Chapter 7

Teacher Preparation

Higher mathematics achievement was related to teachers' having more teaching experience, being confident in their mathematics teaching, and being satisfied with their careers.

The majority of fourth grade students had teachers with a bachelor's degree, and even more eighth grade students had teachers with bachelor's and postgraduate degrees. At both grades, most students had teachers that reported having at least ten years of teaching experience, being very well prepared to teach the TIMSS mathematics topics, and feeling very confident in teaching mathematics.

In view of the importance of a well prepared teaching force to an effective education system, TIMSS 2011 collected a range of information about teacher education. In the *TIMSS 2011 Encyclopedia*, each country chapter describes the educational route to teacher certification, including any additional requirements such as passing an examination or completing an induction year. Each chapter also addresses the requirements and practices for ongoing teacher professional development. Chapter 7 provides information about teachers' education, experience, professional development, and satisfaction with their teaching careers.

Mathematics Teachers' Formal Education

There is growing evidence that teacher preparation is a powerful predictor of students' achievement, perhaps even overcoming socioeconomic and language background factors (Darling-Hammond, 2000).

Exhibits 7.1 and 7.2 present teachers' reports about their highest level of formal education for the TIMSS 2011 fourth and eighth grade assessments, respectively. On average, internationally, across the fourth grade countries, 22 percent of the students had mathematics teachers with a postgraduate university degree, 57 percent had teachers with a bachelor's degree, 15 percent had teachers who had completed post-secondary education (usually a 3-year teacher education program), and 6 percent had teachers with an upper secondary degree. However, it is clear from examining the country-by-country results across the fourth grade, sixth grade, and benchmarking participants that different countries have different educational paths for becoming a primary level teacher. Similar results are shown in Exhibit 7.2 for the eighth grade students, although more students than at the fourth grade had teachers with bachelor's (63% vs. 57%) and postgraduate university degrees (24% vs. 22%).

Teachers Majoring in Education and Mathematics

In addition to the importance of a college or university degree or advanced degree, the literature reports widespread agreement that teachers should have solid mastery of the content in the subject to be taught. For example, a meta-analysis of studies in the United States examining various teacher characteristics and student achievement found that, at least in high school, students learn more mathematics when their mathematics teachers have additional degrees or coursework in mathematics (Wayne & Youngs, 2003).

Exhibit 7.3 shows the percentages of students in the TIMSS 2011 fourth grade assessment whose teachers had a major or specialization in primary education and if they also had a major or specialization in mathematics. Similar to the situation with formal education, there was a great deal of variation across countries in the degree of specialization by primary school teachers in mathematics education. On average across the fourth grade countries, 28 percent of the students were taught mathematics by a teacher with a major in both primary education and mathematics, and almost half (46%) by a teacher with a major in primary education but not in mathematics. Just 10 percent of fourth grade students, on average, were taught mathematics by a teacher with a major in mathematics but not in primary education, and another 10 percent by a teacher with some other major. In several countries, one-third or more of the fourth grade and sixth grade students had mathematics teachers without university degrees (Italy, Honduras, Morocco, Romania, Tunisia, and Yemen). However, as explained in the *TIMSS 2011 Encyclopedia*, countries have been implementing new policies that increase their teacher education requirements.

Mathematics achievement was highest, on average, among students taught by teachers with a primary education major but not a mathematics major (501), followed by students taught by a teacher with both majors (490) and students taught by a teacher with some other major (486). Among the fourth grade students whose teachers had college degrees, average achievement was lowest among students taught by a teacher with a major in mathematics but not in primary education (457).

As shown in Exhibit 7.4, the situation for mathematics teachers of eighth grade students was somewhat different. The majority of eighth grade students were taught mathematics by teachers who had a major in mathematics but not in mathematics education (41%), or who had a major in both (32%). Average mathematics achievement was only slightly different for these students (468 and 471, respectively) than for the 12 percent of students taught by teachers majoring in mathematics education but not mathematics (470), though higher than the 12 percent taught by teachers with other majors (462). Almost all of the eighth grade students were taught mathematics by teachers with college degrees (except in Morocco).

Exhibit 7.1: Mathematics Teachers' Formal Education*

TIMSS 2011 4th Grade Mathematics

Reported by Teachers

Country	Percent of Students by Teacher Educational Level			
	Completed Postgraduate University Degree**	Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree	Completed Post-secondary Education but Not a Bachelor's Degree	No Further than Upper-secondary Education
Armenia	79 (3.3)	3 (1.3)	18 (2.9)	1 (0.8)
Australia r	65 (3.2)	29 (3.1)	5 (1.7)	1 (0.8)
Austria	5 (1.6)	2 (0.9)	92 (1.9)	0 (0.3)
Azerbaijan	8 (1.9)	55 (3.8)	35 (3.6)	2 (0.8)
Bahrain	19 (3.2)	80 (3.3)	1 (0.7)	0 (0.0)
Belgium (Flemish)	0 (0.0)	99 (0.6)	0 (0.0)	1 (0.6)
Chile	9 (2.5)	81 (3.6)	10 (2.6)	0 (0.0)
Chinese Taipei	26 (3.7)	72 (3.7)	2 (1.1)	0 (0.0)
Croatia	1 (0.6)	30 (3.3)	69 (3.2)	1 (0.4)
Czech Republic	93 (2.2)	1 (0.5)	4 (1.7)	3 (1.4)
Denmark	3 (1.2)	80 (3.0)	17 (2.9)	1 (0.8)
England	36 (4.0)	61 (4.0)	2 (0.9)	0 (0.0)
Finland	81 (2.7)	17 (2.5)	0 (0.0)	2 (0.9)
Georgia	74 (3.3)	22 (3.1)	4 (1.4)	0 (0.0)
Germany	3 (1.1)	80 (2.2)	10 (1.8)	7 (1.7)
Hong Kong SAR	21 (3.9)	72 (4.2)	7 (2.3)	0 (0.0)
Hungary	3 (0.8)	97 (1.2)	1 (0.0)	0 (0.0)
Iran, Islamic Rep. of	1 (0.8)	37 (3.4)	49 (3.4)	13 (2.2)
Ireland	18 (2.6)	79 (2.8)	3 (1.0)	0 (0.0)
Italy	6 (1.6)	16 (2.4)	1 (0.3)	77 (2.9)
Japan	5 (1.7)	86 (2.8)	9 (2.2)	0 (0.0)
Kazakhstan	1 (0.7)	74 (3.7)	20 (3.1)	5 (1.9)
Korea, Rep. of	21 (3.2)	72 (3.8)	7 (1.9)	0 (0.0)
Kuwait	6 (1.9)	93 (2.1)	1 (0.8)	0 (0.0)
Lithuania	15 (2.4)	76 (2.7)	8 (1.8)	0 (0.0)
Malta	10 (0.1)	70 (0.1)	12 (0.1)	8 (0.1)
Morocco	1 (0.7)	33 (3.7)	0 (0.0)	67 (3.8)
Netherlands r	1 (0.7)	98 (1.1)	0 (0.0)	1 (0.9)
New Zealand	19 (2.5)	64 (2.7)	16 (2.2)	0 (0.0)
Northern Ireland r	28 (4.1)	69 (4.3)	3 (1.5)	0 (0.0)
Norway	2 (1.0)	93 (2.0)	5 (1.7)	0 (0.0)
Oman	9 (1.1)	75 (2.3)	15 (2.2)	1 (0.4)
Poland	96 (1.4)	3 (1.2)	1 (0.7)	0 (0.0)
Portugal	3 (0.9)	91 (1.7)	6 (1.6)	0 (0.0)
Qatar	25 (3.7)	70 (3.5)	5 (1.2)	0 (0.0)
Romania	7 (2.1)	30 (3.5)	29 (4.0)	34 (3.5)
Russian Federation	79 (2.6)	0 (0.0)	21 (2.6)	0 (0.0)
Saudi Arabia	2 (0.9)	68 (3.5)	30 (3.5)	0 (0.0)
Serbia	2 (0.4)	62 (3.5)	33 (3.5)	3 (1.2)
Singapore	9 (1.5)	62 (2.7)	28 (2.5)	1 (0.5)
Slovak Republic	99 (0.4)	0 (0.2)	0 (0.3)	0 (0.0)
Slovenia	1 (0.5)	58 (3.9)	42 (3.9)	0 (0.0)
Spain	1 (0.7)	99 (0.7)	0 (0.0)	0 (0.0)
Sweden	– –	– –	– –	– –
Thailand	11 (2.9)	86 (3.0)	1 (0.7)	1 (1.0)
Tunisia	0 (0.0)	13 (3.0)	43 (4.3)	43 (4.5)
Turkey	4 (1.2)	81 (2.5)	15 (2.3)	0 (0.0)
United Arab Emirates	19 (2.1)	72 (2.3)	9 (1.2)	0 (0.1)
United States	63 (2.4)	37 (2.4)	0 (0.0)	0 (0.0)
Yemen	0 (0.0)	34 (4.5)	31 (4.3)	35 (4.2)
International Avg.	22 (0.3)	57 (0.4)	15 (0.3)	6 (0.2)

* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-1997).

** For example, doctorate, master's, or other postgraduate degree or diploma.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (–) indicates comparable data not available.

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

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.1: Mathematics Teachers' Formal Education* (Continued)

Country		Percent of Students by Teacher Educational Level			
		Completed Postgraduate University Degree**	Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree	Completed Post-secondary Education but Not a Bachelor's Degree	No Further than Upper-secondary Education
Sixth Grade Participants					
Botswana		2 (1.3)	14 (3.1)	82 (3.4)	2 (1.4)
Honduras		0 (0.0)	45 (3.7)	21 (3.7)	34 (4.1)
Yemen		1 (0.9)	34 (4.1)	38 (4.6)	27 (3.7)
Benchmarking Participants					
Alberta, Canada	r	13 (2.7)	87 (2.7)	0 (0.0)	0 (0.0)
Ontario, Canada		16 (2.7)	83 (2.6)	0 (0.0)	0 (0.0)
Quebec, Canada		14 (3.3)	85 (3.3)	0 (0.1)	0 (0.0)
Abu Dhabi, UAE		16 (3.1)	74 (3.7)	10 (2.3)	0 (0.0)
Dubai, UAE	r	29 (4.4)	63 (4.3)	7 (1.6)	1 (0.5)
Florida, US	r	44 (5.0)	55 (5.1)	1 (0.0)	0 (0.0)
North Carolina, US		45 (5.6)	55 (5.6)	0 (0.0)	0 (0.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.2: Mathematics Teachers' Formal Education*

TIMSS 2011 Mathematics 8th Grade

Reported by Teachers

Country	Percent of Students by Teacher Educational Level			
	Completed Postgraduate University Degree**	Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree	Completed Post-secondary Education but Not a Bachelor's Degree	No Further than Upper-secondary Education
Armenia	97 (1.2)	3 (1.2)	0 (0.0)	0 (0.0)
Australia r	64 (3.6)	36 (3.6)	0 (0.2)	0 (0.0)
Bahrain	23 (2.9)	74 (3.0)	2 (0.6)	2 (1.0)
Chile	6 (1.8)	86 (2.8)	7 (2.1)	0 (0.0)
Chinese Taipei	38 (3.9)	62 (3.9)	0 (0.0)	0 (0.0)
England	38 (4.6)	57 (4.8)	5 (1.6)	0 (0.0)
Finland	78 (3.1)	19 (2.7)	0 (0.1)	4 (1.7)
Georgia	85 (3.1)	14 (3.0)	1 (0.6)	0 (0.0)
Ghana	1 (0.0)	19 (3.1)	67 (3.9)	12 (2.4)
Hong Kong SAR	33 (4.4)	62 (4.3)	5 (1.7)	0 (0.0)
Hungary	20 (2.3)	80 (2.2)	1 (0.6)	0 (0.0)
Indonesia	6 (1.6)	87 (3.1)	6 (2.1)	2 (1.6)
Iran, Islamic Rep. of	2 (1.0)	60 (3.5)	36 (3.4)	2 (0.8)
Israel	34 (2.4)	62 (2.5)	3 (0.9)	0 (0.0)
Italy	25 (3.1)	74 (3.1)	0 (0.5)	0 (0.0)
Japan	9 (2.3)	91 (2.4)	1 (0.7)	0 (0.0)
Jordan	12 (2.7)	75 (3.5)	12 (2.5)	1 (0.9)
Kazakhstan	1 (0.5)	98 (1.1)	1 (0.0)	0 (0.0)
Korea, Rep. of	37 (3.0)	63 (3.0)	0 (0.0)	0 (0.0)
Lebanon	4 (1.4)	72 (3.7)	18 (3.4)	7 (2.2)
Lithuania	31 (3.1)	62 (3.2)	7 (1.9)	0 (0.0)
Macedonia, Rep. of r	1 (0.6)	33 (4.0)	65 (3.9)	2 (1.2)
Malaysia	4 (1.5)	86 (2.7)	8 (2.2)	2 (1.0)
Morocco	1 (0.6)	19 (2.3)	0 (0.0)	80 (2.3)
New Zealand	35 (3.2)	55 (3.5)	10 (2.0)	0 (0.0)
Norway	1 (1.0)	98 (1.5)	1 (1.1)	0 (0.0)
Oman	5 (0.4)	95 (0.5)	0 (0.1)	0 (0.3)
Palestinian Nat'l Auth.	4 (1.5)	85 (3.0)	11 (2.6)	0 (0.0)
Qatar	29 (4.3)	68 (4.4)	2 (0.6)	0 (0.0)
Romania	20 (3.1)	53 (3.7)	26 (2.8)	0 (0.3)
Russian Federation	99 (0.6)	0 (0.0)	1 (0.6)	0 (0.0)
Saudi Arabia	1 (1.0)	95 (1.9)	4 (1.6)	0 (0.0)
Singapore	10 (1.8)	87 (1.9)	2 (0.8)	0 (0.0)
Slovenia	1 (0.5)	53 (2.6)	45 (2.7)	1 (0.3)
Sweden	– –	– –	– –	– –
Syrian Arab Republic	13 (3.1)	45 (4.6)	41 (4.0)	1 (0.8)
Thailand	16 (2.9)	79 (3.2)	1 (1.0)	3 (1.4)
Tunisia	1 (0.0)	73 (3.5)	25 (3.3)	1 (0.0)
Turkey	8 (1.9)	80 (2.5)	12 (2.1)	0 (0.0)
Ukraine	2 (1.1)	98 (1.2)	0 (0.0)	0 (0.0)
United Arab Emirates	26 (1.9)	70 (2.0)	4 (0.8)	0 (0.0)
United States r	62 (2.6)	38 (2.7)	0 (0.0)	0 (0.0)
International Avg.	24 (0.4)	63 (0.5)	11 (0.3)	3 (0.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-1997).

** For example, doctorate, master's, or other postgraduate degree or diploma.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (–) indicates comparable data not available.

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

Exhibit 7.2: Mathematics Teachers' Formal Education* (Continued)

Country		Percent of Students by Teacher Educational Level			
		Completed Postgraduate University Degree**	Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree	Completed Post-secondary Education but Not a Bachelor's Degree	No Further than Upper-secondary Education
Ninth Grade Participants					
Botswana		1 (0.5)	12 (2.8)	88 (2.9)	0 (0.0)
Honduras	r	3 (1.5)	76 (3.9)	12 (3.1)	9 (2.6)
South Africa		18 (3.0)	42 (3.4)	38 (3.8)	2 (1.0)
Benchmarking Participants					
Alberta, Canada		10 (2.0)	90 (2.0)	0 (0.0)	0 (0.0)
Ontario, Canada		17 (3.6)	81 (3.6)	0 (0.0)	1 (0.7)
Quebec, Canada		12 (2.6)	85 (3.0)	2 (1.2)	1 (1.0)
Abu Dhabi, UAE		21 (3.2)	74 (3.5)	5 (1.4)	0 (0.0)
Dubai, UAE		36 (3.9)	58 (4.1)	5 (2.0)	0 (0.0)
Alabama, US	r	51 (7.2)	49 (7.2)	0 (0.0)	0 (0.0)
California, US	r	85 (4.5)	15 (4.5)	0 (0.0)	0 (0.0)
Colorado, US	r	70 (5.5)	30 (5.5)	0 (0.0)	0 (0.0)
Connecticut, US		84 (5.1)	16 (5.1)	0 (0.0)	0 (0.0)
Florida, US	r	42 (7.0)	57 (7.0)	0 (0.0)	2 (0.2)
Indiana, US	r	57 (7.0)	43 (7.0)	0 (0.0)	0 (0.0)
Massachusetts, US		71 (5.0)	29 (5.0)	0 (0.0)	0 (0.0)
Minnesota, US		72 (6.4)	28 (6.4)	0 (0.0)	0 (0.0)
North Carolina, US	r	42 (6.6)	58 (6.6)	0 (0.0)	0 (0.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.3: Teachers Majored in Education and Mathematics

TIMSS 2011 4th Grade Mathematics

Reported by Teachers

Country	Major in Primary Education and Major (or Specialization) in Mathematics		Major in Primary Education but No Major (or Specialization) in Mathematics		Major in Mathematics but No Major in Primary Education		All Other Majors		No Formal Education Beyond Upper-secondary*	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	54 (3.9)	455 (5.2)	22 (3.5)	450 (7.8)	19 (3.4)	457 (8.5)	5 (1.7)	462 (13.2)	1 (0.8)	~ ~
Australia r	14 (2.8)	517 (13.2)	81 (3.2)	521 (3.8)	1 (0.8)	~ ~	4 (1.1)	463 (8.6)	1 (0.8)	~ ~
Austria	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
Azerbaijan	65 (3.5)	469 (7.7)	19 (3.2)	463 (13.5)	11 (2.7)	429 (16.1)	3 (1.3)	463 (20.5)	2 (0.9)	~ ~
Bahrain	31 (5.5)	434 (7.0)	1 (0.7)	~ ~	63 (5.4)	429 (4.8)	5 (1.1)	538 (22.3)	0 (0.0)	~ ~
Belgium (Flemish)	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
Chile	36 (4.2)	471 (5.6)	61 (4.1)	456 (3.8)	1 (0.9)	~ ~	2 (1.0)	~ ~	0 (0.0)	~ ~
Chinese Taipei	32 (3.5)	598 (3.6)	39 (3.9)	594 (3.1)	4 (1.6)	576 (7.9)	25 (3.6)	582 (5.1)	0 (0.0)	~ ~
Croatia	17 (2.8)	481 (5.0)	81 (2.9)	491 (2.4)	0 (0.0)	~ ~	1 (0.6)	~ ~	1 (0.4)	~ ~
Czech Republic	4 (1.7)	523 (14.3)	77 (3.3)	513 (2.4)	3 (1.3)	504 (17.4)	13 (2.6)	497 (9.3)	3 (1.4)	496 (17.5)
Denmark	29 (3.4)	538 (4.5)	16 (2.4)	542 (4.4)	30 (3.3)	540 (5.0)	25 (3.0)	538 (4.8)	1 (0.8)	~ ~
England	17 (3.1)	539 (8.5)	65 (4.1)	546 (5.4)	2 (0.5)	~ ~	17 (3.2)	538 (7.8)	0 (0.0)	~ ~
Finland	13 (2.4)	554 (4.9)	80 (2.7)	544 (2.9)	0 (0.0)	~ ~	5 (1.1)	555 (9.7)	2 (0.9)	~ ~
Georgia	57 (3.7)	452 (4.7)	17 (2.5)	436 (11.5)	19 (3.5)	453 (11.1)	8 (1.8)	457 (9.4)	0 (0.0)	~ ~
Germany	49 (3.4)	534 (2.9)	36 (3.7)	526 (3.6)	2 (1.0)	~ ~	7 (1.8)	507 (12.0)	6 (1.7)	534 (9.0)
Hong Kong SAR	54 (4.2)	604 (5.2)	27 (3.4)	606 (5.1)	12 (3.0)	605 (10.2)	7 (2.2)	568 (25.4)	0 (0.0)	~ ~
Hungary	2 (1.1)	~ ~	94 (1.1)	516 (3.8)	3 (0.9)	479 (21.5)	1 (0.8)	~ ~	0 (0.0)	~ ~
Iran, Islamic Rep. of	21 (2.9)	451 (9.7)	48 (3.5)	426 (4.8)	3 (1.3)	465 (27.1)	15 (2.7)	410 (7.7)	12 (2.2)	437 (10.8)
Ireland	14 (2.7)	534 (5.7)	78 (2.8)	526 (3.0)	0 (0.0)	~ ~	8 (1.6)	535 (9.8)	0 (0.0)	~ ~
Italy	3 (1.3)	528 (25.0)	1 (0.5)	~ ~	1 (0.8)	~ ~	18 (3.0)	511 (4.6)	77 (3.1)	508 (3.1)
Japan	18 (2.6)	586 (4.1)	61 (3.6)	585 (2.1)	1 (0.7)	~ ~	20 (3.1)	586 (4.8)	0 (0.0)	~ ~
Kazakhstan	63 (3.7)	505 (6.0)	29 (3.8)	498 (9.9)	1 (0.9)	~ ~	1 (0.9)	~ ~	5 (1.9)	474 (13.4)
Korea, Rep. of	10 (2.5)	617 (8.1)	86 (2.7)	603 (2.1)	0 (0.0)	~ ~	4 (1.7)	616 (17.5)	0 (0.0)	~ ~
Kuwait	67 (4.2)	342 (4.6)	2 (1.1)	~ ~	31 (4.2)	336 (8.5)	0 (0.0)	~ ~	0 (0.0)	~ ~
Lithuania	9 (2.0)	521 (7.9)	88 (2.2)	535 (2.7)	0 (0.0)	~ ~	2 (0.9)	~ ~	0 (0.0)	~ ~
Malta	14 (0.1)	498 (3.0)	56 (0.1)	492 (1.5)	0 (0.0)	~ ~	21 (0.1)	497 (3.5)	8 (0.1)	511 (4.9)
Morocco	5 (2.2)	340 (34.4)	2 (1.1)	~ ~	4 (1.4)	383 (35.5)	22 (3.0)	335 (9.4)	67 (3.9)	334 (5.8)
Netherlands r	24 (3.4)	538 (5.4)	75 (3.4)	538 (2.3)	0 (0.0)	~ ~	0 (0.0)	~ ~	1 (0.9)	~ ~
New Zealand	15 (2.1)	480 (8.7)	76 (2.6)	488 (3.1)	0 (0.1)	~ ~	9 (1.5)	486 (7.7)	0 (0.0)	~ ~
Northern Ireland r	10 (3.1)	564 (12.2)	76 (4.2)	567 (3.9)	1 (0.0)	~ ~	13 (3.1)	537 (16.4)	0 (0.0)	~ ~
Norway	24 (3.7)	494 (4.9)	62 (4.1)	493 (3.5)	6 (2.4)	516 (15.0)	8 (1.5)	498 (6.0)	0 (0.0)	~ ~
Oman	58 (2.9)	384 (4.0)	8 (1.6)	403 (9.7)	24 (2.8)	389 (6.5)	9 (2.1)	378 (9.8)	1 (0.5)	~ ~
Poland	19 (3.0)	484 (6.6)	81 (3.0)	480 (2.3)	0 (0.0)	~ ~	0 (0.0)	~ ~	0 (0.0)	~ ~
Portugal	25 (3.5)	523 (8.2)	71 (3.7)	535 (3.9)	0 (0.0)	~ ~	4 (1.4)	539 (7.6)	0 (0.0)	~ ~
Qatar	22 (3.3)	411 (11.6)	6 (2.0)	535 (13.6)	49 (4.0)	402 (5.9)	23 (2.9)	406 (13.3)	0 (0.0)	~ ~
Romania	21 (3.4)	470 (14.4)	27 (3.6)	488 (8.4)	1 (0.7)	~ ~	16 (2.3)	499 (10.5)	35 (3.5)	478 (8.1)
Russian Federation	59 (3.5)	542 (4.8)	38 (3.5)	542 (5.2)	1 (0.9)	~ ~	1 (0.8)	~ ~	0 (0.0)	~ ~
Saudi Arabia	46 (4.2)	407 (9.5)	8 (2.5)	436 (11.3)	34 (4.4)	411 (6.9)	12 (2.5)	404 (16.8)	0 (0.0)	~ ~
Serbia	29 (3.4)	524 (5.5)	67 (3.5)	513 (3.9)	2 (1.0)	~ ~	0 (0.0)	~ ~	3 (1.2)	505 (11.8)
Singapore	54 (2.8)	606 (4.6)	14 (1.8)	606 (9.3)	11 (1.6)	615 (10.5)	20 (2.6)	599 (7.5)	1 (0.5)	~ ~
Slovak Republic	10 (2.1)	512 (6.4)	84 (2.3)	507 (4.3)	3 (1.4)	487 (14.5)	2 (1.0)	~ ~	0 (0.0)	~ ~
Slovenia	4 (1.3)	518 (6.9)	96 (1.3)	513 (2.2)	0 (0.0)	~ ~	0 (0.0)	~ ~	0 (0.0)	~ ~
Spain	27 (3.7)	482 (6.2)	57 (3.9)	482 (3.4)	5 (1.8)	500 (12.3)	11 (2.4)	473 (9.1)	0 (0.0)	~ ~
Sweden r	62 (4.0)	502 (2.9)	28 (3.6)	508 (3.8)	5 (1.6)	526 (11.1)	3 (1.5)	512 (15.9)	2 (1.1)	~ ~
Thailand	29 (4.3)	465 (8.9)	13 (2.5)	446 (15.8)	37 (4.4)	462 (6.7)	19 (3.7)	453 (10.9)	1 (1.0)	~ ~
Tunisia	16 (3.2)	348 (8.3)	8 (2.3)	324 (10.3)	11 (2.8)	344 (11.0)	21 (3.3)	359 (10.8)	44 (4.5)	373 (5.6)
Turkey	19 (2.6)	472 (9.5)	58 (3.2)	476 (6.1)	3 (1.4)	438 (33.2)	20 (2.3)	451 (15.2)	0 (0.0)	~ ~
United Arab Emirates	28 (2.4)	430 (4.9)	8 (1.2)	504 (8.0)	53 (2.6)	421 (3.5)	11 (1.3)	465 (6.5)	0 (0.1)	~ ~
United States	10 (1.6)	549 (5.8)	74 (2.3)	543 (2.3)	1 (0.6)	~ ~	14 (1.6)	537 (6.7)	0 (0.0)	~ ~
Yemen	15 (2.9)	257 (14.3)	11 (2.2)	258 (15.2)	23 (3.9)	248 (13.1)	15 (3.3)	257 (13.2)	36 (4.4)	239 (11.1)
International Avg.	28 (0.5)	490 (1.4)	46 (0.4)	501 (1.0)	10 (0.3)	457 (3.1)	10 (0.3)	486 (2.0)	6 (0.2)	444 (3.0)

* Countries have been increasing their certification requirements and providing professional development to teachers certified under earlier guidelines.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (–) indicates comparable data 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.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.3: Teachers Majored in Education and Mathematics (Continued)

TIMSS 2011 Mathematics 4th Grade

Country		Major in Primary Education and Major (or Specialization) in Mathematics		Major in Primary Education but No Major (or Specialization) in Mathematics		Major in Mathematics but No Major in Primary Education		All Other Majors		No Formal Education Beyond Upper-secondary*	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants											
Botswana		32 (3.7)	419 (7.9)	43 (4.3)	423 (8.4)	10 (2.8)	408 (8.5)	12 (2.7)	421 (6.2)	2 (1.4)	~ ~
Honduras		11 (3.4)	427 (24.9)	27 (3.9)	397 (6.9)	4 (1.5)	395 (20.1)	26 (4.0)	396 (11.4)	33 (4.0)	394 (8.2)
Yemen		20 (3.6)	355 (11.0)	9 (2.3)	338 (27.8)	33 (4.0)	350 (8.6)	11 (2.5)	359 (17.2)	27 (3.7)	340 (11.0)
Benchmarking Participants											
Alberta, Canada	r	7 (2.0)	507 (9.8)	82 (3.4)	506 (3.2)	3 (1.7)	516 (6.7)	8 (2.2)	503 (4.1)	0 (0.0)	~ ~
Ontario, Canada		6 (1.7)	535 (8.5)	70 (3.3)	519 (3.8)	1 (0.0)	~ ~	22 (3.1)	513 (5.9)	0 (0.0)	~ ~
Quebec, Canada		11 (2.7)	528 (5.0)	80 (3.3)	534 (2.9)	1 (0.4)	~ ~	8 (2.2)	522 (5.5)	0 (0.0)	~ ~
Abu Dhabi, UAE		34 (4.3)	411 (8.3)	6 (2.1)	459 (19.3)	54 (4.4)	411 (7.2)	6 (2.0)	453 (12.6)	0 (0.0)	~ ~
Dubai, UAE	r	26 (2.0)	470 (5.2)	16 (1.7)	536 (7.1)	35 (2.2)	441 (6.9)	23 (2.6)	480 (5.0)	0 (0.5)	~ ~
Florida, US	r	10 (3.5)	543 (18.9)	66 (4.8)	546 (4.7)	2 (1.4)	~ ~	22 (3.9)	538 (6.8)	0 (0.0)	~ ~
North Carolina, US		12 (4.5)	539 (12.8)	82 (4.3)	553 (5.0)	0 (0.0)	~ ~	6 (2.5)	569 (17.5)	0 (0.0)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.4: Teachers Majored in Education and Mathematics

TIMSS 2011 8th Grade Mathematics

Reported by Teachers

Country	Major in Mathematics and Mathematics Education		Major in Mathematics Education but No Major in Mathematics		Major in Mathematics but No Major in Mathematics Education		All Other Majors		No Formal Education Beyond Upper-secondary*	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	55 (3.6)	459 (4.1)	1 (0.6)	~ ~	42 (3.7)	471 (5.2)	2 (0.7)	~ ~	0 (0.0)	~ ~
Australia r	37 (4.1)	505 (7.5)	9 (2.4)	522 (23.3)	21 (3.0)	519 (14.0)	34 (3.6)	500 (7.5)	0 (0.0)	~ ~
Bahrain	18 (1.8)	458 (8.8)	30 (3.1)	389 (4.8)	48 (3.5)	404 (3.5)	2 (0.1)	~ ~	2 (1.0)	~ ~
Chile	42 (4.1)	434 (6.5)	3 (1.3)	444 (18.1)	30 (3.7)	414 (5.6)	25 (3.4)	393 (6.4)	0 (0.0)	~ ~
Chinese Taipei	55 (3.7)	616 (3.5)	3 (1.3)	605 (47.2)	34 (3.8)	607 (8.0)	8 (2.1)	578 (13.0)	0 (0.0)	~ ~
England	41 (3.9)	502 (10.4)	5 (1.9)	470 (25.6)	35 (4.0)	517 (7.6)	18 (2.6)	503 (13.6)	0 (0.0)	~ ~
Finland	8 (1.9)	525 (7.1)	0 (0.0)	~ ~	63 (3.2)	519 (2.6)	26 (2.6)	498 (6.1)	4 (1.7)	512 (6.7)
Georgia	54 (3.7)	437 (5.2)	4 (1.4)	400 (16.0)	40 (3.6)	430 (7.4)	2 (1.1)	~ ~	0 (0.0)	~ ~
Ghana	33 (4.2)	319 (6.9)	13 (3.0)	346 (10.6)	17 (3.2)	322 (12.1)	25 (3.5)	333 (8.7)	12 (2.3)	352 (16.4)
Hong Kong SAR	46 (4.7)	574 (8.2)	13 (3.1)	613 (15.3)	17 (3.4)	585 (11.7)	24 (3.9)	591 (9.5)	0 (0.0)	~ ~
Hungary	14 (1.9)	530 (7.3)	63 (3.4)	500 (4.3)	22 (2.9)	502 (9.3)	2 (0.7)	~ ~	0 (0.0)	~ ~
Indonesia	23 (3.6)	393 (9.7)	18 (3.0)	398 (10.7)	48 (4.9)	378 (7.4)	10 (2.9)	387 (11.8)	2 (1.7)	~ ~
Iran, Islamic Rep. of	0 (0.0)	~ ~	51 (3.7)	411 (4.9)	36 (3.7)	421 (7.7)	12 (2.1)	417 (18.3)	2 (0.8)	~ ~
Israel	53 (3.2)	532 (6.5)	6 (1.4)	531 (15.9)	36 (3.1)	504 (7.9)	5 (1.2)	492 (17.1)	0 (0.0)	~ ~
Italy r	0 (0.0)	~ ~	0 (0.0)	~ ~	50 (4.0)	491 (4.2)	50 (4.0)	507 (3.2)	0 (0.0)	~ ~
Japan	46 (4.0)	577 (3.9)	7 (2.0)	556 (8.3)	35 (3.3)	567 (3.9)	12 (2.7)	557 (9.5)	0 (0.0)	~ ~
Jordan	9 (2.0)	424 (12.9)	9 (2.4)	407 (13.9)	80 (2.9)	404 (4.0)	2 (1.0)	~ ~	1 (0.9)	~ ~
Kazakhstan	45 (4.2)	489 (6.1)	2 (0.5)	~ ~	51 (4.3)	485 (6.5)	1 (0.0)	~ ~	0 (0.0)	~ ~
Korea, Rep. of	7 (1.4)	620 (10.6)	49 (2.9)	610 (4.7)	42 (2.7)	613 (4.6)	2 (0.9)	~ ~	0 (0.0)	~ ~
Lebanon	43 (4.2)	448 (6.5)	2 (1.3)	~ ~	37 (4.5)	452 (5.5)	11 (2.7)	454 (12.9)	7 (2.2)	439 (12.0)
Lithuania	36 (3.4)	506 (5.4)	10 (1.8)	501 (6.5)	50 (3.8)	503 (4.1)	4 (1.6)	469 (12.1)	0 (0.0)	~ ~
Macedonia, Rep. of r	19 (3.5)	429 (13.5)	7 (2.2)	443 (12.1)	64 (4.2)	422 (7.6)	8 (2.3)	401 (15.2)	2 (1.2)	~ ~
Malaysia	31 (3.9)	432 (9.9)	10 (2.3)	419 (13.6)	36 (3.6)	453 (8.3)	20 (3.5)	444 (13.2)	2 (1.1)	~ ~
Morocco	5 (1.4)	373 (13.4)	0 (0.0)	~ ~	12 (2.1)	360 (6.9)	3 (1.0)	365 (19.9)	80 (2.4)	373 (2.5)
New Zealand	29 (2.8)	505 (11.0)	5 (1.6)	492 (28.7)	37 (3.4)	490 (6.0)	30 (3.1)	471 (9.9)	0 (0.0)	~ ~
Norway	11 (2.8)	474 (4.6)	1 (0.7)	~ ~	39 (4.3)	482 (3.2)	50 (4.6)	471 (3.6)	0 (0.0)	~ ~
Oman	48 (3.2)	363 (4.5)	12 (2.3)	366 (9.7)	39 (3.4)	370 (4.7)	1 (0.6)	~ ~	0 (0.3)	~ ~
Palestinian Nat'l Auth.	17 (3.0)	399 (9.9)	24 (2.9)	394 (7.2)	52 (3.5)	409 (5.2)	7 (1.9)	421 (9.7)	0 (0.0)	~ ~
Qatar	35 (4.2)	387 (10.2)	13 (2.4)	414 (20.6)	46 (4.8)	422 (9.1)	6 (1.7)	431 (21.6)	0 (0.0)	~ ~
Romania	73 (3.2)	451 (4.7)	0 (0.0)	~ ~	26 (3.1)	476 (8.0)	0 (0.0)	~ ~	0 (0.3)	~ ~
Russian Federation	63 (3.1)	543 (3.8)	0 (0.0)	~ ~	35 (3.1)	529 (6.1)	2 (0.9)	~ ~	0 (0.0)	~ ~
Saudi Arabia	31 (4.1)	399 (10.5)	38 (4.3)	397 (6.8)	30 (3.9)	394 (8.1)	2 (1.3)	~ ~	0 (0.0)	~ ~
Singapore	32 (2.1)	620 (5.8)	6 (1.2)	584 (16.2)	45 (2.4)	620 (5.5)	17 (2.0)	585 (10.2)	0 (0.0)	~ ~
Slovenia	33 (2.7)	507 (3.1)	16 (2.0)	508 (6.2)	48 (2.7)	503 (2.9)	3 (0.9)	470 (14.4)	1 (0.3)	~ ~
Sweden r	40 (3.6)	484 (3.6)	21 (3.0)	487 (5.3)	21 (3.0)	491 (4.1)	16 (2.7)	480 (6.7)	2 (0.9)	~ ~
Syrian Arab Republic	17 (3.4)	379 (12.1)	2 (1.2)	~ ~	71 (3.9)	380 (5.1)	8 (2.3)	361 (17.3)	1 (0.8)	~ ~
Thailand	18 (3.1)	417 (11.3)	0 (0.0)	~ ~	61 (4.0)	431 (6.5)	17 (3.1)	426 (10.9)	3 (1.5)	415 (27.7)
Tunisia	17 (2.9)	428 (7.9)	1 (0.7)	~ ~	78 (3.6)	422 (3.6)	3 (1.7)	433 (18.9)	1 (0.0)	~ ~
Turkey	55 (3.7)	449 (4.8)	23 (3.0)	449 (7.0)	18 (2.6)	471 (14.6)	4 (1.5)	442 (19.5)	0 (0.0)	~ ~
Ukraine	45 (4.2)	479 (5.9)	0 (0.0)	~ ~	54 (4.2)	478 (6.0)	1 (0.8)	~ ~	0 (0.0)	~ ~
United Arab Emirates	37 (2.2)	467 (3.5)	7 (1.4)	449 (11.6)	53 (2.4)	448 (3.4)	3 (0.6)	464 (13.9)	0 (0.0)	~ ~
United States r	28 (2.5)	524 (6.8)	25 (2.4)	510 (6.5)	15 (1.8)	497 (6.7)	31 (2.6)	510 (6.7)	0 (0.0)	~ ~
International Avg.	32 (0.5)	471 (1.3)	12 (0.3)	470 (3.0)	41 (0.5)	468 (1.1)	12 (0.4)	462 (2.4)	3 (0.1)	418 (7.0)

* Countries have been increasing their certification requirements and providing professional development to teachers certified under earlier guidelines.

( ) Standard errors appear in parentheses. Because of rounding some results 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.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.4: Teachers Majored in Education and Mathematics (Continued)

TIMSS 2011 Mathematics 8th Grade

Country	Major in Mathematics and Mathematics Education		Major in Mathematics Education but No Major in Mathematics		Major in Mathematics but No Major in Mathematics Education		All Other Majors		No Formal Education Beyond Upper-secondary*	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants										
Botswana	27 (4.0)	396 (6.3)	10 (2.5)	391 (6.1)	58 (4.4)	399 (3.2)	4 (1.7)	397 (5.0)	0 (0.0)	~ ~
Honduras r	42 (4.5)	333 (4.5)	1 (0.8)	~ ~	39 (4.7)	347 (9.3)	9 (2.9)	334 (17.5)	9 (2.6)	333 (16.0)
South Africa	27 (3.3)	358 (7.4)	8 (2.2)	352 (18.1)	54 (3.9)	345 (4.8)	10 (2.1)	372 (13.1)	2 (1.0)	~ ~
Benchmarking Participants										
Alberta, Canada	29 (3.7)	505 (4.6)	10 (2.1)	504 (9.1)	6 (1.8)	481 (7.8)	55 (4.1)	507 (3.4)	0 (0.0)	~ ~
Ontario, Canada	4 (1.6)	520 (9.9)	6 (1.8)	516 (7.6)	8 (2.1)	516 (11.9)	81 (2.9)	512 (3.0)	1 (0.7)	~ ~
Quebec, Canada	27 (4.0)	539 (5.6)	20 (3.2)	531 (6.6)	20 (3.2)	542 (6.2)	32 (3.6)	524 (5.6)	1 (1.1)	~ ~
Abu Dhabi, UAE	32 (4.4)	455 (6.1)	9 (2.8)	451 (14.7)	57 (4.7)	448 (6.5)	2 (1.2)	~ ~	0 (0.0)	~ ~
Dubai, UAE	48 (2.2)	490 (4.1)	3 (1.0)	449 (6.6)	47 (2.3)	463 (4.0)	3 (0.7)	494 (16.4)	0 (0.0)	~ ~
Alabama, US r	43 (6.3)	463 (11.9)	36 (6.4)	470 (10.7)	12 (3.9)	485 (13.3)	8 (4.1)	461 (21.9)	0 (0.0)	~ ~
California, US r	25 (6.1)	507 (18.3)	18 (5.1)	521 (12.1)	15 (4.7)	463 (14.6)	42 (7.5)	485 (11.2)	0 (0.0)	~ ~
Colorado, US r	30 (5.7)	515 (12.9)	16 (4.2)	533 (13.0)	27 (6.1)	516 (13.1)	28 (6.0)	516 (16.7)	0 (0.0)	~ ~
Connecticut, US	29 (4.6)	512 (12.7)	19 (4.8)	513 (23.1)	23 (3.8)	514 (12.2)	30 (5.0)	539 (10.4)	0 (0.0)	~ ~
Florida, US r	11 (3.7)	531 (12.9)	23 (6.5)	530 (13.2)	10 (3.2)	542 (18.4)	54 (7.8)	506 (10.4)	2 (0.2)	~ ~
Indiana, US r	44 (7.0)	529 (7.4)	33 (5.8)	508 (11.1)	18 (5.6)	517 (12.7)	5 (3.2)	517 (27.8)	0 (0.0)	~ ~
Massachusetts, US	20 (4.7)	565 (19.4)	19 (5.5)	554 (14.2)	25 (5.8)	557 (10.8)	35 (6.5)	565 (9.3)	0 (0.0)	~ ~
Minnesota, US r	35 (6.4)	537 (8.3)	32 (6.5)	549 (8.5)	19 (4.9)	547 (12.9)	14 (5.5)	564 (19.2)	0 (0.0)	~ ~
North Carolina, US r	35 (5.2)	555 (12.5)	24 (5.9)	551 (20.0)	14 (4.3)	491 (10.7)	28 (4.3)	542 (11.0)	0 (0.0)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Teachers' Years of Experience

It is difficult to examine the effects of teacher experience on student achievement, because sometimes more experienced teachers are assigned to students of higher ability and fewer discipline problems, and other times the more experienced teachers are assigned to the lower-achieving students in need of more help. However, some research has addressed this selection bias problem; and experience can have a large positive impact primarily in the first few years of teaching, although the benefits can continue beyond the first five years of a teacher's career (Harris & Sass, 2011; Leigh, 2010).

Exhibit 7.5 presents teachers' reports about their years of experience for participants in the TIMSS fourth grade assessment. On average across the fourth grade countries, teachers of mathematics had been teaching for an average of 17 years. Forty-one percent of the students, on average, had very experienced teachers with 20 years or more of experience, and another 30 percent had teachers with at least 10 (but less than 20) years of experience. Taken together, close to three-fourths of the students had very experienced teachers.

Average mathematics achievement was highest, on average, for students whose teachers had 20 or more years of experience, compared to those whose teachers had between 10 and 20 years of experience or students with even less experienced teachers (498 and 490 vs. 486, respectively). This achievement gap could be a reflection of more senior teachers receiving preferred assignments, although at the fourth grade there is relatively little tracking or streaming. However, this gap also could reflect the fact that the newer teachers still are learning the most effective instructional approaches.

Exhibit 7.6 shows mathematics teachers' reports from the eighth grade assessment about their years of experience. On average, the eighth grade teachers were slightly less experienced than their fourth grade counterparts (16 years vs. 17 years), leading to lesser percentages of students taught by experienced teachers—64 percent taught by teachers with at least 10 years of experience, compared to 71 percent of fourth grade students. The relationship between teacher experience and average student achievement was more pronounced among the eighth grade students, rising from 458 points for students taught by teachers with less than 5 years of experience to 474 points for students taught by teachers with more than 20 years of experience. With more use of tracking and streaming of students by the eighth grade, this may be symptomatic of the more experienced teachers receiving preferred assignments.

Teachers' Professional Development

Evidence from recent meta-analyses of research conducted in the United States shows that teacher professional development in mathematics has a significant positive effect on student achievement (Blank & de las Alas, 2009) and that the amount of professional development (more than 14 hours) was an important factor (Yoon, Duncan, Lee, Scarloss, & Shapley, 2007).

Exhibit 7.7 presents, for the fourth grade TIMSS assessment, teachers' reports about areas of professional development in mathematics in which they had participated in the past two years. Although there was a lot of variation across countries, the most common areas of mathematics professional development for teachers of fourth grade students were mathematics pedagogy/instruction, mathematics content, and mathematics curriculum. On average, 46 percent of students had teachers who had professional development in mathematics instruction or pedagogy, 44 percent had teachers taking mathematics content, and 41 percent taking mathematics curriculum. Mathematics assessment and integrating information technology into mathematics were less common areas, with 37 percent and 33 percent of students, respectively, having teachers who had participated in professional development in these areas in the past two years.

As shown in Exhibit 7.8, mathematics teachers of students in the TIMSS eighth grade assessment reported somewhat higher levels of participation in mathematics professional development. On average across the eighth grade countries, the majority of students were taught by mathematics teachers who had participated in professional development in mathematics instruction or pedagogy (58%), content (55%), or curriculum (52%) in the past two years. Furthermore, almost half of the students had teachers with professional development in integrating information technology into mathematics (48%), mathematics assessment (47%), or improving students' critical thinking or problem solving skills (43%).

Exhibit 7.5: Teachers' Years of Experience

TIMSS 2011 4th Grade Mathematics

Reported by Teachers

Country	20 Years or More		At Least 10 but Less than 20 Years		At Least 5 but Less than 10 Years		Less than 5 Years		Average Years of Experience
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Armenia	73 (3.8)	453 (3.9)	21 (3.7)	455 (7.6)	3 (1.2)	444 (9.1)	3 (1.0)	433 (34.1)	26 (0.8)
Australia r	41 (3.8)	517 (6.0)	23 (3.4)	524 (6.6)	19 (2.8)	510 (10.0)	17 (3.1)	524 (9.4)	17 (0.9)
Austria	56 (3.4)	513 (2.9)	24 (3.2)	502 (5.0)	11 (2.0)	504 (6.9)	9 (1.7)	501 (6.6)	22 (0.7)
Azerbaijan	60 (4.5)	465 (6.5)	26 (3.1)	461 (12.0)	10 (2.7)	438 (19.8)	4 (2.0)	461 (27.9)	23 (1.0)
Bahrain	13 (3.9)	439 (12.8)	45 (4.6)	435 (5.1)	32 (5.5)	437 (5.8)	10 (2.6)	440 (16.4)	12 (0.7)
Belgium (Flemish)	42 (3.4)	553 (3.2)	29 (3.4)	545 (3.2)	19 (3.2)	549 (4.1)	10 (2.3)	542 (6.1)	17 (0.7)
Chile	39 (3.7)	464 (5.4)	26 (3.9)	464 (7.0)	12 (2.6)	457 (10.1)	23 (3.5)	458 (8.7)	17 (0.9)
Chinese Taipei	26 (3.3)	595 (3.9)	50 (3.8)	589 (2.9)	17 (3.3)	600 (5.3)	7 (2.0)	576 (5.2)	15 (0.6)
Croatia	56 (3.4)	495 (2.5)	30 (2.9)	482 (4.0)	9 (2.0)	494 (5.7)	5 (1.4)	492 (6.6)	21 (0.7)
Czech Republic	51 (4.1)	508 (3.6)	26 (3.5)	511 (3.9)	12 (2.4)	516 (7.4)	12 (2.5)	517 (9.1)	19 (0.8)
Denmark	34 (3.4)	540 (4.1)	27 (3.6)	536 (5.2)	23 (3.1)	542 (2.9)	16 (2.4)	538 (6.6)	16 (0.7)
England	21 (3.3)	560 (9.1)	29 (4.4)	549 (7.6)	20 (3.6)	549 (7.2)	30 (3.9)	531 (6.9)	12 (0.8)
Finland	41 (3.2)	545 (3.0)	34 (3.1)	549 (3.2)	13 (2.1)	550 (5.3)	13 (1.9)	537 (9.2)	17 (0.6)
Georgia	60 (3.9)	446 (4.2)	30 (3.7)	453 (9.1)	5 (1.2)	471 (33.0)	5 (1.8)	453 (24.3)	23 (0.9)
Germany	47 (3.4)	528 (3.4)	25 (2.9)	530 (4.9)	13 (2.5)	531 (6.5)	15 (2.4)	525 (5.3)	19 (0.9)
Hong Kong SAR	25 (4.2)	612 (5.5)	51 (4.6)	599 (5.6)	10 (3.0)	598 (13.4)	14 (2.8)	595 (8.3)	14 (0.8)
Hungary	70 (3.3)	517 (3.8)	17 (2.7)	515 (15.2)	7 (1.8)	511 (15.0)	5 (1.7)	493 (17.8)	24 (0.7)
Iran, Islamic Rep. of	41 (3.6)	453 (6.1)	41 (3.5)	419 (6.2)	10 (1.9)	419 (14.8)	9 (1.8)	400 (12.2)	17 (0.6)
Ireland	25 (3.1)	536 (7.0)	21 (3.4)	529 (6.5)	27 (3.1)	524 (4.7)	27 (3.2)	522 (5.7)	12 (0.6)
Italy	69 (3.1)	510 (3.4)	21 (2.8)	507 (5.3)	7 (1.8)	502 (11.0)	4 (1.5)	516 (9.6)	24 (0.7)
Japan	47 (3.9)	586 (2.7)	14 (2.9)	580 (3.6)	18 (2.7)	587 (4.2)	21 (3.1)	587 (4.1)	17 (0.9)
Kazakhstan	53 (4.0)	501 (6.1)	31 (3.4)	513 (8.6)	8 (2.3)	468 (15.4)	8 (2.1)	504 (22.6)	20 (0.8)
Korea, Rep. of	38 (4.0)	606 (2.8)	25 (4.1)	609 (4.8)	21 (3.4)	605 (4.2)	17 (3.6)	596 (5.9)	15 (0.9)
Kuwait	2 (1.1)	~ ~	29 (3.3)	346 (6.9)	37 (4.0)	342 (5.8)	32 (3.7)	337 (6.6)	8 (0.3)
Lithuania	71 (2.6)	531 (3.1)	27 (2.5)	540 (5.2)	2 (1.0)	~ ~	1 (0.5)	~ ~	24 (0.6)
Malta	20 (0.1)	502 (2.8)	36 (0.1)	497 (2.2)	32 (0.1)	494 (2.5)	12 (0.1)	490 (4.6)	13 (0.0)
Morocco	51 (4.5)	332 (5.8)	33 (4.4)	328 (7.8)	8 (1.8)	368 (21.2)	8 (1.7)	379 (28.2)	20 (0.8)
Netherlands r	31 (4.8)	538 (4.6)	27 (4.3)	540 (4.2)	29 (5.0)	540 (5.1)	13 (3.0)	536 (5.2)	16 (1.2)
New Zealand	25 (2.6)	484 (5.7)	27 (2.6)	486 (4.8)	25 (2.7)	489 (5.4)	23 (2.8)	487 (6.0)	13 (0.6)
Northern Ireland r	34 (4.7)	559 (5.9)	35 (3.9)	568 (5.8)	24 (4.2)	561 (9.2)	7 (2.3)	566 (23.8)	17 (1.0)
Norway	31 (4.3)	494 (4.3)	37 (4.8)	499 (4.6)	19 (4.2)	483 (5.6)	13 (2.4)	501 (6.3)	16 (1.0)
Oman	7 (1.6)	374 (20.6)	21 (2.7)	393 (7.7)	56 (3.1)	388 (4.0)	16 (1.7)	375 (5.8)	9 (0.3)
Poland	83 (2.2)	481 (2.3)	11 (2.1)	488 (8.0)	4 (1.5)	464 (9.6)	2 (0.9)	~ ~	23 (0.4)
Portugal	36 (3.2)	546 (4.9)	46 (3.8)	520 (5.3)	14 (2.9)	526 (8.9)	4 (1.6)	565 (17.1)	17 (0.6)
Qatar	24 (3.3)	444 (9.4)	24 (4.3)	411 (15.1)	25 (3.9)	421 (11.8)	27 (3.9)	388 (10.1)	11 (0.6)
Romania	57 (3.7)	492 (5.5)	31 (3.5)	467 (10.6)	9 (2.3)	455 (21.2)	2 (1.0)	~ ~	23 (0.8)
Russian Federation	73 (3.0)	543 (3.8)	22 (2.7)	544 (9.0)	3 (1.1)	507 (22.1)	3 (1.5)	524 (16.2)	25 (0.7)
Saudi Arabia	18 (2.9)	417 (9.3)	47 (4.4)	417 (8.8)	19 (3.8)	387 (10.4)	16 (3.1)	405 (10.0)	13 (0.5)
Serbia	63 (3.3)	514 (4.4)	31 (3.2)	525 (4.8)	5 (1.3)	487 (11.8)	2 (1.0)	~ ~	22 (0.6)
Singapore	12 (1.5)	593 (9.6)	26 (2.5)	606 (6.7)	30 (2.5)	614 (6.2)	32 (2.3)	604 (5.6)	10 (0.4)
Slovak Republic	55 (2.8)	506 (5.5)	26 (2.6)	503 (5.3)	10 (2.1)	520 (10.1)	9 (1.9)	497 (11.0)	20 (0.6)
Slovenia	57 (3.8)	514 (2.2)	27 (3.1)	518 (4.8)	10 (2.2)	499 (7.2)	6 (1.5)	505 (7.8)	21 (0.7)
Spain	59 (4.2)	490 (4.0)	21 (3.9)	476 (6.1)	6 (1.5)	480 (12.6)	14 (3.2)	462 (9.6)	21 (0.9)
Sweden r	33 (4.3)	506 (3.6)	42 (4.5)	506 (4.3)	16 (2.9)	499 (4.5)	9 (2.1)	507 (5.4)	16 (0.8)
Thailand	47 (4.5)	463 (4.7)	25 (4.0)	455 (15.1)	14 (3.2)	448 (13.5)	15 (3.4)	469 (10.8)	19 (1.1)
Tunisia	55 (4.2)	370 (5.9)	24 (3.6)	349 (8.1)	11 (2.4)	340 (14.3)	11 (2.6)	354 (12.7)	18 (0.8)
Turkey	21 (2.7)	505 (7.6)	38 (3.0)	481 (5.6)	20 (2.5)	457 (12.9)	21 (2.8)	421 (13.0)	13 (0.5)
United Arab Emirates	13 (2.0)	448 (10.1)	30 (2.1)	424 (5.7)	28 (2.5)	429 (5.0)	29 (2.2)	444 (6.1)	10 (0.4)
United States	25 (2.0)	543 (4.2)	38 (2.7)	544 (3.7)	23 (2.2)	541 (3.8)	14 (1.6)	543 (6.0)	14 (0.5)
Yemen	15 (3.1)	259 (13.6)	60 (4.4)	239 (7.3)	15 (3.4)	276 (14.6)	11 (2.5)	256 (20.9)	14 (0.5)
International Avg.	41 (0.5)	498 (0.9)	30 (0.5)	490 (1.0)	16 (0.4)	486 (1.6)	13 (0.3)	486 (2.0)	17 (0.1)

( ) Standard errors appear in parentheses. Because of rounding some results 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.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.5: Teachers' Years of Experience (Continued)

Country	20 Years or More		At Least 10 but Less than 20 Years		At Least 5 but Less than 10 Years		Less than 5 Years		Average Years of Experience
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants									
Botswana	26 (3.6)	431 (9.6)	34 (4.2)	429 (9.8)	22 (3.7)	402 (7.6)	19 (2.6)	409 (8.8)	13 (0.7)
Honduras	29 (4.2)	408 (6.8)	37 (4.6)	378 (8.0)	17 (3.7)	413 (10.0)	17 (4.0)	411 (21.5)	14 (0.9)
Yemen	15 (3.0)	374 (9.6)	50 (4.1)	343 (8.5)	18 (3.4)	356 (14.1)	16 (3.3)	328 (12.5)	12 (0.6)
Benchmarking Participants									
Alberta, Canada r	36 (4.3)	512 (4.2)	24 (4.1)	503 (4.4)	26 (4.3)	501 (7.0)	14 (3.4)	509 (5.3)	15 (0.9)
Ontario, Canada	17 (2.4)	516 (7.7)	40 (3.4)	518 (4.7)	29 (3.1)	518 (4.5)	13 (2.7)	526 (6.4)	12 (0.4)
Quebec, Canada	32 (4.2)	530 (4.1)	40 (4.6)	535 (3.3)	20 (3.6)	532 (6.4)	8 (2.0)	536 (6.4)	15 (0.7)
Abu Dhabi, UAE	15 (3.8)	432 (16.0)	31 (3.9)	408 (11.8)	27 (3.8)	401 (7.7)	28 (3.8)	438 (10.2)	10 (0.6)
Dubai, UAE r	18 (4.3)	478 (13.2)	27 (3.0)	471 (6.6)	26 (3.5)	462 (8.7)	29 (4.4)	470 (11.1)	11 (0.9)
Florida, US r	16 (3.1)	544 (10.9)	34 (4.8)	553 (6.0)	30 (4.2)	535 (6.4)	20 (3.7)	538 (9.0)	12 (0.9)
North Carolina, US	19 (4.4)	564 (9.8)	36 (5.0)	556 (6.7)	24 (4.2)	559 (8.2)	21 (4.0)	531 (7.7)	12 (1.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.6: Teachers' Years of Experience

TIMSS 2011 8th Grade Mathematics

Reported by Teachers

Country	20 Years or More		At Least 10 but Less than 20 Years		At Least 5 but Less than 10 Years		Less than 5 Years		Average Years of Experience
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Armenia	63 (3.7)	467 (3.9)	30 (3.3)	464 (6.0)	4 (1.6)	473 (24.9)	3 (1.4)	474 (18.4)	24 (0.8)
Australia r	37 (4.0)	519 (8.1)	22 (3.4)	513 (10.8)	18 (3.2)	504 (17.1)	24 (3.4)	485 (8.4)	15 (0.9)
Bahrain	19 (2.2)	433 (7.0)	54 (3.6)	404 (3.7)	17 (2.7)	403 (5.8)	10 (1.9)	430 (9.1)	14 (0.4)
Chile	49 (3.8)	415 (4.6)	15 (2.9)	416 (10.0)	13 (2.8)	421 (12.1)	22 (3.4)	421 (6.3)	19 (1.0)
Chinese Taipei	24 (3.6)	621 (7.2)	41 (3.6)	607 (5.8)	26 (3.5)	608 (9.3)	9 (2.5)	593 (8.9)	14 (0.7)
England	21 (3.6)	510 (15.5)	25 (3.7)	516 (11.8)	22 (3.9)	495 (11.6)	32 (3.9)	503 (10.7)	12 (0.9)
Finland	41 (3.4)	517 (2.8)	27 (3.4)	511 (5.3)	18 (2.8)	515 (6.1)	15 (2.4)	510 (5.2)	16 (0.7)
Georgia	63 (3.9)	428 (5.2)	21 (3.5)	441 (10.1)	9 (2.4)	439 (15.0)	7 (2.3)	431 (18.5)	25 (1.1)
Ghana	6 (1.8)	360 (19.9)	23 (3.8)	340 (9.0)	28 (4.0)	334 (9.3)	43 (3.9)	321 (6.8)	8 (0.5)
Hong Kong SAR	18 (3.3)	570 (11.9)	39 (4.3)	590 (8.4)	25 (4.2)	589 (11.9)	18 (3.3)	588 (10.1)	12 (0.7)
Hungary	62 (3.5)	508 (4.4)	26 (3.0)	508 (6.2)	7 (1.9)	488 (18.6)	5 (1.5)	456 (21.5)	22 (0.7)
Indonesia	25 (3.9)	402 (9.1)	30 (4.0)	399 (9.1)	19 (3.3)	385 (8.0)	26 (4.5)	356 (9.1)	13 (0.8)
Iran, Islamic Rep. of	28 (3.2)	443 (8.9)	40 (3.8)	416 (6.0)	16 (2.6)	402 (10.4)	16 (2.8)	374 (10.7)	14 (0.6)
Israel	38 (2.8)	545 (6.6)	36 (2.8)	518 (6.6)	15 (2.0)	495 (10.7)	11 (1.8)	468 (14.4)	17 (0.5)
Italy	60 (4.1)	502 (3.2)	22 (3.3)	492 (7.3)	11 (2.5)	504 (9.1)	8 (2.1)	492 (13.6)	22 (0.9)
Japan	47 (3.9)	576 (3.7)	18 (3.1)	558 (5.5)	17 (2.3)	575 (9.1)	18 (3.1)	559 (7.5)	17 (0.8)
Jordan	16 (2.6)	406 (8.5)	29 (3.3)	410 (7.6)	29 (3.5)	394 (9.6)	26 (3.1)	413 (7.0)	11 (0.6)
Kazakhstan	62 (3.9)	492 (5.2)	21 (3.2)	468 (8.6)	9 (2.7)	489 (14.9)	8 (2.2)	493 (14.8)	22 (0.9)
Korea, Rep. of	34 (3.1)	618 (5.0)	22 (2.8)	616 (8.8)	17 (2.1)	625 (7.1)	27 (2.6)	594 (4.8)	13 (0.6)
Lebanon	27 (3.6)	454 (7.9)	32 (3.9)	445 (6.9)	21 (3.2)	460 (9.8)	20 (3.5)	445 (8.7)	14 (1.0)
Lithuania	73 (3.4)	501 (3.0)	17 (2.6)	509 (6.8)	7 (2.1)	504 (19.6)	3 (1.4)	506 (17.8)	25 (0.8)
Macedonia, Rep. of r	50 (4.4)	421 (9.1)	25 (4.2)	430 (12.0)	12 (2.7)	415 (15.3)	13 (2.9)	420 (18.6)	20 (0.9)
Malaysia	18 (3.0)	446 (12.2)	31 (3.4)	446 (9.5)	21 (3.0)	426 (11.4)	30 (3.3)	441 (10.5)	11 (0.7)
Morocco	69 (2.8)	374 (2.8)	11 (2.0)	373 (9.0)	5 (1.5)	358 (12.2)	15 (2.3)	363 (6.3)	22 (0.6)
New Zealand	36 (3.0)	492 (8.4)	22 (2.7)	486 (9.6)	25 (3.0)	489 (8.9)	17 (2.8)	482 (15.6)	15 (0.8)
Norway	30 (4.0)	478 (3.7)	25 (3.6)	474 (5.5)	19 (3.7)	475 (4.4)	26 (3.5)	474 (4.0)	15 (1.0)
Oman	7 (1.3)	362 (12.2)	25 (2.6)	385 (6.5)	46 (3.3)	363 (4.7)	21 (2.6)	360 (6.9)	9 (0.3)
Palestinian Nat'l Auth.	14 (3.1)	413 (11.9)	37 (3.9)	410 (7.3)	24 (3.6)	400 (7.6)	25 (3.2)	394 (7.5)	11 (0.7)
Qatar	23 (4.2)	432 (12.7)	36 (4.6)	425 (9.4)	25 (3.4)	388 (9.2)	16 (2.9)	386 (10.1)	13 (0.7)
Romania	66 (3.7)	466 (5.2)	24 (3.3)	449 (9.3)	6 (1.7)	420 (15.9)	4 (1.6)	423 (12.7)	25 (0.9)
Russian Federation	67 (3.3)	540 (4.4)	24 (3.1)	543 (7.0)	5 (1.2)	515 (15.2)	4 (1.2)	547 (23.5)	24 (0.6)
Saudi Arabia	13 (2.9)	386 (10.2)	41 (3.9)	406 (7.3)	25 (3.5)	402 (8.9)	21 (3.5)	367 (7.7)	11 (0.6)
Singapore	10 (1.4)	618 (10.6)	16 (2.1)	619 (9.3)	26 (2.4)	624 (7.3)	47 (2.5)	601 (5.0)	8 (0.4)
Slovenia	52 (2.9)	506 (3.2)	20 (2.6)	500 (5.0)	17 (2.0)	500 (4.1)	12 (1.9)	515 (4.9)	19 (0.6)
Sweden r	26 (2.7)	486 (5.4)	42 (3.4)	489 (3.9)	22 (2.7)	482 (3.7)	10 (2.0)	476 (5.1)	15 (0.6)
Syrian Arab Republic	16 (3.1)	400 (9.6)	26 (3.7)	375 (7.9)	24 (3.6)	370 (8.8)	35 (4.0)	378 (8.7)	10 (0.6)
Thailand	34 (3.4)	444 (8.4)	21 (3.1)	432 (11.0)	18 (2.7)	417 (11.6)	28 (3.2)	415 (8.7)	15 (0.8)
Tunisia	38 (3.3)	442 (5.6)	35 (3.3)	419 (5.4)	18 (2.8)	417 (7.5)	10 (2.1)	394 (7.2)	16 (0.7)
Turkey	11 (2.2)	471 (14.5)	24 (3.2)	481 (10.8)	38 (3.5)	445 (6.9)	27 (2.8)	431 (6.5)	9 (0.5)
Ukraine	68 (4.4)	477 (4.5)	20 (3.6)	491 (10.0)	9 (2.5)	473 (11.1)	3 (1.4)	473 (18.7)	25 (1.0)
United Arab Emirates	24 (2.0)	442 (6.4)	36 (2.4)	455 (4.0)	26 (2.3)	461 (4.8)	14 (1.8)	467 (6.8)	13 (0.4)
United States r	26 (2.2)	519 (6.8)	28 (2.4)	517 (5.1)	28 (2.8)	506 (7.2)	17 (2.2)	505 (6.7)	14 (0.6)
International Avg.	36 (0.5)	474 (1.3)	28 (0.5)	470 (1.2)	19 (0.4)	463 (1.7)	18 (0.4)	458 (1.8)	16 (0.1)

( ) Standard errors appear in parentheses. Because of rounding some results 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.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.6: Teachers' Years of Experience (Continued)

Country	20 Years or More		At Least 10 but Less than 20 Years		At Least 5 but Less than 10 Years		Less than 5 Years		Average Years of Experience
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants									
Botswana	2 (1.0)	~ ~	39 (4.5)	401 (5.3)	31 (4.3)	403 (4.2)	29 (3.9)	384 (5.2)	9 (0.4)
Honduras r	26 (3.8)	341 (6.5)	23 (4.2)	335 (10.8)	22 (4.4)	332 (8.4)	29 (4.2)	339 (11.1)	12 (0.9)
South Africa	30 (3.8)	344 (7.3)	33 (3.4)	358 (5.8)	18 (3.0)	364 (8.6)	19 (3.1)	345 (8.7)	14 (0.8)
Benchmarking Participants									
Alberta, Canada	25 (3.5)	506 (5.0)	37 (4.3)	504 (3.8)	15 (3.0)	504 (6.9)	23 (3.4)	505 (5.3)	13 (0.7)
Ontario, Canada	16 (2.8)	511 (7.5)	44 (4.2)	512 (3.8)	31 (3.5)	516 (4.9)	10 (2.5)	511 (9.4)	12 (0.5)
Quebec, Canada	19 (3.0)	544 (6.6)	47 (3.8)	536 (4.2)	22 (3.2)	524 (7.0)	12 (2.6)	521 (7.3)	13 (0.6)
Abu Dhabi, UAE	25 (4.1)	456 (14.3)	30 (4.1)	433 (6.3)	29 (4.6)	456 (8.5)	16 (3.2)	463 (9.2)	14 (0.9)
Dubai, UAE	19 (2.2)	443 (9.5)	42 (2.6)	491 (5.0)	25 (3.3)	488 (8.7)	13 (2.6)	471 (13.9)	13 (0.5)
Alabama, US r	16 (4.8)	494 (20.4)	35 (7.8)	473 (11.2)	32 (6.2)	450 (12.0)	17 (5.7)	464 (11.2)	12 (1.3)
California, US r	19 (5.4)	502 (25.5)	33 (6.9)	490 (9.2)	28 (6.4)	506 (10.2)	20 (5.9)	479 (21.5)	12 (1.3)
Colorado, US r	21 (4.9)	564 (9.3)	32 (5.6)	517 (11.3)	32 (5.8)	508 (14.0)	15 (3.5)	471 (13.3)	13 (1.0)
Connecticut, US	29 (6.2)	531 (17.9)	32 (5.6)	533 (9.2)	20 (4.8)	509 (18.9)	19 (5.5)	503 (14.5)	14 (1.3)
Florida, US r	18 (5.3)	530 (13.7)	43 (7.0)	521 (10.5)	26 (5.8)	514 (14.6)	13 (4.0)	524 (29.0)	13 (1.2)
Indiana, US r	34 (5.6)	526 (11.0)	22 (5.8)	533 (13.8)	27 (6.0)	516 (12.2)	17 (5.2)	494 (9.9)	15 (1.4)
Massachusetts, US	10 (4.1)	566 (20.3)	33 (5.8)	569 (10.9)	39 (5.2)	552 (8.5)	18 (5.5)	556 (17.9)	11 (1.3)
Minnesota, US	27 (6.4)	556 (9.3)	36 (5.2)	553 (8.9)	22 (4.5)	531 (15.3)	15 (4.3)	528 (17.9)	15 (1.5)
North Carolina, US r	26 (5.5)	559 (13.2)	30 (5.6)	530 (14.8)	33 (5.5)	545 (13.2)	11 (4.3)	517 (12.7)	14 (1.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.7: Teacher Participation in Professional Development in Mathematics in the Past Two Years

TIMSS 2011 Mathematics 4th Grade

Reported by Teachers

Country	Percent of Students by Teacher's Area of Professional Development									
	Mathematics Content		Mathematics Pedagogy / Instruction		Mathematics Curriculum		Integrating Information Technology into Mathematics		Mathematics Assessment	
Armenia		60 (3.7)		65 (3.3)		74 (2.9)		48 (3.7)		77 (3.1)
Australia	r	66 (3.7)	r	65 (4.0)	r	62 (3.7)	r	51 (4.3)	r	49 (3.6)
Austria		75 (2.8)		55 (3.5)		33 (3.4)		15 (2.4)		27 (3.1)
Azerbaijan		69 (3.7)		67 (3.3)		47 (3.7)		53 (4.3)		76 (3.2)
Bahrain		48 (5.1)		50 (5.0)		50 (4.9)		52 (5.6)		42 (5.0)
Belgium (Flemish)		12 (2.8)		11 (2.8)		20 (3.1)		21 (3.1)		6 (1.8)
Chile	r	48 (4.4)	r	31 (3.9)	r	24 (3.4)	r	36 (4.2)	r	30 (3.7)
Chinese Taipei		45 (3.9)		42 (3.8)		50 (3.9)		41 (4.0)		34 (3.9)
Croatia		57 (3.7)		50 (3.2)		51 (3.7)		21 (2.9)		52 (4.0)
Czech Republic		16 (2.7)		26 (3.7)		8 (2.3)		22 (3.3)		11 (2.6)
Denmark	r	29 (4.3)	r	33 (4.3)	r	13 (3.0)	r	20 (3.3)	r	24 (3.6)
England		54 (4.3)		71 (3.7)		46 (3.7)		30 (4.1)		59 (4.4)
Finland		9 (2.1)		20 (2.6)		3 (1.0)		9 (1.9)		3 (1.1)
Georgia		14 (2.7)		28 (3.8)		36 (4.2)		22 (2.9)		35 (4.1)
Germany		55 (3.7)		44 (3.1)		33 (3.1)		5 (1.6)		27 (3.1)
Hong Kong SAR		66 (4.0)		81 (3.8)		53 (4.5)		56 (4.7)		53 (4.6)
Hungary		28 (3.1)		45 (3.8)		13 (2.6)		22 (3.1)		22 (3.0)
Iran, Islamic Rep. of		42 (3.8)		47 (4.1)		29 (3.1)		16 (2.6)		26 (3.1)
Ireland		32 (3.4)		32 (3.7)		34 (3.5)		31 (3.4)		25 (3.4)
Italy		28 (3.5)		38 (3.7)		27 (3.3)		22 (2.9)		21 (2.8)
Japan		54 (3.6)		59 (3.5)		24 (3.2)		23 (3.0)		23 (2.8)
Kazakhstan		52 (4.4)		60 (4.0)		61 (4.3)		77 (3.3)		60 (4.3)
Korea, Rep. of		32 (3.8)		40 (3.8)		47 (4.4)		10 (2.1)		31 (4.1)
Kuwait		79 (3.5)		73 (3.5)		81 (3.1)		41 (3.9)		49 (3.9)
Lithuania		33 (3.4)		31 (3.3)		51 (3.7)		66 (3.0)		48 (3.0)
Malta		18 (0.1)		21 (0.1)		17 (0.1)		32 (0.1)		23 (0.1)
Morocco	r	14 (2.3)	r	18 (2.5)	r	16 (2.4)	r	8 (1.6)	r	16 (2.6)
Netherlands	r	22 (4.0)	r	27 (3.9)	r	11 (2.5)	r	20 (4.5)	r	18 (3.8)
New Zealand		72 (2.7)		67 (3.1)		68 (2.9)		35 (3.0)		58 (3.0)
Northern Ireland	r	55 (5.1)	r	64 (4.5)	r	62 (4.7)	r	55 (4.0)	r	61 (4.1)
Norway		25 (4.5)		30 (4.4)		11 (2.6)		11 (2.7)		16 (3.8)
Oman		41 (3.0)		50 (3.0)		37 (3.4)		24 (2.5)		47 (3.2)
Poland		61 (3.7)		31 (3.2)		49 (3.5)		34 (3.5)		24 (3.5)
Portugal		58 (4.2)		54 (4.5)		61 (3.9)		36 (3.7)		25 (4.0)
Qatar		55 (3.4)		56 (3.9)		51 (4.0)		56 (4.9)		49 (3.9)
Romania		54 (3.5)		50 (3.8)		54 (3.5)		34 (3.7)		61 (3.6)
Russian Federation		58 (4.5)		59 (3.9)		76 (3.7)		65 (3.4)		64 (4.1)
Saudi Arabia		59 (4.2)		73 (3.4)		65 (4.2)		41 (4.2)		43 (4.6)
Serbia		60 (3.6)		39 (3.8)		45 (4.0)		20 (3.0)		33 (3.8)
Singapore		68 (2.6)		82 (2.1)		58 (2.8)		57 (2.9)		63 (2.9)
Slovak Republic		11 (2.3)		20 (3.0)		45 (3.2)		47 (3.3)		17 (2.8)
Slovenia		32 (3.4)		23 (3.3)		45 (3.9)		44 (3.5)		43 (3.5)
Spain		15 (2.9)		25 (3.4)		19 (2.8)		40 (4.0)		14 (2.7)
Sweden	r	53 (3.6)	r	60 (4.0)	r	57 (4.3)	r	10 (2.4)	r	44 (4.1)
Thailand		68 (3.9)		71 (4.3)		78 (3.4)		46 (4.1)		61 (4.1)
Tunisia		31 (4.1)		54 (4.6)		30 (4.2)		12 (2.4)		40 (4.1)
Turkey		10 (2.2)		11 (2.2)		12 (2.1)		12 (2.0)		9 (1.9)
United Arab Emirates		49 (2.7)		57 (2.5)		46 (2.2)		45 (2.9)		49 (2.4)
United States	r	68 (2.1)	r	55 (2.4)	r	68 (2.5)	r	49 (2.2)	r	53 (2.1)
Yemen		22 (3.8)		40 (4.5)		19 (3.7)		6 (2.1)		25 (3.9)
International Avg.		44 (0.5)		46 (0.5)		41 (0.5)		33 (0.5)		37 (0.5)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.7: Teacher Participation in Professional Development in Mathematics in the Past Two Years (Continued)

Country	Percent of Students by Teacher's Area of Professional Development									
	Mathematics Content		Mathematics Pedagogy / Instruction		Mathematics Curriculum		Integrating Information Technology into Mathematics		Mathematics Assessment	
Sixth Grade Participants										
Botswana	r	16 (3.2)	r	8 (2.2)	r	14 (3.2)	r	12 (2.8)	r	27 (4.1)
Honduras		82 (3.5)		63 (5.0)		55 (4.8)		29 (3.4)		49 (4.7)
Yemen		19 (3.4)		39 (4.1)		19 (3.8)		7 (2.5)		25 (4.1)
Benchmarking Participants										
Alberta, Canada	r	71 (4.2)	r	70 (4.0)	r	68 (4.0)	r	50 (4.9)	r	63 (3.9)
Ontario, Canada		52 (4.0)		60 (3.7)		44 (3.9)		23 (3.3)		52 (3.8)
Quebec, Canada		58 (4.1)		55 (4.2)		35 (4.2)		18 (3.4)		57 (4.7)
Abu Dhabi, UAE		50 (4.7)		61 (4.3)		48 (4.5)		45 (4.8)		46 (4.8)
Dubai, UAE		49 (4.0)	r	48 (4.3)	r	46 (4.3)		55 (4.1)		51 (4.3)
Florida, US	r	84 (3.0)	r	66 (4.6)	r	90 (2.7)	r	72 (4.4)	r	54 (5.0)
North Carolina, US		77 (5.4)		62 (5.1)		72 (5.4)		68 (4.6)		64 (5.7)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.8: Teacher Participation in Professional Development in Mathematics in the Past Two Years

TIMSS 2011 Mathematics 8th Grade

Reported by Teachers

Country	Percent of Students by Teacher's Area of Professional Development											
	Mathematics Content		Mathematics Pedagogy / Instruction		Mathematics Curriculum		Integrating Information Technology into Mathematics		Improving Students' Critical Thinking or Problem Solving Skills		Mathematics Assessment	
Armenia		67 (3.9)		78 (3.2)		84 (2.7)		36 (3.8)		40 (4.0)		80 (3.1)
Australia	r	52 (4.5)	r	65 (3.7)	r	55 (4.6)	r	69 (3.7)	r	48 (5.2)	r	39 (4.3)
Bahrain		31 (2.5)		51 (3.9)		33 (1.9)		40 (2.5)		47 (3.6)		44 (2.8)
Chile		63 (4.1)		46 (4.0)		38 (4.3)		49 (3.9)		33 (3.8)		33 (3.9)
Chinese Taipei		73 (3.6)		61 (4.1)		67 (3.8)		71 (4.1)		33 (4.3)		42 (3.6)
England		60 (4.6)		73 (4.3)		62 (3.8)		48 (4.4)		53 (5.0)		51 (4.0)
Finland		9 (1.8)		21 (3.1)		6 (1.6)		16 (2.3)		8 (2.0)		5 (1.5)
Georgia		54 (3.7)		52 (3.7)		42 (3.7)		43 (3.9)		41 (3.3)		47 (3.3)
Ghana		68 (3.8)		52 (4.3)		59 (4.1)		25 (4.2)		66 (3.9)		68 (3.5)
Hong Kong SAR		70 (3.9)		68 (4.5)		71 (4.0)		51 (4.3)		49 (4.7)		63 (3.9)
Hungary		34 (4.0)		67 (3.8)		14 (2.6)		46 (3.7)		38 (3.6)		24 (3.3)
Indonesia		71 (4.5)		50 (4.6)		71 (4.3)		37 (4.3)		59 (4.6)		71 (4.2)
Iran, Islamic Rep. of		52 (3.0)		68 (2.9)		32 (3.4)		42 (2.4)		42 (3.1)		33 (3.7)
Israel		79 (2.6)		77 (2.8)		84 (2.0)		36 (3.3)		43 (3.6)		40 (3.2)
Italy		23 (3.3)		45 (4.0)		29 (3.5)		45 (4.0)		13 (2.5)		26 (3.5)
Japan		66 (4.2)		70 (3.6)		41 (4.0)		23 (3.5)		33 (3.8)		26 (3.8)
Jordan		24 (3.6)		36 (3.4)		20 (3.3)		38 (3.5)		40 (3.9)		31 (3.6)
Kazakhstan		74 (3.4)		78 (3.4)		68 (3.8)		85 (2.9)		66 (3.9)		56 (3.9)
Korea, Rep. of		51 (2.8)		61 (3.0)		53 (3.0)		27 (2.5)		32 (3.1)		46 (3.1)
Lebanon		56 (3.8)		59 (4.3)		47 (4.4)		54 (4.4)		59 (4.2)		51 (4.2)
Lithuania		76 (3.2)		60 (3.2)		88 (2.1)		63 (4.0)		37 (4.0)		62 (3.6)
Macedonia, Rep. of	r	79 (3.8)	r	67 (4.3)	r	81 (3.6)	r	90 (2.1)	r	66 (3.9)	r	90 (2.8)
Malaysia		40 (4.2)		42 (4.1)		35 (3.7)		41 (4.1)		36 (3.8)		46 (4.2)
Morocco		38 (2.9)		52 (2.9)		41 (3.2)		60 (2.7)		28 (3.2)		32 (2.7)
New Zealand		64 (3.8)		60 (4.8)		73 (3.4)		53 (4.0)		47 (4.0)		50 (3.6)
Norway		21 (3.2)		27 (3.6)		14 (2.6)		19 (3.6)		15 (2.7)		29 (3.8)
Oman		47 (3.5)		53 (3.3)		34 (3.1)		33 (3.3)		47 (3.8)		44 (3.1)
Palestinian Nat'l Auth.		30 (3.8)		43 (4.1)		18 (3.2)		33 (3.6)		49 (3.9)		37 (4.2)
Qatar		69 (3.1)		71 (3.1)		66 (2.6)		66 (3.1)		60 (3.1)		57 (3.5)
Romania		70 (3.7)		63 (3.9)		49 (3.9)		47 (4.2)		46 (4.1)		76 (3.2)
Russian Federation		68 (2.8)		69 (2.8)		65 (3.0)		73 (2.8)		43 (3.2)		46 (3.8)
Saudi Arabia		56 (4.4)		63 (3.9)		60 (4.1)		28 (3.6)		45 (4.0)		34 (4.3)
Singapore		67 (2.1)		79 (2.1)		55 (2.5)		68 (2.5)		48 (2.8)		58 (2.4)
Slovenia		62 (3.1)		59 (2.8)		46 (2.8)		68 (2.9)		34 (3.0)		38 (2.8)
Sweden	r	36 (3.8)	r	45 (3.9)	r	50 (3.5)	r	11 (2.4)	r	24 (3.4)	r	41 (3.6)
Syrian Arab Republic		27 (3.7)		41 (4.4)		32 (4.1)		35 (4.2)		45 (4.8)		35 (4.3)
Thailand		76 (3.6)		72 (3.4)		78 (3.4)		61 (3.9)		59 (3.6)		63 (3.5)
Tunisia		71 (3.8)		62 (3.7)		68 (3.8)		50 (3.5)		39 (3.0)		57 (4.1)
Turkey		30 (2.8)		41 (3.3)		31 (3.0)		29 (2.8)		31 (3.1)		26 (3.2)
Ukraine		77 (3.7)		85 (3.3)		83 (3.4)		80 (3.6)		59 (4.0)		73 (3.9)
United Arab Emirates		47 (2.7)		52 (2.7)		54 (2.6)		48 (2.8)		56 (2.4)		52 (2.6)
United States	r	73 (2.1)	r	73 (2.0)	r	78 (2.2)	r	68 (2.1)	r	61 (2.5)	r	61 (2.9)
International Avg.		55 (0.5)		58 (0.6)		52 (0.5)		48 (0.5)		43 (0.6)		47 (0.5)

( ) Standard errors appear in parentheses. Because of rounding some results 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 2011

Exhibit 7.8: Teacher Participation in Professional Development in Mathematics in the Past Two Years (Continued)

Country	Percent of Students by Teacher's Area of Professional Development											
	Mathematics Content		Mathematics Pedagogy / Instruction		Mathematics Curriculum		Integrating Information Technology into Mathematics		Improving Students' Critical Thinking or Problem Solving Skills		Mathematics Assessment	
Ninth Grade Participants												
Botswana		24 (3.7)		30 (4.3)		42 (4.3)		20 (3.4)		29 (4.2)		28 (4.2)
Honduras	r	65 (4.9)	r	49 (5.1)	r	44 (5.4)	r	26 (4.7)	r	40 (4.5)	r	44 (5.4)
South Africa		73 (3.4)		50 (3.8)		71 (3.7)		35 (3.4)		51 (3.6)		69 (3.7)
Benchmarking Participants												
Alberta, Canada		79 (3.5)		81 (3.4)		73 (3.8)		72 (3.4)		63 (4.1)		62 (4.1)
Ontario, Canada		64 (3.6)		71 (3.3)		52 (3.6)		48 (3.9)		70 (3.4)		52 (4.0)
Quebec, Canada		53 (4.3)		46 (4.2)		49 (4.0)		43 (4.0)		17 (2.8)		63 (3.9)
Abu Dhabi, UAE		48 (4.5)		53 (4.1)		58 (4.6)		45 (4.7)		57 (4.3)		55 (4.0)
Dubai, UAE		50 (4.8)		50 (4.6)		59 (4.3)		63 (4.7)		58 (4.2)		55 (4.7)
Alabama, US	r	75 (5.1)	r	73 (7.0)	r	69 (5.9)	r	86 (5.3)	r	66 (6.1)	r	50 (9.4)
California, US	s	69 (6.6)	s	75 (5.6)	s	69 (6.6)	s	53 (6.7)	s	49 (7.1)	s	60 (6.5)
Colorado, US	r	74 (6.9)	r	82 (5.5)	r	82 (5.5)	r	65 (6.8)	r	60 (6.4)	r	48 (7.1)
Connecticut, US		66 (6.2)		71 (4.8)		88 (3.6)		74 (5.4)		51 (5.5)		58 (5.9)
Florida, US	s	91 (4.7)	s	92 (3.8)	s	93 (4.0)	s	87 (5.2)	s	68 (7.5)	s	73 (5.8)
Indiana, US	r	77 (4.6)	r	70 (6.5)	r	86 (4.8)	r	70 (7.1)	r	51 (7.7)	r	51 (7.5)
Massachusetts, US		76 (6.6)	r	80 (4.7)		83 (5.0)		55 (6.2)		49 (6.3)		58 (5.7)
Minnesota, US	r	82 (4.4)	r	77 (6.4)	r	85 (4.7)	r	76 (6.8)	r	47 (6.0)	r	65 (5.7)
North Carolina, US	r	81 (5.5)	r	71 (7.0)	r	79 (6.5)	r	75 (5.4)	r	59 (6.9)	r	67 (7.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Teachers' Preparation to Teach the TIMSS Mathematics Topics

Although a sound knowledge of mathematics would seem to be a prerequisite for effective mathematics teaching, evidence directly linking teacher preparation in mathematics to the achievement of their students is scarce. A meta-analysis of the effects of teachers' subject matter preparation on their students' achievement in mathematics and science found some studies showing a positive effect, but in general results were mixed (Wilson, Floden, & Ferrini-Mundi, 2002). However, a study using a direct measure of teachers' mathematics content knowledge as a measure of teacher preparation found that teachers' mathematics content knowledge related to gains in students' mathematics achievement in primary school (Hill, Rowan, & Ball, 2005).

To provide information about how well prepared teachers feel they are to teach mathematics, TIMSS asks the teachers of the students participating in each assessment to indicate whether they felt very well prepared, somewhat prepared, or not well prepared to teach the mathematics content topics assessed by TIMSS.

Exhibit 7.9 presents reports of how teachers felt about their level of preparation to teach the mathematics topics in the fourth grade assessment. The 18 mathematics topics are shown on the second page of the exhibit, grouped by content domain (number, geometric shapes and measures, and data display). With participants listed in alphabetical order, the exhibit presents for each participant the percentage of students taught by teachers who felt

"very well" prepared to teach the TIMSS topics. The results are averaged across all 18 topics for a perspective on mathematics overall, as well as separately by content domain: eight topics in number, seven topics in geometric shapes and measures, and three topics in data display. Internationally across the fourth grade countries, 83 percent of students were taught by teachers who felt very well prepared to teach the TIMSS mathematics topics. Across the content domains, more students had teachers very well prepared to teach the number topics (87%) than the geometric shapes and measures topics (82%) or the data display topics (74%).

Exhibit 7.10 presents reports of teachers about their level of preparation to teach the 19 mathematics topics in the eighth grade assessment. Similar to the fourth grade, 84 percent of the eighth grade students, on average internationally, were taught by teachers who felt very well prepared to teach the TIMSS mathematics topics. Across the content domains, most students had teachers very well prepared to teach the number topics (92%), with relatively fewer well prepared in algebra (87%) and geometry (85%) topics. Only 62 percent of students, on average internationally, had teachers who felt very well prepared to teach the data and chance topics.

Exhibit 7.9: Teachers Feel "Very Well" Prepared to Teach TIMSS Mathematics Topics

TIMSS 2011 Mathematics 4th Grade

Reported by Teachers

Country	Percent of Students Whose Teachers Feel "Very Well" Prepared to Teach TIMSS Mathematics Topics			
	Overall Mathematics (18 Topics)	Number (8 Topics)	Geometric Shapes and Measures (7 Topics)	Data Display (3 Topics)
Armenia	84 (1.7)	90 (1.5)	81 (2.2)	72 (3.1)
Australia	r 90 (1.6)	r 90 (1.7)	r 90 (1.8)	r 92 (2.0)
Austria	– –	– –	– –	– –
Azerbaijan	67 (2.3)	75 (2.6)	72 (2.9)	36 (3.3)
Bahrain	83 (3.7)	87 (4.1)	82 (3.2)	78 (5.2)
Belgium (Flemish)	88 (1.1)	95 (0.8)	82 (1.7)	81 (2.6)
Chile	r 90 (1.6)	r 93 (1.5)	r 85 (2.0)	r 92 (2.2)
Chinese Taipei	86 (2.0)	89 (2.0)	85 (2.3)	81 (2.8)
Croatia	79 (1.3)	91 (1.6)	91 (1.5)	18 (2.1)
Czech Republic	87 (2.0)	91 (1.9)	87 (2.4)	75 (3.0)
Denmark	r 94 (0.9)	r 96 (0.8)	r 94 (1.1)	r 90 (2.0)
England	90 (1.5)	91 (1.6)	89 (1.9)	93 (1.8)
Finland	83 (1.7)	88 (1.6)	77 (2.1)	79 (2.2)
Georgia	89 (1.3)	94 (1.2)	87 (2.0)	77 (2.5)
Germany	76 (1.7)	78 (1.9)	74 (2.1)	73 (2.9)
Hong Kong SAR	77 (2.8)	77 (3.1)	75 (3.2)	83 (3.0)
Hungary	82 (2.0)	89 (1.8)	79 (2.3)	68 (3.2)
Iran, Islamic Rep. of	78 (1.4)	87 (1.6)	80 (1.6)	49 (3.4)
Ireland	88 (1.3)	92 (1.3)	83 (1.8)	86 (2.6)
Italy	69 (2.4)	76 (2.5)	66 (2.7)	60 (3.6)
Japan	54 (2.9)	61 (3.0)	55 (3.3)	38 (3.3)
Kazakhstan	– –	– –	– –	– –
Korea, Rep. of	73 (2.3)	77 (2.7)	75 (2.6)	58 (3.4)
Kuwait	95 (0.8)	98 (0.6)	94 (1.1)	90 (2.2)
Lithuania	91 (1.0)	93 (1.1)	89 (1.2)	92 (1.4)
Malta	91 (0.0)	93 (0.0)	89 (0.1)	91 (0.1)
Morocco	r 75 (2.0)	r 85 (1.9)	r 79 (2.2)	r 41 (4.1)
Netherlands	r 86 (1.8)	r 91 (1.5)	r 79 (3.1)	r 90 (2.2)
New Zealand	79 (1.4)	77 (1.6)	75 (1.8)	90 (1.7)
Northern Ireland	r 91 (1.7)	r 94 (1.8)	r 88 (2.0)	r 92 (2.4)
Norway	78 (2.6)	78 (2.9)	78 (2.8)	77 (3.3)
Oman	87 (1.3)	88 (1.3)	85 (1.6)	87 (2.0)
Poland	91 (0.9)	97 (0.9)	95 (1.1)	68 (2.9)
Portugal	92 (0.9)	92 (1.0)	91 (1.1)	93 (1.8)
Qatar	91 (1.6)	95 (1.3)	89 (1.9)	87 (3.6)
Romania	92 (1.3)	95 (1.3)	91 (1.6)	86 (2.0)
Russian Federation	– –	– –	– –	– –
Saudi Arabia	90 (1.4)	93 (1.4)	90 (1.9)	84 (2.7)
Serbia	80 (1.8)	85 (1.9)	85 (2.1)	54 (3.4)
Singapore	89 (1.2)	93 (1.3)	85 (1.5)	90 (1.6)
Slovak Republic	83 (1.1)	90 (1.2)	89 (1.4)	49 (2.8)
Slovenia	86 (1.2)	86 (1.5)	85 (1.3)	86 (1.9)
Spain	90 (1.6)	94 (1.5)	86 (2.1)	89 (2.2)
Sweden	r 81 (2.1)	r 87 (2.1)	r 74 (2.3)	r 79 (3.3)
Thailand	50 (3.0)	50 (3.1)	48 (3.4)	54 (3.2)
Tunisia	78 (1.9)	85 (2.1)	85 (2.1)	42 (3.5)
Turkey	82 (1.6)	85 (1.7)	77 (2.1)	88 (1.9)
United Arab Emirates	88 (0.9)	93 (0.9)	87 (1.2)	80 (1.7)
United States	r 93 (0.8)	r 95 (0.9)	r 90 (1.2)	r 93 (1.2)
Yemen	73 (2.1)	86 (2.1)	71 (3.2)	42 (3.6)
International Avg.	83 (0.3)	87 (0.3)	82 (0.3)	74 (0.4)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (–) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.9: Teachers Feel "Very Well" Prepared to Teach TIMSS Mathematics Topics (Continued)

Country	Percent of Students Whose Teachers Feel "Very Well" Prepared to Teach TIMSS Mathematics Topics			
	Overall Mathematics (18 Topics)	Number (8 Topics)	Geometric Shapes and Measures (7 Topics)	Data Display (3 Topics)
Sixth Grade Participants				
Botswana	90 (1.7)	93 (1.6)	r 86 (2.2)	92 (2.3)
Honduras	70 (2.8)	82 (2.7)	62 (3.4)	55 (4.3)
Yemen	82 (2.0)	91 (1.5)	76 (3.1)	73 (3.7)
Benchmarking Participants				
Alberta, Canada	r 88 (1.9)	r 91 (1.9)	r 84 (2.8)	r 91 (2.4)
Ontario, Canada	91 (1.5)	89 (1.5)	89 (1.7)	96 (1.4)
Quebec, Canada	90 (1.5)	90 (1.6)	90 (1.8)	91 (2.2)
Abu Dhabi, UAE	89 (1.5)	94 (1.4)	89 (2.2)	78 (3.5)
Dubai, UAE	92 (1.2)	95 (1.1)	r 91 (1.6)	r 87 (1.8)
Florida, US	r 92 (1.7)	r 96 (1.7)	r 92 (1.9)	r 79 (3.9)
North Carolina, US	92 (1.6)	93 (1.6)	90 (2.1)	95 (1.9)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS 2011 Mathematics Topics

A. Number

1) Concepts of whole numbers, including place value and ordering
2) Adding, subtracting, multiplying, and/or dividing with whole numbers
3) Concepts of fractions
4) Adding and subtracting with fractions
5) Concepts of decimals, including place value and ordering
6) Adding and subtracting with decimals
7) Number sentences
8) Number patterns

B. Geometric Shapes and Measures

1) Lines: measuring, estimating length of; parallel and perpendicular lines
2) Comparing and drawing angles
3) Using informal coordinate systems to locate points in a plane
4) Elementary properties of common geometric shapes
5) Reflections and rotations
6) Relationships between two-dimensional and three-dimensional shapes
7) Finding and estimating areas, perimeters, and volumes

C. Data Display

1) Reading data from tables, pictographs, bar graphs, or pie charts
2) Drawing conclusions from data displays
3) Displaying data using tables, pictographs, and bar graphs

Exhibit 7.10: Teachers Feel "Very Well" Prepared to Teach TIMSS Mathematics Topics

TIMSS 2011 Mathematics 8th Grade

Reported by Teachers

Country	Percent of Students Whose Teachers Feel "Very Well" Prepared to Teach TIMSS Mathematics Topics									
	Overall Mathematics (19 Topics)		Number (5 Topics)		Algebra (5 Topics)		Geometry (6 Topics)		Data and Chance (3 Topics)	
Armenia		93 (0.8)		98 (0.7)		98 (0.5)		95 (1.0)		72 (2.7)
Australia	r	91 (1.6)	r	93 (1.7)	r	92 (1.6)	r	91 (1.8)	r	86 (2.6)
Bahrain		88 (1.0)		93 (1.0)		91 (0.9)		88 (1.1)		74 (2.7)
Chile		84 (2.1)		94 (2.0)		79 (2.6)		83 (2.4)		77 (3.2)
Chinese Taipei		72 (1.9)		90 (2.2)		84 (2.7)		80 (2.5)		8 (2.3)
England		94 (1.4)		97 (1.3)		94 (1.7)		94 (1.5)		92 (2.0)
Finland		84 (1.0)		95 (0.8)		94 (1.0)		90 (1.6)		33 (3.2)
Georgia		94 (0.9)		99 (0.7)		97 (0.9)		95 (1.0)		76 (2.8)
Ghana		87 (1.6)		95 (1.2)		89 (1.8)		84 (2.4)		75 (2.5)
Hong Kong SAR		82 (1.9)		91 (1.9)		87 (2.2)		84 (2.4)		52 (3.9)
Hungary		86 (1.6)		94 (1.6)		88 (1.7)		89 (1.7)		64 (2.5)
Indonesia		54 (2.6)		63 (4.2)		66 (4.1)		59 (3.2)		10 (2.3)
Iran, Islamic Rep. of		82 (1.1)		93 (1.1)		87 (1.2)		86 (1.7)		47 (2.3)
Israel		93 (0.8)		95 (1.0)		96 (0.9)		91 (1.0)		90 (1.3)
Italy		64 (2.8)		73 (3.3)		61 (3.0)		68 (3.0)		48 (3.2)
Japan		67 (2.7)		79 (3.3)		69 (3.3)		74 (3.3)		32 (2.9)
Jordan		84 (1.6)		92 (1.8)		92 (1.6)		87 (1.9)		51 (3.6)
Kazakhstan		– –		– –		– –		– –		– –
Korea, Rep. of		79 (1.3)		88 (1.4)		86 (1.5)		82 (1.9)		46 (2.0)
Lebanon		81 (1.9)		91 (1.7)		89 (2.1)		79 (2.3)		53 (3.6)
Lithuania		93 (0.7)		99 (0.6)		97 (0.8)		95 (1.0)		72 (2.2)
Macedonia, Rep. of	r	93 (1.1)	r	98 (1.1)	s	97 (1.2)	r	96 (1.0)	r	74 (3.1)
Malaysia		83 (1.7)		93 (1.5)		85 (2.2)		85 (2.2)		60 (2.4)
Morocco		75 (1.7)		88 (1.8)		78 (2.3)		78 (2.4)		44 (2.5)
New Zealand		89 (1.4)		92 (1.7)		90 (1.8)		88 (1.6)		84 (1.7)
Norway		85 (1.9)		91 (2.2)		85 (2.4)		86 (2.0)		71 (2.9)
Oman		87 (1.0)		96 (0.6)		91 (1.4)		88 (1.2)		64 (2.6)
Palestinian Nat'l Auth.		86 (1.6)		91 (1.7)		85 (2.0)		86 (2.1)		77 (2.7)
Qatar		96 (0.6)		99 (0.5)		97 (0.7)		96 (0.8)		87 (1.4)
Romania		94 (0.7)		99 (0.5)		96 (0.9)		96 (0.9)		76 (2.6)
Russian Federation		– –		– –		– –		– –		– –
Saudi Arabia		88 (1.1)		92 (1.1)		91 (1.2)		89 (1.4)		75 (3.1)
Singapore		86 (1.1)		96 (1.0)		90 (1.4)		85 (1.5)		66 (1.9)
Slovenia		88 (0.8)		97 (0.8)		92 (1.1)		95 (1.0)		56 (2.1)
Sweden	r	87 (1.2)	r	96 (1.0)	r	89 (1.9)	r	85 (1.6)	r	73 (2.6)
Syrian Arab Republic		79 (1.9)		86 (2.2)		84 (2.5)		80 (2.6)		59 (3.5)
Thailand		55 (2.5)		73 (2.5)		45 (3.7)		59 (3.1)		37 (3.8)
Tunisia		78 (1.7)		90 (1.6)		75 (2.5)		82 (1.9)		54 (3.1)
Turkey		85 (1.5)		94 (1.4)		86 (2.0)		83 (1.9)		72 (2.3)
Ukraine		72 (2.7)		86 (3.0)		80 (3.2)		78 (3.3)		22 (2.7)
United Arab Emirates		90 (0.7)		96 (0.6)		93 (0.9)		91 (0.9)		73 (1.6)
United States	r	94 (0.6)	r	98 (0.4)	r	96 (0.7)	r	93 (0.9)	r	83 (1.6)
International Avg.		84 (0.3)		92 (0.3)		87 (0.3)		85 (0.3)		62 (0.4)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (–) indicates comparable data 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.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.10: Teachers Feel "Very Well" Prepared to Teach TIMSS Mathematics Topics (Continued)

Country	Percent of Students Whose Teachers Feel "Very Well" Prepared to Teach TIMSS Mathematics Topics									
	Overall Mathematics (19 Topics)		Number (5 Topics)		Algebra (5 Topics)		Geometry (6 Topics)		Data and Chance (3 Topics)	
Ninth Grade Participants										
Botswana		86 (1.6)		93 (1.8)		89 (2.1)		89 (2.0)		65 (2.9)
Honduras	r	82 (2.0)	r	95 (1.7)	r	88 (2.5)	r	78 (3.0)	r	58 (3.8)
South Africa		88 (1.3)		93 (1.6)		92 (1.5)		85 (1.9)		80 (2.2)
Benchmarking Participants										
Alberta, Canada		92 (1.9)		95 (1.8)		93 (2.1)		90 (2.3)		91 (2.0)
Ontario, Canada		85 (1.8)		92 (1.5)		83 (2.5)		84 (2.0)		83 (2.5)
Quebec, Canada		90 (1.2)		97 (1.1)		93 (1.4)		94 (1.3)		69 (3.0)
Abu Dhabi, UAE		89 (1.8)		96 (1.3)		92 (2.2)		90 (2.3)		73 (3.0)
Dubai, UAE		92 (0.7)		98 (0.5)		96 (0.5)		95 (1.7)		70 (1.7)
Alabama, US	r	92 (1.4)	r	94 (1.8)	r	94 (1.6)	r	93 (1.5)	r	87 (3.4)
California, US	s	88 (2.2)	s	97 (1.8)	s	94 (3.0)	s	87 (4.0)	s	66 (5.0)
Colorado, US	r	88 (2.6)	r	93 (2.1)	r	91 (2.6)	r	84 (3.3)	r	80 (4.2)
Connecticut, US		96 (0.9)		100 (0.2)		97 (0.8)		97 (1.0)		89 (3.6)
Florida, US	s	97 (0.8)	s	100 (0.3)	s	99 (0.7)	s	98 (1.0)	s	88 (3.1)
Indiana, US	r	93 (2.0)	r	97 (1.5)	r	96 (1.4)	r	92 (2.7)	r	83 (4.5)
Massachusetts, US		97 (0.7)		99 (0.7)		99 (0.7)		98 (1.2)		92 (2.4)
Minnesota, US	r	91 (2.0)	r	97 (1.5)	r	96 (1.7)	r	90 (3.1)	r	74 (5.1)
North Carolina, US	r	95 (1.4)	r	98 (1.3)	r	98 (1.2)	r	95 (2.0)	r	83 (3.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS 2011 Mathematics Topics

A. Number

1) Computing, estimating, or approximating with whole numbers
2) Concepts of fractions and computing with fractions
3) Concepts of decimals and computing with decimals
4) Representing, comparing, ordering, and computing with integers
5) Problem solving involving percents and proportions

B. Algebra

1) Numeric, algebraic, and geometric patterns or sequences
2) Simplifying and evaluating algebraic expressions
3) Simple linear equations and inequalities
4) Simultaneous (two variables) equations
5) Representation of functions as ordered pairs, tables, graphs, words, or equations

C. Geometry

1) Geometric properties of angles and geometric shapes
2) Congruent figures and similar triangles
3) Relationship between three-dimensional shapes and their two-dimensional representations
4) Using appropriate measurement formulas for perimeters, circumferences, areas, surface areas, and volumes
5) Points on the Cartesian plane
6) Translation, reflection, and rotation

D. Data and Chance

1) Reading and displaying data using tables, pictographs, bar graphs, pie charts, and line graphs
2) Interpreting data sets
3) Judging, predicting, and determining the chances of possible outcomes

Teachers' Confidence in Teaching Mathematics

Teachers with a strong sense of personal ability to organize and execute their teaching are more open to new ideas and less likely to experience emotional burnout. Research has shown that teachers' self-confidence in their teaching skills is not only associated with their professional behavior, but also with students' performance and motivation (Bandura, 1997; Henson, 2002).

To investigate teachers' confidence in teaching mathematics to the TIMSS class, teachers were asked to indicate how confident they feel about doing each of the following:

- Answer students' questions about mathematics;
- Show students a variety of problem solving strategies;
- Provide challenging tasks for capable students;
- Adapt my teaching to engage students' interest; and
- Help students appreciate the value of learning mathematics.

Exhibit 7.11 shows the fourth grade TIMSS assessment results for the Confidence in Teaching Mathematics scale. Students were scored according to their teachers' responses with **Very Confident** teachers being "very confident" in using three of the five instructional strategies and "somewhat confident" in using the other two, on average. All other teachers were considered to be **Somewhat Confident**. On average internationally, the majority of fourth grade students (75%) had teachers **Very Confident** in teaching mathematics to the class, and their mathematics achievement was somewhat higher on average than the 25 percent of students whose teachers were only **Somewhat Confident** (492 vs. 487). Across countries, the percentage of students taught by **Very Confident** teachers varied widely, from 21 to 99 percent.

Exhibit 7.12 provides further information about the components of the Confidence in Teaching Mathematics scale, by showing the percentage of students whose teachers reported feeling very confident in using each of the five instructional strategies. On average across countries at the fourth grade, teachers were most often very confident about answering student questions about mathematics (84% of students taught by such teachers) and showing students a variety of problem solving strategies (75%), and less often very confident about helping students appreciate the value of learning mathematics (69%), adapting teaching to engage student interests (65%), and providing challenging tasks for capable students (59%).

Exhibit 7.13 shows results for the Confidence in Teaching Mathematics scale for the eighth grade TIMSS assessment. On average, the results were very similar to the fourth grade, although the achievement difference between students with **Very Confident** teachers and **Somewhat Confident** teachers was slightly larger (14 points vs. 5 points). Again, the percentage of students taught by **Very Confident** teachers varied widely, from 36 to 99 percent. Also, as shown in Exhibit 7.14, the components of the Confidence in Teaching Mathematics scale at the eighth grade followed a similar pattern in terms of teacher confidence as at the fourth grade, with teachers most often very confident about answering student questions about mathematics (87% of students taught by such teachers) and showing students a variety of problem solving strategies (77%) and less often very confident about the other components.

Exhibit 7.11: Confidence in Teaching Mathematics

TIMSS 2011 Mathematics 4th Grade

Reported by Teachers

Students were scored according to their teachers' responses to how confident they felt in using five instructional strategies on the *Confidence in Teaching Mathematics* scale. Students with **Very Confident** teachers had a score on the scale of at least 9.2, which corresponds to their teachers being "very confident" in using three of the five instructional strategies and "somewhat confident" in using the other two, on average. All other students had **Somewhat Confident** teachers.

Country	Very Confident		Somewhat Confident		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Romania	99 (0.5)	481 (5.9)	1 (0.5)	~ ~	11.6 (0.05)
Kazakhstan	99 (0.8)	503 (4.4)	1 (0.8)	~ ~	11.7 (0.07)
Russian Federation	97 (1.2)	542 (3.7)	3 (1.2)	542 (22.1)	11.4 (0.06)
Georgia	95 (1.6)	450 (3.9)	5 (1.6)	483 (22.9)	11.0 (0.10)
Portugal	92 (2.3)	533 (3.9)	8 (2.3)	526 (6.5)	11.2 (0.12)
Azerbaijan	91 (2.2)	463 (6.4)	9 (2.2)	476 (13.2)	10.8 (0.11)
Poland	90 (2.1)	482 (2.1)	10 (2.1)	473 (8.4)	10.7 (0.10)
Serbia	89 (2.6)	517 (3.3)	11 (2.6)	507 (10.4)	10.8 (0.13)
Chile r	89 (2.5)	463 (3.4)	11 (2.5)	446 (13.1)	10.9 (0.14)
United Arab Emirates	89 (1.4)	439 (2.2)	11 (1.4)	412 (9.8)	10.6 (0.07)
Croatia	88 (2.1)	489 (2.1)	12 (2.1)	501 (5.0)	10.5 (0.10)
Armenia	87 (2.2)	455 (3.9)	13 (2.2)	430 (8.1)	10.4 (0.12)
Lithuania	87 (2.5)	536 (2.5)	13 (2.5)	517 (9.6)	10.8 (0.14)
Qatar	85 (2.6)	418 (4.2)	15 (2.6)	379 (14.6)	10.5 (0.12)
United States r	84 (1.8)	543 (2.2)	16 (1.8)	539 (5.9)	10.6 (0.09)
Spain	84 (3.1)	484 (3.4)	16 (3.1)	475 (6.1)	10.6 (0.12)
Malta	84 (0.1)	496 (1.5)	16 (0.1)	497 (3.3)	10.5 (0.00)
Hungary	83 (2.7)	515 (4.2)	17 (2.7)	512 (9.2)	10.5 (0.14)
Norway	82 (3.5)	496 (3.3)	18 (3.5)	487 (5.0)	10.3 (0.15)
Oman	81 (2.6)	390 (3.1)	19 (2.6)	364 (7.7)	10.3 (0.10)
Saudi Arabia	80 (3.6)	409 (6.4)	20 (3.6)	408 (9.5)	10.1 (0.15)
Netherlands r	79 (3.4)	539 (2.3)	21 (3.4)	539 (4.1)	9.9 (0.14)
Slovenia	78 (2.8)	514 (2.1)	22 (2.8)	509 (6.1)	10.0 (0.12)
Northern Ireland r	78 (3.6)	562 (3.4)	22 (3.6)	565 (8.5)	10.3 (0.16)
Australia r	76 (3.0)	524 (4.0)	24 (3.0)	509 (6.0)	10.2 (0.14)
Bahrain	76 (3.1)	441 (4.1)	24 (3.1)	423 (4.1)	10.0 (0.16)
Belgium (Flemish)	74 (3.0)	550 (2.1)	26 (3.0)	548 (4.0)	9.9 (0.14)
Ireland	74 (3.2)	529 (2.9)	26 (3.2)	523 (6.5)	10.0 (0.14)
England	73 (4.3)	546 (4.3)	27 (4.3)	540 (7.5)	10.0 (0.16)
Slovak Republic	72 (3.1)	509 (4.3)	28 (3.1)	501 (6.5)	9.7 (0.14)
Austria	72 (2.7)	506 (2.7)	28 (2.7)	514 (4.8)	9.8 (0.11)
Kuwait	72 (3.9)	341 (4.5)	28 (3.9)	344 (6.6)	9.8 (0.14)
Singapore	71 (2.3)	605 (4.1)	29 (2.3)	608 (5.2)	10.0 (0.11)
Chinese Taipei	71 (3.4)	593 (2.3)	29 (3.4)	587 (4.8)	9.7 (0.15)
Tunisia	71 (4.1)	362 (4.5)	29 (4.1)	353 (6.9)	9.5 (0.18)
Sweden r	71 (4.4)	506 (3.0)	29 (4.4)	505 (4.9)	10.0 (0.16)
Denmark r	70 (3.9)	540 (3.1)	30 (3.9)	540 (5.1)	9.9 (0.15)
Turkey	66 (2.9)	474 (6.3)	34 (2.9)	460 (8.1)	9.6 (0.13)
Yemen	64 (4.4)	247 (7.8)	36 (4.4)	252 (9.5)	9.4 (0.16)
Czech Republic	63 (3.7)	511 (3.4)	37 (3.7)	511 (4.0)	9.3 (0.16)
New Zealand	63 (3.0)	485 (3.9)	37 (3.0)	486 (3.7)	9.5 (0.13)
Morocco r	62 (4.5)	339 (5.6)	38 (4.5)	337 (9.3)	9.3 (0.16)
Finland	62 (3.3)	549 (2.6)	38 (3.3)	542 (3.2)	9.2 (0.14)
Germany	61 (3.1)	529 (2.9)	39 (3.1)	527 (3.7)	9.2 (0.15)
Iran, Islamic Rep. of	57 (3.8)	436 (4.4)	43 (3.8)	423 (5.8)	9.0 (0.13)
Korea, Rep. of	48 (4.3)	606 (2.7)	52 (4.3)	603 (2.9)	8.6 (0.18)
Hong Kong SAR	48 (4.6)	598 (6.5)	52 (4.6)	606 (3.9)	8.7 (0.18)
Thailand	47 (4.6)	467 (6.8)	53 (4.6)	450 (6.9)	8.3 (0.18)
Italy	45 (3.5)	511 (4.3)	55 (3.5)	508 (3.1)	8.4 (0.17)
Japan	21 (2.9)	584 (3.7)	79 (2.9)	586 (1.9)	7.3 (0.14)
International Avg.	75 (0.4)	492 (0.6)	25 (0.4)	487 (1.2)	

Centerpoint of scale set at 10.

( ) Standard errors appear in parentheses. Because of rounding some results 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.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.11: Confidence in Teaching Mathematics (Continued)

Country	Very Confident		Somewhat Confident		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants					
Honduras	94 (1.9)	395 (6.2)	6 (1.9)	393 (14.2)	11.2 (0.11)
Botswana r	85 (3.2)	419 (4.5)	15 (3.2)	420 (9.0)	10.6 (0.15)
Yemen	60 (4.4)	343 (7.2)	40 (4.4)	355 (9.2)	9.3 (0.15)
Benchmarking Participants					
Dubai, UAE	95 (1.4)	474 (2.6)	5 (1.4)	448 (20.8)	11.1 (0.08)
Abu Dhabi, UAE	90 (2.5)	421 (4.8)	10 (2.5)	408 (18.7)	10.6 (0.15)
Florida, US r	85 (3.3)	543 (4.1)	15 (3.3)	551 (9.4)	10.8 (0.16)
North Carolina, US	81 (4.7)	555 (4.7)	19 (4.7)	547 (9.5)	10.2 (0.18)
Alberta, Canada r	79 (3.7)	509 (2.9)	21 (3.7)	497 (7.6)	10.2 (0.18)
Quebec, Canada	78 (3.5)	532 (2.8)	22 (3.5)	535 (4.6)	10.1 (0.17)
Ontario, Canada	74 (3.4)	520 (3.5)	26 (3.4)	516 (4.8)	10.1 (0.15)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

In teaching mathematics to this class, how confident do you feel to do the following?

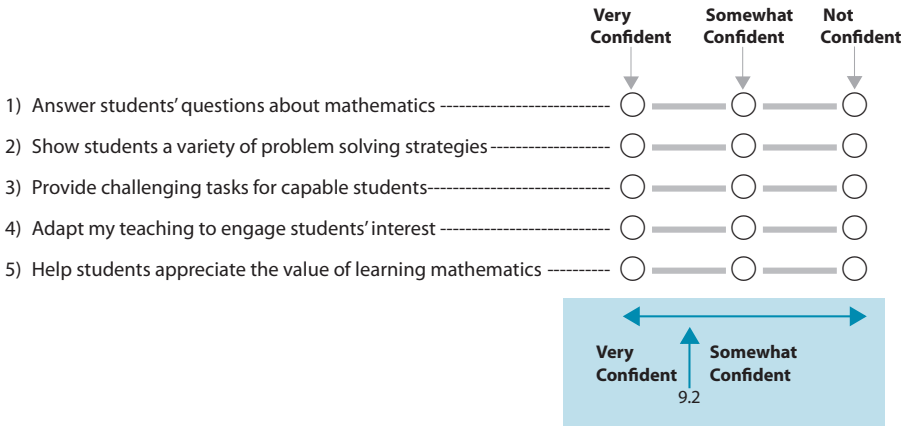

Exhibit 7.12: Components of Confidence in Teaching Mathematics Scale

TIMSS 2011 Mathematics 4th Grade

Reported by Teachers

Country	Percent of Students Whose Teachers Feel Very Confident to									
	Answer Student Questions About Mathematics		Show Students a Variety of Problem Solving Strategies		Provide Challenging Tasks for Capable Students		Adapt Teaching to Engage Student Interests		Help Students Appreciate the Value of Learning Mathematics	
Armenia		88 (2.6)		91 (2.0)		68 (3.2)		66 (3.7)		77 (3.4)
Australia	r	86 (2.1)	r	83 (2.3)	r	67 (3.7)	r	63 (4.1)	r	65 (3.8)
Austria		90 (2.1)		80 (2.5)		58 (3.4)		48 (3.4)		59 (3.4)
Azerbaijan		96 (1.6)		76 (3.1)		76 (3.6)		80 (2.4)		89 (2.4)
Bahrain		76 (3.5)		67 (3.4)		65 (4.1)		71 (3.6)		75 (3.8)
Belgium (Flemish)		90 (2.0)		79 (3.1)		45 (3.8)		66 (3.6)		63 (3.8)
Chile	r	92 (2.4)	r	80 (3.2)	r	80 (3.4)	r	81 (3.2)	r	88 (2.8)
Chinese Taipei		87 (2.7)		79 (3.2)		57 (3.9)		57 (3.8)		46 (3.8)
Croatia		89 (2.0)		76 (3.2)		65 (3.1)		81 (2.4)		86 (2.5)
Czech Republic		74 (3.9)		71 (3.1)		52 (3.9)		42 (3.8)		58 (4.0)
Denmark	r	93 (2.2)	r	80 (3.2)	r	52 (4.3)	r	55 (4.1)	r	61 (4.3)
England		85 (3.3)		76 (3.8)		59 (4.5)		70 (3.9)		65 (4.0)
Finland		77 (3.0)		66 (3.0)		46 (3.7)		44 (3.3)		55 (3.6)
Georgia		89 (2.2)		92 (2.1)		73 (3.4)		81 (2.9)		95 (1.6)
Germany		82 (2.5)		67 (3.5)		51 (3.5)		41 (3.4)		48 (3.5)
Hong Kong SAR		79 (3.4)		62 (4.2)		37 (4.3)		38 (4.3)		31 (4.2)
Hungary		88 (2.4)		82 (2.8)		69 (3.3)		75 (3.5)		76 (2.9)
Iran, Islamic Rep. of		67 (3.3)		45 (3.9)		36 (3.6)		57 (3.3)		68 (3.9)
Ireland		92 (2.1)		70 (3.1)		63 (4.0)		63 (3.2)		61 (3.6)
Italy		42 (3.6)		52 (3.1)		32 (3.2)		48 (4.0)		51 (3.5)
Japan		50 (4.2)		31 (3.2)		14 (2.6)		19 (2.8)		22 (3.0)
Kazakhstan		98 (1.1)		99 (0.9)		97 (1.3)		92 (2.3)		98 (1.1)
Korea, Rep. of		73 (3.6)		46 (4.1)		34 (4.2)		44 (4.3)		42 (4.2)
Kuwait		75 (3.6)		63 (4.0)		50 (3.7)		74 (3.7)		77 (3.5)
Lithuania		90 (2.4)		90 (2.5)		76 (3.4)		77 (3.3)		83 (2.3)
Malta		93 (0.1)		85 (0.1)		63 (0.1)		78 (0.1)		75 (0.1)
Morocco	r	60 (3.8)	r	61 (3.8)	r	42 (4.3)	r	61 (4.0)	r	71 (3.9)
Netherlands	r	92 (2.7)	r	86 (3.3)	r	42 (4.8)	r	57 (3.9)	r	73 (3.9)
New Zealand		77 (2.9)		71 (2.9)		51 (3.3)		56 (3.2)		58 (3.1)
Northern Ireland	r	89 (2.9)	r	80 (4.0)	r	70 (4.3)	r	72 (4.1)	r	69 (4.2)
Norway		97 (1.3)		89 (2.6)		63 (4.2)		56 (4.3)		75 (4.4)
Oman		89 (2.3)		76 (2.5)		66 (2.8)		71 (2.6)		75 (2.6)
Poland		94 (1.9)		90 (1.8)		65 (3.5)		70 (3.4)		89 (2.2)
Portugal		96 (1.6)		93 (1.9)		81 (2.9)		87 (2.9)		84 (2.9)
Qatar		84 (1.8)		81 (2.5)		65 (3.6)		84 (2.7)		77 (3.5)
Romania		100 (0.0)		95 (1.4)		96 (1.4)		95 (1.6)		94 (1.6)
Russian Federation		98 (1.0)		98 (0.9)		89 (2.2)		83 (2.4)		97 (1.2)
Saudi Arabia		81 (3.4)		77 (3.6)		57 (4.3)		74 (3.7)		73 (3.8)
Serbia		90 (2.3)		87 (2.8)		77 (3.3)		78 (3.2)		86 (2.9)
Singapore		89 (1.6)		78 (2.1)		64 (2.6)		61 (2.8)		55 (2.9)
Slovak Republic		83 (2.5)		71 (2.9)		61 (3.4)		65 (3.3)		54 (3.5)
Slovenia		87 (2.6)		72 (3.0)		52 (3.4)		68 (3.0)		73 (3.3)
Spain		98 (0.8)		87 (2.4)		68 (3.3)		71 (3.6)		79 (3.5)
Sweden	r	92 (2.3)	r	86 (3.0)	r	59 (4.6)	r	54 (4.4)	r	63 (4.2)
Thailand		62 (4.4)		54 (4.3)		31 (4.4)		36 (4.1)		39 (4.4)
Tunisia		71 (4.0)		68 (4.2)		44 (4.5)		68 (4.3)		67 (3.8)
Turkey		64 (2.9)		59 (3.3)		58 (3.2)		73 (2.4)		64 (3.0)
United Arab Emirates		88 (1.5)		79 (2.0)		69 (2.6)		83 (1.6)		85 (1.6)
United States	r	93 (1.2)	r	83 (2.0)	r	69 (2.9)	r	74 (2.0)	r	78 (2.2)
Yemen		76 (3.3)		64 (4.2)		44 (4.3)		56 (4.5)		71 (3.7)
International Avg.		84 (0.4)		75 (0.4)		59 (0.5)		65 (0.5)		69 (0.5)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.12: Components of Confidence in Teaching Mathematics Scale (Continued)

Country	Percent of Students Whose Teachers Feel Very Confident to				
	Answer Student Questions About Mathematics	Show Students a Variety of Problem Solving Strategies	Provide Challenging Tasks for Capable Students	Adapt Teaching to Engage Student Interests	Help Students Appreciate the Value of Learning Mathematics
Sixth Grade Participants					
Botswana	r 89 (3.1)	r 81 (3.7)	r 72 (3.9)	r 74 (4.0)	r 87 (3.1)
Honduras	90 (2.5)	90 (2.4)	84 (3.4)	88 (3.0)	98 (1.2)
Yemen	74 (3.6)	64 (4.2)	39 (4.4)	48 (4.5)	69 (4.1)
Benchmarking Participants					
Alberta, Canada	r 88 (2.7)	r 80 (3.5)	r 60 (4.4)	r 70 (3.9)	r 71 (4.3)
Ontario, Canada	88 (2.4)	80 (2.9)	58 (3.5)	66 (3.5)	67 (3.3)
Quebec, Canada	87 (3.0)	78 (3.6)	61 (3.9)	61 (4.3)	73 (3.8)
Abu Dhabi, UAE	88 (3.0)	83 (3.2)	69 (4.1)	83 (3.3)	84 (3.5)
Dubai, UAE	94 (1.9)	88 (1.9)	79 (2.4)	89 (1.8)	91 (1.4)
Florida, US	r 93 (2.2)	r 88 (3.1)	r 74 (4.2)	s 78 (4.3)	r 81 (4.1)
North Carolina, US	89 (2.3)	85 (4.9)	r 59 (5.4)	68 (5.6)	71 (4.2)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Exhibit 7.13: Confidence in Teaching Mathematics

TIMSS 2011 Mathematics 8th Grade

Reported by Teachers

Students were scored according to their teachers' responses to how confident they felt in using five instructional strategies on the *Confidence in Teaching Mathematics* scale. Students with **Very Confident** teachers had a score on the scale of at least 9.2, which corresponds to their teachers being "very confident" in using three of the five instructional strategies and "somewhat confident" in using the other two, on average. All other students had **Somewhat Confident** teachers.

Country	Very Confident		Somewhat Confident		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Kazakhstan	99 (0.8)	487 (4.1)	1 (0.8)	~ ~	11.5 (0.07)
Ukraine	99 (0.7)	479 (3.8)	1 (0.7)	~ ~	11.4 (0.10)
Russian Federation	97 (1.0)	540 (3.7)	3 (1.0)	514 (16.6)	11.4 (0.07)
Lithuania	96 (1.4)	503 (2.8)	4 (1.4)	497 (12.8)	11.1 (0.09)
Macedonia, Rep. of r	95 (1.7)	427 (6.6)	5 (1.7)	385 (25.5)	11.1 (0.11)
Romania	95 (1.9)	461 (4.0)	5 (1.9)	411 (25.1)	11.2 (0.11)
Chile	95 (1.8)	418 (3.0)	5 (1.8)	405 (11.4)	11.0 (0.10)
Ghana	93 (2.1)	329 (4.5)	7 (2.1)	358 (20.0)	11.2 (0.11)
Slovenia	92 (1.5)	505 (2.3)	8 (1.5)	509 (6.1)	10.7 (0.08)
Indonesia	90 (2.5)	387 (4.6)	10 (2.5)	377 (14.8)	10.7 (0.14)
United States r	86 (2.0)	514 (3.7)	14 (2.0)	503 (6.7)	10.6 (0.09)
Israel	86 (1.9)	523 (4.5)	14 (1.9)	496 (10.8)	10.9 (0.09)
Qatar	85 (2.9)	419 (4.7)	15 (2.9)	358 (13.6)	10.6 (0.14)
England	84 (3.2)	509 (5.9)	16 (3.2)	489 (14.9)	10.5 (0.15)
Georgia	83 (3.1)	431 (4.7)	17 (3.1)	429 (9.4)	10.3 (0.13)
Armenia	81 (3.1)	471 (3.3)	19 (3.1)	444 (8.5)	10.2 (0.13)
United Arab Emirates	81 (1.7)	463 (2.5)	19 (1.7)	423 (4.2)	10.4 (0.08)
Oman	81 (2.4)	370 (2.9)	19 (2.4)	349 (7.7)	10.1 (0.11)
Lebanon	80 (3.5)	455 (4.3)	20 (3.5)	433 (8.4)	10.2 (0.14)
Australia r	78 (3.4)	507 (5.8)	22 (3.4)	513 (11.3)	10.2 (0.15)
Hungary	78 (3.0)	505 (3.8)	22 (3.0)	501 (7.5)	10.1 (0.12)
Sweden r	78 (2.7)	486 (2.5)	22 (2.7)	487 (4.0)	10.0 (0.11)
Malaysia	77 (3.2)	446 (6.1)	23 (3.2)	422 (11.8)	10.1 (0.17)
Norway	76 (3.9)	474 (2.8)	24 (3.9)	481 (4.0)	9.9 (0.15)
Saudi Arabia	73 (3.3)	402 (5.6)	27 (3.3)	376 (6.3)	9.9 (0.15)
New Zealand	73 (2.5)	489 (5.8)	27 (2.5)	489 (13.5)	10.0 (0.10)
Bahrain	73 (2.6)	421 (2.5)	27 (2.6)	388 (4.2)	9.9 (0.11)
Chinese Taipei	69 (3.5)	615 (4.6)	31 (3.5)	597 (6.5)	9.4 (0.15)
Palestinian Nat'l Auth.	69 (4.0)	409 (4.7)	31 (4.0)	394 (7.4)	9.5 (0.17)
Finland	69 (3.4)	514 (3.1)	31 (3.4)	514 (3.2)	9.6 (0.13)
Syrian Arab Republic	67 (4.1)	380 (5.4)	33 (4.1)	376 (8.2)	9.4 (0.18)
Morocco	66 (3.1)	375 (2.7)	34 (3.1)	365 (3.8)	9.4 (0.14)
Jordan	66 (3.4)	408 (4.5)	34 (3.4)	401 (6.0)	9.2 (0.14)
Turkey	65 (3.3)	461 (4.9)	35 (3.3)	436 (5.6)	9.3 (0.15)
Tunisia	61 (4.1)	422 (3.4)	39 (4.1)	428 (5.0)	9.3 (0.17)
Singapore	59 (2.8)	603 (5.5)	41 (2.8)	623 (5.2)	9.1 (0.12)
Hong Kong SAR	56 (4.7)	583 (6.6)	44 (4.7)	590 (8.2)	8.9 (0.17)
Iran, Islamic Rep. of	55 (3.3)	421 (7.0)	45 (3.3)	407 (6.5)	8.9 (0.14)
Italy	51 (3.7)	501 (3.6)	49 (3.7)	498 (4.1)	8.4 (0.17)
Korea, Rep. of	50 (3.3)	613 (4.2)	50 (3.3)	613 (4.4)	8.6 (0.15)
Thailand	39 (4.1)	445 (8.3)	61 (4.1)	415 (6.0)	8.4 (0.17)
Japan	36 (3.9)	577 (5.5)	64 (3.9)	566 (3.7)	8.0 (0.17)
International Avg.	76 (0.5)	470 (0.7)	24 (0.5)	456 (1.7)	

Centerpoint of scale set at 10.

( ) Standard errors appear in parentheses. Because of rounding some results 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 2011

Exhibit 7.13: Confidence in Teaching Mathematics (Continued)

Country		Very Confident		Somewhat Confident		Average Scale Score
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants						
Honduras	r	97 (1.6)	337 (4.5)	3 (1.6)	361 (30.0)	11.1 (0.11)
Botswana		89 (2.8)	399 (2.8)	11 (2.8)	377 (7.4)	10.6 (0.15)
South Africa		89 (2.7)	354 (3.3)	11 (2.7)	336 (11.0)	10.8 (0.15)
Benchmarking Participants						
North Carolina, US	r	92 (4.2)	538 (6.4)	8 (4.2)	539 (38.4)	10.9 (0.21)
Florida, US	r	92 (3.1)	521 (7.7)	8 (3.1)	484 (15.1)	10.9 (0.16)
Massachusetts, US	r	92 (4.0)	558 (6.6)	8 (4.0)	584 (13.0)	10.8 (0.19)
California, US	s	89 (3.4)	497 (6.9)	11 (3.4)	472 (15.1)	10.4 (0.19)
Minnesota, US	r	87 (4.6)	549 (5.3)	13 (4.6)	524 (22.5)	10.5 (0.17)
Alabama, US	s	87 (4.1)	472 (9.2)	13 (4.1)	441 (13.4)	10.7 (0.19)
Connecticut, US	r	87 (4.3)	531 (6.1)	13 (4.3)	482 (18.4)	10.6 (0.17)
Dubai, UAE		86 (1.7)	486 (3.0)	14 (1.7)	414 (7.4)	10.7 (0.12)
Alberta, Canada		80 (3.3)	506 (3.2)	20 (3.3)	498 (5.3)	10.2 (0.15)
Indiana, US	r	80 (5.7)	521 (6.3)	20 (5.7)	502 (9.0)	10.3 (0.21)
Colorado, US	r	79 (4.6)	523 (6.0)	21 (4.6)	498 (16.8)	10.2 (0.21)
Abu Dhabi, UAE		77 (3.6)	458 (4.8)	23 (3.6)	422 (6.6)	10.4 (0.15)
Ontario, Canada		74 (3.8)	514 (3.0)	26 (3.8)	510 (5.0)	9.9 (0.18)
Quebec, Canada		73 (3.4)	536 (3.0)	27 (3.4)	523 (5.8)	9.9 (0.13)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

In teaching mathematics to this class, how confident do you feel to do the following?

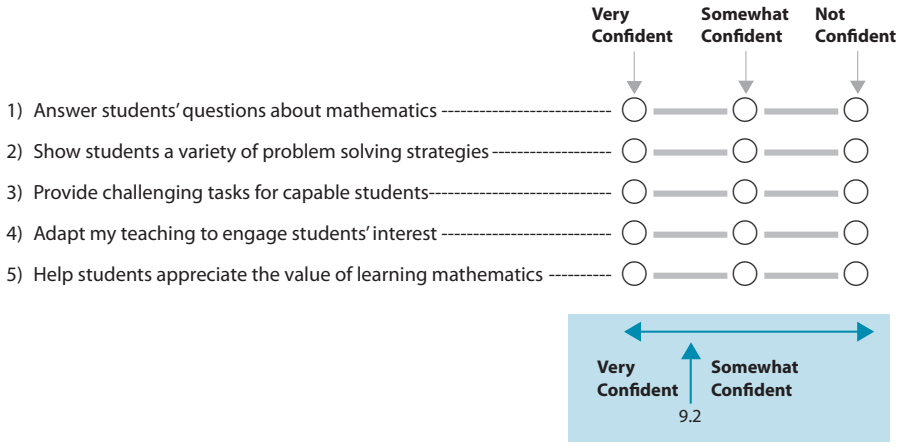

Exhibit 7.14: Components of Confidence in Teaching Mathematics Scale

TIMSS 2011 Mathematics 8th Grade

Reported by Teachers

Country	Percent of Students Whose Teachers Feel Very Confident to				
	Answer Student Questions About Mathematics	Show Students a Variety of Problem Solving Strategies	Provide Challenging Tasks for Capable Students	Adapt Teaching to Engage Student Interests	Help Students Appreciate the Value of Learning Mathematics
Armenia	95 (1.6)	86 (2.5)	61 (3.9)	55 (3.6)	72 (3.1)
Australia	r 95 (1.4)	r 80 (3.2)	r 70 (3.4)	r 63 (4.2)	r 62 (3.7)
Bahrain	84 (2.9)	66 (2.6)	63 (2.9)	68 (2.6)	68 (3.1)
Chile	97 (1.4)	88 (2.6)	81 (3.3)	73 (3.5)	92 (1.9)
Chinese Taipei	88 (2.5)	81 (3.2)	65 (3.7)	44 (4.0)	34 (4.1)
England	97 (1.3)	87 (3.0)	83 (3.3)	62 (3.9)	61 (4.2)
Finland	93 (2.1)	84 (2.8)	63 (3.6)	40 (3.8)	48 (3.5)
Georgia	89 (2.4)	87 (2.8)	64 (3.4)	65 (3.6)	77 (3.1)
Ghana	94 (2.0)	91 (2.2)	77 (3.5)	90 (2.3)	92 (2.0)
Hong Kong SAR	90 (2.8)	73 (3.9)	45 (4.5)	33 (4.2)	28 (4.0)
Hungary	95 (1.6)	85 (2.6)	64 (3.2)	58 (3.5)	58 (3.5)
Indonesia	95 (1.9)	79 (4.7)	69 (4.4)	80 (3.0)	87 (2.9)
Iran, Islamic Rep. of	66 (3.3)	43 (3.8)	44 (3.4)	57 (4.0)	57 (3.2)
Israel	96 (1.0)	91 (1.2)	75 (2.4)	80 (2.3)	77 (2.6)
Italy	63 (3.6)	60 (3.7)	47 (3.8)	35 (3.7)	32 (3.5)
Japan	74 (3.4)	46 (4.2)	36 (4.0)	27 (3.8)	21 (3.0)
Jordan	69 (3.3)	60 (3.5)	54 (3.8)	55 (4.1)	61 (3.8)
Kazakhstan	100 (0.0)	99 (0.9)	87 (2.9)	88 (2.6)	96 (1.4)
Korea, Rep. of	72 (2.6)	55 (3.3)	46 (3.2)	36 (3.0)	36 (3.3)
Lebanon	89 (2.4)	78 (3.3)	62 (4.2)	71 (3.9)	73 (3.4)
Lithuania	98 (0.9)	99 (0.8)	92 (1.7)	74 (3.4)	77 (3.0)
Macedonia, Rep. of	r 91 (2.6)	s 80 (3.4)	r 85 (3.5)	r 90 (2.5)	r 94 (2.3)
Malaysia	88 (2.4)	80 (3.1)	62 (3.8)	63 (3.8)	72 (3.4)
Morocco	69 (3.5)	61 (3.1)	49 (3.5)	61 (3.3)	66 (3.2)
New Zealand	91 (2.0)	77 (2.4)	70 (2.5)	58 (3.0)	56 (3.3)
Norway	94 (2.0)	79 (3.5)	70 (3.9)	37 (4.1)	64 (4.1)
Oman	90 (1.7)	69 (3.1)	63 (3.1)	67 (3.0)	74 (2.9)
Palestinian Nat'l Auth.	75 (3.9)	68 (3.9)	56 (4.3)	64 (4.1)	59 (4.2)
Qatar	90 (2.5)	86 (2.9)	70 (3.5)	79 (3.0)	75 (3.3)
Romania	96 (1.4)	94 (2.0)	87 (2.6)	90 (2.5)	82 (3.2)
Russian Federation	99 (0.7)	98 (1.0)	85 (2.4)	83 (2.4)	93 (1.4)
Saudi Arabia	84 (3.3)	63 (4.3)	59 (3.6)	68 (3.9)	76 (3.3)
Singapore	89 (1.8)	71 (2.5)	51 (3.1)	41 (2.9)	35 (2.7)
Slovenia	97 (0.8)	90 (1.7)	82 (2.4)	68 (2.3)	72 (2.9)
Sweden	r 96 (1.6)	r 92 (2.0)	r 68 (3.0)	r 44 (3.8)	r 54 (3.7)
Syrian Arab Republic	74 (3.8)	51 (4.5)	53 (4.4)	64 (4.2)	66 (4.1)
Thailand	72 (3.5)	61 (4.1)	26 (3.7)	37 (3.9)	34 (4.2)
Tunisia	80 (3.2)	62 (3.9)	39 (3.4)	56 (4.0)	64 (3.9)
Turkey	69 (3.5)	64 (3.1)	55 (3.6)	62 (3.2)	57 (3.4)
Ukraine	100 (0.0)	98 (1.3)	90 (2.6)	82 (3.7)	92 (2.5)
United Arab Emirates	86 (1.7)	79 (2.0)	68 (2.0)	75 (2.2)	78 (1.9)
United States	r 97 (0.8)	r 91 (1.6)	r 76 (2.3)	r 65 (2.6)	r 67 (2.5)
International Avg.	87 (0.4)	77 (0.5)	65 (0.5)	62 (0.5)	65 (0.5)

( ) Standard errors appear in parentheses. Because of rounding some results 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 2011

Exhibit 7.14: Components of Confidence in Teaching Mathematics Scale (Continued)

Country	Percent of Students Whose Teachers Feel Very Confident to				
	Answer Students Questions About Mathematics	Show Students a Variety of Problem Solving Strategies	Provide Challenging Tasks for Capable Students	Adapt Teaching to Engage Student Interests	Help Students Appreciate the Value of Learning Mathematics
Ninth Grade Participants					
Botswana	96 (1.6)	84 (3.1)	72 (4.3)	64 (4.5)	87 (3.0)
Honduras	r 93 (2.7)	r 93 (2.7)	r 70 (4.6)	r 89 (3.1)	r 96 (1.6)
South Africa	95 (1.7)	86 (3.0)	70 (3.9)	79 (3.3)	86 (2.7)
Benchmarking Participants					
Alberta, Canada	93 (2.2)	87 (2.8)	72 (3.6)	57 (3.9)	63 (3.7)
Ontario, Canada	86 (2.9)	76 (3.7)	65 (4.3)	60 (3.8)	63 (3.9)
Quebec, Canada	96 (1.4)	84 (3.0)	55 (4.1)	52 (3.5)	60 (3.5)
Abu Dhabi, UAE	85 (3.5)	81 (3.4)	65 (3.7)	72 (3.9)	77 (3.5)
Dubai, UAE	88 (1.1)	82 (3.4)	80 (2.3)	80 (4.0)	80 (2.2)
Alabama, US	s 97 (2.2)	s 98 (1.9)	s 77 (5.7)	s 63 (5.5)	s 70 (7.7)
California, US	s 98 (1.5)	s 93 (2.7)	s 80 (5.6)	s 58 (6.9)	s 56 (5.8)
Colorado, US	r 96 (2.1)	r 92 (3.5)	r 72 (5.2)	r 53 (6.4)	r 58 (6.5)
Connecticut, US	r 100 (0.0)	r 93 (2.8)	r 79 (4.3)	r 58 (5.0)	r 70 (5.7)
Florida, US	r 100 (0.4)	s 91 (4.3)	r 80 (5.8)	r 76 (5.0)	r 78 (5.7)
Indiana, US	r 100 (0.0)	r 92 (3.2)	r 70 (6.6)	r 58 (6.3)	r 61 (5.7)
Massachusetts, US	r 99 (1.2)	r 92 (4.0)	r 84 (4.2)	r 62 (6.0)	r 75 (5.3)
Minnesota, US	r 99 (1.3)	r 92 (3.7)	r 81 (4.0)	r 58 (5.5)	r 65 (5.1)
North Carolina, US	r 98 (2.1)	r 94 (3.9)	r 87 (4.9)	r 69 (4.9)	r 76 (6.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

Teachers' Career Satisfaction

Teachers who are satisfied with their profession and the working conditions at their school are more motivated to teach and prepare their instruction. Further, having teachers that can provide leadership is a dimension of teacher quality. However, developing master teachers requires retention in the profession. Teachers need to be committed to the profession and like it enough to continue teaching. It may be that some subject areas and locales would benefit from policies to reduce teacher attrition in order to improve student achievement (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2009).

Exhibit 7.15 shows the fourth grade TIMSS assessment results for the TIMSS 2011 Teacher Career Satisfaction scale, based on how much teachers agreed with each of the following six statements:

- I am content with my profession as a teacher;
- I am satisfied with being a teacher at this school;
- I had more enthusiasm when I began teaching than I have now (reverse coded);
- I do important work as a teacher;
- I plan to continue as a teacher for as long as I can; and,
- I am frustrated as a teacher (reverse coded).

Students were scored according to their teachers responses, with **Satisfied** teachers "agreeing a lot" with three of the six statements and "agreeing a little" with the other three, on average. Internationally, on average, the majority of fourth grade students (54%) had teachers **Satisfied** with their careers. Another 41 percent of the students, on average, had teachers that reported being **Somewhat Satisfied** (mostly agreed "a little" instead of "a lot"). Although satisfaction could be relative and dependent on the teaching situation, very few fourth grade students had mathematics teachers expressing any dissatisfaction except in a small number of countries.

The Teacher Career Satisfaction scale was positively related to average mathematics achievement. On average, mathematics achievement was higher for the fourth grade students of Satisfied teachers than for students of **Somewhat Satisfied** or **Less Than Satisfied** teachers. However, looking across the countries at the fourth grade, sixth grade, and benchmarking participants, it is clear that there are differences from country to country. In particular, it is noteworthy that four of the highest achieving countries in mathematics at the fourth grade—Chinese Taipei, Singapore, Japan, and Korea—had among the lowest percentages of students taught by **Satisfied** teachers, but that there was no relationship between teacher satisfaction and mathematics achievement in these countries.

As shown in Exhibit 7.16, the eighth grade mathematics teachers reported somewhat lower levels of career satisfaction than the fourth grade teachers, with 47 percent of students taught by **Satisfied** teachers (compared to 54% at the fourth grade). However, taken together, almost all of the eighth grade students (92%) were taught mathematics by **Satisfied** or **Somewhat Satisfied** teachers. Similar to the fourth grade situation, on average, students taught by Satisfied teachers had higher mathematics achievement than those taught by less satisfied teachers (473 vs. 464 and 462).

Exhibit 7.15: Teacher Career Satisfaction

TIMSS 2011 4th Grade Mathematics

Reported by Teachers

Students were scored according to their teachers' degree of agreement with six statements on the *Teacher Career Satisfaction* scale. Students with **Satisfied** teachers had a score on the scale of at least 10.1, which corresponds to their teachers "agreeing a lot" with three of the six statements and "agreeing a little" with the other three, on average. Students with **Less Than Satisfied** teachers had a score no higher than 6.6, which corresponds to their teachers "disagreeing a little" with three of the six statements and "agreeing a little" with the other three, on average. All other students had **Somewhat Satisfied** teachers.

Country	Satisfied		Somewhat Satisfied		Less Than Satisfied		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Croatia	83 (2.7)	489 (2.1)	16 (2.5)	495 (5.2)	1 (0.9)	~ ~	11.1 (0.11)
Georgia	79 (3.3)	451 (4.1)	20 (3.2)	451 (7.0)	1 (0.6)	~ ~	11.3 (0.14)
Chile	79 (2.9)	463 (3.2)	18 (2.6)	454 (7.2)	3 (1.2)	460 (10.7)	11.2 (0.14)
Armenia	77 (3.0)	450 (4.1)	21 (2.9)	458 (6.7)	1 (0.7)	~ ~	11.1 (0.13)
Denmark	70 (3.6)	542 (2.8)	27 (3.6)	531 (5.4)	3 (1.3)	547 (8.0)	10.6 (0.15)
Thailand	69 (3.6)	457 (4.7)	31 (3.6)	461 (11.4)	0 (0.0)	~ ~	10.1 (0.11)
Spain	69 (4.0)	491 (3.2)	27 (3.7)	464 (4.7)	4 (1.6)	460 (11.8)	11.0 (0.19)
Malta	69 (0.1)	502 (1.6)	28 (0.1)	484 (2.6)	3 (0.1)	486 (9.0)	10.9 (0.01)
Ireland	68 (3.4)	526 (3.1)	29 (3.4)	532 (6.9)	2 (0.8)	~ ~	10.9 (0.12)
United Arab Emirates	66 (2.0)	442 (3.1)	29 (2.0)	423 (4.7)	5 (1.0)	411 (10.8)	10.5 (0.09)
Iran, Islamic Rep. of	66 (3.3)	435 (4.8)	31 (3.5)	423 (6.1)	3 (1.1)	431 (24.5)	10.4 (0.11)
Qatar	64 (4.0)	411 (5.9)	33 (3.8)	419 (10.1)	3 (1.3)	384 (30.0)	10.5 (0.14)
Poland	64 (3.0)	479 (2.6)	36 (3.0)	485 (3.5)	1 (0.5)	~ ~	10.6 (0.11)
Turkey	62 (3.4)	482 (5.2)	34 (3.4)	451 (9.2)	4 (1.5)	431 (11.2)	10.4 (0.14)
Belgium (Flemish)	62 (3.6)	550 (2.1)	34 (3.3)	548 (3.5)	4 (1.2)	545 (12.6)	10.3 (0.14)
Azerbaijan	62 (3.5)	465 (6.8)	37 (3.4)	461 (8.3)	1 (0.5)	~ ~	10.2 (0.10)
Kazakhstan	60 (3.4)	510 (6.0)	39 (3.3)	489 (8.5)	1 (0.4)	~ ~	10.2 (0.10)
Russian Federation	60 (3.0)	542 (4.3)	36 (2.9)	542 (5.2)	4 (1.2)	533 (5.2)	10.2 (0.13)
Austria	59 (3.6)	511 (3.0)	36 (3.6)	506 (4.4)	5 (1.5)	500 (11.7)	10.4 (0.14)
Saudi Arabia	59 (4.1)	417 (7.6)	38 (4.1)	402 (6.8)	3 (1.2)	368 (14.4)	10.3 (0.15)
Serbia	59 (4.3)	518 (3.7)	38 (4.2)	512 (5.4)	3 (1.4)	526 (20.2)	10.2 (0.15)
Kuwait	58 (3.6)	342 (4.6)	36 (3.6)	340 (5.9)	6 (1.9)	350 (10.3)	10.1 (0.14)
Romania	57 (4.2)	487 (8.1)	42 (4.3)	473 (7.6)	1 (0.6)	~ ~	10.5 (0.14)
Lithuania	56 (3.8)	536 (3.5)	41 (3.8)	531 (4.8)	3 (1.0)	519 (14.1)	10.2 (0.13)
Hungary	56 (3.5)	525 (4.2)	41 (3.5)	504 (6.2)	3 (1.0)	470 (10.7)	10.0 (0.13)
Australia r	56 (4.0)	528 (4.4)	37 (3.8)	509 (5.4)	7 (1.7)	505 (13.8)	10.0 (0.17)
Northern Ireland r	56 (4.3)	564 (4.2)	41 (4.6)	562 (6.8)	4 (1.5)	562 (12.0)	10.3 (0.18)
Slovak Republic	54 (3.2)	504 (5.2)	40 (3.0)	508 (4.7)	7 (1.7)	519 (9.7)	9.8 (0.13)
England	53 (3.9)	549 (4.8)	36 (3.6)	543 (7.0)	11 (2.8)	527 (12.6)	9.9 (0.19)
Tunisia	52 (4.2)	366 (4.7)	42 (3.9)	355 (6.4)	6 (1.9)	327 (18.5)	9.9 (0.15)
Bahrain	49 (4.3)	449 (6.1)	38 (4.7)	421 (6.0)	13 (2.9)	432 (6.2)	9.6 (0.19)
Germany	49 (3.2)	530 (3.2)	44 (3.4)	526 (3.0)	7 (1.8)	528 (4.9)	9.9 (0.13)
Yemen	49 (4.0)	252 (8.8)	47 (4.1)	238 (8.8)	4 (1.4)	274 (39.5)	9.6 (0.12)
New Zealand	48 (3.0)	487 (4.2)	45 (2.9)	488 (3.7)	7 (1.5)	472 (11.2)	9.9 (0.14)
United States r	47 (2.6)	541 (2.8)	46 (2.7)	546 (3.2)	8 (1.4)	525 (8.1)	9.8 (0.11)
Norway	46 (3.7)	499 (3.5)	43 (3.8)	490 (5.2)	11 (2.7)	492 (7.8)	9.7 (0.17)
Hong Kong SAR	46 (4.4)	605 (4.0)	46 (4.3)	596 (5.0)	8 (2.6)	624 (10.6)	9.4 (0.15)
Oman	45 (2.7)	396 (3.8)	45 (2.7)	378 (4.0)	10 (1.7)	366 (9.7)	9.5 (0.10)
Czech Republic	45 (3.6)	518 (3.7)	48 (4.1)	505 (3.9)	8 (2.2)	502 (5.7)	9.6 (0.14)
Slovenia	44 (3.0)	514 (3.1)	53 (3.2)	512 (3.3)	3 (0.9)	515 (10.4)	9.6 (0.08)
Finland	41 (3.1)	552 (3.2)	51 (3.5)	542 (2.9)	8 (2.3)	537 (7.0)	9.4 (0.13)
Netherlands r	40 (4.5)	539 (4.2)	53 (4.6)	540 (2.9)	7 (2.6)	532 (9.0)	9.4 (0.18)
Italy	38 (3.7)	515 (4.1)	53 (3.7)	504 (4.3)	9 (2.4)	506 (9.4)	9.3 (0.14)
Portugal	36 (4.0)	537 (5.2)	59 (4.3)	530 (4.9)	5 (1.8)	526 (10.9)	9.5 (0.19)
Morocco	33 (3.1)	361 (7.9)	58 (3.1)	326 (6.5)	9 (2.3)	338 (14.7)	9.0 (0.15)
Chinese Taipei	31 (3.9)	591 (3.6)	64 (4.0)	591 (2.5)	5 (0.9)	590 (6.9)	9.0 (0.11)
Sweden r	30 (3.3)	501 (4.4)	58 (3.7)	506 (3.1)	12 (3.1)	508 (8.4)	9.0 (0.16)
Singapore	29 (2.8)	609 (6.3)	59 (3.0)	604 (4.3)	12 (1.8)	605 (11.9)	8.8 (0.11)
Japan	28 (3.7)	588 (3.9)	58 (4.2)	586 (2.3)	15 (2.8)	581 (3.9)	8.7 (0.14)
Korea, Rep. of	19 (3.3)	602 (3.6)	69 (4.1)	607 (2.7)	11 (2.9)	598 (5.3)	8.3 (0.13)
International Avg.	54 (0.5)	494 (0.7)	41 (0.5)	487 (0.8)	5 (0.2)	486 (2.1)	

Centerpoint of scale set at 10.

( ) Standard errors appear in parentheses. Because of rounding some results 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.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 7.15: Teacher Career Satisfaction (Continued)

Country	Satisfied		Somewhat Satisfied		Less Than Satisfied		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Honduras	95 (1.8)	397 (6.0)	5 (1.8)	387 (18.8)	0 (0.0)	~ ~	12.2 (0.13)
Yemen	44 (3.9)	342 (8.7)	52 (3.8)	353 (7.0)	4 (1.8)	346 (38.6)	9.6 (0.12)
Botswana	27 (4.0)	433 (8.7)	59 (4.1)	416 (5.4)	13 (2.9)	415 (8.3)	8.6 (0.15)
Benchmarking Participants							
Dubai, UAE	69 (1.7)	480 (2.8)	29 (1.8)	448 (6.5)	2 (0.6)	~ ~	10.7 (0.09)
Abu Dhabi, UAE	65 (3.8)	425 (6.6)	30 (3.8)	405 (7.3)	4 (1.4)	399 (21.1)	10.6 (0.15)
Alberta, Canada r	59 (4.3)	514 (3.6)	40 (4.3)	498 (3.8)	1 (0.8)	~ ~	10.2 (0.15)
Ontario, Canada	58 (3.7)	519 (3.7)	39 (3.5)	518 (4.6)	3 (1.2)	521 (10.6)	10.2 (0.13)
Quebec, Canada	40 (3.6)	539 (4.0)	50 (4.1)	527 (3.1)	10 (2.8)	535 (5.8)	9.5 (0.15)
Florida, US r	38 (4.9)	543 (6.7)	54 (5.2)	543 (5.2)	8 (2.9)	547 (13.4)	9.7 (0.19)
North Carolina, US	35 (5.8)	559 (6.1)	58 (5.0)	551 (6.0)	6 (2.2)	539 (5.5)	9.3 (0.24)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

How much do you agree with the following statements?

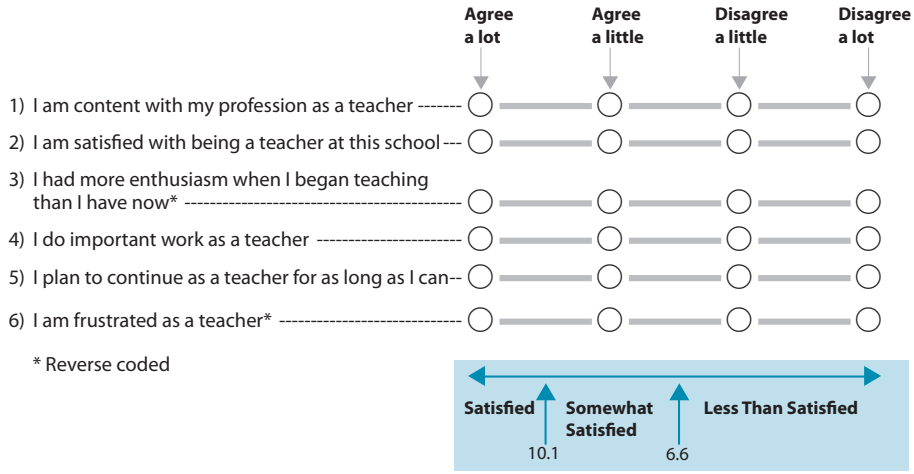

Exhibit 7.16: Teacher Career Satisfaction

TIMSS 2011 8th Grade Mathematics

Reported by Teachers

Students were scored according to their teachers' degree of agreement with six statements on the *Teacher Career Satisfaction* scale. Students with **Satisfied** teachers had a score on the scale of at least 10.4, which corresponds to their teachers "agreeing a lot" with three of the six statements and "agreeing a little" with the other three, on average. Students with **Less Than Satisfied** teachers had a score no higher than 7.0, which corresponds to their teachers "disagreeing a little" with three of the six statements and "agreeing a little" with the other three, on average. All other students had **Somewhat Satisfied** teachers.

Country	Satisfied		Somewhat Satisfied		Less Than Satisfied		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Chile	72 (3.8)	418 (3.8)	26 (3.7)	415 (7.3)	2 (1.2)	~ ~	11.2 (0.15)
Armenia	69 (3.5)	467 (3.7)	29 (3.5)	464 (7.6)	2 (0.9)	~ ~	11.0 (0.13)
Thailand	69 (4.0)	425 (5.7)	31 (4.0)	431 (9.8)	0 (0.0)	~ ~	10.5 (0.08)
Israel	69 (2.6)	524 (5.1)	28 (2.6)	508 (9.7)	3 (0.9)	503 (24.0)	11.1 (0.11)
Qatar	66 (3.5)	421 (5.2)	31 (3.2)	387 (7.0)	3 (1.4)	395 (17.6)	10.9 (0.18)
Georgia	65 (3.9)	431 (5.8)	32 (3.6)	430 (7.5)	3 (1.3)	438 (10.0)	10.9 (0.15)
Ukraine	63 (4.1)	484 (5.6)	35 (3.9)	471 (5.6)	1 (1.0)	~ ~	10.5 (0.12)
Syrian Arab Republic	62 (4.6)	382 (6.0)	35 (4.4)	370 (8.5)	3 (1.5)	402 (24.4)	10.8 (0.18)
Malaysia	61 (4.3)	441 (6.6)	38 (4.4)	439 (9.1)	0 (0.0)	~ ~	10.4 (0.13)
Indonesia	59 (4.5)	387 (6.3)	41 (4.5)	384 (6.9)	0 (0.0)	~ ~	10.6 (0.17)
United Arab Emirates	58 (2.4)	462 (3.5)	39 (2.4)	448 (3.7)	4 (0.8)	424 (7.4)	10.7 (0.09)
Norway	57 (4.1)	480 (3.0)	38 (4.1)	468 (3.8)	5 (1.9)	474 (6.4)	10.3 (0.17)
Romania	57 (3.9)	458 (5.5)	40 (3.8)	457 (7.8)	4 (1.3)	453 (9.3)	10.4 (0.14)
Kazakhstan	55 (3.6)	497 (5.9)	44 (3.6)	475 (6.1)	1 (0.4)	~ ~	10.3 (0.11)
Saudi Arabia	54 (3.8)	401 (6.5)	37 (3.9)	394 (6.4)	9 (2.0)	363 (8.7)	10.1 (0.15)
Iran, Islamic Rep. of	51 (3.5)	419 (7.0)	42 (3.8)	414 (5.2)	7 (1.7)	390 (12.2)	10.2 (0.12)
Turkey	50 (3.7)	466 (5.5)	40 (3.4)	440 (6.0)	9 (1.9)	432 (12.9)	10.0 (0.16)
New Zealand	49 (4.2)	495 (8.3)	41 (3.9)	483 (7.8)	10 (2.2)	479 (16.0)	9.9 (0.16)
United States r	48 (2.4)	515 (5.0)	43 (2.4)	510 (4.5)	9 (1.3)	503 (10.4)	10.1 (0.11)
Tunisia	48 (4.0)	426 (5.1)	47 (3.8)	423 (4.5)	5 (1.8)	432 (12.7)	10.0 (0.15)
England	46 (4.0)	513 (8.0)	44 (3.9)	507 (9.1)	10 (2.8)	466 (20.3)	10.1 (0.19)
Lithuania	45 (3.5)	503 (5.3)	47 (3.6)	504 (4.5)	8 (1.7)	490 (7.3)	10.0 (0.14)
Russian Federation	45 (3.6)	544 (4.5)	51 (3.5)	535 (5.6)	4 (1.4)	540 (14.9)	10.0 (0.11)
Macedonia, Rep. of r	44 (3.9)	430 (10.4)	51 (4.0)	416 (7.4)	5 (1.9)	444 (39.9)	10.2 (0.15)
Hungary	42 (3.7)	502 (5.9)	52 (3.8)	506 (5.6)	6 (1.6)	506 (8.7)	9.9 (0.13)
Italy	42 (3.9)	497 (4.5)	49 (3.9)	500 (3.9)	9 (2.2)	504 (12.4)	9.7 (0.13)
Hong Kong SAR	42 (4.3)	597 (7.0)	52 (4.4)	583 (6.1)	6 (1.8)	547 (25.9)	9.8 (0.15)
Australia r	42 (3.9)	516 (8.3)	43 (3.4)	505 (8.3)	15 (2.8)	487 (13.8)	9.8 (0.18)
Palestinian Nat'l Auth.	41 (3.9)	403 (5.2)	54 (4.2)	404 (5.3)	5 (1.8)	414 (15.1)	9.9 (0.14)
Bahrain	41 (2.1)	437 (4.4)	46 (2.9)	392 (4.1)	13 (2.3)	386 (6.4)	9.9 (0.11)
Finland	41 (3.9)	516 (4.0)	50 (3.9)	513 (3.2)	10 (2.4)	513 (5.9)	9.7 (0.15)
Oman	36 (3.1)	383 (4.9)	52 (3.2)	363 (4.4)	12 (2.1)	326 (7.0)	9.5 (0.12)
Morocco	36 (3.2)	381 (4.5)	49 (3.7)	365 (3.0)	15 (2.2)	368 (3.2)	9.5 (0.11)
Slovenia	36 (2.9)	503 (3.5)	59 (2.8)	506 (2.9)	6 (1.2)	495 (5.2)	9.7 (0.11)
Lebanon	34 (4.0)	448 (6.8)	61 (4.1)	453 (4.9)	6 (2.1)	427 (19.1)	9.9 (0.16)
Chinese Taipei	33 (4.0)	611 (7.8)	57 (3.9)	610 (5.2)	10 (2.4)	602 (7.3)	9.4 (0.13)
Jordan	31 (3.4)	415 (5.9)	52 (3.4)	403 (6.0)	18 (2.8)	399 (10.5)	9.2 (0.15)
Sweden r	31 (3.5)	492 (3.6)	52 (3.5)	484 (3.4)	17 (2.7)	481 (4.7)	9.2 (0.16)
Ghana	30 (3.5)	334 (8.0)	58 (4.0)	328 (6.1)	13 (2.6)	339 (11.0)	9.4 (0.13)
Singapore	29 (2.5)	634 (6.7)	62 (2.5)	603 (5.3)	9 (1.5)	597 (9.6)	9.2 (0.10)
Japan	25 (3.0)	588 (5.6)	63 (3.6)	566 (3.7)	12 (2.5)	552 (5.8)	9.1 (0.15)
Korea, Rep. of	11 (1.8)	610 (8.9)	67 (2.9)	616 (3.5)	22 (2.7)	602 (6.9)	8.2 (0.09)
International Avg.	47 (0.6)	473 (0.9)	45 (0.6)	464 (1.0)	7 (0.3)	462 (2.4)	

Centerpoint of scale set at 10.

( ) Standard errors appear in parentheses. Because of rounding some results 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.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 7.16: Teacher Career Satisfaction (Continued)

Country	Satisfied		Somewhat Satisfied		Less Than Satisfied		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants							
Honduras	86 (3.5)	333 (4.5)	14 (3.5)	365 (11.9)	0 (0.0)	~ ~	12.3 (0.15)
South Africa	42 (3.4)	351 (5.2)	48 (3.7)	357 (4.7)	10 (2.3)	332 (5.4)	9.7 (0.12)
Botswana	15 (3.0)	408 (8.6)	65 (4.1)	394 (3.2)	21 (3.7)	398 (7.6)	8.6 (0.14)
Benchmarking Participants							
Dubai, UAE	65 (3.6)	483 (3.5)	32 (3.5)	469 (7.3)	3 (0.4)	392 (11.7)	11.1 (0.14)
Ontario, Canada	58 (3.9)	516 (3.0)	39 (3.9)	508 (4.4)	2 (1.0)	~ ~	10.4 (0.16)
Connecticut, US	55 (5.7)	523 (7.7)	37 (5.5)	516 (12.3)	9 (4.2)	523 (22.1)	10.3 (0.23)
Massachusetts, US	53 (6.4)	555 (7.5)	43 (6.2)	566 (8.8)	4 (1.7)	544 (15.6)	10.3 (0.24)
Colorado, US r	52 (7.4)	529 (9.0)	37 (6.6)	509 (13.3)	10 (3.7)	497 (23.4)	10.0 (0.27)
California, US r	52 (6.4)	493 (10.6)	42 (6.1)	494 (9.0)	7 (3.3)	480 (15.8)	10.3 (0.22)
Abu Dhabi, UAE	51 (3.8)	454 (6.3)	44 (4.2)	447 (6.4)	5 (1.9)	434 (12.0)	10.4 (0.15)
Alberta, Canada	49 (3.6)	507 (4.4)	46 (3.5)	502 (3.0)	5 (1.7)	515 (8.8)	10.4 (0.17)
Quebec, Canada	46 (4.7)	537 (4.3)	45 (4.4)	528 (4.0)	8 (2.2)	530 (8.0)	10.0 (0.21)
Indiana, US r	45 (6.7)	524 (10.0)	41 (7.0)	505 (7.2)	14 (5.3)	542 (14.1)	9.8 (0.29)
Alabama, US r	39 (7.3)	477 (14.0)	45 (9.0)	458 (9.7)	16 (6.5)	471 (15.9)	9.7 (0.33)
North Carolina, US r	36 (6.7)	532 (9.1)	55 (6.9)	549 (12.3)	9 (4.0)	539 (17.9)	9.7 (0.28)
Minnesota, US	35 (6.3)	555 (9.6)	57 (6.1)	542 (8.8)	8 (3.5)	528 (14.9)	9.7 (0.22)
Florida, US r	22 (5.8)	552 (13.8)	58 (6.3)	516 (10.7)	20 (4.9)	489 (14.7)	9.1 (0.30)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

How much do you agree with the following statements?