)	43 (1.5)	36 (1.4)	47 (1.4)
Bahrain	64 (0.9)	54 (1.0)	50 (0.7)	62 (0.8)
Belgium (Flemish)	65 (1.3)	61 (1.4)	19 (1.1)	43 (1.4)
Botswana	63 (1.1)	40 (1.0)	34 (1.0)	39 (0.9)
Bulgaria	60 (1.1)	51 (1.4)	46 (1.6)	71 (1.2)
Chile	68 (1.0)	71 (1.1)	51 (1.3)	64 (1.1)
Chinese Taipei	55 (1.0)	32 (1.0)	36 (0.9)	47 (1.0)
Cyprus	60 (0.8)	35 (0.8)	41 (0.9)	49 (0.9)
Egypt	61 (1.1)	63 (0.8)	55 (1.1)	67 (0.6)
Estonia	50 (1.3)	53 (1.3)	29 (1.2)	59 (1.3)
Ghana	63 (1.3)	55 (1.2)	50 (1.0)	54 (1.0)
Hong Kong, SAR	43 (0.8)	32 (0.9)	21 (0.9)	41 (0.9)
Hungary	67 (1.2)	64 (1.3)	56 (1.6)	67 (1.3)
Indonesia	49 (0.9)	38 (1.2)	42 (1.1)	44 (1.0)
Iran, Islamic Rep. of	58 (1.2)	44 (1.1)	49 (1.2)	48 (1.2)
Israel	61 (1.2)	55 (1.5)	51 (1.4)	65 (1.2)
Italy	43 (1.5)	46 (1.2)	39 (1.8)	68 (1.5)
Japan	86 (0.6)	42 (1.0)	51 (0.8)	66 (0.9)
Jordan	60 (0.9)	57 (0.8)	64 (1.1)	71 (1.0)
Korea, Rep. of	81 (0.7)	40 (0.8)	13 (0.6)	39 (0.9)
Latvia	78 (0.9)	73 (1.0)	30 (1.0)	65 (1.2)
Lebanon	58 (1.5)	58 (1.4)	44 (1.5)	66 (1.1)
Lithuania	46 (1.5)	56 (1.4)	39 (1.2)	62 (1.3)
Macedonia, Rep. of	55 (1.1)	44 (1.3)	37 (1.1)	64 (1.0)
Malaysia	72 (1.1)	65 (1.0)	46 (1.0)	48 (0.9)
Moldova, Rep. of	56 (1.3)	51 (1.5)	35 (1.2)	57 (1.5)
Morocco	61 (1.4)	64 (1.3)	51 (1.5)	58 (1.1)
Netherlands	12 (1.1)	30 (1.1)	42 (1.4)	38 (1.5)
New Zealand	46 (1.3)	45 (1.5)	40 (1.3)	45 (1.3)
Norway	21 (0.9)	28 (1.3)	29 (1.4)	23 (0.8)
Palestinian Nat'l Auth.	58 (1.0)	49 (1.2)	61 (1.1)	56 (1.0)
Philippines	74 (0.7)	68 (1.0)	54 (1.2)	68 (1.0)
Romania	63 (1.5)	63 (1.4)	44 (1.6)	70 (1.2)
Russian Federation	69 (1.0)	58 (1.3)	40 (1.2)	62 (1.3)
Saudi Arabia	57 (1.3)	54 (1.0)	51 (0.9)	64 (1.1)
Scotland	56 (1.4)	41 (1.5)	28 (1.2)	38 (1.3)
Serbia	56 (1.2)	52 (1.0)	35 (1.0)	55 (0.9)
Singapore	55 (0.7)	52 (0.8)	34 (0.8)	60 (0.9)
Slovak Republic	55 (1.2)	47 (1.1)	18 (1.0)	65 (1.1)
Slovenia	57 (1.3)	61 (1.5)	40 (1.6)	46 (1.2)
South Africa	70 (0.7)	66 (1.0)	54 (1.1)	62 (1.0)
Sweden	37 (1.3)	37 (1.3)	25 (1.3)	30 (1.3)
Tunisia	54 (0.9)	66 (0.8)	42 (0.9)	45 (0.9)
United States	63 (0.9)	66 (0.9)	55 (1.2)	73 (1.0)
‡ England	43 (1.1)	31 (1.3)	33 (1.5)	38 (1.7)
International Avg.	57 (0.2)	51 (0.2)	41 (0.2)	55 (0.2)
Benchmarking Participants				
Basque Country, Spain	79 (1.4)	76 (1.1)	53 (2.0)	77 (1.4)
Indiana State, US	67 (1.8)	72 (1.5)	54 (2.1)	74 (1.9)
Ontario Province, Can.	51 (1.7)	50 (1.4)	41 (1.7)	53 (1.3)
Quebec Province, Can.	33 (1.5)	51 (1.6)	32 (1.3)	57 (1.2)

Background data provided by students.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Exhibit 7.5: Students' Reports on Mathematics Content Related Emphasis in Classroom Activities

MATHEMATICS Grade 4

Countries	Percentage of Students Who Reported Doing the Activity About Half of the Lessons or More											
	Practice Adding, Subtracting, Multiplying, and Dividing Without Using Calculator		Work on Fractions and Decimals		Measure Things in the Classroom and Around the School		Make Tables, Charts, or Graphs		Learn about Shapes such as Circles, Triangles, Rectangles, and Cubes	
Armenia	r	68 (1.1)	r	76 (1.2)	s	20 (1.0)	s	34 (1.2)	s	64 (1.4)
Australia		75 (1.1)		58 (1.7)		29 (1.2)		42 (1.4)		52 (1.6)
Belgium (Flemish)		74 (1.2)		60 (1.3)		14 (0.7)		23 (1.4)		51 (1.6)
Chinese Taipei		50 (1.1)		45 (1.1)		29 (1.0)		37 (1.1)		52 (1.2)
Cyprus		69 (0.9)		69 (1.0)		45 (1.2)		58 (1.0)		69 (1.0)
England		63 (1.1)		42 (1.6)		12 (0.9)		36 (1.5)		33 (1.3)
Hong Kong, SAR		53 (1.6)		53 (1.1)		16 (1.0)		25 (1.0)		46 (1.1)
Hungary		72 (1.0)		32 (1.6)		12 (0.7)		16 (1.0)		53 (1.7)
Iran, Islamic Rep. of		58 (2.8)		64 (2.8)		51 (2.3)		58 (2.6)		72 (2.4)
Italy		61 (1.3)		60 (1.4)		21 (1.1)		49 (1.6)		72 (1.5)
Japan		80 (0.9)		74 (1.4)		27 (0.9)		50 (1.4)		57 (1.3)
Latvia		73 (1.1)		46 (1.7)		19 (1.0)		33 (1.4)		62 (1.3)
Lithuania		76 (1.0)		60 (1.4)		11 (0.7)		37 (1.4)		57 (1.1)
Moldova, Rep. of		65 (2.1)		42 (2.1)		15 (1.1)		36 (2.0)		49 (2.3)
Morocco	r	75 (2.1)	r	61 (2.8)	r	49 (2.3)	r	56 (2.6)	r	64 (2.5)
Netherlands		74 (1.4)		36 (1.8)		9 (0.9)		29 (1.5)		15 (0.9)
New Zealand		74 (0.8)		58 (1.3)		31 (1.2)		48 (1.2)		52 (1.1)
Norway		56 (1.1)		36 (1.6)		13 (0.7)		21 (1.2)		41 (1.0)
Philippines		66 (1.8)		73 (1.4)		45 (1.5)		49 (1.5)		74 (1.6)
Russian Federation		– –		– –		– –		– –		– –
Scotland		73 (1.0)		38 (1.7)		25 (1.3)		42 (1.5)		43 (1.5)
Singapore		77 (0.9)		73 (1.0)		14 (0.6)		29 (0.9)		47 (1.2)
Slovenia		59 (1.3)		40 (1.8)		18 (1.1)		26 (1.2)		50 (1.9)
Tunisia	r	53 (2.0)	r	25 (1.8)	r	46 (2.2)	r	50 (2.6)	r	62 (2.3)
United States		74 (0.7)		64 (1.1)		28 (0.8)		51 (1.0)		56 (1.0)
International Avg.		67 (0.3)		54 (0.3)		25 (0.3)		39 (0.3)		54 (0.3)
Benchmarking Participants										
Indiana State, US		76 (1.2)		66 (2.5)		22 (1.4)		43 (1.9)		50 (1.8)
Ontario Province, Can.		72 (1.0)		58 (2.3)		30 (1.3)		53 (1.3)		53 (1.6)
Quebec Province, Can.		76 (0.9)		57 (1.8)		31 (1.4)		45 (1.5)		63 (1.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by students.

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

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

Exhibit 7.6: Teachers' Reports on Mathematics Content Related Emphasis in Students' Classroom Activities

Countries	Percentage of Students Whose Teachers Reported Students Doing the Activity About Half of the Lessons or More							
	Practice Adding, Subtracting, Multiplying, and Dividing Without Using Calculator		Work on Fractions and Decimals		Interepret Data in Tables, Charts, or Graphs		Write Equations and Functions to Represent Relationships	
Armenia	66 (3.9)	r	51 (4.3)	r	13 (2.9)	r	27 (3.8)	
Australia	38 (4.3)		26 (3.9)		8 (2.2)		17 (3.5)	
Bahrain	66 (3.1)		32 (3.4)		14 (3.3)		23 (3.4)	
Belgium (Flemish)	67 (3.5)		45 (3.4)		1 (0.5)		3 (1.1)	
Botswana	80 (3.6)		36 (4.5)		9 (2.6)		18 (3.7)	
Bulgaria	85 (3.3)		71 (4.1)		5 (1.6)		28 (3.9)	
Chile	73 (3.4)		50 (3.9)		16 (2.5)		26 (3.5)	
Chinese Taipei	70 (3.8)		16 (3.0)		9 (2.4)		30 (3.9)	
Cyprus	69 (2.2)		40 (2.1)		7 (1.6)		40 (2.5)	
Egypt	44 (3.7)		40 (4.1)		25 (3.9)		33 (3.7)	
Estonia	63 (4.3)		61 (4.4)		12 (2.7)		32 (3.6)	
Ghana	73 (4.2)		37 (4.2)		22 (3.9)		30 (4.5)	
Hong Kong, SAR	10 (2.8)		6 (2.2)		6 (2.2)		32 (4.2)	
Hungary	75 (3.2)		80 (3.4)		5 (1.3)		50 (4.4)	
Indonesia	48 (4.2)		31 (3.7)		30 (4.2)		48 (4.8)	
Iran, Islamic Rep. of	77 (3.0)		50 (3.8)		41 (3.8)		33 (3.9)	
Israel	53 (3.8)		44 (3.8)		27 (3.1)		34 (3.9)	
Italy	53 (3.5)		62 (3.5)		20 (3.0)		22 (2.8)	
Japan	53 (4.3)		11 (2.6)		36 (3.7)		62 (3.7)	
Jordan	76 (3.3)		41 (4.3)		27 (3.9)		40 (4.3)	
Korea, Rep. of	56 (3.8)	s	32 (3.9)	s	18 (2.4)	s	41 (3.3)	s
Latvia	86 (2.6)		80 (3.3)		9 (2.1)		35 (4.0)	
Lebanon	51 (4.5)		37 (4.4)		29 (3.6)		37 (4.4)	
Lithuania	66 (3.7)		62 (3.8)		21 (3.0)		16 (2.8)	
Macedonia, Rep. of	67 (4.0)		57 (4.5)		21 (3.5)		49 (4.0)	
Malaysia	82 (3.2)		46 (4.2)		24 (4.0)		31 (3.6)	
Moldova, Rep. of	79 (3.8)	r	61 (4.6)	r	29 (4.3)	r	38 (4.8)	r
Morocco	77 (5.7)	s	82 (5.5)	s	18 (5.0)	s	21 (5.8)	s
Netherlands	15 (3.5)		8 (3.0)		34 (4.8)		28 (4.1)	
New Zealand	40 (4.2)		24 (4.3)		12 (3.6)		15 (4.4)	
Norway	5 (2.0)		5 (2.1)		2 (1.1)		4 (1.5)	
Palestinian Nat'l Auth.	71 (3.8)		33 (4.1)		28 (4.0)		24 (4.1)	
Philippines	73 (4.3)		52 (4.9)		26 (3.8)		46 (4.3)	
Romania	85 (3.2)		67 (4.4)		13 (2.8)		32 (3.8)	
Russian Federation	85 (2.4)		70 (3.6)		20 (3.1)		51 (3.7)	
Saudi Arabia	85 (3.5)		32 (4.2)		25 (4.6)		21 (4.2)	
Scotland	63 (4.5)		25 (4.0)		8 (2.7)		5 (2.4)	
Serbia	74 (3.6)		59 (3.9)		15 (3.0)		45 (3.6)	
Singapore	38 (2.5)		26 (2.3)		10 (1.6)		37 (2.8)	
Slovak Republic	57 (4.0)		56 (4.5)		5 (1.7)		35 (4.5)	
Slovenia	71 (3.9)		66 (4.0)		6 (1.9)		12 (2.3)	
South Africa	63 (3.4)		26 (3.6)		23 (3.0)		25 (3.5)	
Sweden	43 (3.7)		25 (3.3)		6 (1.8)		6 (1.8)	
Tunisia	75 (3.4)		50 (4.7)		11 (2.5)		16 (3.1)	
United States	46 (2.6)		45 (3.1)		25 (2.5)		47 (2.9)	
‡ England	50 (5.7)	s	19 (4.4)	s	9 (3.2)	s	14 (3.7)	s
International Avg.	62 (0.5)		43 (0.6)		17 (0.5)		30 (0.5)	
Benchmarking Participants								
Basque Country, Spain	75 (4.1)		60 (5.2)		15 (3.0)		39 (5.3)	
Indiana State, US	64 (4.8)		64 (5.1)		14 (4.7)		48 (5.2)	
Ontario Province, Can.	37 (4.5)		34 (4.3)		12 (3.0)		26 (4.3)	
Quebec Province, Can.	19 (3.9)		47 (5.0)		11 (2.9)		35 (4.6)	

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Exhibit 7.6: Teachers' Reports on Mathematics Content Related Emphasis in Students' Classroom Activities

MATHEMATICS Grade 4

Countries	Percentage of Students Whose Teachers Reported Students Doing the Activity About Half of the Lessons or More									
	Practice Adding, Subtracting, Multiplying, and Dividing Without Using Calculator		Work on Fractions and Decimals		Measure Things in the Classroom and Around the School		Make Tables, Charts, or Graphs		Learn about Shapes such as Circles, Triangles, Rectangles, and Cubes	
Armenia	r	91 (2.3)	r	73 (3.9)	r	8 (2.2)	r	11 (2.5)	r	22 (3.7)
Australia		71 (4.6)		18 (2.9)		6 (1.9)		7 (2.0)		8 (2.1)
Belgium (Flemish)		89 (2.1)		42 (3.0)		5 (1.6)		9 (1.9)		6 (1.8)
Chinese Taipei		75 (3.7)		22 (3.1)		9 (2.5)		8 (2.1)		8 (2.2)
Cyprus		80 (3.1)		43 (4.4)		16 (3.0)		19 (3.5)		18 (3.2)
England	r	82 (3.7)	r	21 (4.1)	r	5 (2.7)	r	6 (2.8)	r	4 (2.4)
Hong Kong, SAR		52 (4.6)		23 (3.9)		3 (1.6)		3 (1.4)		4 (1.6)
Hungary		97 (1.4)		8 (2.0)		5 (1.5)		2 (1.1)		5 (1.9)
Iran, Islamic Rep. of		56 (4.6)		41 (4.6)		48 (4.5)		39 (4.4)		61 (4.5)
Italy		76 (2.7)		42 (3.4)		7 (1.7)		18 (2.4)		21 (3.0)
Japan		90 (2.3)		53 (4.1)		18 (3.2)		35 (4.0)		37 (4.4)
Latvia		97 (1.2)		15 (3.1)		4 (1.5)		18 (3.3)		35 (4.1)
Lithuania		98 (1.0)		24 (2.6)		9 (2.0)		20 (2.8)		22 (2.5)
Moldova, Rep. of	r	93 (2.4)	r	25 (4.4)	r	5 (1.8)	r	25 (3.7)	r	29 (4.2)
Morocco		x x		x x		x x		x x		x x
Netherlands		90 (2.8)		33 (4.4)		3 (1.6)		5 (2.1)		0 (0.0)
New Zealand		88 (2.0)		20 (2.8)		3 (0.9)		7 (1.5)		4 (1.1)
Norway		70 (3.6)		2 (1.1)		3 (1.7)		0 (0.5)		4 (2.3)
Philippines		84 (3.4)		54 (4.8)		36 (4.4)		34 (4.4)		43 (4.3)
Russian Federation		– –		– –		– –		– –		– –
Scotland	r	84 (3.7)	r	12 (3.3)	r	2 (1.1)	r	2 (1.1)	r	6 (2.1)
Singapore		87 (2.4)		58 (4.4)		4 (1.5)		6 (1.5)		7 (1.8)
Slovenia		81 (3.5)		7 (2.2)		5 (1.9)		11 (2.9)		6 (2.2)
Tunisia		59 (4.6)	s	10 (3.3)	r	34 (4.6)	r	35 (4.2)	r	25 (4.1)
United States		87 (1.7)		23 (2.7)		8 (1.4)		17 (2.3)		11 (1.8)
International Avg.		82 (0.7)		29 (0.7)		11 (0.5)		15 (0.6)		17 (0.6)
Benchmarking Participants										
Indiana State, US		91 (3.2)		30 (5.5)		1 (0.0)		5 (2.2)		9 (3.7)
Ontario Province, Can.		73 (3.6)		15 (3.9)		4 (2.1)		21 (3.8)		11 (2.7)
Quebec Province, Can.		84 (3.0)		21 (3.9)		3 (1.5)		7 (1.7)		10 (2.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by teachers.

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

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students."

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 asked eighth-grade students and teachers about how often students were asked to do the following three activities – relate what was being learned in mathematics to their daily lives, explain their answers, and decide procedures for solving complex problems.

Exhibits 7.7 and 7.8 present students' and teachers' reports, respectively. In most of the countries, students reported a moderate emphasis on doing these types of problems in mathematics class. About two-thirds (67 percent), on average, internationally, said they were asked to explain answers in at least half their lessons, and more than half (53%) reported deciding problem-solving procedures this frequently. Students reported the least attention to relating mathematics to their daily lives (44%). On average, internationally, teachers reported more emphasis on explanations than did the students. They reported asking about three-fourths of the students (78%) to explain answers in at least half the lessons. Perhaps as a matter for some concern, the teachers reported somewhat less emphasis on problem-solving procedures (45%) than did the students. Teachers reported half the students were asked to relate mathematics to their daily lives in at least half the lessons.

Exhibit 7.7: Students' Reports on Problem Solving Related Emphasis in Classroom Activities

MATHEMATICS Grade 8

Countries	Percentage of Students Who Reported Doing the Activity About Half of the Lessons or More		
	Relate What is Being Learned in Mathematics to Their Daily Lives	Explain Answers	Decide Procedures for Solving Complex Problems
Armenia	51 (1.1)	72 (0.8)	71 (0.9)
Australia	37 (1.1)	69 (1.1)	45 (1.1)
Bahrain	59 (0.9)	73 (0.8)	63 (0.8)
Belgium (Flemish)	22 (1.0)	71 (1.1)	38 (1.0)
Botswana	64 (0.6)	78 (0.7)	52 (0.8)
Bulgaria	32 (1.6)	66 (1.2)	49 (1.6)
Chile	63 (1.0)	68 (1.0)	55 (1.1)
Chinese Taipei	28 (0.8)	31 (0.9)	41 (0.9)
Cyprus	50 (0.8)	81 (0.6)	46 (0.7)
Egypt	68 (0.9)	73 (0.7)	63 (0.8)
Estonia	31 (1.2)	65 (1.3)	82 (0.8)
Ghana	71 (1.2)	75 (1.2)	56 (1.0)
Hong Kong, SAR	41 (0.8)	57 (0.9)	52 (0.7)
Hungary	38 (1.4)	72 (1.1)	50 (1.1)
Indonesia	34 (1.1)	47 (1.0)	– –
Iran, Islamic Rep. of	61 (1.2)	75 (0.9)	73 (0.9)
Israel	50 (1.3)	82 (0.9)	73 (1.1)
Italy	37 (1.1)	57 (1.3)	55 (1.1)
Japan	24 (0.8)	32 (1.5)	45 (0.9)
Jordan	63 (1.0)	83 (0.9)	80 (0.9)
Korea, Rep. of	17 (0.6)	29 (0.8)	43 (0.8)
Latvia	28 (1.1)	67 (1.2)	35 (1.2)
Lebanon	56 (1.4)	79 (1.0)	63 (1.4)
Lithuania	25 (1.0)	60 (1.2)	37 (1.1)
Macedonia, Rep. of	53 (1.4)	65 (1.3)	50 (1.2)
Malaysia	65 (0.9)	62 (1.0)	47 (1.0)
Moldova, Rep. of	39 (1.6)	72 (1.2)	49 (1.5)
Morocco r	61 (1.3)	76 (1.0)	66 (1.1)
Netherlands	22 (1.2)	67 (1.8)	28 (1.2)
New Zealand	40 (1.2)	68 (1.7)	49 (1.3)
Norway	35 (1.1)	51 (1.3)	40 (1.1)
Palestinian Nat'l Auth.	63 (0.9)	80 (0.8)	74 (0.9)
Philippines	71 (0.8)	64 (1.0)	59 (1.0)
Romania	32 (1.3)	71 (1.3)	53 (1.6)
Russian Federation	30 (1.4)	84 (0.7)	57 (1.2)
Saudi Arabia	53 (1.3)	70 (1.5)	61 (1.7)
Scotland	36 (1.1)	75 (1.2)	45 (1.1)
Serbia	42 (1.3)	56 (1.2)	52 (0.9)
Singapore	41 (0.9)	60 (0.7)	51 (0.8)
Slovak Republic	51 (1.3)	63 (1.1)	48 (1.4)
Slovenia	42 (1.3)	57 (1.1)	42 (1.1)
South Africa	74 (1.0)	78 (0.8)	64 (0.8)
Sweden	25 (1.1)	57 (1.2)	50 (1.1)
Tunisia	50 (1.0)	75 (0.9)	53 (1.0)
United States	45 (1.0)	79 (0.8)	53 (0.9)
‡ England	27 (1.2)	69 (1.6)	42 (1.1)
International Avg.	44 (0.2)	67 (0.2)	53 (0.2)
Benchmarking Participants			
Basque Country, Spain	49 (1.6)	73 (1.4)	67 (1.5)
Indiana State, US	45 (2.0)	76 (1.2)	48 (1.7)
Ontario Province, Can.	44 (1.3)	86 (1.0)	56 (1.5)
Quebec Province, Can.	38 (1.3)	74 (1.0)	71 (1.1)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by students.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students.

Exhibit 7.8: Teachers' Reports on Problem Solving Related Emphasis in Classroom Activities

Countries	Percentage of Students Whose Teachers Reported Students Doing the Activity About Half of the Lessons or More					
	Relate What is Being Learned in Mathematics to Students' Daily Lives		Explain Answers		Decide Procedures for Solving Complex Problems	
Armenia	r	45 (4.2)	r	82 (2.9)	r	40 (3.6)
Australia		39 (4.3)		64 (4.2)		23 (3.7)
Bahrain		56 (3.2)		92 (1.3)		47 (3.9)
Belgium (Flemish)		32 (3.3)		78 (3.0)		22 (2.7)
Botswana		71 (4.3)		78 (4.0)		46 (5.3)
Bulgaria		26 (3.6)		88 (3.2)		28 (3.9)
Chile		87 (2.2)		84 (2.7)		75 (3.1)
Chinese Taipei		27 (3.6)		58 (3.9)		24 (3.2)
Cyprus		50 (2.5)		86 (1.3)		68 (2.2)
Egypt		63 (4.4)		85 (3.3)		41 (3.8)
Estonia		62 (3.9)		91 (2.5)		80 (3.2)
Ghana		63 (4.3)		75 (4.0)		36 (4.9)
Hong Kong, SAR		26 (4.0)		60 (4.7)		40 (4.6)
Hungary		63 (3.7)		98 (1.2)		68 (4.2)
Indonesia		50 (4.4)		61 (4.5)		25 (3.7)
Iran, Islamic Rep. of		69 (4.1)		92 (2.4)		64 (4.0)
Israel		44 (3.6)		82 (2.7)		71 (3.5)
Italy		31 (3.4)		89 (2.1)		57 (3.4)
Japan		14 (3.0)		44 (3.9)		21 (3.5)
Jordan		72 (3.9)		88 (2.4)		42 (4.0)
Korea, Rep. of	s	50 (3.6)	s	75 (3.1)	s	52 (3.5)
Latvia		43 (3.7)		80 (3.2)		54 (4.0)
Lebanon		43 (4.1)		89 (2.8)		56 (4.5)
Lithuania		52 (3.3)		92 (2.0)		58 (4.0)
Macedonia, Rep. of		57 (4.1)		76 (3.5)		58 (3.8)
Malaysia		64 (4.3)		78 (3.5)		40 (4.3)
Moldova, Rep. of	r	63 (4.2)	r	85 (3.5)	r	44 (4.7)
Morocco	s	45 (6.7)	s	81 (4.3)		x x
Netherlands		26 (4.2)		62 (4.7)		19 (4.0)
New Zealand		57 (4.7)		75 (4.3)		35 (4.4)
Norway		46 (4.4)		60 (4.0)		32 (3.9)
Palestinian Nat'l Auth.		72 (3.6)		92 (2.5)		43 (4.3)
Philippines		63 (4.4)		78 (4.1)		56 (4.8)
Romania		57 (3.5)		90 (2.4)		74 (3.6)
Russian Federation		24 (2.7)		93 (1.6)		14 (2.7)
Saudi Arabia		48 (4.7)		75 (5.7)		21 (4.4)
Scotland		41 (4.2)		69 (4.5)		25 (4.5)
Serbia		57 (3.8)		85 (3.0)		58 (4.0)
Singapore		32 (2.5)		48 (2.7)		27 (2.5)
Slovak Republic		66 (4.7)		84 (3.1)		66 (4.5)
Slovenia		58 (4.6)		74 (3.6)		46 (4.2)
South Africa		59 (4.0)		67 (3.4)		36 (3.9)
Sweden		40 (3.5)		60 (4.0)		54 (3.5)
Tunisia		38 (3.8)		80 (3.3)		35 (4.1)
United States		66 (2.8)		80 (2.4)		62 (2.9)
‡ England	s	46 (6.9)	s	75 (5.5)	s	45 (7.1)
International Avg.		50 (0.6)		78 (0.5)		45 (0.6)
Benchmarking Participants						
Basque Country, Spain		64 (4.5)		93 (2.6)		48 (4.3)
Indiana State, US		63 (5.3)		66 (5.8)		51 (6.5)
Ontario Province, Can.		60 (4.5)		81 (3.9)		49 (4.5)
Quebec Province, Can.		58 (5.1)		74 (4.5)		48 (5.1)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

What Instructional Strategies Are Used in Mathematics Classes?

As shown in Exhibit 7.9, the textbook is often the foundation of mathematics instruction at both the eighth and fourth grades. On average, internationally, nearly two-thirds of the eighth- and fourth-grade students (65-66%) had teachers who reported using a textbook as the primary basis of their lessons. For another 32 percent of the eighth-grade students and 29 percent of the fourth-grade students, teachers reported using textbooks as a supplementary resource.

Exhibit 7.10 presents a profile of the activities most commonly encountered in mathematics classes around the world, as reported by mathematics teachers. At the eighth grade, the three most predominant activities, accounting for 59 percent of class time, on average, internationally, were teacher lecture (19 % of class time), teacher-guided student practice (22 %), and students working on problems on their own (18%). At the fourth grade, these activities accounted for approximately about the same percentage of time as at the eighth grade (61%). The distribution was slightly different, though, since problem-solving activities with teacher guidance (22%) and on students' own (23%) accounted for nearly half the time. Teachers reported that 16 percent of the time, on average, was devoted to teacher lecture.

Exhibit 7.9: Textbook Use in Teaching Mathematics

Countries		Percentage of Students Taught by Teachers Reporting Textbook Use		
		Do Not Use Textbook to Teach Mathematics	Use Textbook to Teach Mathematics	
			As Primary Basis for Lessons	As Supplementary Resource
Armenia	r	7 (2.0)	72 (3.9)	21 (3.5)
Australia		5 (1.8)	52 (4.5)	43 (4.2)
Bahrain		0 (0.0)	76 (3.1)	24 (3.1)
Belgium (Flemish)		10 (2.3)	64 (3.5)	26 (2.8)
Botswana		3 (1.6)	44 (4.2)	53 (4.2)
Bulgaria		2 (1.1)	77 (3.7)	21 (3.5)
Chile		15 (2.6)	4 (1.2)	81 (2.8)
Chinese Taipei		6 (1.9)	81 (3.5)	13 (3.1)
Cyprus		3 (0.8)	63 (2.6)	34 (2.6)
Egypt		0 (0.0)	48 (4.2)	52 (4.2)
Estonia		0 (0.0)	93 (1.6)	7 (1.6)
Ghana		4 (1.5)	42 (4.6)	54 (4.5)
Hong Kong, SAR		0 (0.3)	83 (3.6)	17 (3.5)
Hungary		1 (0.4)	60 (3.6)	40 (3.6)
Indonesia		0 (0.0)	63 (3.7)	37 (3.7)
Iran, Islamic Rep. of		15 (3.0)	75 (3.2)	10 (2.2)
Israel		2 (0.9)	56 (3.7)	42 (3.7)
Italy		4 (1.2)	34 (3.8)	62 (3.9)
Japan		2 (1.2)	76 (3.7)	22 (3.8)
Jordan		0 (0.0)	84 (3.2)	16 (3.2)
Korea, Rep. of	s	4 (1.4)	89 (2.1)	8 (1.6)
Latvia		0 (0.0)	66 (4.1)	34 (4.1)
Lebanon		11 (2.8)	52 (5.0)	37 (4.6)
Lithuania		0 (0.0)	100 (0.0)	0 (0.0)
Macedonia, Rep. of		4 (1.9)	64 (4.0)	32 (4.2)
Malaysia		11 (2.5)	64 (4.2)	26 (4.0)
Moldova, Rep. of	r	1 (0.9)	85 (4.0)	14 (3.9)
Morocco	s	2 (1.1)	42 (6.4)	56 (6.4)
Netherlands		0 (0.0)	99 (1.2)	1 (1.2)
New Zealand		4 (2.4)	44 (5.6)	52 (5.5)
Norway		0 (0.0)	92 (2.4)	8 (2.4)
Palestinian Nat'l Auth.		2 (1.3)	80 (3.9)	18 (3.8)
Philippines		6 (1.9)	60 (4.5)	34 (4.3)
Romania		2 (1.4)	58 (4.3)	39 (4.2)
Russian Federation		0 (0.4)	86 (2.5)	14 (2.5)
Saudi Arabia		1 (0.0)	67 (5.8)	33 (5.8)
Scotland		4 (1.8)	80 (3.7)	16 (3.2)
Serbia		1 (0.0)	47 (4.2)	52 (4.3)
Singapore		0 (0.0)	74 (2.3)	26 (2.3)
Slovak Republic		1 (0.4)	74 (4.1)	26 (4.0)
Slovenia		0 (0.2)	55 (4.5)	45 (4.5)
South Africa		6 (1.9)	34 (4.0)	60 (3.9)
Sweden		0 (0.2)	90 (2.2)	9 (2.2)
Tunisia		1 (0.0)	23 (3.6)	76 (3.7)
United States		3 (0.9)	64 (3.0)	33 (3.0)
‡ England	r	14 (4.0)	46 (6.6)	40 (7.0)
International Avg.		3 (0.2)	65 (0.6)	32 (0.6)
Benchmarking Participants				
Basque Country, Spain		10 (3.3)	56 (5.4)	33 (5.0)
Indiana State, US		2 (1.2)	74 (4.2)	24 (4.3)
Ontario Province, Can.		2 (1.3)	55 (5.0)	43 (5.0)
Quebec Province, Can.		3 (1.6)	46 (4.4)	50 (4.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

Exhibit 7.9: Textbook Use in Teaching Mathematics

MATHEMATICS Grade 4

Countries		Percentage of Students Taught by Teachers Reporting Textbook Use		
		Do Not Use Textbook to Teach Mathematics	Use Textbook to Teach Mathematics	
			As Primary Basis for Lessons	As Supplementary Resource
Armenia	r	13 (3.3)	69 (4.7)	19 (3.7)
Australia		29 (3.9)	16 (3.1)	56 (4.1)
Belgium (Flemish)		4 (1.4)	85 (2.8)	11 (2.6)
Chinese Taipei		2 (1.1)	92 (2.3)	6 (2.1)
Cyprus		0 (0.0)	71 (3.7)	29 (3.7)
England	r	11 (2.9)	26 (3.9)	62 (4.5)
Hong Kong, SAR		0 (0.0)	81 (3.5)	19 (3.5)
Hungary		0 (0.0)	77 (3.8)	23 (3.8)
Iran, Islamic Rep. of		5 (1.7)	68 (4.5)	27 (4.5)
Italy		11 (2.0)	11 (2.0)	78 (2.5)
Japan		1 (0.0)	86 (3.0)	14 (2.9)
Latvia		0 (0.4)	88 (2.6)	11 (2.5)
Lithuania		0 (0.0)	100 (0.0)	0 (0.0)
Moldova, Rep. of	r	8 (2.7)	85 (3.6)	7 (2.5)
Morocco		x x	x x	x x
Netherlands		2 (1.4)	98 (1.4)	0 (0.4)
New Zealand		11 (2.2)	16 (2.8)	72 (3.0)
Norway		1 (0.6)	87 (3.1)	13 (3.0)
Philippines		6 (2.3)	57 (5.2)	37 (5.0)
Russian Federation		0 (0.0)	92 (1.9)	8 (1.9)
Scotland	s	0 (0.0)	82 (4.2)	18 (4.2)
Singapore		0 (0.0)	66 (4.0)	34 (4.0)
Slovenia		9 (2.5)	44 (4.5)	47 (4.8)
Tunisia	r	3 (1.4)	33 (4.1)	65 (4.2)
United States		11 (2.1)	60 (3.1)	29 (2.8)
International Avg.		5 (0.4)	66 (0.7)	29 (0.7)
Benchmarking Participants				
Indiana State, US		6 (2.6)	73 (4.8)	21 (3.6)
Ontario Province, Can.		6 (2.4)	39 (4.7)	54 (4.6)
Quebec Province, Can.		5 (1.6)	55 (4.5)	40 (4.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by teachers.

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

Exhibit 7.10: Percentage of Time in Mathematics Lessons Students Spend on Various Activities in a Typical Week

Countries	Reviewing Homework	Listening to Lecture-Style Presentations	Working Problems with Teacher's Guidance	Working Problems on Their Own Without Teacher's Guidance
Armenia	r 10 (0.5)	r 14 (0.8)	r 26 (1.1)	r 19 (0.9)
Australia	8 (0.5)	15 (0.8)	23 (1.2)	28 (1.2)
Bahrain	13 (0.5)	24 (0.9)	17 (0.5)	12 (0.5)
Belgium (Flemish)	7 (0.4)	14 (1.0)	26 (1.0)	20 (0.9)
Botswana	r 13 (0.9)	r 16 (1.1)	r 19 (1.1)	r 21 (1.2)
Bulgaria	10 (0.6)	18 (1.3)	26 (1.0)	16 (0.8)
Chile	10 (0.4)	18 (0.8)	21 (0.9)	18 (0.8)
Chinese Taipei	12 (0.5)	42 (1.3)	13 (0.6)	7 (0.5)
Cyprus	r 22 (0.4)	r 16 (0.5)	r 20 (0.5)	r 14 (0.4)
Egypt	11 (0.4)	18 (1.0)	17 (0.8)	15 (0.7)
Estonia	10 (0.4)	12 (0.6)	25 (1.0)	25 (0.8)
Ghana	r 11 (0.4)	r 16 (0.9)	r 20 (0.8)	r 18 (0.7)
Hong Kong, SAR	8 (0.4)	36 (1.5)	18 (0.7)	16 (0.8)
Hungary	12 (0.4)	13 (0.7)	25 (0.9)	25 (1.0)
Indonesia	r 12 (0.5)	r 25 (1.1)	r 20 (0.9)	r 14 (0.9)
Iran, Islamic Rep. of	12 (0.6)	17 (0.8)	18 (0.7)	14 (0.7)
Israel	r 14 (0.6)	r 15 (0.8)	r 22 (0.7)	r 21 (0.8)
Italy	15 (0.6)	22 (0.6)	19 (0.6)	13 (0.6)
Japan	7 (0.6)	29 (1.3)	28 (1.1)	11 (1.0)
Jordan	15 (0.7)	23 (1.0)	17 (0.8)	13 (0.8)
Korea, Rep. of	s 6 (0.3)	s 30 (1.2)	s 19 (0.6)	s 20 (0.7)
Latvia	r 8 (0.6)	r 12 (0.7)	r 25 (1.1)	r 22 (0.9)
Lebanon	s 24 (1.6)	s 17 (0.9)	s 23 (1.1)	s 8 (0.8)
Lithuania	9 (0.5)	7 (0.6)	30 (1.2)	26 (0.9)
Macedonia, Rep. of	7 (0.3)	37 (1.1)	19 (0.7)	15 (0.7)
Malaysia	13 (0.7)	21 (1.0)	21 (0.9)	16 (0.8)
Moldova, Rep. of	s 9 (0.6)	s 15 (1.0)	s 23 (1.0)	s 18 (0.9)
Morocco	x x	x x	x x	x x
Netherlands	15 (1.1)	13 (0.7)	21 (2.0)	28 (2.5)
New Zealand	7 (0.4)	17 (0.8)	24 (1.1)	23 (1.3)
Norway	8 (0.4)	19 (0.6)	26 (1.2)	25 (1.5)
Palestinian Nat'l Auth.	r 13 (0.6)	r 23 (1.0)	r 18 (0.8)	r 16 (0.9)
Philippines	r 9 (0.4)	r 20 (0.9)	r 16 (0.8)	r 15 (1.0)
Romania	9 (0.4)	24 (0.8)	29 (1.0)	15 (0.7)
Russian Federation	11 (0.2)	20 (0.7)	20 (0.7)	18 (0.7)
Saudi Arabia	r 15 (1.0)	r 16 (1.6)	r 13 (1.0)	r 8 (0.7)
Scotland	r 8 (0.3)	r 22 (0.7)	r 26 (1.3)	r 22 (1.5)
Serbia	7 (0.4)	25 (1.4)	23 (1.2)	20 (1.2)
Singapore	11 (0.4)	27 (0.7)	19 (0.6)	15 (0.5)
Slovak Republic	8 (0.3)	17 (0.7)	27 (0.9)	17 (0.7)
Slovenia	11 (0.4)	21 (0.8)	24 (0.7)	22 (0.9)
South Africa	s 15 (0.9)	s 13 (0.7)	s 19 (0.9)	s 18 (0.9)
Sweden	4 (0.4)	11 (0.6)	37 (1.8)	28 (1.8)
Tunisia	r 18 (0.9)	r 14 (1.0)	r 17 (0.9)	r 18 (0.9)
United States	13 (0.5)	18 (0.7)	21 (0.6)	18 (0.6)
‡ England	s 8 (0.4)	s 15 (1.2)	s 32 (2.3)	s 20 (1.7)
International Avg.	11 (0.1)	19 (0.1)	22 (0.2)	18 (0.2)
Benchmarking Participants				
Basque Country, Spain	22 (1.2)	16 (1.0)	20 (1.1)	15 (0.9)
Indiana State, US	16 (1.0)	17 (0.9)	19 (1.1)	18 (1.3)
Ontario Province, Can.	16 (0.7)	16 (0.8)	18 (0.9)	22 (1.3)
Quebec Province, Can.	12 (0.7)	25 (0.9)	17 (0.9)	21 (1.0)

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Exhibit 7.10: Percentage of Time in Mathematics Lessons Students Spend on Various Activities in a Typical Week

MATHEMATICS Grade 8

Countries		Listening to Teachers Re-teach and Clarify Content / Procedures		Taking Tests and Quizzes		Participating in Classroom Management Tasks Not Related to the Lesson's Content/Purpose		Other Student Activities
Armenia	r	13 (0.6)	r	11 (0.6)	r	4 (0.3)	r	4 (0.3)
Australia		9 (0.4)		7 (0.4)		7 (0.6)		3 (0.4)
Bahrain		12 (0.3)		13 (0.5)		6 (0.5)		6 (0.3)
Belgium (Flemish)		16 (0.8)		11 (0.4)		4 (0.3)		2 (0.2)
Botswana	r	11 (0.8)	r	10 (0.7)	r	6 (0.5)	r	5 (0.4)
Bulgaria		17 (0.9)		8 (0.5)		3 (0.4)		2 (0.3)
Chile		14 (0.7)		11 (0.5)		6 (0.4)		3 (0.3)
Chinese Taipei		9 (0.4)		10 (0.4)		4 (0.3)		3 (0.3)
Cyprus	r	12 (0.4)	r	10 (0.5)	r	5 (0.2)	r	2 (0.2)
Egypt		15 (0.8)		11 (0.4)		6 (0.3)		7 (0.4)
Estonia		11 (0.5)		13 (0.6)		3 (0.3)		2 (0.3)
Ghana	r	12 (0.7)	r	12 (0.4)	r	7 (0.4)	r	6 (0.3)
Hong Kong, SAR		9 (0.7)		6 (0.3)		4 (0.5)		4 (0.4)
Hungary		10 (0.4)		10 (0.4)		3 (0.3)		3 (0.3)
Indonesia	r	12 (0.5)	r	12 (0.7)	r	3 (0.4)	r	3 (0.5)
Iran, Islamic Rep. of		15 (0.7)		11 (0.5)		6 (0.3)		6 (0.6)
Israel	r	11 (0.4)	r	10 (0.5)	r	5 (0.5)	r	3 (0.3)
Italy		13 (0.4)		11 (0.5)		4 (0.3)		2 (0.3)
Japan		15 (0.9)		6 (0.4)		2 (0.2)		2 (0.4)
Jordan		11 (0.5)		9 (0.4)		6 (0.4)		6 (0.5)
Korea, Rep. of	s	9 (0.4)	s	8 (0.4)	s	5 (0.3)	s	3 (0.5)
Latvia	r	11 (0.6)	r	15 (0.7)	r	2 (0.2)	r	4 (0.4)
Lebanon	s	10 (0.6)	s	11 (0.6)	s	4 (0.4)	s	4 (0.4)
Lithuania		11 (0.7)		14 (0.6)		1 (0.2)		2 (0.2)
Macedonia, Rep. of		6 (0.4)		8 (0.4)		3 (0.3)		4 (0.3)
Malaysia		9 (0.5)		8 (0.4)		6 (0.4)		6 (0.4)
Moldova, Rep. of	s	11 (0.8)	s	14 (0.8)	s	4 (0.7)	s	5 (0.6)
Morocco		x x		x x		x x		x x
Netherlands		7 (0.5)		8 (0.5)		5 (0.5)		4 (0.4)
New Zealand		9 (0.4)		8 (0.4)		7 (0.5)		4 (0.5)
Norway		10 (0.4)		6 (0.3)		4 (0.3)		3 (0.4)
Palestinian Nat'l Auth.	r	11 (0.5)	r	9 (0.3)	r	6 (0.3)	r	6 (0.4)
Philippines	r	11 (0.5)	r	16 (0.7)	r	7 (0.3)	r	6 (0.4)
Romania		10 (0.4)		9 (0.5)		3 (0.3)		2 (0.2)
Russian Federation		8 (0.4)		18 (0.5)		1 (0.2)		3 (0.3)
Saudi Arabia	r	23 (2.2)	r	12 (1.0)	r	6 (0.4)	r	7 (0.8)
Scotland	r	8 (0.5)	r	4 (0.3)	r	6 (0.5)	r	3 (0.5)
Serbia		9 (0.5)		7 (0.4)		3 (0.3)		5 (0.5)
Singapore		9 (0.3)		8 (0.3)		6 (0.4)		4 (0.4)
Slovak Republic		13 (0.5)		12 (0.4)		3 (0.3)		3 (0.3)
Slovenia		10 (0.6)		6 (0.3)		2 (0.2)		4 (0.4)
South Africa	s	11 (0.6)	s	12 (0.6)	s	7 (0.4)	s	5 (0.4)
Sweden		9 (0.3)		6 (0.3)		3 (0.3)		3 (0.4)
Tunisia	r	14 (0.8)	r	13 (0.7)	r	4 (0.4)	r	4 (0.5)
United States		11 (0.3)		11 (0.4)		5 (0.3)		4 (0.4)
‡ England	s	11 (0.6)	s	4 (0.4)	s	7 (0.6)	s	4 (0.8)
International Avg.		11 (0.1)		10 (0.1)		5 (0.1)		4 (0.1)
Benchmarking Participants								
Basque Country, Spain		10 (0.7)		9 (0.6)		4 (0.4)		3 (0.5)
Indiana State, US		10 (0.6)		10 (0.7)		6 (0.6)		4 (0.7)
Ontario Province, Can.		10 (0.5)		11 (0.6)		5 (0.4)		3 (0.4)
Quebec Province, Can.		9 (0.4)		9 (0.5)		5 (0.4)		3 (0.4)

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Exhibit 7.10: Percentage of Time in Mathematics Lessons Students Spend on Various Activities in a Typical Week

Countries	Reviewing Homework	Listening to Lecture-Style Presentations	Working Problems with Teacher's Guidance	Working Problems on Their Own Without Teacher's Guidance
Armenia	s 10 (0.5)	s 12 (0.7)	s 24 (1.1)	s 20 (0.8)
Australia	6 (0.4)	12 (0.8)	27 (1.1)	25 (1.0)
Belgium (Flemish)	6 (0.4)	18 (0.6)	19 (0.6)	32 (1.1)
Chinese Taipei	10 (0.4)	33 (1.3)	16 (0.6)	11 (0.7)
Cyprus	14 (0.5)	12 (0.5)	22 (0.6)	21 (0.7)
England	r 6 (0.4)	r 18 (1.2)	r 24 (1.2)	r 27 (1.1)
Hong Kong, SAR	7 (0.4)	37 (1.3)	17 (0.7)	15 (0.8)
Hungary	r 8 (0.4)	r 12 (0.8)	r 27 (0.8)	r 27 (0.8)
Iran, Islamic Rep. of	13 (0.6)	13 (0.6)	17 (0.7)	14 (0.7)
Italy	11 (0.4)	24 (0.6)	13 (0.4)	14 (0.4)
Japan	5 (0.3)	19 (0.9)	32 (1.1)	16 (1.0)
Latvia	7 (0.5)	10 (0.7)	22 (0.8)	27 (0.9)
Lithuania	8 (0.3)	6 (0.4)	24 (0.8)	33 (1.0)
Moldova, Rep. of	r 10 (0.5)	r 12 (0.6)	r 20 (1.0)	r 18 (0.8)
Morocco	x x	x x	x x	x x
Netherlands	r 3 (0.3)	r 14 (0.9)	r 20 (1.2)	r 37 (1.4)
New Zealand	4 (0.3)	10 (0.5)	28 (1.1)	27 (0.9)
Norway	7 (0.4)	15 (0.5)	23 (1.3)	35 (1.6)
Philippines	9 (0.4)	18 (0.8)	17 (0.7)	17 (0.8)
Russian Federation	9 (0.3)	14 (0.6)	21 (0.7)	23 (0.6)
Scotland	s 6 (0.4)	s 21 (0.9)	s 20 (1.4)	s 31 (1.8)
Singapore	14 (0.6)	21 (1.0)	17 (0.8)	17 (0.7)
Slovenia	r 9 (0.4)	r 14 (0.8)	r 23 (1.0)	r 29 (1.2)
Tunisia	r 14 (1.0)	r 9 (1.0)	r 25 (1.6)	s 18 (1.1)
United States	10 (0.4)	16 (0.4)	23 (0.7)	22 (0.7)
International Avg.	8 (0.1)	16 (0.2)	22 (0.2)	23 (0.2)
Benchmarking Participants				
Indiana State, US	10 (0.8)	18 (1.2)	25 (1.4)	21 (1.6)
Ontario Province, Can.	13 (0.7)	16 (0.8)	21 (1.1)	21 (1.1)
Quebec Province, Can.	7 (0.3)	20 (0.9)	21 (1.0)	20 (0.9)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by teachers.

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

Exhibit 7.10: Percentage of Time in Mathematics Lessons Students Spend on Various Activities in a Typical Week

MATHEMATICS Grade 4

Countries	Listening to Teachers Re-teach and Clarify Content / Procedures	Taking Tests and Quizzes	Participating in Classroom Management Tasks Not Related to the Lesson's Content/Purpose	Other Student Activities
Armenia	s 13 (0.7)	s 12 (0.6)	s 5 (0.4)	s 5 (0.5)
Australia	13 (0.6)	7 (0.4)	5 (0.5)	r 5 (0.6)
Belgium (Flemish)	11 (0.6)	8 (0.3)	3 (0.2)	3 (0.3)
Chinese Taipei	12 (0.4)	9 (0.4)	4 (0.2)	4 (0.3)
Cyprus	13 (0.5)	10 (0.4)	5 (0.3)	6 (0.6)
England	r 12 (0.6)	s 5 (0.4)	s 4 (0.3)	s 5 (0.7)
Hong Kong, SAR	9 (0.5)	6 (0.3)	4 (0.3)	6 (0.4)
Hungary	r 12 (0.6)	r 8 (0.6)	r 3 (0.3)	r 5 (0.6)
Iran, Islamic Rep. of	15 (0.8)	12 (0.6)	8 (0.4)	9 (0.6)
Italy	14 (0.4)	14 (0.5)	6 (0.3)	5 (0.4)
Japan	15 (0.7)	10 (0.4)	1 (0.2)	2 (0.6)
Latvia	11 (0.5)	15 (0.6)	2 (0.2)	r 6 (0.7)
Lithuania	11 (0.6)	13 (0.6)	3 (0.3)	2 (0.3)
Moldova, Rep. of	r 12 (0.6)	r 16 (0.7)	r 6 (0.5)	r 7 (0.5)
Morocco	x x	x x	x x	x x
Netherlands	r 12 (0.7)	r 7 (0.8)	r 3 (0.3)	r 4 (0.6)
New Zealand	14 (0.7)	7 (0.3)	4 (0.2)	6 (0.6)
Norway	10 (0.4)	5 (0.3)	3 (0.2)	3 (0.3)
Philippines	12 (0.7)	15 (0.8)	8 (0.5)	6 (0.3)
Russian Federation	9 (0.4)	18 (0.6)	1 (0.2)	5 (0.5)
Scotland	s 9 (0.5)	s 5 (0.3)	s 4 (0.3)	s 4 (0.5)
Singapore	11 (0.4)	8 (0.4)	6 (0.3)	5 (0.5)
Slovenia	r 10 (0.4)	r 9 (0.6)	r 3 (0.3)	r 4 (0.4)
Tunisia	r 14 (1.0)	s 12 (0.6)	r 5 (0.4)	s 6 (0.7)
United States	11 (0.3)	9 (0.3)	5 (0.3)	5 (0.4)
International Avg.	12 (0.1)	10 (0.1)	4 (0.1)	5 (0.1)
Benchmarking Participants				
Indiana State, US	11 (0.6)	9 (0.5)	4 (0.6)	4 (0.6)
Ontario Province, Can.	12 (0.5)	8 (0.6)	6 (0.5)	4 (0.5)
Quebec Province, Can.	12 (0.8)	7 (0.4)	7 (0.5)	7 (1.1)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by teachers.

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

How Are Calculators and Computers Used?

Exhibit 7.11 shows the number of countries with national policies on calculator use, the percentages of students not permitted to use calculators in mathematics class, and the percentages of students using calculators for various activities in about half of the lessons or more. At the eighth grade, 29 countries and all four benchmarking participants reported that their official curriculum contained statements about using calculators. According to their teachers, the percentages of students not permitted to use calculators varied dramatically from country to country. More than half the eighth-grade students were not permitted to use calculators in Bahrain, Cyprus, Ghana, Iran, Jordan, Romania, and Saudi Arabia. The countries permitting calculator use for essentially all eighth-grade students (98% or more) included Egypt, Hong Kong SAR, Lithuania, Morocco, the Netherlands, Norway, the Palestinian National Authority, Scotland, Sweden, and England. The percentages of eighth-grade students asked to use calculators in at least half of their lessons for each of four different activities reveal that, on average, internationally, teachers asked the most students to use calculators for checking answers (27%), performing routine computations (29%), and solving complex problems (31%). Only 14 percent, on average, were asked to explore number concepts.

At the fourth grade, 14 participants reported that their national or regional mathematics curriculum contained statements about using calculators. Compared to eighth grade, teachers in the TIMSS countries reported that greater percentages of fourth-grade students were not permitted to use calculators – 57 percent, on average. The countries permitting widespread calculator usage (90% of the students or more) at the fourth grade included Australia, Cyprus, England, New Zealand, and Scotland. However, even in those countries, teachers reported asking relatively small percentages of students to do any calculator activities in half the lessons or more.

Countries' reports on computer use in mathematics class are presented in Exhibit 7.12. Across countries, 26 participants at the eighth grade and 12 at the fourth grade reported that their mathematics curriculum contained statements about computer use, nearly as many as reported statements about calculator use. Yet, access to computers remains a challenge in many countries. Teachers reported that, on average, internationally, computers were not available for 68 percent of the eighth-grade students and 58 percent of the fourth-grade students. Beyond that, using computers as often as in half the lessons was extremely rare at either grade, even in countries with relatively high availability.

Exhibit 7.11: Emphasis on Calculators in Mathematics Class

Countries	National Curriculum Contains Policies / Statements About the Use of Calculators	Percentage of Students Whose Teachers Reported That Calculators Are Not Permitted	Percentage of Students Whose Teachers Reported on Calculator Use About Half of the Lessons or More			
			Checking Answers	Doing Routine Computations	Solving Complex Problems	Exploring Number Concepts
Armenia	○	r 8 (2.5)	r 23 (3.2)	r 35 (3.9)	r 32 (3.9)	r 18 (3.5)
Australia	●	4 (2.2)	62 (4.5)	74 (4.1)	56 (4.7)	25 (3.6)
Bahrain	○	69 (2.6)	10 (1.1)	4 (1.0)	11 (2.2)	6 (1.2)
Belgium (Flemish)	●	3 (1.4)	32 (3.6)	27 (3.1)	61 (3.8)	18 (2.8)
Botswana	●	37 (4.5)	7 (2.1)	8 (2.5)	9 (2.4)	5 (1.9)
Bulgaria	○	29 (4.1)	9 (2.7)	11 (2.6)	10 (2.2)	2 (1.5)
Chile	●	14 (2.5)	38 (3.4)	22 (3.0)	33 (3.6)	23 (3.4)
Chinese Taipei	●	34 (4.0)	2 (1.3)	4 (1.6)	8 (2.4)	6 (2.0)
Cyprus	○	65 (2.8)	7 (1.8)	8 (1.4)	6 (1.7)	2 (1.2)
Egypt	●	0 (0.0)	46 (4.0)	64 (4.1)	52 (4.1)	36 (3.9)
Estonia	●	5 (1.7)	59 (3.9)	65 (4.1)	51 (4.2)	18 (3.4)
Ghana	●	r 61 (5.0)	5 (2.0)	4 (1.7)	7 (2.4)	4 (2.0)
Hong Kong, SAR	○	2 (1.1)	49 (4.4)	66 (4.4)	50 (4.6)	13 (3.1)
Hungary	●	19 (3.1)	29 (3.7)	23 (3.4)	33 (3.9)	9 (2.3)
Indonesia	○	28 (4.0)	8 (2.4)	7 (2.3)	19 (3.4)	7 (2.3)
Iran, Islamic Rep. of	○	52 (4.1)	8 (2.1)	5 (1.7)	10 (2.4)	3 (1.5)
Israel	●	8 (2.2)	50 (3.7)	53 (4.1)	47 (3.8)	28 (3.2)
Italy	●	16 (2.9)	40 (4.2)	45 (3.9)	55 (4.0)	11 (2.3)
Japan	●	37 (4.1)	0 (0.0)	2 (1.2)	1 (0.9)	3 (1.6)
Jordan	●	55 (4.4)	4 (1.7)	6 (2.1)	14 (3.5)	3 (1.4)
Korea, Rep. of	●	s 35 (3.3)	s 2 (1.3)	s 2 (1.2)	s 3 (1.0)	s 2 (0.8)
Latvia	○	47 (4.5)	10 (2.7)	8 (2.4)	7 (2.0)	5 (1.7)
Lebanon	○	6 (1.8)	46 (4.5)	39 (4.4)	34 (4.1)	26 (3.8)
Lithuania	●	1 (0.7)	59 (3.7)	60 (3.8)	68 (3.5)	17 (2.9)
Macedonia, Rep. of	○	24 (3.7)	19 (3.4)	19 (3.0)	19 (3.3)	9 (2.3)
Malaysia	○	46 (3.9)	14 (2.7)	12 (2.6)	23 (3.7)	10 (2.4)
Moldova, Rep. of	○	s 15 (3.4)	r 24 (4.2)	r 23 (3.9)	r 23 (3.5)	r 22 (3.8)
Morocco	○	s 1 (1.1)	s 15 (4.8)	s 10 (4.0)	s 13 (4.1)	s 15 (5.0)
Netherlands	●	0 (0.0)	72 (4.3)	94 (2.3)	75 (4.1)	42 (4.8)
New Zealand	●	4 (2.5)	60 (4.8)	77 (3.2)	64 (5.4)	42 (4.5)
Norway	●	0 (0.0)	72 (3.6)	77 (3.8)	68 (4.0)	21 (3.4)
Palestinian Nat'l Auth.	●	1 (0.7)	24 (4.0)	21 (3.9)	39 (4.1)	8 (2.4)
Philippines	○	28 (4.1)	10 (2.0)	6 (2.1)	16 (3.4)	13 (2.9)
Romania	●	52 (4.1)	4 (1.6)	6 (1.7)	0 (0.0)	0 (0.0)
Russian Federation	●	20 (2.4)	20 (2.6)	13 (2.3)	19 (3.2)	5 (1.5)
Saudi Arabia	○	r 59 (4.6)	10 (3.3)	4 (2.0)	9 (3.1)	2 (1.0)
Scotland	●	2 (1.4)	11 (2.3)	22 (3.8)	37 (5.2)	12 (3.2)
Serbia	●	36 (4.2)	19 (3.4)	22 (3.4)	17 (3.2)	11 (2.7)
Singapore	●	0 (0.0)	63 (2.4)	63 (2.1)	65 (2.5)	32 (2.2)
Slovak Republic	○	— —	r 36 (4.6)	r 38 (4.5)	r 22 (4.0)	r 9 (2.8)
Slovenia	●	40 (4.4)	9 (2.5)	9 (2.3)	13 (2.7)	3 (1.4)
South Africa	●	r 6 (1.8)	21 (3.3)	18 (2.5)	32 (3.4)	23 (3.1)
Sweden	●	1 (0.4)	43 (3.5)	70 (3.7)	55 (4.0)	13 (2.1)
Tunisia	○	r 44 (4.6)	6 (2.0)	8 (2.4)	5 (1.9)	8 (2.4)
United States	●	6 (1.4)	55 (3.1)	52 (2.6)	69 (2.7)	48 (3.0)
‡ England	●	r 0 (0.0)	r 42 (6.7)	r 35 (5.4)	r 51 (6.3)	r 16 (4.1)
International Avg.		23 (0.5)	27 (0.5)	29 (0.5)	31 (0.5)	14 (0.4)
Benchmarking Participants						
Basque Country, Spain	●	27 (4.3)	24 (4.3)	27 (4.6)	48 (5.2)	16 (3.3)
Indiana State, US	●	14 (3.9)	51 (5.9)	40 (4.4)	62 (5.7)	42 (6.8)
Ontario Province, Can.	●	1 (1.0)	62 (4.5)	56 (4.6)	75 (4.4)	44 (4.7)
Quebec Province, Can.	●	0 (0.0)	91 (2.2)	86 (4.0)	87 (3.7)	49 (4.5)

● Yes

○ No

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by National Research Coordinators and by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

Exhibit 7.11: **Emphasis on Calculators in Mathematics Class**

MATHEMATICS Grade 4

Countries	National Curriculum Contains Policies / Statements About the Use of Calculators	Percentage of Students Whose Teachers Reported That Calculators Are Not Permitted	Percentage of Students Whose Teachers Reported on Calculator Use About Half of the Lessons or More			
			Checking Answers	Doing Routine Computations	Solving Complex Problems	Exploring Number Concepts
Armenia	○	s 74 (3.8)	r 3 (1.0)	r 4 (1.4)	r 2 (0.8)	r 5 (1.7)
Australia	●	6 (2.4)	15 (3.3)	5 (1.9)	13 (2.6)	11 (2.9)
Belgium (Flemish)	○	29 (3.8)	9 (2.1)	2 (0.7)	9 (2.2)	1 (0.5)
Chinese Taipei	○	54 (4.3)	0 (0.0)	1 (1.0)	4 (1.7)	3 (1.4)
Cyprus	●	3 (1.3)	21 (3.3)	16 (3.2)	15 (3.3)	24 (3.6)
England	●	r 1 (0.6)	r 18 (4.2)	r 7 (2.7)	r 22 (4.4)	r 14 (3.7)
Hong Kong, SAR	○	87 (3.0)	0 (0.0)	1 (0.9)	1 (0.9)	2 (1.1)
Hungary	○	87 (2.9)	1 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Iran, Islamic Rep. of	○	82 (4.0)	0 (0.1)	0 (0.1)	0 (0.1)	1 (0.0)
Italy	●	88 (2.3)	1 (0.9)	2 (0.7)	1 (0.4)	1 (0.0)
Japan	●	32 (3.7)	0 (0.0)	1 (0.0)	3 (1.4)	1 (1.0)
Latvia	○	95 (1.8)	0 (0.0)	0 (0.0)	1 (0.5)	1 (0.5)
Lithuania	●	69 (3.6)	1 (0.6)	0 (0.0)	4 (1.4)	2 (1.1)
Moldova, Rep. of	○	r 66 (4.6)	r 4 (1.6)	r 4 (1.7)	r 7 (2.5)	r 3 (1.5)
Morocco	○	x x	x x	x x	x x	x x
Netherlands	●	61 (4.8)	1 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
New Zealand	●	4 (1.3)	11 (2.0)	3 (1.1)	13 (2.2)	7 (1.6)
Norway	●	10 (2.7)	3 (1.2)	1 (0.5)	2 (1.0)	2 (0.9)
Philippines	○	96 (1.7)	1 (0.7)	1 (0.7)	0 (0.0)	0 (0.0)
Russian Federation	○	89 (2.2)	2 (1.1)	1 (0.6)	0 (0.0)	1 (0.8)
Scotland	●	s 9 (2.4)	r 2 (1.6)	r 0 (0.0)	r 5 (2.0)	r 4 (1.7)
Singapore	○	97 (1.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Slovenia	○	95 (2.0)	0 (0.0)	1 (0.0)	1 (1.0)	0 (0.0)
Tunisia	○	r 97 (1.6)	r 4 (1.9)	r 3 (1.5)	r 5 (2.0)	r 2 (1.3)
United States	●	r 31 (2.6)	7 (1.4)	2 (0.8)	9 (1.8)	6 (1.4)
International Avg.		57 (0.6)	4 (0.3)	2 (0.2)	5 (0.4)	4 (0.3)
Benchmarking Participants						
Indiana State, US	●	40 (5.9)	6 (2.5)	1 (0.8)	4 (1.6)	3 (1.6)
Ontario Province, Can.	●	20 (3.8)	5 (2.1)	3 (2.2)	15 (3.8)	7 (2.5)
Quebec Province, Can.	●	38 (4.3)	9 (2.6)	1 (0.8)	8 (2.6)	2 (1.4)

● Yes

○ No

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by National Research Coordinators and by teachers.

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

Exhibit 7.12: Computer Use in Mathematics Class

Countries	National Curriculum Contains Policies / Statements About the Use of Computers	Percentage of Students Whose Teachers Reported That Computers Are Not Available	Percentage of Students Whose Teachers Reported on Computer Use About Half of the Lessons or More			
			Discovering Principles and Concepts	Practicing Skills and Procedures	Looking up Ideas and Information	Processing and Analyzing Data
Armenia	○	r 80 (3.4)	r 0 (0.4)	r 3 (1.8)	r 1 (0.7)	r 1 (0.9)
Australia	●	46 (4.2)	0 (0.4)	1 (0.4)	1 (0.6)	0 (0.0)
Bahrain	○	65 (3.5)	1 (0.6)	1 (0.7)	3 (1.1)	5 (1.3)
Belgium (Flemish)	●	52 (3.8)	1 (1.0)	1 (0.9)	1 (0.9)	1 (0.8)
Botswana	●	r 93 (2.6)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.5)
Bulgaria	○	91 (2.2)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.0)
Chile	○	48 (3.8)	1 (0.8)	2 (0.8)	9 (2.1)	7 (2.0)
Chinese Taipei	●	71 (3.3)	0 (0.0)	0 (0.0)	1 (1.0)	1 (1.0)
Cyprus	○	92 (1.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Egypt	●	– –	– –	– –	– –	– –
Estonia	●	69 (3.8)	0 (0.0)	0 (0.0)	0 (0.0)	2 (1.0)
Ghana	●	85 (3.5)	0 (0.0)	1 (0.0)	1 (0.9)	2 (1.1)
Hong Kong, SAR	○	61 (4.3)	0 (0.4)	0 (0.0)	1 (0.9)	3 (1.5)
Hungary	●	73 (3.5)	1 (0.7)	1 (1.0)	1 (0.7)	1 (0.7)
Indonesia	○	89 (2.5)	1 (0.7)	2 (1.3)	1 (0.8)	1 (0.8)
Iran, Islamic Rep. of	○	98 (0.9)	1 (0.0)	1 (0.0)	1 (0.0)	1 (0.0)
Israel	●	53 (3.8)	5 (1.3)	9 (2.1)	3 (1.0)	7 (1.8)
Italy	○	68 (3.6)	0 (0.3)	1 (0.6)	0 (0.0)	1 (0.8)
Japan	●	14 (3.2)	2 (1.2)	1 (0.9)	1 (1.0)	1 (0.7)
Jordan	●	89 (2.8)	0 (0.0)	1 (1.0)	0 (0.0)	1 (0.0)
Korea, Rep. of	●	s 27 (3.4)	s 17 (2.6)	s 7 (1.7)	s 11 (2.3)	s 6 (2.0)
Latvia	○	77 (4.1)	0 (0.0)	0 (0.4)	0 (0.0)	1 (0.5)
Lebanon	○	76 (3.8)	8 (2.4)	8 (2.4)	6 (2.3)	10 (3.2)
Lithuania	○	30 (3.6)	0 (0.0)	3 (1.5)	3 (1.3)	3 (1.7)
Macedonia, Rep. of	○	96 (1.4)	0 (0.0)	1 (0.5)	0 (0.0)	0 (0.0)
Malaysia	○	95 (1.7)	1 (0.7)	0 (0.5)	0 (0.5)	0 (0.0)
Moldova, Rep. of	○	r 72 (3.7)	r 13 (3.6)	r 14 (3.2)	r 12 (2.9)	r 14 (3.1)
Morocco	○	x x	x x	x x	x x	x x
Netherlands	●	70 (4.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
New Zealand	●	29 (4.6)	1 (0.3)	0 (0.3)	1 (0.6)	1 (0.6)
Norway	●	45 (4.1)	1 (0.5)	1 (0.9)	3 (1.4)	3 (1.3)
Palestinian Nat'l Auth.	●	71 (4.1)	3 (1.4)	3 (1.3)	2 (1.2)	0 (0.0)
Philippines	○	90 (2.9)	2 (1.4)	2 (1.4)	3 (1.6)	2 (1.4)
Romania	○	88 (2.7)	0 (0.0)	1 (0.5)	1 (0.8)	0 (0.0)
Russian Federation	○	89 (2.6)	1 (0.5)	1 (0.6)	1 (0.5)	1 (0.7)
Saudi Arabia	○	81 (3.6)	1 (0.9)	3 (1.5)	5 (1.7)	3 (1.3)
Scotland	●	60 (4.8)	2 (1.0)	2 (1.0)	0 (0.0)	0 (0.0)
Serbia	●	92 (2.4)	3 (1.7)	3 (1.5)	3 (1.5)	3 (1.5)
Singapore	●	33 (2.7)	3 (1.0)	4 (1.0)	3 (0.9)	3 (0.8)
Slovak Republic	○	75 (3.5)	0 (0.0)	1 (0.6)	0 (0.0)	0 (0.0)
Slovenia	●	62 (4.1)	0 (0.1)	1 (1.0)	0 (0.1)	1 (0.2)
South Africa	○	r 85 (2.7)	3 (1.4)	3 (1.2)	3 (1.2)	2 (1.1)
Sweden	●	54 (3.6)	0 (0.0)	2 (0.9)	1 (0.7)	1 (0.5)
Tunisia	○	77 (3.5)	3 (0.8)	3 (0.8)	4 (1.3)	5 (1.3)
United States	○	54 (3.0)	2 (0.7)	4 (1.0)	3 (1.0)	2 (0.7)
‡ England	●	r 34 (6.6)	r 1 (0.8)	r 5 (2.9)	r 2 (1.4)	r 1 (1.3)
International Avg.		68 (0.5)	2 (0.2)	2 (0.2)	2 (0.2)	2 (0.2)
Benchmarking Participants						
Basque Country, Spain	●	65 (4.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Indiana State, US	●	49 (5.9)	2 (1.5)	4 (2.0)	1 (1.1)	2 (1.5)
Ontario Province, Can.	●	54 (5.2)	1 (0.0)	2 (1.2)	4 (1.5)	5 (1.9)
Quebec Province, Can.	●	89 (2.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

● Yes

○ No

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by National Research Coordinators and by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

Exhibit 7.12: **Computer Use in Mathematics Class**

MATHEMATICS Grade 4

Countries	National Curriculum Contains Policies / Statements About the Use of Computers	Percentage of Students Whose Teachers Reported That Computers Are Not Available	Percentage of Students Whose Teachers Reported on Computer Use About Half of the Lessons or More		
			Discovering Principles and Concepts	Practicing Skills and Procedures	Looking up Ideas and Information
Armenia	○	r 88 (2.6)	r 0 (0.0)	r 0 (0.0)	r 1 (0.6)
Australia	●	24 (3.6)	5 (2.3)	8 (2.4)	3 (1.7)
Belgium (Flemish)	○	33 (3.4)	0 (0.3)	9 (2.2)	1 (0.2)
Chinese Taipei	●	84 (3.3)	1 (0.0)	1 (0.0)	1 (0.6)
Cyprus	○	19 (3.3)	2 (1.2)	7 (2.1)	6 (1.8)
England	●	r 19 (3.4)	r 4 (1.9)	r 5 (2.3)	r 2 (1.4)
Hong Kong, SAR	○	47 (4.4)	1 (1.0)	1 (1.1)	0 (0.0)
Hungary	○	86 (3.3)	1 (0.9)	3 (1.4)	2 (1.1)
Iran, Islamic Rep. of	○	98 (1.1)	0 (0.0)	0 (0.0)	0 (0.0)
Italy	●	75 (3.1)	0 (0.0)	0 (0.3)	0 (0.0)
Japan	●	16 (3.2)	0 (0.0)	1 (0.7)	1 (0.7)
Latvia	○	89 (2.9)	0 (0.0)	0 (0.0)	0 (0.3)
Lithuania	○	87 (2.5)	0 (0.2)	3 (1.3)	0 (0.0)
Moldova, Rep. of	○	r 94 (2.1)	r 1 (0.0)	r 2 (1.2)	r 1 (0.0)
Morocco	○	x x	x x	x x	x x
Netherlands	○	24 (3.5)	11 (3.0)	31 (4.4)	1 (0.0)
New Zealand	●	30 (3.1)	1 (0.5)	4 (1.4)	1 (0.6)
Norway	●	41 (4.5)	1 (0.6)	3 (2.2)	0 (0.0)
Philippines	○	95 (2.3)	1 (0.0)	2 (1.1)	2 (1.1)
Russian Federation	○	96 (1.2)	1 (0.4)	1 (0.4)	2 (0.7)
Scotland	●	r 19 (3.8)	r 0 (0.3)	r 2 (1.1)	r 0 (0.3)
Singapore	●	21 (3.3)	6 (1.9)	14 (3.0)	4 (1.5)
Slovenia	○	76 (3.7)	0 (0.0)	1 (0.8)	0 (0.0)
Tunisia	○	r 89 (2.9)	2 (1.2)	5 (1.9)	10 (2.7)
United States	○	40 (2.4)	3 (0.8)	7 (1.3)	3 (0.9)
International Avg.		58 (0.6)	2 (0.2)	4 (0.3)	2 (0.2)
Benchmarking Participants					
Indiana State, US	●	43 (5.3)	1 (1.1)	9 (3.4)	1 (0.8)
Ontario Province, Can.	●	43 (4.6)	1 (0.9)	3 (1.8)	2 (1.3)
Quebec Province, Can.	●	54 (4.7)	1 (0.6)	2 (1.1)	1 (1.0)

● Yes

○ No

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by National Research Coordinators and by teachers.

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "x" indicates data are available for less than 50% of the students.

What Are the Roles of Homework and Assessment?

The amount of time students spend on homework assignments is an important consideration in examining their opportunity to learn mathematics. Exhibit 7.13 presents the index of teachers' emphasis on mathematics homework. Students in the high category had teachers who reported giving relatively long homework assignments (more than 30 minutes) on a relatively frequent basis (in about half the lessons or more). Those in the low category had teachers who gave short assignments (less than 30 minutes) relatively infrequently (in about half the lessons or less). The medium level includes all other possible combinations of responses.

The results show substantial variation across countries in the emphasis placed on homework. At the eighth grade, more than 70 percent of the students in Romania and Italy were in the high category. For the majority of countries, most students were in the medium category. More than half the students were in the low category in Sweden, Belgium (Flemish), Korea, Japan, and Scotland. It can be noted, however, that students in Japan and perhaps Korea may be more likely to spend extra time in tutoring and special schools than doing homework.[1] At the eighth grade, there was a slight, but noticeable positive relationship between teachers assigning more homework and students having higher mathematics achievement. At the fourth grade, teachers reported giving homework much less frequently than at eighth grade. On average, internationally, only 14 percent of the fourth-grade students were in the high category. About half (49%) were in the medium category and 37 percent were in the low category. The fourth-grade students in the high category had the lowest mathematics achievement, on average, suggesting that homework often was being used for remedial purposes.

Exhibit 7.14 presents eighth-grade teachers' reports about how they usually use homework in their mathematics instruction. Internationally, the eighth-grade mathematics teachers reported always or

1 Robitaille, D.F., (1997), *National Contexts for Mathematics and Science Education: An Encyclopedia of the Education Systems Participating in TIMSS*, Vancouver, BC: Pacific Educational Press.

almost always monitoring whether homework was completed (for 78 percent of the students, on average). For more than half the eighth-grade students, on average, teachers reported always or almost always correcting assignments and giving feedback to students, but for about one-third, on average, the students corrected their own homework in class. About one-fourth of the students, on average, had teachers that reported using homework as basis for class discussion (27%) and to contribute toward grades or marks (25%).

As shown in Exhibit 7.15, eighth-grade teachers reported substantial variation across countries in the frequency of testing in mathematics class. On average, internationally, nearly half the students (47%) reported having a mathematics test or examination every two weeks or more and another 40 percent reported such testing about once a month. Testing every two weeks or more for most students (80% or more) was reported by eighth-grade teachers in Bahrain, Belgium (Flemish), Chinese Taipei, Lebanon, Lithuania, the Philippines, the Russian Federation, the Slovak Republic, and the Canadian province of Quebec. Even though the international average was low (14%) for infrequent testing, there were countries where teachers reported testing only a few time a year or more for half or more of the eighth-grade students, including Scotland, Slovenia, Sweden, and England.

Exhibit 7.16 presents eighth-grade teachers' reports about the types of test formats they use for mathematics tests in relation to average mathematics achievement. On average, internationally, more than half the eighth-grade students (56%) had teachers who used only or mostly constructed-response tests or examinations. These students had higher mathematics achievement, on average, than did students whose teachers used some constructed-response and multiple-choice items or only multiple-choice items. However, very few students (12%, on average) had teachers who reported using only or mostly multiple-choice testing.

Exhibit 7.13: Index of Teachers' Emphasis on Mathematics Homework (EMH)

MATHEMATICS Grade 8

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. High level indicates the assignment of more than 30 minutes of homework about half of the lessons or more. Low level indicates no assignment or the assignment of less than 30 minutes of homework about half of the lessons or less. Medium level includes all other possible combinations of responses.

Countries	High EMH		Medium EMH		Low EMH	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Romania	78 (3.3)	478 (5.5)	21 (3.3)	463 (10.1)	1 (0.7)	~ ~
Italy	71 (3.5)	482 (3.2)	25 (3.2)	489 (8.4)	4 (1.5)	480 (11.2)
Armenia r	65 (4.6)	481 (4.2)	31 (4.7)	474 (6.6)	4 (2.1)	467 (11.5)
Iran, Islamic Rep. of	63 (4.4)	417 (3.2)	26 (4.0)	406 (7.2)	12 (2.8)	399 (9.3)
Malaysia	60 (4.5)	508 (5.0)	34 (4.2)	515 (8.5)	5 (1.9)	466 (10.1)
Singapore	59 (2.4)	620 (4.2)	33 (2.5)	592 (6.6)	8 (1.3)	563 (13.1)
Russian Federation	56 (3.5)	514 (4.3)	43 (3.5)	499 (4.7)	1 (0.5)	~ ~
Morocco s	54 (6.2)	391 (5.9)	37 (6.4)	383 (5.2)	9 (4.1)	389 (11.1)
Bulgaria	53 (4.2)	483 (6.1)	38 (4.2)	467 (7.7)	9 (2.5)	469 (15.6)
Israel	50 (3.8)	501 (5.4)	44 (4.1)	500 (6.1)	6 (1.7)	438 (17.8)
Lebanon	49 (4.6)	433 (4.6)	45 (4.4)	436 (5.8)	6 (1.9)	401 (13.1)
Ghana	48 (5.0)	271 (7.9)	37 (5.0)	275 (7.1)	15 (3.0)	284 (10.2)
Indonesia	45 (3.9)	421 (7.4)	45 (4.4)	402 (9.4)	10 (2.6)	412 (15.3)
Botswana	44 (4.6)	364 (4.0)	49 (4.5)	368 (4.0)	7 (2.5)	379 (7.0)
Moldova, Rep. of r	43 (4.8)	451 (6.1)	52 (5.0)	463 (7.9)	5 (1.9)	468 (10.1)
Cyprus	35 (3.1)	455 (3.2)	65 (3.1)	462 (2.3)	0 (0.0)	~ ~
Serbia	34 (4.1)	474 (4.9)	45 (4.3)	481 (4.5)	22 (3.7)	470 (5.6)
Jordan	30 (3.8)	422 (5.5)	55 (4.4)	430 (6.3)	14 (2.8)	410 (8.6)
Palestinian Nat'l Auth.	30 (4.0)	389 (6.4)	58 (4.3)	391 (4.6)	12 (2.5)	388 (14.9)
Chinese Taipei	29 (3.9)	602 (8.6)	39 (3.9)	588 (6.3)	32 (3.9)	570 (7.6)
United States	27 (2.5)	531 (8.0)	62 (2.9)	504 (3.8)	11 (2.2)	471 (9.5)
South Africa r	26 (3.4)	266 (9.2)	54 (3.9)	267 (9.6)	20 (3.3)	250 (9.1)
Hong Kong, SAR	26 (3.7)	598 (6.0)	50 (4.6)	593 (6.0)	24 (4.0)	566 (10.0)
Norway	25 (3.4)	460 (6.5)	46 (4.3)	465 (3.8)	29 (4.3)	455 (5.0)
Philippines	24 (4.0)	358 (10.9)	61 (4.8)	384 (7.1)	15 (3.7)	377 (19.1)
Egypt	23 (3.3)	401 (8.6)	57 (3.8)	409 (4.8)	20 (3.2)	406 (8.1)
Macedonia, Rep. of	22 (3.3)	450 (8.1)	66 (3.9)	428 (5.2)	12 (2.6)	432 (13.8)
Sweden	17 (2.8)	503 (7.0)	25 (3.2)	506 (6.0)	59 (3.7)	494 (4.0)
Latvia	17 (2.9)	523 (8.8)	75 (3.8)	505 (3.5)	9 (2.6)	500 (11.7)
Bahrain	15 (2.5)	389 (6.1)	72 (3.7)	404 (2.3)	14 (3.1)	396 (8.7)
Saudi Arabia	14 (3.0)	331 (8.9)	69 (3.9)	332 (4.6)	17 (3.0)	346 (15.0)
Lithuania	13 (2.7)	512 (7.7)	76 (3.6)	501 (3.4)	11 (2.6)	477 (11.3)
Slovenia	13 (2.9)	490 (9.2)	85 (3.1)	495 (2.5)	3 (1.0)	473 (9.7)
Estonia	12 (2.3)	540 (9.9)	78 (3.2)	532 (3.3)	9 (2.5)	518 (14.1)
Tunisia	12 (2.5)	423 (9.1)	84 (3.0)	407 (2.2)	4 (1.6)	442 (11.3)
Australia	10 (3.0)	544 (19.7)	56 (4.1)	518 (5.9)	34 (3.8)	475 (9.5)
Chile	10 (2.2)	401 (14.9)	49 (3.6)	388 (5.1)	40 (3.3)	383 (5.5)
Belgium (Flemish)	9 (2.5)	555 (6.5)	30 (3.8)	555 (5.8)	60 (3.9)	529 (5.6)
Korea, Rep. of s	9 (2.1)	582 (10.8)	31 (3.6)	589 (4.7)	60 (3.5)	591 (3.5)
Hungary	8 (2.0)	532 (8.9)	90 (2.2)	530 (3.5)	2 (0.9)	~ ~
New Zealand	7 (2.1)	479 (15.6)	67 (4.1)	510 (6.6)	25 (4.2)	471 (5.3)
Netherlands	7 (2.4)	550 (15.3)	82 (3.7)	541 (4.9)	11 (3.1)	495 (14.1)
Japan	7 (2.2)	583 (23.4)	29 (3.8)	573 (6.9)	64 (3.9)	567 (2.5)
Slovak Republic	5 (1.5)	510 (12.4)	79 (2.9)	511 (4.0)	16 (2.7)	492 (6.3)
Scotland	3 (1.7)	549 (10.6)	45 (4.6)	527 (5.7)	51 (4.5)	477 (6.2)
‡ England r	24 (6.1)	528 (10.2)	21 (4.5)	519 (15.8)	56 (5.9)	493 (9.7)
International Avg.	30 (0.5)	473 (1.4)	51 (0.6)	469 (0.9)	19 (0.4)	453 (1.7)
Benchmarking Participants						
Basque Country, Spain	15 (4.0)	496 (7.1)	70 (5.2)	486 (3.3)	15 (3.3)	487 (8.6)
Indiana State, US	35 (4.4)	537 (9.3)	60 (4.2)	495 (5.5)	5 (2.0)	470 (14.4)
Ontario Province, Can.	30 (4.3)	511 (5.2)	63 (4.4)	526 (3.7)	7 (2.4)	505 (11.9)
Quebec Province, Can.	22 (4.0)	557 (8.5)	61 (5.1)	542 (4.1)	17 (3.9)	528 (6.8)

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

( ) 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 data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Exhibit 7.13: **Index of Teachers' Emphasis on Mathematics Homework (EMH)**

MATHEMATICS Grade 4

Countries		High EMH		Medium EMH		Low EMH	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	r	46 (4.4)	460 (6.3)	51 (4.4)	451 (5.7)	3 (1.4)	453 (28.4)
Singapore		35 (4.2)	593 (7.7)	49 (3.8)	596 (8.7)	16 (2.8)	598 (11.0)
Hong Kong, SAR		33 (4.7)	575 (5.3)	63 (4.7)	577 (4.1)	4 (1.7)	552 (8.9)
Italy		33 (3.4)	498 (7.0)	33 (3.7)	501 (7.1)	34 (3.5)	509 (4.6)
Iran, Islamic Rep. of		32 (5.0)	389 (8.7)	33 (4.6)	402 (7.5)	35 (4.6)	378 (6.0)
Moldova, Rep. of		30 (4.2)	516 (9.3)	70 (4.2)	502 (5.9)	0 (0.0)	~ ~
Russian Federation		25 (3.3)	536 (9.9)	73 (3.5)	529 (4.9)	1 (0.9)	~ ~
Cyprus		15 (2.9)	514 (6.1)	76 (3.5)	509 (2.8)	8 (2.2)	503 (8.8)
Tunisia		14 (3.3)	330 (15.6)	32 (3.8)	350 (8.7)	53 (4.2)	333 (7.0)
Chinese Taipei		11 (2.7)	555 (8.4)	52 (4.3)	568 (2.7)	37 (3.9)	561 (3.2)
Latvia		8 (1.9)	542 (8.6)	86 (2.8)	536 (3.3)	5 (2.0)	517 (15.5)
Philippines		8 (2.1)	322 (19.0)	71 (4.3)	360 (10.9)	21 (3.9)	367 (17.6)
United States		8 (1.3)	503 (8.8)	68 (2.8)	521 (2.8)	25 (2.8)	518 (5.6)
Hungary		7 (2.3)	499 (15.2)	88 (2.8)	529 (3.7)	4 (1.7)	547 (11.7)
Norway		7 (2.0)	448 (10.2)	46 (4.6)	451 (4.1)	47 (4.6)	452 (3.3)
England	r	5 (2.5)	483 (25.2)	13 (3.2)	553 (10.7)	82 (4.0)	531 (4.4)
Australia		4 (1.3)	520 (12.7)	26 (4.0)	504 (9.4)	70 (4.1)	498 (4.6)
Japan		3 (1.5)	563 (7.9)	40 (4.3)	567 (2.4)	57 (4.4)	563 (2.5)
Slovenia		3 (1.6)	480 (9.7)	87 (2.5)	479 (2.9)	10 (2.1)	474 (10.0)
Belgium (Flemish)		2 (1.0)	~ ~	10 (2.4)	544 (4.4)	88 (2.6)	551 (2.0)
Lithuania		2 (1.0)	~ ~	73 (2.5)	538 (3.3)	25 (2.4)	519 (5.8)
Scotland	s	1 (0.6)	~ ~	20 (4.3)	503 (6.1)	80 (4.4)	491 (4.3)
New Zealand		1 (0.4)	~ ~	11 (2.4)	500 (10.7)	88 (2.5)	494 (2.7)
Netherlands		0 (0.0)	~ ~	2 (1.4)	~ ~	98 (1.4)	542 (2.4)
Morocco		x x	x x	x x	x x	x x	x x
International Avg.		14 (0.6)	491 (2.7)	49 (0.7)	503 (1.4)	37 (0.6)	498 (2.1)
Benchmarking Participants							
Indiana State, US		10 (3.7)	523 (8.0)	75 (5.4)	537 (4.2)	15 (4.3)	521 (6.0)
Ontario Province, Can.		6 (2.5)	472 (10.2)	42 (4.5)	513 (8.0)	53 (4.8)	513 (3.4)
Quebec Province, Can.		8 (2.6)	500 (9.6)	18 (3.6)	503 (5.1)	74 (4.0)	508 (3.1)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by teachers.

( ) 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 data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

Exhibit 7.14: Use of Mathematics Homework

Countries	Percentage of Students Whose Teachers Always or Almost Always									
	Monitor Whether or Not the Homework Was Completed		Correct Assignments and Then Give Feedback to Students		Have Students Correct Their Own Homework in Class		Use the Homework as a Basis for Class Discussion		Use the Homework to Contribute Toward Students' Grades/Marks	
Armenia	r	86 (2.6)	r	68 (3.8)	r	18 (2.9)	r	16 (2.7)	r	9 (2.1)
Australia		75 (3.4)		56 (3.6)		25 (3.7)		16 (3.2)		22 (3.3)
Bahrain		92 (2.4)		91 (2.3)		70 (1.8)		50 (3.9)		66 (2.4)
Belgium (Flemish)		88 (2.9)		83 (2.8)		24 (3.3)		7 (1.8)		22 (3.2)
Botswana		97 (1.8)		93 (2.4)		31 (4.3)		30 (3.8)		8 (1.6)
Bulgaria		79 (3.9)		53 (4.7)		7 (2.2)		22 (3.6)		3 (1.2)
Chile		79 (3.4)		72 (3.4)		59 (4.0)		37 (3.9)		20 (3.0)
Chinese Taipei		75 (3.6)		48 (4.5)		46 (3.9)		48 (4.5)		57 (4.1)
Cyprus		85 (1.9)		84 (1.8)		28 (2.1)		44 (2.6)		46 (2.4)
Egypt		80 (3.1)		72 (3.8)		31 (3.5)		37 (3.7)		42 (4.3)
Estonia		72 (3.6)		20 (3.3)		19 (3.2)		21 (3.5)		13 (2.2)
Ghana		87 (3.3)		83 (3.8)		45 (4.7)		43 (4.6)		52 (4.5)
Hong Kong, SAR		86 (3.2)		78 (3.8)		20 (3.5)		23 (3.7)		20 (3.5)
Hungary		97 (1.6)		38 (3.6)		73 (3.5)		13 (2.7)		7 (2.2)
Indonesia		92 (2.5)		85 (3.0)		22 (3.6)		14 (3.0)		37 (4.2)
Iran, Islamic Rep. of		76 (3.5)		43 (3.6)		56 (3.7)		41 (3.6)		38 (3.9)
Israel		71 (3.3)		39 (3.7)		29 (3.5)		38 (3.6)		47 (3.5)
Italy		82 (2.5)		41 (3.8)		59 (3.7)		48 (3.3)		9 (2.2)
Japan		51 (3.7)		15 (2.7)		41 (3.8)		9 (2.3)		24 (3.2)
Jordan		83 (3.0)		73 (3.6)		66 (3.9)		54 (3.8)		35 (4.2)
Korea, Rep. of	s	76 (3.0)	s	13 (2.9)	s	28 (3.4)	s	3 (1.3)	s	28 (3.2)
Latvia		80 (3.1)		57 (4.1)		11 (3.0)		9 (2.0)		26 (3.0)
Lebanon		77 (3.7)		66 (4.3)		62 (4.6)		44 (4.8)		15 (3.0)
Lithuania		67 (3.5)		26 (3.5)		8 (2.3)		6 (1.6)		6 (1.8)
Macedonia, Rep. of		69 (4.0)		54 (3.8)		24 (3.8)		27 (3.9)		42 (4.5)
Malaysia		89 (2.8)		86 (3.3)		14 (3.0)		31 (3.9)		5 (1.8)
Moldova, Rep. of	r	70 (5.0)	r	34 (4.7)	r	33 (4.0)	r	21 (4.1)	r	25 (4.5)
Morocco	s	60 (7.0)	s	79 (6.1)	s	59 (5.5)	s	41 (6.4)	s	8 (3.6)
Netherlands		44 (4.5)		39 (5.0)		69 (4.4)		13 (3.0)		4 (1.9)
New Zealand		68 (4.9)		34 (4.2)		41 (5.4)		13 (3.4)		12 (3.5)
Norway		21 (3.4)		4 (1.6)		12 (2.6)		10 (2.4)		20 (3.6)
Palestinian Nat'l Auth.		92 (2.5)		66 (3.8)		66 (3.5)		50 (4.1)		38 (4.2)
Philippines		85 (3.6)		83 (3.6)		43 (4.7)		41 (4.5)		55 (4.9)
Romania		86 (3.0)		49 (4.1)		15 (3.1)		35 (3.7)		9 (2.3)
Russian Federation		86 (3.3)		48 (3.1)		16 (2.3)		8 (1.7)		6 (1.7)
Saudi Arabia		95 (1.2)		84 (5.1)		65 (5.5)		42 (5.4)		68 (5.7)
Scotland		88 (3.0)		62 (4.6)		13 (3.0)		19 (3.7)		11 (3.0)
Serbia		77 (3.4)		38 (3.7)		21 (2.8)		22 (3.4)		11 (2.7)
Singapore		89 (1.8)		87 (1.8)		5 (1.2)		24 (2.1)		18 (1.6)
Slovak Republic		74 (4.0)		46 (4.2)		19 (3.1)		12 (2.6)		6 (2.1)
Slovenia		79 (3.7)		23 (3.2)		60 (3.8)		18 (3.6)		3 (1.5)
South Africa		85 (2.5)		80 (2.3)	r	38 (3.6)	r	38 (3.9)		30 (3.2)
Sweden		67 (3.3)		42 (3.5)		12 (2.6)		7 (1.9)		11 (2.4)
Tunisia		68 (4.2)		58 (3.8)		75 (3.5)		30 (4.0)		6 (2.1)
United States		90 (1.6)		45 (3.6)		55 (2.8)		50 (3.2)		77 (2.7)
‡ England	r	94 (2.0)	r	72 (5.4)	r	8 (2.9)	r	15 (4.4)	r	37 (6.4)
International Avg.		78 (0.5)		57 (0.6)		36 (0.5)		27 (0.5)		25 (0.5)
Benchmarking Participants										
Basque Country, Spain		79 (4.0)		54 (5.4)		86 (3.5)		29 (4.9)		62 (4.8)
Indiana State, US		97 (1.6)		42 (6.5)		58 (5.5)		55 (6.3)		80 (5.8)
Ontario Province, Can.		82 (3.6)		47 (4.9)		56 (4.8)		38 (4.7)		38 (5.0)
Quebec Province, Can.		64 (4.7)		66 (4.1)		53 (4.5)		24 (3.9)		19 (3.5)

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Exhibit 7.15: **Frequency of Mathematics Tests**

MATHEMATICS Grade 8

Countries		Percentage of Students Whose Teachers Give a Mathematics Test or Examination		
		Every Two Weeks or More	About Once a Month	A Few Times a Year or Less
Armenia	r	38 (3.7)	53 (3.8)	9 (2.0)
Australia		19 (3.6)	64 (4.6)	16 (3.4)
Bahrain		85 (1.7)	15 (1.7)	0 (0.0)
Belgium (Flemish)		94 (1.7)	4 (1.5)	2 (0.9)
Botswana		17 (3.6)	81 (3.8)	1 (1.3)
Bulgaria		31 (4.2)	46 (4.1)	23 (3.1)
Chile		78 (3.3)	20 (3.2)	2 (0.9)
Chinese Taipei		99 (0.9)	1 (0.6)	1 (0.0)
Cyprus		9 (2.0)	79 (2.7)	11 (1.7)
Egypt		– –	– –	– –
Estonia		67 (4.1)	32 (4.1)	1 (0.8)
Ghana		75 (3.8)	25 (3.8)	1 (0.0)
Hong Kong, SAR		43 (4.8)	39 (4.8)	18 (3.6)
Hungary		68 (4.1)	30 (3.9)	2 (1.2)
Indonesia		45 (4.2)	47 (4.4)	9 (2.6)
Iran, Islamic Rep. of	r	34 (3.6)	34 (3.9)	31 (4.4)
Israel		57 (4.0)	34 (3.6)	9 (2.1)
Italy		31 (3.4)	67 (3.4)	2 (1.2)
Japan		17 (3.4)	38 (4.4)	45 (4.3)
Jordan		30 (3.6)	70 (3.6)	0 (0.0)
Korea, Rep. of	s	63 (3.4)	33 (3.1)	5 (1.5)
Latvia		71 (4.2)	28 (4.2)	1 (0.0)
Lebanon		83 (3.4)	17 (3.4)	0 (0.0)
Lithuania		80 (3.2)	19 (3.1)	0 (0.0)
Macedonia, Rep. of		23 (3.8)	49 (4.3)	27 (3.7)
Malaysia		5 (1.4)	48 (3.8)	47 (3.9)
Moldova, Rep. of	r	67 (4.5)	30 (4.7)	3 (1.6)
Morocco		x x	x x	x x
Netherlands		43 (4.8)	57 (4.8)	0 (0.0)
New Zealand		25 (4.4)	59 (4.6)	16 (4.0)
Norway		6 (2.5)	64 (4.4)	30 (4.0)
Palestinian Nat'l Auth.		61 (2.7)	38 (2.8)	1 (0.0)
Philippines		93 (2.4)	5 (1.9)	2 (1.4)
Romania		73 (3.9)	25 (3.7)	2 (1.2)
Russian Federation		88 (2.5)	11 (2.3)	1 (0.9)
Saudi Arabia		45 (5.8)	43 (5.8)	11 (2.8)
Scotland		14 (3.2)	31 (4.5)	55 (4.6)
Serbia		15 (2.8)	66 (4.1)	18 (3.2)
Singapore		31 (1.8)	57 (2.4)	12 (1.5)
Slovak Republic		81 (3.3)	17 (3.1)	2 (1.2)
Slovenia		2 (1.2)	47 (3.7)	51 (3.8)
South Africa	r	41 (3.8)	53 (4.0)	6 (1.6)
Sweden		1 (1.0)	28 (3.5)	70 (3.4)
Tunisia	s	21 (4.4)	74 (5.0)	6 (2.5)
United States		73 (2.6)	24 (2.7)	3 (1.1)
‡ England	r	9 (2.6)	38 (6.2)	53 (6.5)
International Avg.		47 (0.5)	40 (0.6)	14 (0.4)
Benchmarking Participants				
Basque Country, Spain		51 (4.7)	48 (4.5)	1 (1.4)
Indiana State, US		77 (4.8)	22 (4.8)	1 (0.1)
Ontario Province, Can.		84 (3.2)	15 (3.0)	1 (1.0)
Quebec Province, Can.		61 (4.2)	33 (4.2)	6 (2.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

Exhibit 7.16: Item Formats Used by Teachers in Mathematics Tests or Examinations

Countries		Only or Mostly Constructed-Response		About Half Constructed-Response and Half Multiple-Choice		Only or Mostly Multiple-Choice	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	r	76 (3.8)	477 (3.8)	17 (3.3)	490 (6.8)	7 (2.5)	454 (11.1)
Australia		69 (3.8)	504 (6.3)	22 (2.8)	497 (8.9)	9 (3.0)	537 (31.2)
Bahrain		41 (3.0)	405 (2.9)	52 (3.2)	397 (3.4)	7 (2.0)	395 (8.8)
Belgium (Flemish)		62 (3.5)	542 (4.3)	12 (2.5)	532 (15.7)	26 (3.8)	534 (9.0)
Botswana		23 (4.2)	370 (6.8)	48 (4.4)	370 (4.5)	29 (3.7)	360 (4.7)
Bulgaria		51 (4.7)	481 (6.5)	27 (3.6)	472 (6.7)	21 (4.0)	467 (9.3)
Chile		55 (3.6)	388 (5.2)	43 (3.4)	386 (5.3)	2 (1.1)	~ ~
Chinese Taipei		25 (3.5)	599 (8.9)	70 (3.7)	581 (5.2)	5 (1.8)	585 (20.5)
Cyprus		38 (2.5)	462 (3.0)	24 (2.4)	454 (4.7)	38 (2.0)	462 (2.4)
Egypt		– –	– –	– –	– –	– –	– –
Estonia		25 (3.4)	538 (6.7)	28 (3.6)	528 (6.8)	46 (3.8)	529 (4.0)
Ghana		25 (3.9)	279 (8.5)	75 (3.9)	271 (5.5)	1 (0.6)	~ ~
Hong Kong, SAR		72 (3.4)	576 (5.1)	27 (3.5)	611 (6.1)	1 (0.8)	~ ~
Hungary		86 (2.5)	531 (3.8)	12 (2.6)	513 (6.5)	2 (1.0)	~ ~
Indonesia		52 (4.3)	402 (7.2)	40 (4.4)	421 (9.5)	8 (2.0)	432 (16.0)
Iran, Islamic Rep. of	s	47 (5.3)	422 (5.2)	45 (4.9)	402 (6.1)	7 (2.6)	411 (13.6)
Israel		58 (3.6)	497 (4.3)	33 (3.6)	496 (8.1)	8 (2.1)	482 (13.6)
Italy		48 (4.2)	492 (3.8)	43 (4.1)	475 (5.8)	9 (2.0)	475 (7.9)
Japan		89 (2.2)	571 (2.3)	10 (2.2)	561 (6.0)	1 (1.0)	~ ~
Jordan		38 (4.5)	421 (6.4)	58 (4.7)	427 (6.3)	4 (1.7)	425 (6.0)
Korea, Rep. of	s	28 (3.3)	595 (3.6)	34 (4.0)	587 (5.1)	38 (3.6)	588 (3.6)
Latvia		81 (3.8)	508 (3.9)	16 (3.5)	511 (8.9)	3 (1.3)	501 (28.9)
Lebanon		24 (4.1)	427 (9.3)	45 (4.7)	435 (5.6)	31 (4.4)	437 (5.8)
Lithuania		85 (3.0)	505 (2.8)	15 (3.0)	477 (6.6)	0 (0.0)	~ ~
Macedonia, Rep. of		52 (4.2)	438 (5.9)	44 (3.9)	438 (5.9)	4 (1.8)	352 (28.8)
Malaysia		9 (2.4)	499 (11.0)	88 (2.8)	510 (4.5)	3 (1.5)	495 (22.9)
Moldova, Rep. of	r	29 (4.5)	462 (8.5)	32 (4.8)	459 (10.0)	39 (4.7)	452 (8.3)
Morocco		x x	x x	x x	x x	x x	x x
Netherlands		95 (1.8)	537 (4.3)	2 (1.1)	~ ~	3 (1.4)	536 (35.1)
New Zealand		72 (4.4)	495 (5.3)	17 (3.4)	487 (11.4)	10 (3.1)	530 (15.3)
Norway		72 (3.9)	461 (3.0)	24 (3.9)	458 (5.2)	4 (1.8)	476 (14.7)
Palestinian Nat'l Auth.		24 (3.4)	403 (7.0)	69 (3.9)	386 (4.4)	7 (2.1)	394 (12.9)
Philippines		37 (4.8)	374 (10.3)	62 (4.7)	381 (7.1)	1 (0.9)	~ ~
Romania		35 (4.0)	472 (8.0)	46 (4.0)	474 (7.1)	19 (2.9)	483 (12.3)
Russian Federation		78 (5.2)	505 (3.8)	21 (5.2)	519 (5.6)	1 (0.6)	~ ~
Saudi Arabia		7 (2.3)	318 (11.7)	79 (3.2)	337 (4.9)	13 (3.0)	323 (6.4)
Scotland		99 (1.1)	502 (4.2)	1 (1.1)	~ ~	0 (0.0)	~ ~
Serbia		88 (2.9)	477 (2.7)	11 (2.8)	480 (9.1)	2 (1.1)	~ ~
Singapore		85 (1.9)	607 (3.9)	4 (1.1)	577 (8.7)	11 (1.6)	603 (12.4)
Slovak Republic		92 (2.4)	506 (3.3)	7 (2.2)	534 (19.2)	1 (0.8)	~ ~
Slovenia		88 (2.4)	494 (2.4)	12 (2.4)	486 (9.2)	0 (0.2)	~ ~
South Africa	r	45 (3.7)	286 (9.7)	44 (3.6)	240 (8.8)	11 (2.4)	261 (14.7)
Sweden		84 (2.8)	500 (3.0)	11 (2.5)	494 (9.7)	5 (1.6)	478 (12.6)
Tunisia	s	8 (3.0)	413 (11.7)	20 (4.3)	412 (5.3)	72 (4.6)	412 (4.3)
United States		55 (3.3)	516 (4.2)	31 (3.1)	487 (5.7)	14 (2.0)	521 (11.0)
‡ England	s	97 (2.0)	509 (6.6)	3 (2.0)	392 (33.1)	0 (0.0)	~ ~
International Avg.		56 (0.5)	472 (0.9)	32 (0.5)	463 (1.4)	12 (0.4)	464 (2.8)
Benchmarking Participants							
Basque Country, Spain		33 (4.5)	487 (5.3)	17 (3.9)	482 (6.2)	50 (5.4)	490 (4.1)
Indiana State, US		71 (6.0)	513 (6.1)	22 (6.2)	497 (13.5)	7 (3.1)	510 (5.2)
Ontario Province, Can.	r	82 (4.0)	524 (3.8)	17 (3.9)	513 (8.2)	1 (0.1)	~ ~
Quebec Province, Can.		x x	x x	x x	x x	x x	x x

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

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

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

"An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students."