

Chapter 5

School Resources for Teaching Science

The most successful schools tend to have students that are relatively economically affluent and speak the language of instruction. Successful schools also are likely to have better working conditions and facilities as well as more instructional materials, such as books, computers, technological support, and supplies.

The learning environment of the school can be a positive influence, encouraging a positive attitude toward academic excellence and facilitating classroom instruction. Considerable research has shown that higher levels of school resources are associated with higher achievement. However, the relationship between resources and achievement is complicated. First, a school can have a more socioeconomically advantaged student population, for example, because of its location or because it competes for students. Second, the school system can invest more money into schools for such things as facilities, teachers' salaries, equipment, and materials. It follows that the most successful schools are likely to have more socioeconomically advantaged students and better resources.

Schools with Students from Advantaged Home Backgrounds

The home backgrounds of students attending a school can be closely related to the learning environment, with the two reinforcing each other and being strongly linked to academic achievement. Students from home backgrounds supportive of learning are likely to have more positive attitudes toward learning and, perhaps, even better discipline. Beyond that, parents that have high educational expectations for their children are more likely to take an active interest in the quality of teachers and school facilities.

School Location

Depending on each country's characteristics, a school's location can have a substantial impact on whether the students attending that school typically are from economically and educationally advantaged home backgrounds. Also, depending on the country, the location of the school can provide access to important additional resources (e.g., libraries, media centers, or museums) or mean that the school is relatively isolated.

To provide some information about the urbanicity of each school's location, TIMSS 2011 asked principals to describe the population size of the city, town, or area in which their schools were located. For the fourth grade science assessment, Exhibit 5.1 shows the percentages of students together with their average achievement for schools located in cities, towns, or areas of three different population sizes: cities of more than 100,000; cities or towns of 15,001 to 100,000; and small towns, villages, or rural areas of 15,000 or fewer people. Countries are presented in alphabetical order with the fourth grade on

the first page of the exhibit, followed by the sixth grade and the benchmarking participants on the second page.

On average, across the fourth grade countries, 31 percent of students attended schools in cities with more than 100,000 people, 27 percent attended schools in cities or towns of 15,001 to 100,000, and 42 percent in small towns, villages, or rural areas. In general, the fourth grade students attending schools in the largest cities had the highest average science achievement (497), followed by students in medium sized cities (484), and then those in smaller towns and rural areas (475). While this pattern held for the majority of the countries in the fourth grade assessment, there were also other patterns. In some countries, students attending schools in medium sized cities of 15,001 to 100,000 had higher average achievement than students in schools in larger cities, or there was not much difference in average achievement between the two. There were also a number of countries where average science achievement was highest among students attending schools in small towns or rural areas. The countries that assessed TIMSS 2011 in the sixth grade had relatively large percentages of students (64–77%) attending schools small towns or rural areas, and these students had lower average science achievement than students in schools in large or medium sized cities.

Exhibit 5.2 shows principals' reports about school location for the TIMSS 2011 eighth grade assessment, with percentages of students and average achievement for the eighth grade countries on the first page and results for the ninth grade and benchmarking participants on the second page. Compared to the fourth grade assessment, the results indicated a slight shift away from small towns and rural areas into large cities. For the eighth grade assessment, 37 percent of students were attending schools in cities with more than 100,000 people, 28 percent attended schools in cities or towns of 15,001 to 100,000, and 35 percent in small towns, villages, or rural areas. On average across countries, science achievement differences among students attending the three types of schools were somewhat more pronounced than at the fourth grade, with average achievement highest in the big-city schools (492), next highest in schools in medium sized cities (473), and lowest in schools in rural areas or small towns (463). As with the fourth grade, this pattern did not hold in all countries and there was considerable variation.

Exhibit 5.1: School Location
Reported by Principals

Country	Population Size of City, Town, or Area Where School Is Located					
	More than 100,000		15,001 to 100,000		15,000 or Fewer	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	27 (3.0)	429 (5.7)	26 (3.4)	418 (6.1)	46 (3.2)	407 (6.7)
Australia	42 (3.3)	530 (4.0)	30 (3.9)	504 (5.7)	28 (4.1)	510 (5.2)
Austria	24 (1.5)	520 (5.7)	9 (1.9)	522 (6.1)	66 (2.3)	537 (3.3)
Azerbaijan	16 (2.9)	441 (7.9)	21 (2.9)	459 (12.6)	63 (3.5)	430 (7.4)
Bahrain	11 (3.3)	457 (11.1)	28 (5.1)	440 (9.5)	61 (5.5)	451 (5.2)
Belgium (Flemish)	6 (1.9)	493 (14.6)	55 (4.1)	505 (2.6)	39 (3.8)	519 (2.9)
Chile	56 (3.5)	493 (4.2)	28 (3.3)	474 (6.2)	16 (2.5)	458 (5.6)
Chinese Taipei	56 (3.5)	564 (2.5)	39 (3.3)	537 (3.4)	6 (2.0)	530 (12.3)
Croatia	16 (2.2)	532 (3.6)	23 (3.3)	518 (3.2)	61 (3.7)	511 (2.8)
Czech Republic	15 (2.5)	542 (8.8)	33 (3.1)	538 (3.8)	52 (3.2)	533 (3.4)
Denmark	r 15 (2.6)	516 (8.2)	37 (3.6)	537 (5.1)	48 (3.2)	529 (3.4)
England	40 (5.2)	518 (6.4)	38 (5.0)	521 (6.5)	23 (3.9)	555 (6.1)
Finland	31 (3.9)	569 (3.9)	39 (4.2)	574 (3.0)	30 (3.3)	567 (4.9)
Georgia	37 (2.9)	474 (5.3)	17 (2.3)	457 (7.2)	46 (2.4)	439 (5.9)
Germany	25 (3.2)	515 (5.3)	33 (3.7)	527 (4.7)	42 (3.5)	539 (2.8)
Hong Kong SAR	r 84 (3.4)	537 (5.6)	15 (3.2)	543 (7.4)	1 (1.2)	~ ~
Hungary	25 (2.6)	557 (7.3)	29 (3.2)	553 (4.6)	46 (2.2)	512 (6.3)
Iran, Islamic Rep. of	45 (3.5)	481 (5.8)	18 (2.9)	456 (10.1)	36 (3.4)	417 (5.7)
Ireland	16 (3.0)	503 (8.5)	27 (3.2)	507 (6.5)	57 (3.0)	526 (4.5)
Italy	16 (2.3)	525 (6.1)	34 (3.2)	521 (5.3)	50 (3.3)	525 (4.1)
Japan	64 (2.9)	563 (2.3)	33 (3.0)	553 (2.5)	3 (1.4)	536 (12.3)
Kazakhstan	26 (3.0)	508 (10.2)	21 (2.8)	480 (8.7)	54 (3.0)	492 (7.4)
Korea, Rep. of	86 (2.8)	590 (2.1)	9 (2.1)	571 (2.5)	5 (2.2)	561 (8.8)
Kuwait	12 (2.7)	344 (16.0)	38 (4.2)	352 (8.3)	50 (4.2)	350 (7.5)
Lithuania	35 (1.7)	536 (3.7)	19 (2.8)	513 (3.6)	46 (2.9)	499 (3.9)
Malta	0 (0.0)	~ ~	13 (0.1)	423 (4.7)	87 (0.1)	450 (2.1)
Morocco	r 30 (3.4)	299 (7.3)	27 (3.6)	254 (7.9)	43 (3.9)	245 (8.2)
Netherlands	r 25 (4.9)	525 (4.2)	59 (5.5)	535 (3.0)	16 (3.7)	536 (4.0)
New Zealand	40 (3.6)	507 (4.1)	23 (3.2)	475 (6.2)	37 (3.1)	501 (3.8)
Northern Ireland	r 23 (3.6)	521 (7.7)	29 (4.9)	516 (7.0)	48 (4.4)	522 (4.1)
Norway	20 (2.8)	495 (6.1)	45 (3.8)	497 (2.6)	34 (3.5)	487 (3.9)
Oman	r 4 (1.4)	345 (15.5)	17 (2.5)	388 (8.1)	79 (2.5)	369 (5.7)
Poland	24 (0.9)	524 (5.6)	24 (2.1)	509 (4.4)	52 (2.3)	496 (3.2)
Portugal	14 (2.6)	536 (8.3)	28 (4.6)	513 (4.6)	58 (4.6)	521 (6.1)
Qatar	34 (3.0)	440 (10.3)	24 (2.7)	378 (10.8)	42 (3.1)	365 (7.8)
Romania	21 (2.7)	567 (5.4)	15 (2.4)	541 (7.2)	65 (2.5)	477 (8.2)
Russian Federation	48 (1.6)	566 (4.1)	22 (2.3)	549 (5.5)	30 (2.0)	533 (6.1)
Saudi Arabia	57 (3.7)	426 (8.3)	15 (2.9)	437 (9.7)	28 (3.9)	432 (10.4)
Serbia	28 (3.2)	534 (4.7)	34 (3.7)	515 (5.8)	38 (3.2)	501 (5.3)
Singapore	100 (0.0)	583 (3.4)	0 (0.0)	~ ~	0 (0.0)	~ ~
Slovak Republic	11 (2.1)	567 (5.9)	35 (3.3)	544 (3.7)	54 (2.9)	516 (5.8)
Slovenia	14 (2.8)	532 (6.7)	21 (3.4)	521 (4.8)	65 (3.6)	517 (3.2)
Spain	37 (3.6)	510 (4.8)	34 (3.6)	509 (4.6)	30 (3.6)	498 (4.7)
Sweden	16 (3.5)	538 (7.5)	38 (4.5)	531 (4.9)	46 (5.0)	531 (3.9)
Thailand	8 (2.2)	541 (15.7)	22 (2.7)	487 (11.6)	70 (3.1)	459 (6.5)
Tunisia	12 (2.7)	376 (12.4)	28 (3.5)	363 (8.7)	60 (3.3)	331 (7.3)
Turkey	52 (2.4)	481 (5.6)	21 (2.3)	471 (7.9)	28 (2.4)	420 (10.0)
United Arab Emirates	50 (1.8)	444 (3.9)	22 (1.7)	414 (6.2)	28 (1.8)	404 (6.2)
United States	33 (2.1)	539 (5.4)	36 (2.6)	550 (3.2)	31 (2.4)	548 (3.7)
Yemen	15 (3.1)	244 (17.8)	10 (2.2)	240 (19.1)	75 (3.5)	198 (8.7)
International Avg.	31 (0.4)	497 (1.1)	27 (0.5)	484 (1.0)	42 (0.5)	475 (0.9)

() 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 5.1: School Location (Continued)

Country	Population Size of City, Town, or Area Where School Is Located					
	More than 100,000		15,001 to 100,000		15,000 or Fewer	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants						
Botswana	3 (1.6)	449 (53.4)	20 (3.2)	423 (17.8)	77 (3.3)	348 (5.3)
Honduras	21 (4.0)	478 (13.4)	15 (2.6)	468 (3.4)	64 (3.8)	409 (7.1)
Yemen	18 (3.6)	372 (13.3)	13 (2.8)	361 (17.7)	69 (3.9)	329 (8.5)
Benchmarking Participants						
Alberta, Canada	46 (4.4)	545 (4.2)	21 (3.7)	543 (4.2)	33 (3.6)	537 (4.4)
Ontario, Canada	62 (3.7)	532 (4.2)	21 (3.8)	523 (4.6)	16 (3.1)	524 (5.3)
Quebec, Canada	37 (4.0)	515 (4.4)	35 (4.4)	522 (3.9)	28 (4.5)	511 (4.2)
Abu Dhabi, UAE	46 (3.9)	430 (8.4)	21 (3.5)	381 (13.3)	33 (3.6)	393 (7.5)
Dubai, UAE	65 (0.3)	468 (3.2)	19 (0.2)	467 (2.2)	16 (0.2)	425 (3.6)
Florida, US	52 (6.6)	541 (7.3)	36 (6.0)	548 (7.6)	13 (4.2)	543 (15.8)
North Carolina, US	23 (5.5)	550 (14.6)	33 (7.1)	537 (10.7)	45 (6.7)	537 (6.4)

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

Exhibit 5.2: School Location
Reported by Principals

Country	Population Size of City, Town, or Area Where School Is Located					
	More than 100,000		15,001 to 100,000		15,000 or Fewer	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	24 (2.8)	458 (6.3)	24 (3.5)	441 (7.4)	52 (3.5)	425 (4.8)
Australia	55 (3.2)	532 (6.5)	28 (3.5)	521 (9.4)	16 (2.9)	489 (5.8)
Bahrain	17 (0.3)	453 (5.0)	42 (0.3)	448 (3.5)	41 (0.3)	459 (3.0)
Chile	55 (3.5)	474 (3.9)	29 (3.8)	449 (6.4)	16 (2.9)	450 (6.3)
Chinese Taipei	63 (3.5)	575 (2.5)	34 (3.6)	547 (5.5)	3 (1.3)	529 (20.7)
England	49 (5.0)	530 (7.2)	36 (4.6)	531 (9.0)	15 (3.2)	567 (13.9)
Finland	24 (3.3)	554 (6.1)	42 (4.1)	551 (3.2)	34 (3.4)	553 (3.9)
Georgia	31 (2.4)	438 (4.5)	17 (2.4)	423 (9.5)	52 (2.5)	409 (4.7)
Ghana	19 (3.0)	359 (9.4)	13 (2.5)	329 (18.1)	68 (3.2)	285 (6.6)
Hong Kong SAR	88 (3.1)	536 (3.9)	9 (2.9)	518 (18.8)	3 (1.8)	573 (17.0)
Hungary	27 (2.4)	541 (6.9)	27 (3.1)	539 (4.7)	46 (2.4)	503 (3.8)
Indonesia	68 (4.1)	414 (6.2)	20 (4.1)	393 (9.1)	12 (3.0)	383 (11.3)
Iran, Islamic Rep. of	48 (3.4)	501 (6.2)	20 (2.7)	465 (7.0)	32 (3.4)	440 (5.9)
Israel	26 (3.0)	540 (7.1)	45 (4.0)	507 (8.1)	29 (3.2)	515 (7.3)
Italy	17 (2.7)	510 (6.6)	39 (3.4)	495 (4.8)	43 (3.7)	502 (3.9)
Japan	67 (3.2)	560 (3.0)	27 (3.4)	557 (3.5)	5 (1.8)	544 (18.4)
Jordan	26 (3.0)	461 (6.9)	31 (3.4)	454 (6.7)	42 (3.4)	441 (7.3)
Kazakhstan	26 (3.3)	514 (7.3)	21 (3.2)	485 (8.7)	53 (3.2)	480 (6.6)
Korea, Rep. of	87 (2.6)	562 (2.1)	10 (2.0)	550 (5.6)	3 (1.7)	531 (6.7)
Lebanon	21 (3.2)	434 (11.7)	37 (4.3)	399 (10.0)	42 (4.0)	393 (7.4)
Lithuania	31 (2.3)	540 (4.4)	19 (3.1)	513 (4.4)	50 (3.1)	498 (4.1)
Macedonia, Rep. of	21 (3.1)	444 (14.5)	36 (3.2)	411 (9.3)	43 (3.0)	388 (8.5)
Malaysia	18 (3.1)	446 (14.8)	49 (4.4)	431 (8.8)	33 (3.4)	407 (11.2)
Morocco	47 (2.7)	383 (3.2)	32 (2.9)	376 (4.2)	21 (2.5)	359 (4.7)
New Zealand	48 (5.0)	520 (7.8)	32 (4.7)	521 (7.2)	20 (3.1)	485 (8.6)
Norway	25 (2.0)	504 (5.0)	43 (3.2)	494 (4.2)	32 (2.8)	487 (3.9)
Oman	8 (1.2)	461 (9.2)	21 (2.8)	432 (8.6)	70 (3.0)	411 (3.6)
Palestinian Nat'l Auth.	22 (3.2)	422 (7.9)	35 (4.1)	412 (6.4)	43 (3.5)	426 (5.8)
Qatar	29 (0.7)	450 (9.0)	32 (0.5)	421 (6.0)	39 (0.3)	404 (4.2)
Romania	24 (2.8)	500 (7.2)	16 (2.9)	475 (5.6)	60 (2.8)	448 (5.3)
Russian Federation	48 (2.1)	553 (4.5)	20 (2.4)	544 (6.4)	31 (2.2)	525 (6.9)
Saudi Arabia	57 (3.2)	444 (5.2)	18 (2.8)	437 (8.3)	24 (3.0)	416 (8.1)
Singapore	100 (0.0)	590 (4.3)	0 (0.0)	~ ~	0 (0.0)	~ ~
Slovenia	13 (2.1)	554 (9.1)	21 (3.5)	539 (6.1)	66 (3.7)	543 (3.0)
Sweden	22 (3.6)	515 (7.5)	42 (4.4)	512 (4.4)	36 (4.5)	509 (4.8)
Syrian Arab Republic	26 (3.2)	432 (6.3)	26 (3.9)	423 (7.1)	47 (3.5)	424 (7.0)
Thailand	11 (2.6)	487 (14.6)	36 (3.5)	453 (6.6)	53 (3.5)	440 (5.3)
Tunisia	16 (2.8)	451 (8.1)	44 (3.4)	443 (2.8)	39 (3.5)	428 (3.8)
Turkey	54 (2.3)	492 (5.6)	21 (2.4)	488 (7.4)	25 (2.0)	459 (6.6)
Ukraine	31 (3.0)	527 (5.2)	18 (2.7)	499 (5.9)	52 (2.9)	486 (5.5)
United Arab Emirates	48 (2.4)	483 (4.6)	23 (2.0)	451 (4.2)	30 (2.3)	445 (4.1)
United States	30 (2.4)	511 (6.9)	43 (2.7)	531 (3.7)	27 (1.8)	535 (5.8)
International Avg.	37 (0.5)	492 (1.1)	28 (0.5)	473 (1.2)	35 (0.4)	463 (1.3)

() 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 5.2: School Location (Continued)

Country	Population Size of City, Town, or Area Where School Is Located					
	More than 100,000		15,001 to 100,000		15,000 or Fewer	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants						
Botswana	15 (2.6)	443 (9.9)	60 (3.9)	402 (4.7)	25 (3.5)	383 (5.9)
Honduras	24 (3.6)	393 (10.1)	27 (4.1)	369 (7.6)	49 (4.2)	355 (5.0)
South Africa	19 (2.5)	391 (14.0)	32 (3.1)	342 (7.0)	50 (3.3)	300 (6.5)
Benchmarking Participants						
Alberta, Canada	53 (3.7)	546 (3.4)	18 (3.3)	551 (4.5)	29 (3.2)	543 (4.5)
Ontario, Canada	63 (3.5)	522 (3.7)	20 (3.7)	523 (4.4)	17 (3.0)	518 (4.6)
Quebec, Canada	45 (3.5)	519 (4.6)	39 (4.0)	518 (3.6)	16 (2.4)	529 (7.9)
Abu Dhabi, UAE	43 (4.2)	484 (8.9)	26 (4.1)	438 (7.0)	31 (4.1)	450 (7.4)
Dubai, UAE	66 (0.4)	495 (3.8)	16 (0.4)	509 (5.1)	18 (0.2)	438 (3.8)
Alabama, US	10 (5.1)	497 (22.5)	42 (9.2)	482 (13.8)	48 (6.7)	485 (6.9)
California, US	41 (6.3)	484 (10.6)	53 (6.8)	509 (7.8)	7 (2.4)	503 (12.0)
Colorado, US	40 (6.4)	535 (8.5)	45 (7.3)	544 (7.5)	15 (3.0)	551 (14.9)
Connecticut, US	12 (2.9)	462 (9.8)	64 (5.6)	537 (8.4)	24 (5.0)	555 (13.2)
Florida, US	58 (5.1)	526 (13.5)	36 (4.8)	537 (10.6)	6 (3.4)	517 (23.6)
Indiana, US	17 (5.1)	506 (19.1)	51 (6.0)	540 (8.0)	32 (5.1)	538 (7.7)
Massachusetts, US	9 (2.9)	497 (16.1)	67 (6.5)	573 (7.0)	24 (5.7)	583 (8.3)
Minnesota, US	13 (4.5)	522 (25.5)	43 (5.6)	558 (7.5)	44 (5.6)	560 (6.2)
North Carolina, US	30 (4.6)	530 (15.6)	36 (7.9)	527 (9.9)	35 (6.9)	536 (13.5)

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

School Composition by Student Background

Ever since the Coleman report (Coleman, et al., 1966), researchers have recognized that the compositional characteristics of a school's student body can affect student achievement, and specifically that students from disadvantaged backgrounds typically have higher achievement if they attend schools in which the majority of students are from advantaged backgrounds. To provide information on this topic, TIMSS routinely asks school principals to report on two demographic characteristics of their schools:

- ◆ Economic home background; and
- ◆ Language home background.

Previous assessments have found both to be strongly related to average science achievement. For example, in TIMSS 2007 the science achievement of students attending schools with a higher proportion of economically advantaged students was higher than for those attending schools with large proportions of disadvantaged students. Also, science achievement was highest for students in schools where most students spoke the language of the TIMSS assessment as their first language, and was progressively lower as percentages of students not having the TIMSS language as their first language increased.

Exhibit 5.3 presents, for participants in the TIMSS 2011 fourth grade assessment, principals' economic categorizations of their schools according to three categories that are fully described on the second page of the exhibit. To summarize, the **More Affluent** schools had more than one-fourth of their students from affluent home backgrounds and not more than one-fourth from disadvantaged home backgrounds, and the **More Disadvantaged** schools had the reverse situation. The other schools were "in between." Across the fourth grade countries, students were distributed relatively equally across three types of schools. On average, across countries at the fourth grade, 36 percent of the students attended schools with relatively more affluent students than disadvantaged students, and students in these schools had the highest average achievement (505). At the other end of the range, 30 percent of the students attended schools with relatively more disadvantaged students than affluent students, and students in these schools had the lowest average achievement (463). Although this overall achievement pattern was observed in most countries and benchmarking participants, there was a wide variation among participants in the percentages of students attending the three different economic categories of schools.

Exhibit 5.4 presents the results for school composition by student economic background for participants in the TIMSS 2011 eighth grade assessment. Similar to the fourth grade assessment, internationally students were distributed relatively equally across three categories of schools, with 32 percent of the eighth grade students attending schools with relatively more affluent than disadvantaged students and 36 percent attending schools with relatively more disadvantaged than affluent students. Again, the percentages of students in each school category varied considerably across countries. Also similar to the fourth grade assessment, average science achievement was highest among the eighth grade students attending schools with relatively more affluent students than disadvantaged students (501), and lowest among students attending schools with relatively more disadvantaged students (458).

Exhibit 5.5 presents, for participants in the fourth grade assessment, principals' reports of the percentage of students in their schools who had the language of the TIMSS 2011 test as their native language. Approximately three-fourths of the fourth grade students (73%) were in schools where almost all students (more than 90%) spoke the language of the TIMSS test as their native language, 15 percent were in schools where the majority of students (51–90%) were native speakers of the TIMSS test language, and 13 percent were in schools where half the students (or less) spoke the language of the test as their native language. Among countries participating at the sixth grade, Botswana was notable for having almost all students (92%) in schools in which 50 percent or fewer of students had the language of the TIMSS test as their native language. On average across the fourth grade countries, science achievement was highest among students in schools where almost all students had the language of the TIMSS test as their native language (488). Achievement was next highest in schools where 51–90% of students had the language of the TIMSS test as their native language (477), and was lowest in schools where half the students or less had the language of the TIMSS test as their native language (457). Among countries participating at the sixth grade, Botswana was notable for having almost all students (92%) in schools with half or less native speakers.

Exhibit 5.6 presents, for participants in the eighth grade assessment, principals' reports of the percentage of students in their schools who had the language of the TIMSS 2011 test as their native language. Similar to the fourth grade results, across countries, the majority of eighth grade students (69%) were in schools where almost all students (more than 90%) spoke the language of the TIMSS test as their native language, 13 percent were in schools where the

Exhibit 5.3: School Composition by Student Economic Background
Reported by Principals

Country	More Affluent - Schools Where More than 25% of Students Come from Economically Affluent Homes and Not More than 25% from Economically Disadvantaged Homes		Neither More Affluent nor More Disadvantaged		More Disadvantaged - Schools Where More than 25% of Students Come from Economically Disadvantaged Homes and Not More than 25% from Economically Affluent homes	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	38 (3.9)	423 (6.1)	20 (3.3)	418 (8.7)	42 (4.0)	408 (5.8)
Australia	32 (3.9)	542 (4.5)	41 (4.0)	518 (4.2)	27 (3.4)	486 (5.7)
Austria	31 (4.0)	540 (3.8)	48 (3.8)	538 (3.0)	21 (3.9)	502 (6.3)
Azerbaijan	r 11 (2.5)	452 (15.4)	32 (4.7)	455 (14.4)	57 (4.9)	431 (8.7)
Bahrain	r 46 (6.1)	465 (6.0)	35 (5.7)	444 (7.8)	19 (3.7)	421 (14.9)
Belgium (Flemish)	r 64 (4.6)	516 (1.9)	26 (4.2)	503 (4.5)	10 (2.6)	483 (10.1)
Chile	r 11 (2.2)	530 (8.7)	33 (4.6)	505 (4.7)	57 (4.2)	465 (3.9)
Chinese Taipei	r 22 (3.3)	561 (4.8)	67 (3.5)	554 (2.7)	11 (2.0)	519 (7.1)
Croatia	r 38 (4.0)	522 (2.9)	38 (4.2)	514 (3.2)	24 (3.2)	514 (4.8)
Czech Republic	r 37 (3.7)	541 (3.9)	46 (4.4)	539 (2.8)	17 (3.1)	513 (6.9)
Denmark	r 60 (3.9)	537 (3.4)	31 (3.9)	528 (4.1)	9 (2.5)	504 (11.8)
England	r 34 (4.8)	561 (6.7)	29 (4.5)	528 (5.8)	36 (4.2)	507 (5.4)
Finland	r 43 (4.2)	577 (3.5)	47 (4.3)	570 (3.5)	10 (2.6)	545 (6.3)
Georgia	r 16 (3.0)	468 (8.9)	41 (4.3)	461 (6.8)	43 (4.0)	448 (5.7)
Germany	r 21 (2.8)	542 (3.7)	53 (3.7)	539 (3.6)	26 (3.3)	496 (5.4)
Hong Kong SAR	r 21 (3.5)	537 (13.5)	29 (4.5)	541 (6.1)	50 (4.7)	535 (4.7)
Hungary	r 21 (3.6)	573 (5.9)	31 (4.3)	554 (5.0)	48 (4.0)	508 (6.3)
Iran, Islamic Rep. of	r 27 (3.6)	489 (9.3)	27 (4.1)	458 (8.5)	46 (4.2)	429 (5.6)
Ireland	r 39 (4.5)	536 (4.7)	30 (3.8)	518 (7.3)	31 (3.7)	485 (5.5)
Italy	r 37 (3.8)	524 (5.3)	43 (3.7)	527 (3.6)	20 (2.9)	512 (6.7)
Japan	r 46 (4.3)	562 (3.0)	45 (4.4)	557 (2.3)	9 (2.6)	545 (8.0)
Kazakhstan	r 73 (3.6)	497 (5.5)	19 (3.4)	483 (12.6)	8 (2.3)	501 (30.0)
Korea, Rep. of	r 17 (3.7)	608 (5.0)	62 (4.7)	587 (2.0)	21 (3.2)	571 (3.3)
Kuwait	r 57 (3.7)	360 (7.3)	28 (3.8)	326 (10.6)	15 (3.2)	323 (12.2)
Lithuania	r 19 (3.3)	539 (5.9)	43 (4.6)	519 (4.1)	38 (3.5)	501 (3.4)
Malta	r 47 (0.1)	454 (2.3)	43 (0.1)	443 (2.8)	10 (0.1)	397 (5.5)
Morocco	s 12 (2.1)	315 (19.9)	13 (2.9)	260 (16.1)	75 (2.9)	254 (7.3)
Netherlands	r 70 (5.2)	539 (2.4)	21 (5.0)	529 (5.4)	9 (2.5)	497 (8.9)
New Zealand	r 33 (3.0)	532 (3.6)	41 (3.3)	498 (3.1)	26 (2.8)	454 (5.4)
Northern Ireland	r 36 (4.7)	541 (4.2)	38 (4.3)	515 (3.8)	26 (3.8)	484 (7.1)
Norway	r 53 (5.2)	498 (3.0)	44 (5.2)	490 (3.7)	3 (1.3)	469 (13.7)
Oman	r 44 (3.4)	385 (5.5)	25 (2.9)	363 (7.2)	31 (2.9)	366 (9.8)
Poland	r 8 (2.1)	517 (10.9)	61 (3.8)	511 (3.4)	31 (3.7)	491 (4.3)
Portugal	r 31 (4.6)	531 (4.8)	39 (5.1)	530 (5.4)	31 (4.9)	499 (7.2)
Qatar	r 68 (3.0)	392 (6.3)	21 (2.3)	414 (6.6)	11 (1.9)	319 (15.9)
Romania	r 19 (3.1)	549 (9.9)	24 (4.0)	510 (10.6)	57 (4.8)	494 (8.3)
Russian Federation	r 58 (3.2)	563 (4.5)	29 (3.3)	540 (6.0)	13 (2.1)	537 (10.1)
Saudi Arabia	r 42 (4.7)	447 (11.5)	30 (4.3)	437 (6.6)	29 (4.0)	403 (12.9)
Serbia	r 18 (3.6)	521 (6.8)	37 (4.3)	515 (5.4)	45 (4.4)	515 (4.6)
Singapore	r 40 (0.0)	610 (5.5)	50 (0.0)	569 (4.9)	10 (0.0)	556 (14.2)
Slovak Republic	r 24 (3.3)	550 (4.4)	56 (3.4)	538 (3.4)	20 (3.2)	486 (12.3)
Slovenia	r 42 (4.0)	523 (4.5)	40 (4.0)	522 (3.2)	18 (3.0)	511 (8.7)
Spain	r 51 (4.1)	516 (4.0)	31 (3.7)	509 (4.8)	18 (3.2)	474 (7.0)
Sweden	r 77 (4.1)	541 (3.3)	17 (4.1)	516 (7.8)	7 (1.5)	479 (8.1)
Thailand	r 18 (3.8)	525 (12.4)	17 (3.3)	497 (11.5)	65 (4.2)	454 (7.5)
Tunisia	r 30 (3.4)	374 (7.8)	27 (3.9)	357 (11.2)	43 (4.3)	313 (7.1)
Turkey	r 14 (2.3)	527 (8.1)	24 (3.0)	477 (11.8)	63 (3.4)	442 (5.4)
United Arab Emirates	r 68 (2.2)	429 (3.9)	20 (1.6)	435 (5.5)	12 (1.7)	400 (6.6)
United States	r 19 (2.2)	581 (5.8)	31 (2.5)	560 (3.5)	50 (2.6)	523 (2.8)
Yemen	r 8 (2.9)	283 (14.4)	12 (3.5)	241 (18.6)	81 (4.3)	194 (8.9)
International Avg.	36 (0.5)	505 (1.0)	35 (0.6)	489 (1.0)	30 (0.5)	463 (1.3)

() 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 5.3: School Composition by Student Economic Background (Continued)

Country	More Affluent - Schools Where More than 25% of Students Come from Economically Affluent Homes and Not More than 25% from Economically Disadvantaged Homes		Neither More Affluent nor More Disadvantaged		More Disadvantaged - Schools Where More than 25% of Students Come from Economically Disadvantaged Homes and Not More than 25% from Economically Affluent homes	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants						
Botswana	32 (3.6)	416 (10.6)	25 (4.0)	349 (12.9)	43 (4.3)	328 (6.7)
Honduras	r 16 (4.0)	507 (17.1)	13 (3.8)	409 (18.4)	71 (4.9)	426 (5.9)
Yemen	r 7 (2.9)	412 (9.4)	13 (3.2)	363 (21.7)	80 (3.6)	340 (8.9)
Benchmarking Participants						
Alberta, Canada	37 (4.3)	550 (3.9)	51 (4.5)	542 (3.2)	12 (2.8)	517 (10.1)
Ontario, Canada	36 (4.4)	541 (4.9)	36 (4.3)	532 (3.6)	28 (4.4)	508 (5.1)
Quebec, Canada	60 (4.1)	521 (2.9)	25 (4.0)	512 (6.2)	15 (2.7)	502 (6.2)
Abu Dhabi, UAE	s 75 (4.5)	409 (7.9)	12 (3.2)	421 (20.6)	13 (3.5)	387 (8.9)
Dubai, UAE	r 67 (0.4)	457 (3.2)	22 (0.3)	485 (5.3)	11 (0.2)	396 (5.2)
Florida, US	r 11 (4.4)	595 (12.5)	20 (4.7)	567 (12.2)	69 (4.6)	529 (3.6)
North Carolina, US	r 21 (6.0)	574 (8.2)	16 (5.3)	531 (5.8)	64 (7.5)	531 (7.1)

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

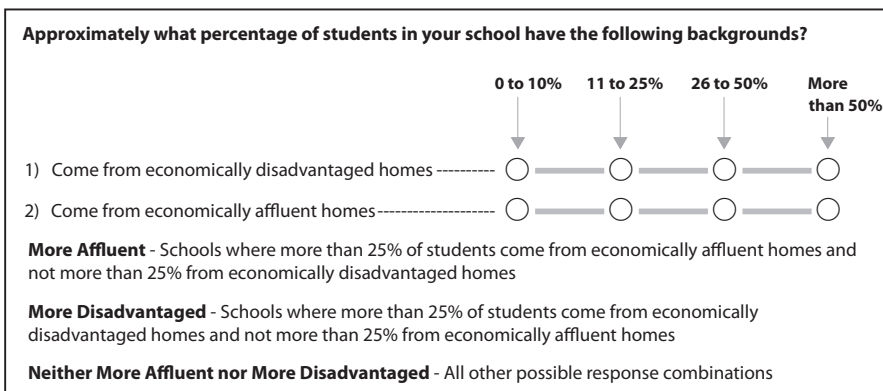


Exhibit 5.4: School Composition by Student Economic Background

Reported by Principals

Country	More Affluent - Schools Where More than 25% of Students Come from Economically Affluent Homes and Not More than 25% from Economically Disadvantaged Homes		Neither More Affluent nor More Disadvantaged		More Disadvantaged - Schools Where More than 25% of Students Come from Economically Disadvantaged Homes and Not More than 25% from Economically Affluent homes	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	35 (3.7)	454 (7.2)	24 (3.6)	428 (6.9)	41 (3.7)	427 (5.0)
Australia	32 (3.4)	553 (9.7)	39 (3.7)	521 (5.5)	29 (3.1)	493 (7.9)
Bahrain	45 (0.3)	457 (3.1)	28 (0.2)	456 (2.7)	27 (0.3)	444 (3.7)
Chile	r 12 (2.3)	514 (11.4)	32 (4.1)	483 (5.4)	56 (3.9)	445 (4.2)
Chinese Taipei	17 (2.7)	592 (5.6)	69 (3.8)	560 (2.8)	14 (2.9)	544 (9.8)
England	28 (4.1)	578 (8.9)	50 (4.5)	527 (8.2)	22 (4.3)	512 (10.1)
Finland	r 30 (3.4)	555 (3.7)	67 (3.8)	553 (3.2)	3 (1.5)	526 (5.4)
Georgia	11 (2.0)	425 (11.3)	44 (4.4)	425 (5.2)	45 (4.2)	410 (5.6)
Ghana	7 (2.0)	385 (17.0)	18 (3.4)	305 (14.1)	75 (3.6)	293 (6.6)
Hong Kong SAR	11 (3.0)	567 (10.9)	37 (5.1)	551 (8.6)	53 (4.8)	517 (6.4)
Hungary	16 (2.7)	550 (6.5)	33 (4.1)	544 (4.1)	50 (4.3)	500 (5.0)
Indonesia	16 (3.3)	439 (9.5)	28 (4.6)	418 (7.7)	56 (4.6)	392 (6.7)
Iran, Islamic Rep. of	20 (2.7)	523 (9.6)	25 (3.5)	487 (8.0)	54 (3.8)	452 (5.3)
Israel	28 (3.5)	551 (7.4)	30 (4.5)	526 (7.1)	42 (3.9)	485 (7.9)
Italy	40 (3.7)	518 (3.8)	47 (3.9)	499 (4.0)	13 (2.6)	462 (8.6)
Japan	46 (4.4)	566 (4.0)	44 (4.5)	555 (3.4)	10 (2.9)	540 (7.9)
Jordan	r 32 (3.5)	474 (6.8)	25 (2.9)	449 (9.9)	43 (3.9)	431 (7.5)
Kazakhstan	75 (3.5)	493 (4.8)	20 (3.4)	487 (9.9)	5 (1.8)	466 (28.0)
Korea, Rep. of	18 (3.3)	589 (4.0)	51 (4.3)	559 (2.1)	32 (3.9)	545 (3.6)
Lebanon	r 21 (4.1)	466 (11.2)	34 (4.2)	413 (11.2)	45 (5.0)	387 (7.6)
Lithuania	23 (3.6)	545 (6.5)	39 (4.4)	509 (4.0)	38 (4.0)	502 (4.3)
Macedonia, Rep. of	r 38 (3.6)	443 (8.2)	30 (4.1)	409 (10.4)	32 (3.9)	383 (10.7)
Malaysia	26 (3.2)	458 (12.0)	23 (3.3)	440 (13.1)	52 (4.1)	408 (10.4)
Morocco	r 6 (1.4)	416 (14.0)	13 (2.5)	396 (9.0)	81 (2.9)	367 (2.8)
New Zealand	30 (5.6)	542 (4.9)	47 (5.8)	516 (7.0)	24 (4.0)	472 (10.7)
Norway	--	--	--	--	--	--
Oman	43 (3.1)	440 (5.0)	26 (2.6)	413 (6.5)	31 (3.1)	395 (7.0)
Palestinian Nat'l Auth.	44 (4.2)	426 (6.0)	23 (3.9)	419 (9.2)	33 (3.7)	411 (6.8)
Qatar	r 81 (0.2)	412 (4.3)	16 (0.2)	466 (12.5)	3 (0.1)	425 (3.6)
Romania	18 (2.9)	478 (9.8)	29 (4.2)	475 (6.1)	52 (4.3)	456 (5.3)
Russian Federation	58 (3.5)	555 (4.7)	25 (2.8)	532 (3.8)	16 (3.1)	518 (9.4)
Saudi Arabia	r 40 (4.4)	446 (6.1)	30 (4.4)	437 (8.6)	29 (4.1)	427 (7.5)
Singapore	27 (0.0)	631 (6.9)	61 (0.0)	581 (5.7)	11 (0.0)	538 (13.6)
Slovenia	40 (3.8)	548 (4.8)	45 (4.3)	545 (3.2)	15 (2.7)	524 (7.4)
Sweden	r 74 (4.4)	518 (3.3)	21 (4.1)	494 (7.4)	5 (1.8)	479 (15.1)
Syrian Arab Republic	r 37 (4.2)	431 (6.4)	27 (4.3)	438 (9.0)	36 (4.4)	417 (6.6)
Thailand	20 (3.0)	485 (12.1)	24 (3.6)	461 (9.2)	57 (4.4)	435 (5.4)
Tunisia	23 (3.3)	449 (7.8)	29 (3.3)	446 (3.8)	48 (3.5)	428 (2.6)
Turkey	17 (2.6)	550 (10.5)	25 (3.3)	484 (5.2)	59 (3.8)	463 (4.6)
Ukraine	13 (2.7)	509 (12.0)	29 (3.9)	506 (6.8)	59 (4.5)	494 (4.5)
United Arab Emirates	r 70 (2.0)	468 (3.6)	17 (1.9)	450 (7.3)	13 (1.4)	446 (6.2)
United States	22 (1.9)	560 (4.9)	23 (1.9)	542 (5.6)	55 (1.9)	505 (3.5)
International Avg.	32 (0.5)	501 (1.3)	33 (0.6)	481 (1.2)	36 (0.5)	458 (1.3)

() 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 5.4: School Composition by Student Economic Background (Continued)

Country	More Affluent - Schools Where More than 25% of Students Come from Economically Affluent Homes and Not More than 25% from Economically Disadvantaged Homes		Neither More Affluent nor More Disadvantaged		More Disadvantaged - Schools Where More than 25% of Students Come from Economically Disadvantaged Homes and Not More than 25% from Economically Affluent homes	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants						
Botswana	13 (3.0)	452 (12.0)	24 (4.0)	410 (6.7)	63 (4.6)	388 (4.2)
Honduras	5 (1.6)	422 (14.5)	14 (3.4)	391 (12.4)	82 (3.6)	363 (5.0)
South Africa	8 (1.3)	502 (17.0)	12 (2.6)	336 (21.0)	80 (2.7)	317 (4.9)
Benchmarking Participants						
Alberta, Canada	39 (4.1)	556 (3.9)	43 (4.8)	545 (3.4)	18 (3.8)	526 (5.5)
Ontario, Canada	37 (4.1)	531 (5.0)	36 (4.7)	522 (3.6)	27 (4.5)	509 (4.7)
Quebec, Canada	51 (4.1)	529 (4.4)	32 (3.8)	515 (5.7)	17 (3.5)	501 (6.4)
Abu Dhabi, UAE	76 (4.1)	465 (6.4)	17 (3.6)	443 (9.2)	7 (2.4)	455 (16.0)
Dubai, UAE	71 (0.3)	492 (3.6)	12 (0.2)	459 (5.0)	16 (0.2)	439 (5.9)
Alabama, US	17 (4.4)	508 (18.2)	5 (3.4)	500 (45.1)	78 (5.6)	476 (7.1)
California, US	16 (4.2)	551 (10.5)	20 (5.2)	544 (11.4)	64 (5.4)	470 (6.0)
Colorado, US	21 (5.7)	546 (7.7)	34 (6.6)	553 (10.3)	46 (7.4)	524 (11.4)
Connecticut, US	43 (6.1)	579 (7.0)	27 (6.1)	543 (9.3)	30 (5.9)	471 (10.6)
Florida, US	6 (3.4)	522 (24.3)	37 (5.6)	552 (10.9)	58 (6.0)	513 (11.0)
Indiana, US	13 (4.5)	581 (6.5)	29 (5.3)	540 (10.0)	58 (5.9)	520 (6.6)
Massachusetts, US	29 (6.8)	599 (7.6)	45 (6.6)	575 (8.5)	26 (4.2)	510 (14.9)
Minnesota, US	18 (3.2)	583 (13.2)	45 (7.1)	555 (5.5)	37 (7.6)	540 (11.0)
North Carolina, US	14 (5.6)	556 (15.4)	23 (6.4)	545 (12.2)	63 (6.7)	514 (9.4)

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

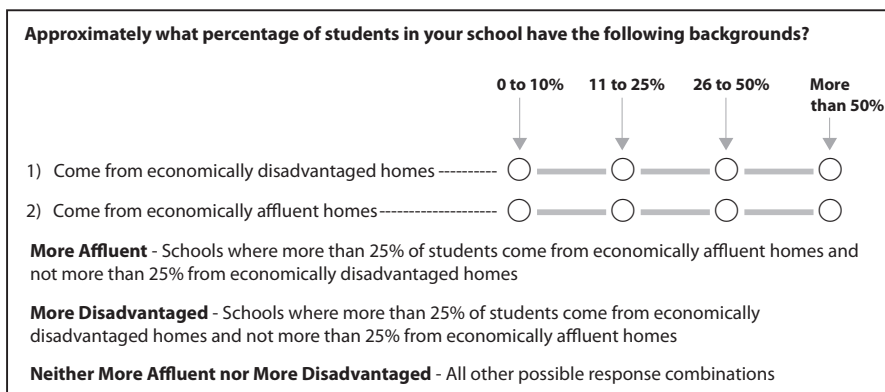


Exhibit 5.5: Schools with Students Having the Language of the Test as Their Native Language

Reported by Principals

Country	More than 90% of Students		51–90% of Students		50% of Students or Less	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	95 (1.6)	415 (3.9)	5 (1.6)	433 (18.8)	0 (0.0)	~ ~
Australia	63 (3.8)	523 (3.2)	21 (2.8)	508 (7.1)	16 (3.1)	502 (9.7)
Austria	33 (4.1)	549 (3.5)	52 (4.7)	530 (3.8)	16 (1.9)	499 (8.1)
Azerbaijan	90 (2.6)	438 (5.3)	5 (1.9)	436 (22.8)	4 (1.8)	440 (54.6)
Bahrain	65 (3.8)	443 (4.1)	13 (2.3)	444 (13.0)	22 (3.0)	458 (10.4)
Belgium (Flemish)	52 (3.7)	522 (2.0)	36 (4.1)	502 (2.9)	12 (2.3)	479 (8.7)
Chile	99 (0.9)	483 (2.6)	1 (0.8)	~ ~	0 (0.0)	~ ~
Chinese Taipei	49 (3.8)	557 (3.0)	36 (3.8)	548 (3.5)	15 (2.6)	542 (7.5)
Croatia	95 (1.7)	518 (2.0)	3 (1.2)	492 (9.4)	1 (1.1)	~ ~
Czech Republic	96 (1.5)	538 (2.3)	2 (1.1)	~ ~	1 (1.0)	~ ~
Denmark	r 95 (1.6)	531 (3.0)	4 (1.5)	525 (17.7)	1 (0.6)	~ ~
England	56 (4.7)	532 (4.3)	22 (4.4)	527 (11.2)	22 (4.6)	520 (7.9)
Finland	85 (3.2)	572 (2.5)	15 (3.1)	558 (5.8)	1 (0.8)	~ ~
Georgia	92 (2.3)	455 (3.7)	7 (2.0)	470 (13.0)	1 (1.1)	~ ~
Germany	49 (2.9)	539 (2.5)	37 (2.8)	527 (4.2)	13 (2.4)	497 (8.0)
Hong Kong SAR	94 (1.2)	541 (2.9)	3 (1.6)	440 (83.1)	3 (1.1)	447 (75.4)
Hungary	96 (1.5)	536 (3.9)	3 (1.4)	524 (35.2)	1 (0.0)	~ ~
Iran, Islamic Rep. of	48 (3.4)	487 (4.9)	15 (3.5)	449 (9.1)	37 (2.9)	411 (6.2)
Ireland	64 (3.6)	525 (4.4)	33 (3.9)	505 (5.3)	3 (1.7)	474 (20.1)
Italy	64 (3.7)	526 (3.5)	30 (3.3)	521 (4.3)	6 (1.9)	508 (9.6)
Japan	99 (0.8)	559 (2.0)	1 (0.0)	~ ~	0 (0.0)	~ ~
Kazakhstan	56 (3.7)	478 (7.3)	30 (3.6)	512 (8.6)	14 (2.8)	522 (13.8)
Korea, Rep. of	100 (0.0)	587 (2.0)	0 (0.0)	~ ~	0 (0.0)	~ ~
Kuwait	93 (2.1)	347 (5.0)	6 (1.9)	356 (21.8)	2 (0.8)	~ ~
Lithuania	88 (2.5)	516 (2.8)	8 (1.5)	520 (5.7)	4 (2.0)	479 (22.9)
Malta	6 (0.1)	498 (7.1)	12 (0.1)	487 (4.3)	82 (0.1)	439 (2.2)
Morocco	60 (4.1)	273 (7.1)	13 (2.3)	260 (13.1)	27 (4.1)	242 (9.6)
Netherlands	r 75 (4.3)	536 (2.5)	15 (3.7)	529 (7.7)	10 (2.8)	505 (7.5)
New Zealand	58 (3.5)	507 (3.5)	25 (3.1)	498 (5.8)	17 (2.5)	469 (8.5)
Northern Ireland	88 (3.1)	518 (3.4)	7 (2.4)	510 (7.8)	4 (1.9)	511 (11.5)
Norway	64 (4.5)	495 (2.7)	29 (4.6)	492 (4.3)	8 (2.9)	492 (13.6)
Oman	85 (1.9)	374 (5.3)	10 (1.8)	358 (10.5)	5 (1.2)	338 (15.3)
Poland	100 (0.0)	505 (2.6)	0 (0.0)	~ ~	0 (0.0)	~ ~
Portugal	92 (1.9)	524 (4.2)	6 (1.5)	489 (11.8)	2 (1.0)	~ ~
Qatar	r 40 (3.2)	378 (7.7)	9 (2.6)	456 (30.5)	51 (3.2)	431 (5.6)
Romania	88 (2.5)	506 (6.6)	8 (2.3)	498 (14.1)	4 (1.7)	506 (20.0)
Russian Federation	73 (3.7)	554 (3.5)	17 (2.8)	550 (5.6)	9 (2.3)	550 (14.4)
Saudi Arabia	88 (2.3)	432 (6.2)	8 (2.2)	402 (14.7)	5 (1.4)	414 (14.5)
Serbia	89 (3.1)	516 (3.6)	10 (2.9)	513 (9.7)	2 (1.0)	~ ~
Singapore	2 (0.0)	~ ~	32 (0.0)	601 (5.3)	65 (0.0)	572 (4.7)
Slovak Republic	89 (2.4)	535 (3.7)	7 (2.2)	521 (21.5)	4 (1.3)	479 (18.6)
Slovenia	70 (2.8)	524 (3.2)	28 (2.9)	513 (4.8)	2 (0.9)	~ ~
Spain	60 (2.8)	513 (4.0)	24 (3.0)	504 (4.3)	16 (2.5)	483 (5.4)
Sweden	56 (3.6)	545 (3.5)	29 (3.2)	532 (5.0)	15 (2.9)	487 (9.6)
Thailand	84 (3.3)	483 (4.8)	4 (1.9)	404 (13.4)	13 (3.3)	415 (20.3)
Tunisia	75 (3.3)	351 (6.4)	5 (2.0)	338 (15.8)	20 (2.6)	332 (13.3)
Turkey	78 (2.5)	473 (5.0)	7 (1.8)	473 (10.0)	15 (2.2)	402 (12.2)
United Arab Emirates	47 (1.4)	402 (3.4)	8 (0.8)	450 (10.2)	45 (1.4)	446 (4.1)
United States	55 (2.5)	558 (3.0)	30 (2.1)	538 (4.0)	15 (2.1)	515 (4.9)
Yemen	92 (2.2)	208 (8.3)	3 (1.2)	207 (13.8)	5 (2.0)	192 (34.8)
International Avg.	73 (0.4)	488 (0.6)	15 (0.4)	477 (2.6)	13 (0.3)	457 (3.4)

() 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 5.5: Schools with Students Having the Language of the Test as Their Native Language (Continued)

Country	More than 90% of Students		51–90% of Students		50% of Students or Less	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants						
Botswana	5 (1.9)	324 (21.1)	4 (1.7)	438 (49.7)	92 (2.5)	367 (6.0)
Honduras	95 (2.2)	435 (6.2)	3 (1.3)	388 (15.9)	2 (1.7)	~ ~
Yemen	92 (2.4)	346 (7.7)	4 (1.7)	304 (34.3)	4 (2.0)	345 (47.3)
Benchmarking Participants						
Alberta, Canada	56 (4.2)	545 (3.6)	33 (4.2)	541 (3.7)	11 (2.6)	528 (8.4)
Ontario, Canada	50 (3.9)	531 (4.0)	28 (3.9)	535 (5.7)	22 (3.2)	513 (7.0)
Quebec, Canada	69 (3.8)	517 (3.1)	20 (3.2)	520 (4.9)	11 (2.4)	506 (6.8)
Abu Dhabi, UAE	59 (2.5)	386 (5.6)	3 (1.5)	455 (41.7)	38 (2.6)	436 (9.1)
Dubai, UAE	15 (0.2)	427 (5.2)	15 (0.4)	468 (4.1)	69 (0.4)	467 (2.9)
Florida, US	43 (6.2)	552 (6.1)	33 (5.9)	547 (7.7)	24 (5.6)	524 (6.1)
North Carolina, US	61 (7.9)	544 (6.7)	34 (8.1)	535 (10.2)	5 (3.6)	531 (25.2)

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

Exhibit 5.6: Schools with Students Having the Language of the Test as Their Native Language

Reported by Principals

Country	More than 90% of Students		51–90% of Students		50% of Students or Less	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	95 (1.6)	436 (3.2)	5 (1.6)	457 (12.4)	0 (0.0)	~ ~
Australia	65 (3.6)	520 (6.1)	25 (3.2)	527 (9.3)	10 (2.2)	522 (10.7)
Bahrain	76 (0.2)	442 (2.3)	9 (0.1)	450 (5.4)	14 (0.2)	512 (3.8)
Chile	99 (0.5)	463 (2.8)	1 (0.0)	~ ~	0 (0.2)	~ ~
Chinese Taipei	62 (4.0)	566 (3.2)	23 (3.1)	563 (5.5)	15 (2.9)	555 (8.9)
England	66 (3.9)	543 (6.4)	21 (3.2)	524 (13.6)	13 (2.9)	504 (15.5)
Finland	87 (3.1)	553 (2.6)	13 (3.1)	546 (5.6)	0 (0.0)	~ ~
Georgia	94 (1.7)	421 (3.2)	6 (1.6)	419 (10.4)	0 (0.0)	~ ~
Ghana	0 (0.0)	~ ~	2 (1.6)	~ ~	98 (1.6)	300 (5.4)
Hong Kong SAR	49 (4.4)	522 (5.5)	3 (1.7)	475 (25.7)	48 (4.3)	549 (6.7)
Hungary	98 (1.1)	522 (3.2)	2 (1.1)	~ ~	0 (0.1)	~ ~
Indonesia	23 (3.8)	416 (13.1)	33 (4.4)	393 (8.0)	43 (3.9)	409 (5.1)
Iran, Islamic Rep. of	50 (2.7)	503 (4.9)	10 (2.0)	448 (7.5)	40 (2.8)	446 (4.5)
Israel	64 (4.0)	517 (5.2)	25 (3.6)	510 (9.4)	11 (2.5)	541 (14.9)
Italy	64 (3.5)	502 (3.3)	31 (3.2)	506 (3.9)	5 (1.5)	467 (14.4)
Japan	98 (1.3)	558 (2.5)	0 (0.0)	~ ~	2 (1.3)	~ ~
Jordan	93 (1.9)	452 (3.8)	4 (1.3)	461 (15.8)	3 (1.3)	368 (58.1)
Kazakhstan	53 (3.6)	470 (5.6)	33 (3.6)	505 (7.5)	14 (3.1)	529 (11.8)
Korea, Rep. of	100 (0.0)	560 (2.0)	0 (0.0)	~ ~	0 (0.0)	~ ~
Lebanon	6 (2.1)	404 (26.9)	8 (2.5)	428 (15.9)	87 (3.1)	404 (5.4)
Lithuania	91 (2.0)	514 (2.8)	6 (1.3)	528 (7.7)	4 (1.6)	479 (30.7)
Macedonia, Rep. of	71 (3.4)	414 (7.2)	19 (3.2)	400 (9.8)	10 (1.9)	389 (18.5)
Malaysia	40 (3.3)	429 (9.7)	24 (3.2)	412 (13.2)	36 (3.6)	433 (11.5)
Morocco	75 (2.9)	378 (2.6)	12 (2.2)	375 (7.7)	13 (2.0)	367 (5.8)
New Zealand	64 (5.2)	518 (4.6)	28 (4.3)	508 (10.6)	9 (3.4)	498 (20.5)
Norway	73 (3.7)	496 (2.9)	21 (3.7)	499 (4.8)	6 (2.1)	465 (15.3)
Oman	84 (1.9)	415 (3.6)	5 (0.9)	425 (13.2)	11 (1.7)	460 (8.7)
Palestinian Nat'l Auth.	96 (1.7)	422 (3.4)	3 (1.6)	398 (19.0)	1 (0.6)	~ ~
Qatar	46 (0.6)	390 (5.1)	5 (1.1)	521 (21.7)	49 (1.0)	431 (4.6)
Romania	90 (2.5)	464 (3.7)	6 (1.8)	461 (13.8)	4 (1.7)	485 (14.4)
Russian Federation	74 (3.9)	544 (3.4)	17 (2.9)	543 (8.9)	9 (2.4)	530 (9.1)
Saudi Arabia	89 (2.4)	437 (4.2)	7 (2.0)	435 (12.6)	3 (1.4)	424 (11.4)
Singapore	7 (0.0)	663 (8.5)	15 (0.0)	611 (11.0)	77 (0.0)	579 (5.1)
Slovenia	72 (3.9)	546 (2.5)	26 (3.8)	541 (6.7)	2 (1.0)	~ ~
Sweden	53 (4.5)	522 (3.2)	36 (4.6)	500 (5.5)	11 (2.8)	497 (11.9)
Syrian Arab Republic	90 (2.8)	429 (4.2)	9 (2.7)	407 (14.3)	1 (0.6)	~ ~
Thailand	89 (2.3)	454 (4.1)	2 (0.9)	~ ~	9 (2.4)	427 (10.9)
Tunisia	91 (2.0)	438 (2.6)	7 (1.7)	447 (11.5)	3 (1.3)	453 (6.1)
Turkey	80 (2.1)	491 (4.3)	7 (1.9)	481 (9.7)	13 (2.0)	432 (8.5)
Ukraine	76 (3.7)	502 (4.2)	18 (3.4)	497 (6.7)	6 (2.0)	499 (14.4)
United Arab Emirates	56 (1.7)	444 (2.9)	8 (1.1)	489 (11.3)	36 (1.6)	489 (4.4)
United States	65 (1.8)	537 (3.6)	23 (1.9)	517 (5.5)	12 (1.4)	482 (7.8)
International Avg.	69 (0.4)	483 (1.0)	13 (0.4)	478 (1.9)	17 (0.3)	466 (2.8)

() 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 5.6: Schools with Students Having the Language of the Test as Their Native Language (Continued)

Country	More than 90% of Students		51–90% of Students		50% of Students or Less	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants						
Botswana	4 (1.8)	377 (11.1)	1 (0.7)	~ ~	95 (2.0)	404 (3.6)
Honduras	97 (1.8)	370 (4.3)	2 (1.7)	~ ~	1 (0.4)	~ ~
South Africa	7 (1.3)	462 (13.5)	7 (1.4)	446 (17.6)	85 (1.7)	314 (4.5)
Benchmarking Participants						
Alberta, Canada	51 (4.2)	550 (3.2)	36 (4.2)	546 (4.0)	13 (3.3)	530 (5.4)
Ontario, Canada	51 (3.6)	525 (3.0)	27 (3.1)	520 (5.3)	22 (3.0)	515 (6.4)
Quebec, Canada	66 (3.8)	524 (3.1)	24 (3.2)	523 (7.4)	11 (2.4)	491 (6.7)
Abu Dhabi, UAE	67 (2.6)	444 (4.3)	4 (1.6)	486 (25.9)	30 (2.5)	496 (9.4)
Dubai, UAE	24 (0.3)	442 (3.8)	12 (0.3)	533 (9.5)	64 (0.4)	493 (3.4)
Alabama, US	r 84 (6.0)	489 (8.9)	10 (4.9)	486 (12.0)	6 (3.7)	460 (22.0)
California, US	r 14 (5.8)	545 (15.3)	47 (6.0)	511 (6.6)	38 (5.7)	466 (8.8)
Colorado, US	45 (5.1)	566 (6.7)	39 (5.5)	532 (8.4)	16 (5.3)	502 (20.9)
Connecticut, US	r 73 (4.5)	555 (6.9)	21 (4.3)	488 (15.3)	6 (3.7)	453 (45.9)
Florida, US	43 (6.5)	530 (10.2)	47 (6.6)	537 (11.2)	9 (4.2)	478 (24.6)
Indiana, US	r 85 (5.2)	538 (6.4)	15 (5.2)	513 (17.2)	0 (0.0)	~ ~
Massachusetts, US	76 (3.8)	586 (5.2)	10 (3.9)	536 (21.2)	14 (4.5)	484 (16.1)
Minnesota, US	67 (6.5)	559 (5.2)	28 (6.2)	549 (7.2)	5 (3.6)	513 (104.9)
North Carolina, US	69 (6.1)	543 (10.0)	27 (5.6)	506 (7.8)	3 (2.4)	531 (60.1)

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

majority of students (51–90%) were native speakers of the TIMSS test language, and 17 percent were in schools where half the students (or less) spoke the language of the test as their native language. For the eighth grade students, on average across countries, the relationship between language composition of the school and average science achievement also was similar to the fourth grade. Science achievement was highest among students in schools where almost all students had the language of the TIMSS test as their native language (483), next highest in schools where 51–90% of students had the language of the TIMSS test as their native language (478), and lowest in schools where 50 percent or fewer of the students had the language of the TIMSS test as their native language (466).

Schools with Sufficient Facilities, Books, and Technology

Studies have shown that resources are crucial for improving schooling, perhaps even more so in developing countries than in economically developed countries, where adequate school structures and material resources can be taken for granted (Lee & Zuze, 2011). The extent and quality of school resources can have an important impact on the quality of classroom instruction.

School Resources

TIMSS collects information on the extent to which school resources are available to support science instruction by asking school principals about the degree of shortages or inadequacies in general school resources (materials, supplies, heating/cooling/lighting, buildings, space, staff, and computers) as well as about resources specifically targeted to support science instruction (specialized teachers, science equipment and materials, computer software, library materials, audio-visual resources, and calculators). Although “adequacy” can be relative, in each previous TIMSS assessment there has been a strong positive relationship between principals’ perceptions of the absence of school resource shortages and average science achievement.

Exhibit 5.7 presents the results for the Science Resources Shortages scale for participants in the TIMSS 2011 fourth grade assessment. Students were scored according to their principals’ responses concerning twelve school and classroom resources (see the second page of the exhibit for details). Countries are ordered according to the percentage of students (from most to least) in schools **Not Affected** by resource shortages. Schools in this category had principals who reported that shortages affected instruction “not at all” for six of the twelve resources and only “a little” for the other six, on average. There was

substantial variation across the fourth grade countries—from 0 to 63 percent, with an average of 22 percent of students attending well-resourced schools.

Students in schools where instruction was **Affected A Lot** had principals who reported that shortages affected instruction “a lot” for six of the twelve resources and “some” for the other six, on average. All other students attended schools where instruction was **Somewhat Affected** by resource shortages. Countries are ordered according to the percentage of students (from highest to lowest) in schools **Not Affected** by resource shortages. Only two countries (Korea and Slovenia) had more than 50 percent of their students in schools **Not Affected** by resource shortages; a large majority of countries and benchmarking participants had more than 50 percent of their students in schools that were **Somewhat Affected** by resource shortages. Only eight of the 50 fourth grade countries and one benchmarking participant had more than 15 percent of their students in schools that were **Affected a Lot**. On average across countries, students in schools that were **Affected a Lot** by science resource shortages had lower science achievement (460 points) than students in schools that were **Not Affected** (495) or **Somewhat Affected** (485).

Exhibit 5.8 presents the results for the Science Resource Shortages scale for participants in the TIMSS 2011 eighth grade assessment. As shown on the second page of the exhibit, the eighth grade scale was based on principals’ responses concerning 13 school and classroom resources. The results were similar to the fourth grade results, with wide variation across countries in the percentage of eighth grade students attending schools that were **Not Affected** by resource shortages (1–64%), and only three countries having more than 50 percent of their students in such schools (Singapore, Slovenia, and Korea). Again, a large majority of countries and benchmarking participants had more than 50 percent of their students in schools that were **Somewhat Affected** by resource shortages, and only four of the 42 eighth grade countries and one benchmarking participant had more than 15 percent of their students in schools that were **Affected a Lot**. Also as at fourth grade, on average across countries, students in schools that were **Affected a Lot** by science resource shortages had lower science achievement (464) than students in schools that were **Not Affected** (494) or **Somewhat Affected** (474).

Exhibit 5.7: Instruction Affected by Science Resource Shortages

Reported by Principals

Students were scored according to their principals' responses concerning twelve school and classroom resources on the *Science Resource Shortages* scale. Students in schools where instruction was **Not Affected** by resource shortages had a score on the scale of at least 11.3, which corresponds to their principals reporting that shortages affected instruction "not at all" for six of the twelve resources and "a little" for the other six, on average. Students in schools where instruction was **Affected A Lot** had a score no higher than 7.1, which corresponds to their principals reporting that shortages affected instruction "a lot" for six of the twelve resources and "some" for the other six, on average. All other students attended schools where instruction was **Somewhat Affected** by resource shortages.

Country	Not Affected		Somewhat Affected		Affected A Lot		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Korea, Rep. of	63 (4.4)	587 (2.5)	36 (4.3)	586 (3.7)	1 (0.6)	~ ~	12.1 (0.18)
Slovenia	57 (4.0)	521 (3.5)	43 (4.0)	519 (3.9)	0 (0.0)	~ ~	11.8 (0.12)
England	37 (4.7)	527 (6.4)	63 (4.7)	529 (4.4)	0 (0.0)	~ ~	11.1 (0.17)
Spain	37 (4.4)	511 (4.9)	62 (4.3)	503 (4.0)	2 (1.0)	~ ~	10.9 (0.16)
Singapore	36 (0.0)	580 (5.4)	57 (0.0)	586 (4.7)	7 (0.0)	575 (14.5)	10.5 (0.00)
United States	34 (2.8)	555 (4.0)	65 (2.9)	542 (2.9)	2 (0.7)	~ ~	10.8 (0.13)
Poland	33 (3.8)	513 (4.2)	67 (3.8)	502 (3.3)	0 (0.0)	~ ~	10.9 (0.14)
Kazakhstan	32 (3.8)	490 (8.9)	57 (4.0)	497 (7.3)	11 (2.7)	499 (20.0)	10.2 (0.22)
Australia	32 (3.7)	529 (5.1)	68 (3.7)	511 (3.7)	1 (0.5)	~ ~	10.6 (0.14)
Czech Republic	31 (3.7)	537 (5.3)	66 (3.8)	536 (2.8)	3 (1.5)	537 (9.8)	10.9 (0.15)
Qatar	31 (3.0)	419 (11.5)	41 (3.2)	402 (7.7)	29 (3.1)	364 (9.9)	9.3 (0.24)
Netherlands	30 (4.9)	537 (4.6)	70 (4.9)	531 (2.4)	0 (0.0)	~ ~	10.5 (0.14)
United Arab Emirates	29 (1.9)	449 (5.7)	58 (2.3)	419 (3.4)	13 (1.6)	417 (8.6)	9.9 (0.10)
Croatia	29 (4.0)	516 (3.8)	69 (3.9)	515 (2.6)	2 (1.2)	~ ~	10.6 (0.16)
Belgium (Flemish)	29 (4.2)	512 (4.5)	70 (4.2)	508 (2.1)	1 (0.6)	~ ~	10.6 (0.13)
Hungary	28 (3.9)	541 (5.7)	68 (4.1)	532 (5.3)	4 (1.8)	548 (10.1)	10.5 (0.18)
Sweden	28 (4.0)	541 (6.0)	71 (4.0)	530 (3.3)	1 (0.7)	~ ~	10.5 (0.15)
Georgia	27 (3.8)	453 (7.7)	73 (3.8)	455 (4.5)	0 (0.0)	~ ~	10.6 (0.14)
Armenia	26 (3.5)	422 (7.1)	74 (3.5)	415 (4.5)	1 (0.0)	~ ~	10.5 (0.12)
Austria	25 (3.8)	531 (5.1)	75 (3.8)	532 (3.5)	0 (0.0)	~ ~	10.6 (0.14)
Malta	25 (0.1)	462 (3.8)	72 (0.1)	441 (2.0)	3 (0.0)	449 (8.9)	10.2 (0.00)
Germany	25 (2.5)	534 (4.6)	75 (2.5)	527 (3.3)	0 (0.0)	~ ~	10.6 (0.09)
New Zealand	24 (3.5)	501 (7.0)	76 (3.5)	496 (3.3)	0 (0.0)	~ ~	10.5 (0.09)
Northern Ireland	23 (4.1)	523 (6.9)	74 (4.0)	516 (3.6)	3 (2.4)	501 (8.0)	10.3 (0.18)
Japan	23 (3.4)	558 (3.0)	75 (3.7)	560 (2.3)	2 (1.4)	~ ~	10.3 (0.14)
Norway	21 (4.4)	485 (5.5)	79 (4.4)	496 (2.6)	0 (0.0)	~ ~	10.4 (0.12)
Russian Federation	20 (3.0)	567 (6.1)	72 (3.5)	546 (4.4)	8 (2.1)	550 (9.9)	9.9 (0.15)
Finland	19 (3.1)	577 (3.9)	79 (3.3)	569 (2.8)	2 (1.2)	~ ~	10.1 (0.14)
Lithuania	18 (3.2)	513 (6.3)	82 (3.2)	515 (2.9)	0 (0.0)	~ ~	10.3 (0.11)
Slovak Republic	17 (2.3)	534 (6.6)	83 (2.3)	530 (4.2)	0 (0.0)	~ ~	10.2 (0.10)
Bahrain	17 (4.8)	471 (9.1)	62 (5.2)	439 (5.9)	21 (3.7)	458 (9.9)	9.3 (0.35)
Serbia	17 (3.2)	529 (7.3)	75 (4.1)	515 (3.6)	8 (2.7)	495 (16.7)	9.5 (0.14)
Chile	17 (2.5)	520 (8.9)	79 (2.9)	474 (3.3)	4 (1.7)	481 (12.8)	9.7 (0.15)
Ireland	17 (3.4)	518 (8.6)	81 (3.6)	517 (4.0)	2 (1.2)	~ ~	10.2 (0.13)
Yemen	16 (3.2)	213 (15.4)	81 (3.5)	206 (8.0)	3 (1.5)	290 (23.8)	10.1 (0.12)
Kuwait	14 (3.0)	327 (10.1)	51 (4.0)	349 (6.7)	35 (4.0)	356 (8.8)	8.3 (0.21)
Morocco	14 (2.6)	270 (10.8)	82 (2.8)	260 (5.8)	4 (1.2)	325 (20.3)	10.1 (0.10)
Romania	12 (2.8)	536 (16.1)	85 (2.8)	502 (6.3)	3 (0.5)	471 (72.3)	9.8 (0.13)
Portugal	11 (1.9)	534 (9.8)	87 (2.2)	520 (4.4)	2 (0.9)	~ ~	9.6 (0.14)
Italy	10 (2.2)	533 (9.3)	88 (2.3)	523 (2.7)	1 (0.9)	~ ~	9.7 (0.09)
Chinese Taipei	9 (2.5)	563 (6.4)	71 (3.4)	551 (2.6)	19 (3.0)	551 (4.5)	8.6 (0.17)
Tunisia	9 (2.0)	347 (14.6)	89 (2.1)	345 (5.5)	2 (1.1)	~ ~	10.0 (0.08)
Denmark	8 (1.9)	537 (5.9)	90 (2.2)	529 (3.5)	2 (1.1)	~ ~	9.9 (0.09)
Saudi Arabia	7 (2.5)	442 (11.6)	83 (2.4)	428 (6.2)	10 (2.4)	431 (20.1)	9.2 (0.15)
Oman	7 (1.4)	379 (12.6)	74 (2.5)	365 (4.6)	19 (2.0)	380 (9.6)	8.6 (0.09)
Thailand	4 (1.8)	537 (16.8)	63 (4.3)	477 (5.7)	33 (4.1)	453 (12.1)	8.2 (0.15)
Iran, Islamic Rep. of	4 (1.7)	480 (26.2)	73 (3.5)	451 (4.7)	23 (3.2)	450 (7.8)	8.4 (0.15)
Turkey	2 (0.7)	~ ~	70 (3.1)	464 (5.5)	28 (3.1)	449 (8.2)	7.9 (0.08)
Azerbaijan	1 (0.8)	~ ~	87 (2.7)	433 (6.2)	11 (2.7)	474 (16.7)	8.7 (0.12)
Hong Kong SAR	0 (0.0)	~ ~	91 (2.6)	535 (4.6)	9 (2.6)	536 (8.7)	8.3 (0.08)
International Avg.	22 (0.4)	495 (1.3)	72 (0.5)	485 (0.6)	7 (0.3)	460 (4.0)	

Centerpoint of scale set at 10.

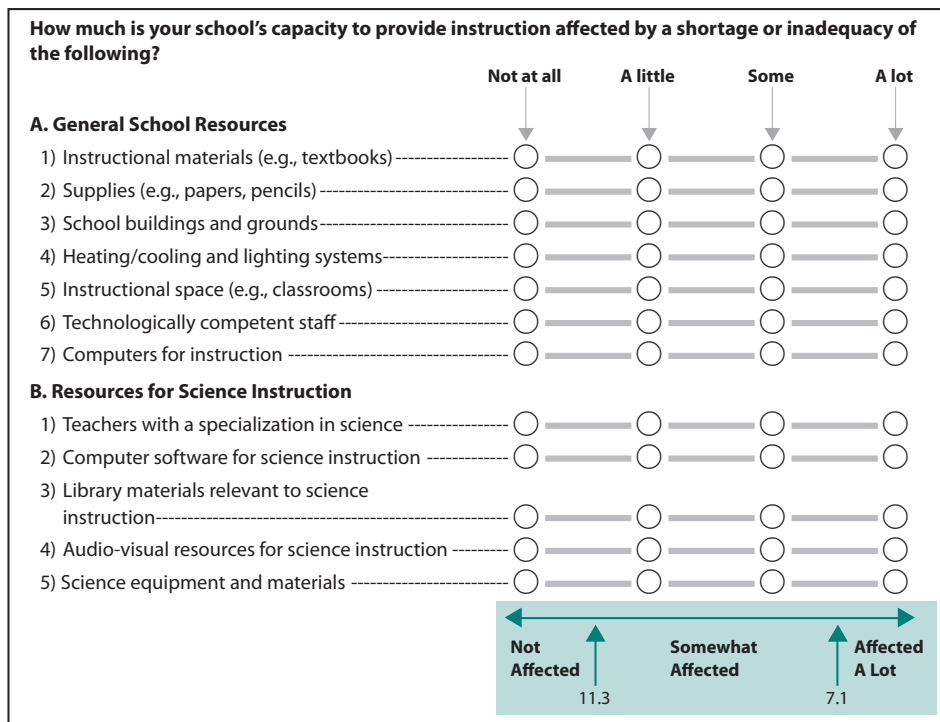
() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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.

Exhibit 5.7: Instruction Affected by Science Resource Shortages (Continued)

Country	Not Affected		Somewhat Affected		Affected A Lot		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Honduras	20 (4.1)	443 (18.2)	69 (4.4)	432 (6.3)	11 (2.7)	409 (14.8)	9.4 (0.23)
Yemen	15 (2.8)	326 (16.9)	82 (3.0)	344 (7.4)	3 (1.5)	392 (12.7)	10.0 (0.13)
Botswana	2 (1.2)	~ ~	87 (2.9)	360 (5.3)	10 (2.6)	402 (32.1)	8.9 (0.11)
Benchmarking Participants							
Dubai, UAE	47 (0.4)	480 (3.8)	42 (0.3)	453 (2.6)	11 (0.2)	428 (10.1)	10.7 (0.02)
Alberta, Canada	42 (4.3)	545 (4.3)	58 (4.3)	540 (3.1)	0 (0.0)	~ ~	11.3 (0.16)
Florida, US	37 (5.6)	541 (5.1)	62 (5.3)	543 (5.0)	2 (0.1)	~ ~	11.0 (0.25)
Quebec, Canada	30 (4.4)	525 (3.9)	69 (4.3)	513 (3.3)	1 (0.7)	~ ~	10.7 (0.15)
North Carolina, US	30 (7.8)	541 (10.0)	64 (8.6)	538 (6.6)	6 (4.1)	541 (11.8)	10.7 (0.35)
Abu Dhabi, UAE	24 (4.0)	428 (12.1)	59 (4.6)	403 (6.9)	17 (3.6)	399 (11.9)	9.5 (0.23)
Ontario, Canada	20 (3.7)	525 (7.2)	79 (3.6)	529 (3.4)	1 (0.7)	~ ~	10.4 (0.14)



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

Exhibit 5.8: Instruction Affected by Science Resource Shortages

Reported by Principals

Students were scored according to their principals' responses concerning thirteen school and classroom resources on the *Science Resource Shortages* scale. Students in schools where instruction was **Not Affected** by resource shortages had a score on the scale of at least 11.2, which corresponds to their principals reporting that shortages affected instruction "not at all" for seven of the thirteen resources and "a little" for the other six, on average. Students in schools where instruction was **Affected A Lot** had a score no higher than 7.3, which corresponds to their principals reporting that shortages affected instruction "a lot" for seven of the thirteen resources and "some" for the other six, on average. All other students attended schools where instruction was **Somewhat Affected** by resource shortages.

Country	Not Affected		Somewhat Affected		Affected A Lot		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Singapore	64 (0.0)	593 (5.2)	28 (0.0)	578 (7.6)	8 (0.0)	604 (14.5)	11.7 (0.00)
Slovenia	59 (4.5)	544 (3.8)	41 (4.5)	543 (3.2)	0 (0.0)	~ ~	11.8 (0.12)
Korea, Rep. of	57 (4.1)	563 (2.7)	42 (4.2)	556 (3.0)	2 (1.1)	~ ~	11.6 (0.17)
England	47 (4.0)	525 (7.8)	53 (4.0)	542 (7.3)	0 (0.0)	~ ~	11.3 (0.16)
Australia	45 (3.0)	531 (8.0)	52 (2.9)	514 (5.8)	3 (1.5)	523 (31.0)	11.2 (0.16)
New Zealand	43 (3.8)	524 (7.2)	56 (3.6)	506 (7.0)	2 (1.3)	~ ~	11.4 (0.16)
Norway	41 (4.5)	495 (4.2)	59 (4.5)	494 (3.3)	0 (0.0)	~ ~	11.1 (0.10)
Sweden	40 (5.1)	517 (3.7)	60 (5.0)	508 (4.3)	0 (0.2)	~ ~	11.0 (0.13)
Hong Kong SAR	39 (4.2)	545 (7.9)	55 (4.8)	529 (5.3)	7 (2.5)	511 (23.0)	10.9 (0.19)
United States	39 (2.5)	538 (4.6)	59 (2.6)	517 (3.8)	3 (0.9)	543 (12.6)	11.0 (0.10)
Qatar	32 (1.0)	434 (8.3)	30 (0.7)	446 (5.6)	38 (0.5)	379 (4.0)	9.1 (0.06)
Japan	31 (4.3)	571 (4.8)	69 (4.3)	552 (2.6)	1 (0.0)	~ ~	10.7 (0.14)
Chinese Taipei	31 (4.0)	570 (6.3)	68 (4.1)	561 (2.8)	2 (1.1)	~ ~	10.6 (0.16)
Israel	29 (3.8)	538 (7.9)	59 (4.1)	519 (5.5)	12 (2.2)	458 (13.1)	10.1 (0.19)
Kazakhstan	27 (3.8)	505 (7.8)	65 (4.3)	484 (5.8)	8 (2.4)	490 (17.4)	10.2 (0.19)
United Arab Emirates	26 (1.8)	493 (5.0)	59 (2.2)	454 (3.8)	15 (1.6)	454 (6.1)	9.7 (0.10)
Finland	25 (3.7)	556 (4.4)	75 (3.7)	551 (2.6)	1 (0.6)	~ ~	10.7 (0.10)
Armenia	25 (3.2)	448 (7.5)	75 (3.3)	434 (4.1)	1 (0.0)	~ ~	10.5 (0.10)
Hungary	24 (3.8)	531 (5.1)	71 (3.8)	518 (4.4)	4 (1.9)	535 (10.2)	10.4 (0.15)
Russian Federation	22 (3.5)	547 (10.5)	74 (3.8)	543 (3.2)	4 (1.4)	515 (13.8)	10.1 (0.13)
Lebanon	19 (3.1)	454 (15.0)	72 (3.4)	389 (5.5)	9 (2.1)	441 (15.0)	9.8 (0.17)
Malaysia	18 (2.6)	454 (14.0)	69 (3.5)	420 (6.8)	14 (2.5)	422 (16.5)	9.4 (0.15)
Lithuania	16 (3.4)	524 (7.6)	84 (3.4)	511 (3.2)	0 (0.0)	~ ~	10.3 (0.10)
Chile	15 (2.3)	501 (6.8)	82 (2.8)	455 (3.3)	3 (1.4)	464 (15.4)	9.7 (0.10)
Romania	14 (2.8)	480 (13.3)	84 (3.1)	462 (3.9)	2 (1.4)	~ ~	9.9 (0.12)
Bahrain	14 (0.1)	524 (5.4)	77 (0.2)	440 (2.1)	9 (0.2)	451 (6.3)	9.5 (0.01)
Georgia	12 (2.3)	422 (10.7)	86 (2.5)	420 (3.3)	2 (1.2)	~ ~	10.1 (0.10)
Oman	12 (1.4)	453 (10.4)	76 (2.4)	413 (4.0)	12 (2.3)	435 (8.4)	9.0 (0.10)
Italy	11 (2.1)	525 (7.5)	88 (2.1)	498 (2.9)	1 (0.0)	~ ~	10.0 (0.08)
Jordan	10 (2.0)	470 (13.7)	80 (2.8)	444 (4.6)	11 (2.1)	469 (14.3)	9.1 (0.12)
Saudi Arabia	9 (2.4)	418 (15.4)	86 (2.8)	438 (4.0)	5 (1.8)	445 (11.4)	9.4 (0.12)
Ghana	8 (2.1)	306 (15.2)	89 (2.4)	305 (5.6)	3 (1.5)	347 (37.2)	10.0 (0.09)
Macedonia, Rep. of	6 (2.2)	444 (25.2)	89 (2.1)	407 (5.8)	5 (1.3)	392 (39.8)	9.4 (0.11)
Thailand	5 (1.6)	466 (19.1)	76 (3.4)	453 (4.8)	19 (3.0)	438 (8.3)	8.5 (0.11)
Indonesia	5 (2.9)	353 (30.6)	89 (2.9)	406 (3.9)	7 (2.1)	438 (12.7)	9.0 (0.13)
Palestinian Nat'l Auth.	4 (1.2)	426 (9.5)	90 (2.3)	419 (3.7)	6 (2.0)	439 (8.9)	9.0 (0.10)
Morocco	4 (1.0)	433 (16.1)	93 (1.3)	371 (2.4)	3 (0.8)	456 (16.7)	9.5 (0.07)
Iran, Islamic Rep. of	3 (1.1)	550 (25.6)	85 (2.4)	474 (4.2)	12 (2.2)	457 (9.9)	8.8 (0.09)
Tunisia	2 (0.9)	~ ~	96 (1.5)	439 (2.6)	2 (1.2)	~ ~	9.4 (0.08)
Ukraine	1 (1.1)	~ ~	80 (3.4)	500 (3.9)	19 (3.2)	504 (8.2)	8.5 (0.10)
Turkey	1 (0.6)	~ ~	80 (2.7)	480 (3.6)	19 (2.6)	478 (9.8)	8.3 (0.09)
Syrian Arab Republic	1 (0.9)	~ ~	91 (2.5)	424 (4.2)	8 (2.3)	442 (8.4)	9.2 (0.09)
International Avg.	22 (0.4)	494 (1.9)	71 (0.5)	474 (0.7)	7 (0.3)	464 (3.3)	

Centerpoint of scale set at 10.

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

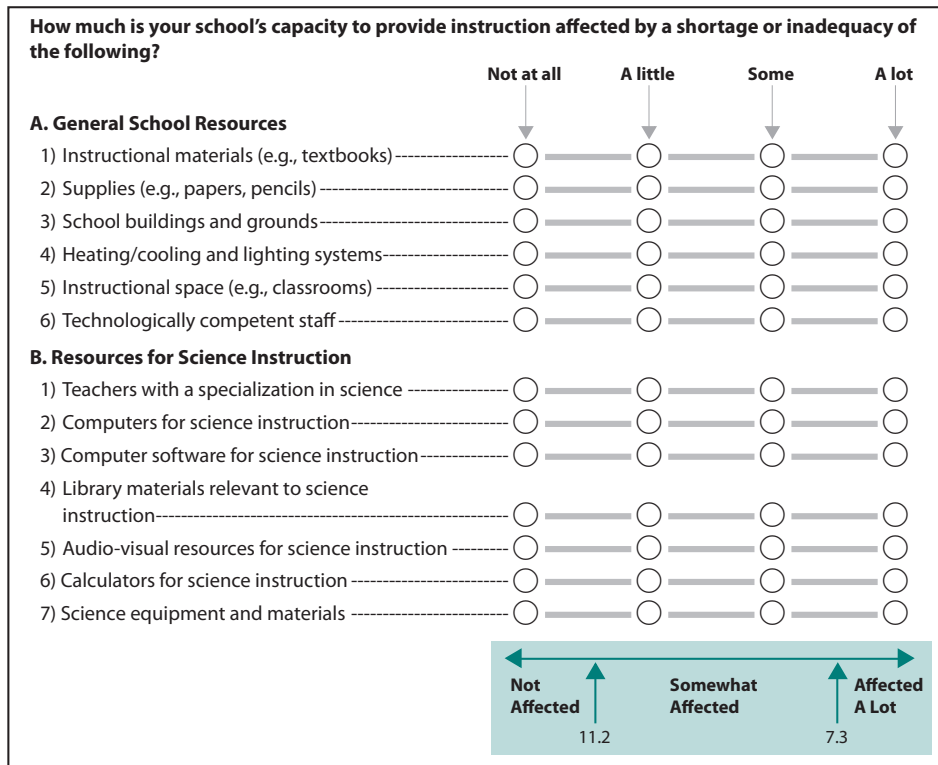
A tilde (~) indicates insufficient data to report achievement.

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

Exhibit 5.8: Instruction Affected by Science Resource Shortages (Continued)

Country	Not Affected		Somewhat Affected		Affected A Lot		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Ninth Grade Participants							
Honduras	13 (2.6)	410 (16.8)	78 (3.3)	364 (4.0)	9 (2.3)	344 (9.7)	9.3 (0.13)
South Africa	5 (1.0)	499 (24.0)	87 (2.2)	321 (4.3)	9 (2.1)	333 (13.6)	9.4 (0.10)
Botswana	1 (0.7)	~ ~	95 (2.0)	402 (3.9)	4 (1.8)	425 (20.1)	8.9 (0.09)
Benchmarking Participants							
Quebec, Canada	65 (3.4)	526 (3.5)	35 (3.4)	510 (4.3)	0 (0.0)	~ ~	12.0 (0.13)
Connecticut, US	57 (7.1)	547 (8.5)	42 (6.9)	516 (12.5)	2 (1.8)	~ ~	11.3 (0.24)
Florida, US	54 (8.0)	529 (11.8)	43 (7.9)	532 (13.0)	3 (2.4)	469 (15.8)	11.3 (0.35)
Indiana, US	52 (8.1)	534 (9.1)	48 (8.1)	538 (7.6)	0 (0.0)	~ ~	11.5 (0.25)
Dubai, UAE	43 (0.5)	510 (4.7)	42 (0.4)	466 (2.7)	15 (0.3)	469 (6.0)	10.4 (0.03)
Massachusetts, US	42 (6.9)	584 (10.2)	57 (6.6)	555 (9.1)	1 (0.1)	~ ~	11.0 (0.27)
Minnesota, US	40 (6.8)	561 (7.3)	60 (6.8)	549 (7.8)	0 (0.0)	~ ~	11.1 (0.26)
Alberta, Canada	38 (4.2)	553 (3.7)	59 (4.2)	542 (3.0)	3 (1.7)	540 (12.3)	11.0 (0.16)
California, US	36 (5.7)	500 (9.7)	64 (5.7)	498 (7.5)	0 (0.0)	~ ~	10.8 (0.23)
Alabama, US	33 (6.6)	505 (14.8)	65 (7.1)	479 (8.8)	2 (0.2)	~ ~	10.9 (0.25)
Ontario, Canada	28 (3.8)	529 (5.0)	71 (4.0)	519 (3.0)	1 (0.0)	~ ~	10.7 (0.14)
Colorado, US	22 (5.7)	554 (13.3)	76 (6.0)	539 (5.8)	2 (0.1)	~ ~	10.3 (0.26)
North Carolina, US	20 (6.3)	509 (16.7)	78 (6.5)	536 (8.2)	2 (0.1)	~ ~	10.3 (0.29)
Abu Dhabi, UAE	18 (3.0)	505 (12.6)	64 (3.8)	453 (6.4)	18 (3.0)	449 (7.7)	9.2 (0.18)

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



Teacher Working Conditions

There is evidence that, in some countries, teacher shortages may exist partly as a result of poor working conditions. For example, a review of research from the United States suggests that teachers who leave the profession after just a few years are more likely to leave because of poor working conditions than because of low pay (Johnson, 2006). Although teachers' reports across countries are related to their expectations and need to be considered in the context of variations in economic situations, TIMSS 2011 asked the students' teachers to provide their views on the adequacy of their working conditions. More specifically, teachers were asked about five potential problem areas:

- ◆ The school building needing significant repair;
- ◆ Classrooms being overcrowded;
- ◆ Teachers having too many teaching hours;
- ◆ Teachers not having adequate workspace; and
- ◆ Teachers not having adequate instructional materials and supplies.

Exhibit 5.9 presents the results for the TIMSS 2011 fourth grade assessment for the Teacher Working Conditions scale (see the second page of the exhibit for details about the scale). Countries are ordered by the percentage of students whose teachers reported few problems with their working conditions. Teachers with **Hardly Any Problems** with their working conditions reported “not a problem” for three of the five areas and only “minor problems” for the other two, on average. There was a range of results across the fourth grade countries—from 5 to 51 percent, with about one-fourth of students in schools where teachers had **Hardly Any Problems**.

For this scale, the remaining two categories were **Minor Problems** and **Moderate Problems**. Teachers with **Moderate Problems** reported “moderate problem” for three of five conditions and “minor problem” for the other two, on average. All other students had teachers that reported **Minor Problems** with their working conditions. About half of the students, on average, across the fourth grade countries were in schools where teachers had **Minor Problems** and about one-fourth were in schools with **Moderate Problems**. Students whose teachers reported **Moderate Problems** had somewhat lower science achievement, on average, than those whose teachers reported **Minor Problems**, and those students in turn had lower achievement than students whose teachers reported **Hardly Any Problems** (481, 487, and 494, respectively). In general,

the results for the sixth grade and benchmarking participants followed a similar pattern. However, substantial percentages of students (ranging from 45–56%) in the sixth grade countries had teachers reporting moderate problems with school conditions.

Exhibit 5.10 presents the results for the Teacher Working Conditions scale for the TIMSS 2011 eighth grade assessment. The eighth grade scale was based on responses by the students' science teachers to statements about the same five problem areas as the fourth grade. Eighth grade science teachers expressed about the same level of satisfaction with working conditions as fourth grade teachers, with 20 percent of students in schools whose teachers reported **Hardly Any Problems** and 32 percent in schools with **Moderate Problems**. On average across countries, the science achievement difference between these two groups of students was 16 points (489 vs. 473).

Difficulties Filling Vacancies for Science Teachers

Recent research suggests that teachers are in relatively short supply in some countries, and that the impending retirement of aging teachers will further contribute to this shortage (Ingersoll & Perda, 2010). TIMSS Advanced 2008 noted that, in several countries, not only were teachers of physics nearing retirement age, but relatively few students were considering physics as a career option, suggesting that there also may be a shortage of students entering science education careers (Mullis, Martin, Robitaille, & Foy, 2009).

Exhibit 5.11 summarizes school principals' reports from the TIMSS 2011 eighth grade assessment about difficulties in filling vacancies for science teachers. In most countries, on average, eighth grade students were in schools where principals reported that there were no vacancies (56%) or that vacancies were easy to fill (25%). Average science achievement was similar for these two groups of students (477 and 479, respectively). However, average achievement was somewhat lower among the 15 percent of students in schools where vacancies were somewhat difficult to fill (468) and among the 4 percent in schools where vacancies were very difficult to fill (459).

Exhibit 5.9: Teacher Working Conditions

Reported by Teachers

Students were scored according to their teachers' responses concerning five potential problem areas on the *Teacher Working Conditions* scale. Students whose teachers had **Hardly Any Problems** with their working conditions had a score on the scale of at least 11.3, which corresponds to their teachers reporting "not a problem" for three of five areas and "minor problem" for the other two, on average. Students whose teachers had **Moderate Problems** had a score no higher than 8.7, which corresponds to their teachers reporting "moderate problem" for three of five conditions and "minor problem" for the other two, on average. All other students had teachers that reported **Minor Problems** with their working conditions.

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
United States	r 51 (2.2)	550 (2.6)	39 (2.3)	544 (3.4)	10 (1.5)	522 (6.8)	11.2 (0.09)
Poland	49 (3.6)	498 (3.1)	44 (3.5)	513 (3.6)	7 (1.5)	507 (7.8)	11.2 (0.13)
Czech Republic	45 (4.4)	537 (4.7)	46 (4.3)	535 (3.1)	9 (2.3)	544 (4.7)	11.0 (0.15)
Australia	r 45 (4.1)	528 (5.6)	37 (4.3)	514 (5.9)	18 (2.6)	507 (8.1)	10.9 (0.17)
United Arab Emirates	43 (2.2)	438 (4.6)	40 (2.3)	424 (4.7)	17 (1.7)	422 (6.2)	10.8 (0.10)
England	41 (4.2)	528 (5.4)	52 (4.5)	533 (4.9)	7 (2.2)	518 (12.3)	11.0 (0.14)
New Zealand	41 (3.3)	500 (4.4)	44 (3.1)	498 (3.7)	15 (2.3)	487 (7.5)	10.7 (0.13)
Slovak Republic	38 (3.5)	529 (5.6)	49 (3.3)	529 (5.4)	13 (2.3)	548 (6.6)	10.6 (0.11)
Ireland	38 (4.0)	522 (5.4)	47 (3.8)	510 (4.9)	15 (2.5)	522 (8.2)	10.8 (0.17)
Belgium (Flemish)	37 (3.6)	510 (3.1)	47 (3.9)	511 (2.6)	16 (2.8)	499 (6.7)	10.6 (0.14)
Kuwait	36 (3.9)	350 (8.2)	43 (4.2)	341 (7.6)	21 (3.0)	351 (9.8)	10.5 (0.17)
Chile	35 (4.2)	500 (5.8)	38 (3.9)	472 (5.9)	27 (3.5)	468 (6.5)	10.2 (0.17)
Northern Ireland	r 34 (4.7)	522 (5.6)	50 (4.3)	517 (4.3)	16 (3.5)	506 (7.4)	10.6 (0.19)
Qatar	34 (3.6)	399 (11.5)	54 (4.1)	407 (6.9)	13 (2.1)	333 (13.7)	10.6 (0.14)
Singapore	33 (2.5)	592 (6.0)	50 (2.9)	578 (5.4)	17 (2.1)	583 (8.2)	10.5 (0.10)
Spain	32 (3.8)	508 (4.8)	46 (4.1)	506 (4.3)	22 (3.1)	502 (4.7)	10.3 (0.13)
Hungary	31 (3.4)	520 (7.2)	50 (3.5)	543 (5.4)	19 (2.8)	533 (7.3)	10.4 (0.15)
Austria	30 (3.6)	537 (4.3)	45 (3.7)	534 (3.7)	24 (3.5)	521 (5.2)	10.3 (0.18)
Lithuania	30 (3.2)	511 (4.6)	60 (3.2)	515 (3.3)	10 (2.0)	516 (4.6)	10.5 (0.11)
Malta	30 (0.1)	449 (2.8)	49 (0.1)	455 (2.9)	21 (0.1)	422 (3.0)	10.3 (0.00)
Netherlands	r 29 (4.3)	530 (4.6)	53 (5.0)	531 (3.5)	18 (3.7)	527 (6.0)	10.3 (0.17)
Slovenia	29 (3.6)	523 (4.5)	44 (4.0)	522 (3.4)	27 (3.2)	514 (4.8)	10.0 (0.14)
Kazakhstan	29 (3.8)	504 (10.6)	44 (3.9)	499 (8.9)	27 (3.7)	480 (9.0)	10.0 (0.19)
Croatia	27 (3.0)	509 (4.4)	51 (3.5)	519 (2.7)	21 (3.0)	518 (3.7)	10.2 (0.14)
Thailand	27 (4.0)	482 (7.8)	50 (4.3)	473 (6.9)	23 (3.8)	463 (17.3)	10.2 (0.16)
Romania	26 (3.4)	505 (10.5)	44 (4.2)	504 (7.6)	30 (3.6)	504 (11.7)	9.9 (0.15)
Bahrain	26 (4.3)	477 (8.4)	39 (4.5)	433 (7.1)	35 (5.0)	448 (5.2)	9.9 (0.21)
Georgia	25 (3.2)	459 (7.7)	56 (4.1)	448 (4.9)	19 (2.8)	470 (7.7)	10.1 (0.14)
Russian Federation	24 (3.1)	554 (6.3)	54 (4.0)	553 (4.3)	23 (2.9)	548 (6.7)	10.0 (0.12)
Chinese Taipei	23 (3.4)	551 (5.1)	55 (3.9)	555 (2.8)	22 (3.3)	546 (5.6)	10.1 (0.16)
Finland	21 (3.0)	574 (5.1)	62 (4.2)	569 (2.9)	17 (3.4)	572 (4.0)	10.1 (0.12)
Italy	r 20 (2.6)	535 (5.6)	47 (3.6)	527 (4.0)	34 (3.8)	517 (5.3)	9.7 (0.11)
Azerbaijan	19 (2.9)	448 (14.9)	46 (3.8)	438 (8.2)	35 (3.4)	434 (8.2)	9.7 (0.14)
Japan	19 (3.3)	564 (4.6)	38 (3.9)	556 (3.3)	43 (3.5)	559 (2.3)	9.4 (0.15)
Turkey	18 (2.3)	491 (7.6)	43 (3.0)	473 (6.9)	39 (3.1)	438 (8.1)	9.4 (0.13)
Iran, Islamic Rep. of	18 (2.4)	471 (10.1)	51 (4.2)	451 (6.0)	31 (4.3)	447 (8.4)	9.7 (0.15)
Denmark	17 (2.8)	537 (4.9)	56 (3.9)	529 (3.9)	27 (3.5)	527 (4.3)	9.9 (0.13)
Saudi Arabia	16 (2.4)	462 (10.4)	49 (4.0)	430 (7.0)	35 (3.8)	413 (10.7)	9.4 (0.17)
Serbia	16 (3.1)	514 (5.6)	48 (3.9)	514 (4.5)	36 (3.8)	517 (4.4)	9.5 (0.13)
Hong Kong SAR	r 16 (3.7)	539 (8.0)	50 (4.2)	536 (3.9)	34 (4.1)	531 (10.1)	9.5 (0.17)
Portugal	16 (4.7)	513 (17.3)	46 (4.9)	528 (5.5)	38 (4.8)	519 (4.8)	9.3 (0.26)
Armenia	16 (2.5)	416 (9.2)	49 (3.6)	416 (5.5)	35 (3.7)	417 (6.1)	9.5 (0.11)
Norway	15 (3.4)	497 (6.0)	49 (5.1)	493 (2.9)	36 (5.0)	495 (3.9)	9.4 (0.17)
Oman	15 (2.0)	390 (9.3)	47 (3.2)	376 (4.8)	38 (3.3)	373 (6.8)	9.3 (0.11)
Korea, Rep. of	15 (3.1)	583 (4.6)	52 (4.0)	586 (2.9)	33 (4.0)	590 (3.3)	9.5 (0.15)
Germany	15 (1.9)	536 (6.8)	49 (3.1)	534 (3.3)	37 (3.1)	518 (5.1)	9.4 (0.13)
Sweden	r 10 (2.6)	534 (8.9)	47 (4.1)	539 (3.7)	44 (4.6)	530 (4.7)	9.1 (0.16)
Yemen	9 (2.7)	201 (20.6)	43 (4.4)	205 (9.6)	48 (4.6)	213 (11.5)	8.9 (0.14)
Morocco	5 (1.0)	371 (16.8)	19 (3.4)	285 (16.2)	75 (3.4)	252 (4.9)	7.9 (0.11)
Tunisia	5 (1.2)	396 (12.7)	25 (4.0)	352 (10.3)	70 (4.1)	340 (6.0)	8.0 (0.17)
International Avg.	26 (0.5)	494 (1.2)	47 (0.5)	487 (0.8)	27 (0.5)	481 (1.1)	

Centerpoint of scale set at 10.

() 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 5.9: Teacher Working Conditions (Continued)

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Sixth Grade Participants							
Honduras	15 (3.1)	475 (18.0)	40 (4.5)	434 (7.3)	45 (4.4)	415 (8.5)	9.3 (0.17)
Yemen	11 (3.1)	341 (21.2)	33 (4.3)	332 (11.7)	56 (4.8)	354 (9.6)	8.7 (0.17)
Botswana	7 (1.7)	456 (42.5)	38 (4.0)	377 (12.3)	55 (3.9)	355 (6.3)	8.6 (0.13)
Benchmarking Participants							
Florida, US	r 58 (5.6)	544 (4.7)	34 (5.7)	549 (10.2)	7 (2.9)	520 (11.2)	11.5 (0.20)
Dubai, UAE	r 45 (3.0)	481 (5.7)	45 (3.1)	462 (6.9)	10 (1.0)	426 (12.0)	11.0 (0.11)
Abu Dhabi, UAE	44 (4.5)	424 (8.1)	38 (4.5)	404 (9.1)	18 (3.2)	408 (13.6)	10.9 (0.19)
Alberta, Canada	r 44 (4.7)	541 (5.0)	46 (4.4)	544 (3.8)	10 (2.6)	535 (6.2)	10.8 (0.16)
Ontario, Canada	40 (4.0)	524 (4.1)	52 (4.1)	530 (4.1)	8 (2.1)	535 (7.5)	10.8 (0.13)
Quebec, Canada	36 (4.7)	523 (4.5)	49 (4.6)	515 (3.2)	15 (3.7)	507 (7.5)	10.6 (0.17)
North Carolina, US	35 (6.5)	532 (8.4)	57 (6.8)	537 (4.6)	7 (2.3)	572 (13.0)	10.6 (0.24)

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

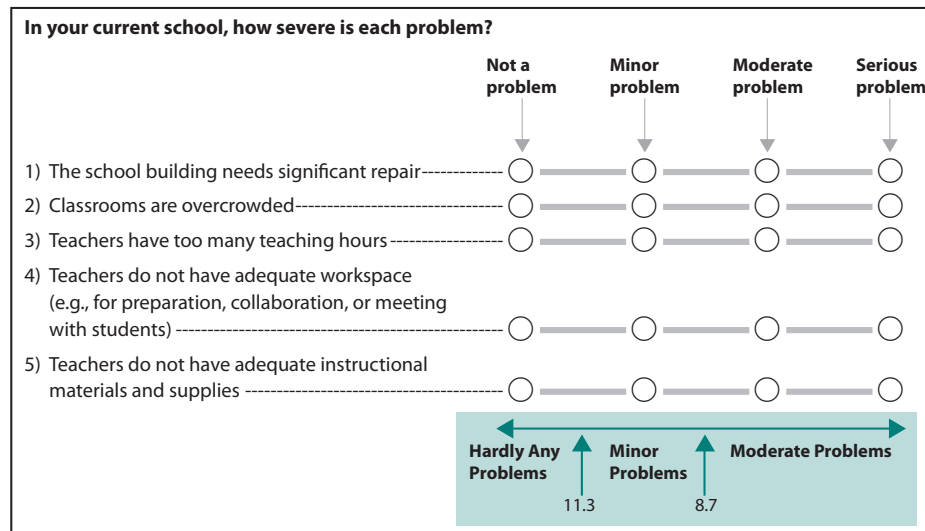


Exhibit 5.10: Teacher Working Conditions

Reported by Teachers

Students were scored according to their teachers' responses concerning five potential problem areas on the *Teacher Working Conditions* scale. Students whose teachers had **Hardly Any Problems** with their working conditions had a score on the scale of at least 11.7, which corresponds to their teachers reporting "not a problem" for three of five areas and "minor problem" for the other two, on average. Students whose teachers had **Moderate Problems** had a score no higher than 8.9, which corresponds to their teachers reporting "moderate problem" for three of five conditions and "minor problem" for the other two, on average. All other students had teachers that reported **Minor Problems** with their working conditions.

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Qatar	51 (4.2)	420 (9.1)	34 (4.6)	408 (10.5)	16 (2.1)	435 (15.8)	11.4 (0.14)
United States	r 40 (2.6)	538 (5.8)	48 (2.5)	522 (3.8)	12 (1.5)	508 (8.1)	11.2 (0.10)
Lebanon	37 (3.6)	427 (8.1)	45 (3.6)	399 (6.7)	19 (2.9)	383 (11.4)	10.8 (0.16)
United Arab Emirates	36 (2.4)	467 (3.9)	44 (2.1)	457 (4.0)	19 (2.1)	460 (5.6)	10.8 (0.12)
Hungary	29 (2.5)	510 (4.2)	49 (2.5)	526 (4.1)	22 (2.3)	531 (5.2)	10.5 (0.11)
Romania	29 (2.5)	465 (5.8)	50 (2.3)	465 (4.5)	21 (2.0)	465 (4.9)	10.5 (0.10)
Slovenia	28 (2.3)	542 (3.4)	46 (2.3)	542 (3.3)	25 (2.0)	544 (3.3)	10.5 (0.10)
Singapore	28 (2.5)	595 (8.9)	56 (2.6)	591 (6.2)	16 (1.8)	579 (10.0)	10.6 (0.09)
Australia	s 27 (3.4)	527 (10.0)	54 (3.0)	522 (6.0)	18 (2.7)	533 (9.9)	10.6 (0.16)
Italy	26 (3.2)	503 (5.4)	55 (4.0)	501 (3.8)	19 (3.0)	502 (7.5)	10.4 (0.12)
Lithuania	26 (2.5)	511 (3.9)	57 (2.2)	513 (2.8)	17 (2.0)	521 (5.4)	10.5 (0.10)
Bahrain	25 (2.3)	495 (5.4)	37 (3.3)	451 (4.9)	38 (2.6)	427 (4.4)	10.1 (0.11)
England	r 23 (3.0)	536 (9.5)	48 (3.5)	531 (7.3)	28 (3.3)	529 (9.9)	10.2 (0.14)
Russian Federation	23 (2.2)	550 (4.1)	60 (2.6)	543 (3.9)	17 (1.9)	532 (5.8)	10.5 (0.09)
New Zealand	23 (3.3)	511 (8.0)	56 (4.1)	514 (6.6)	21 (3.5)	501 (12.0)	10.3 (0.16)
Kazakhstan	21 (2.6)	515 (8.7)	46 (2.9)	491 (6.0)	33 (3.2)	474 (5.3)	10.0 (0.15)
Georgia	21 (2.4)	422 (6.3)	51 (3.0)	417 (4.3)	29 (2.8)	426 (4.4)	10.1 (0.12)
Macedonia, Rep. of	20 (2.5)	431 (10.0)	46 (2.6)	412 (7.7)	34 (2.7)	395 (6.9)	10.0 (0.12)
Saudi Arabia	20 (3.4)	448 (8.9)	48 (4.3)	437 (4.8)	32 (3.7)	428 (8.0)	9.8 (0.16)
Chile	20 (2.8)	479 (7.5)	36 (3.6)	464 (4.6)	44 (4.0)	451 (5.1)	9.7 (0.16)
Ukraine	18 (2.6)	502 (5.9)	64 (2.9)	506 (4.4)	17 (2.5)	483 (6.1)	10.3 (0.11)
Japan	18 (3.2)	567 (7.9)	42 (4.5)	559 (3.7)	40 (4.2)	552 (3.6)	9.8 (0.18)
Finland	18 (2.5)	558 (4.7)	58 (2.5)	549 (2.8)	24 (2.4)	554 (3.5)	10.1 (0.11)
Iran, Islamic Rep. of	18 (2.3)	495 (9.6)	49 (3.4)	469 (6.0)	33 (3.3)	473 (5.9)	9.9 (0.10)
Turkey	18 (2.1)	497 (13.4)	44 (3.4)	481 (4.8)	38 (3.0)	478 (6.3)	9.7 (0.10)
Israel	17 (3.4)	524 (9.9)	43 (4.4)	511 (6.8)	39 (4.1)	522 (6.4)	9.7 (0.17)
Chinese Taipei	17 (3.0)	561 (7.5)	61 (4.2)	563 (3.4)	21 (3.2)	569 (6.1)	10.1 (0.11)
Jordan	17 (2.9)	484 (9.0)	37 (4.1)	453 (6.7)	46 (3.9)	432 (7.3)	9.4 (0.18)
Thailand	17 (3.2)	446 (12.0)	57 (4.4)	451 (5.4)	26 (3.8)	453 (9.6)	10.0 (0.13)
Hong Kong SAR	16 (3.6)	541 (12.5)	58 (4.1)	532 (4.5)	25 (4.1)	541 (9.7)	10.1 (0.15)
Norway	12 (2.6)	497 (4.8)	60 (3.8)	493 (3.0)	28 (3.2)	494 (4.9)	9.7 (0.12)
Palestinian Nat'l Auth.	12 (2.6)	437 (10.2)	49 (4.1)	422 (5.3)	39 (3.7)	413 (6.2)	9.5 (0.13)
Syrian Arab Republic	12 (2.0)	423 (11.3)	45 (3.6)	428 (5.8)	42 (3.9)	425 (5.9)	9.5 (0.16)
Indonesia	12 (2.6)	428 (9.5)	39 (4.2)	414 (5.4)	50 (4.3)	393 (7.6)	9.3 (0.16)
Tunisia	11 (2.4)	442 (11.4)	47 (3.9)	439 (3.7)	42 (3.9)	437 (4.1)	9.3 (0.14)
Malaysia	10 (2.1)	433 (20.8)	56 (3.5)	419 (9.0)	34 (3.5)	435 (9.5)	9.6 (0.11)
Armenia	9 (1.6)	459 (8.3)	50 (2.6)	440 (4.3)	41 (3.1)	432 (4.8)	9.5 (0.10)
Oman	9 (1.6)	439 (12.7)	34 (3.1)	431 (5.7)	57 (3.1)	410 (5.2)	9.0 (0.11)
Korea, Rep. of	7 (2.0)	569 (6.2)	40 (3.7)	557 (3.0)	53 (3.8)	561 (2.7)	9.1 (0.13)
Morocco	7 (1.0)	443 (9.2)	25 (2.1)	374 (4.1)	68 (2.3)	371 (2.4)	8.6 (0.09)
Sweden	r 5 (1.6)	527 (9.9)	54 (3.2)	515 (3.6)	41 (3.4)	503 (4.2)	9.2 (0.11)
Ghana	5 (1.7)	366 (20.3)	35 (4.0)	322 (8.4)	60 (4.2)	293 (7.3)	8.6 (0.15)
International Avg.	20 (0.4)	489 (1.5)	48 (0.5)	477 (0.8)	32 (0.5)	473 (1.1)	

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

An "x" indicates data are available for less than 50% of students.

Exhibit 5.10: Teacher Working Conditions (Continued)

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Ninth Grade Participants								
Honduras	13 (3.0)	397 (10.3)	39 (4.0)	372 (6.6)	48 (3.9)	359 (5.6)	9.4 (0.16)	
South Africa	5 (0.9)	505 (13.2)	30 (3.3)	349 (9.4)	64 (3.3)	306 (4.6)	8.4 (0.12)	
Botswana	2 (1.0)	~ ~	26 (3.6)	403 (8.4)	72 (3.6)	401 (4.0)	7.8 (0.16)	
Benchmarking Participants								
Indiana, US	r	52 (6.6)	539 (6.8)	40 (6.2)	532 (7.3)	8 (3.7)	525 (15.5)	11.7 (0.32)
Ontario, Canada		50 (4.2)	521 (3.8)	37 (3.9)	521 (4.4)	13 (3.0)	525 (8.8)	11.4 (0.20)
Dubai, UAE	r	45 (3.0)	501 (4.0)	43 (3.5)	464 (6.1)	12 (1.8)	450 (11.9)	11.2 (0.12)
Massachusetts, US	r	41 (7.0)	575 (11.1)	53 (6.6)	560 (10.5)	6 (3.3)	514 (26.9)	11.1 (0.26)
North Carolina, US	s	38 (6.4)	531 (8.2)	47 (6.8)	532 (16.6)	14 (5.1)	493 (18.8)	10.8 (0.27)
Minnesota, US	r	36 (6.9)	563 (7.2)	48 (6.5)	543 (9.3)	16 (4.3)	564 (14.9)	10.9 (0.30)
Alabama, US	r	36 (6.6)	501 (8.5)	46 (6.0)	476 (10.1)	18 (4.4)	465 (11.9)	10.7 (0.34)
Colorado, US		35 (6.9)	550 (9.1)	57 (6.6)	538 (8.7)	7 (2.8)	524 (13.1)	11.2 (0.30)
California, US	s	33 (5.1)	504 (8.9)	52 (5.0)	496 (7.3)	14 (3.8)	504 (19.1)	10.8 (0.18)
Quebec, Canada		33 (4.1)	529 (4.9)	57 (4.4)	519 (4.4)	10 (2.2)	500 (7.7)	10.7 (0.12)
Connecticut, US	r	33 (6.0)	574 (9.5)	48 (6.8)	524 (11.9)	20 (5.6)	486 (16.3)	10.7 (0.26)
Alberta, Canada		32 (3.6)	548 (4.5)	50 (3.9)	548 (3.3)	19 (3.1)	537 (3.5)	10.8 (0.15)
Abu Dhabi, UAE		29 (4.0)	463 (6.6)	52 (3.8)	456 (6.4)	19 (3.3)	467 (8.9)	10.6 (0.19)
Florida, US		x x	x x	x x	x x	x x	x x	x x

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

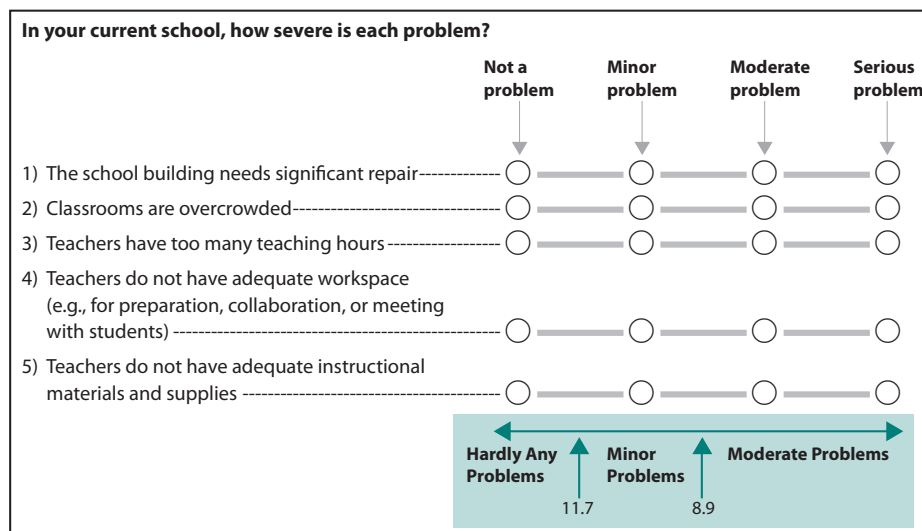


Exhibit 5.11: Schools with Difficulties Filling Vacancies for Science Teachers

Reported by Principals

Country	No Vacancies		Vacancies Are Easy to Fill		Vacancies Are Somewhat Difficult to Fill		Vacancies Are Very Difficult to Fill	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	94 (2.2)	436 (3.3)	4 (1.7)	477 (19.5)	2 (1.4)	~ ~	0 (0.0)	~ ~
Australia	25 (2.7)	520 (8.1)	37 (3.2)	535 (8.0)	32 (3.3)	507 (7.0)	7 (2.1)	526 (28.4)
Bahrain	37 (0.3)	457 (3.2)	33 (0.3)	458 (2.8)	26 (0.3)	440 (5.1)	5 (0.1)	447 (9.6)
Chile	69 (3.9)	468 (3.7)	10 (2.5)	450 (12.1)	16 (3.1)	447 (6.7)	4 (1.8)	463 (13.7)
Chinese Taipei	41 (3.8)	566 (4.0)	36 (3.9)	564 (5.0)	18 (2.5)	562 (6.5)	4 (1.7)	554 (11.4)
England	28 (4.0)	546 (11.8)	41 (5.0)	538 (8.9)	27 (4.3)	518 (12.2)	4 (2.0)	518 (32.2)
Finland	57 (3.8)	555 (2.7)	37 (3.5)	550 (4.6)	6 (1.9)	546 (4.5)	0 (0.0)	~ ~
Georgia	86 (2.9)	421 (3.4)	4 (1.6)	410 (17.2)	7 (2.0)	421 (12.1)	3 (1.1)	416 (20.8)
Ghana	44 (3.6)	312 (8.9)	23 (3.5)	321 (13.5)	26 (3.9)	275 (7.4)	7 (2.1)	306 (24.5)
Hong Kong SAR	55 (5.1)	531 (5.9)	38 (5.1)	538 (7.9)	6 (2.4)	553 (12.3)	0 (0.0)	~ ~
Hungary	--	--	--	--	--	--	--	--
Indonesia	45 (4.5)	425 (6.4)	23 (4.0)	394 (8.3)	27 (3.9)	380 (10.4)	6 (1.9)	409 (13.1)
Iran, Islamic Rep. of	37 (3.4)	489 (6.9)	41 (3.4)	462 (5.5)	19 (2.8)	472 (7.8)	3 (1.2)	490 (22.2)
Israel	44 (3.6)	515 (7.2)	15 (3.1)	512 (14.9)	22 (3.4)	517 (9.0)	19 (3.7)	520 (11.0)
Italy	71 (3.4)	502 (3.3)	21 (3.0)	498 (6.7)	8 (1.4)	503 (6.9)	0 (0.4)	~ ~
Japan	83 (3.3)	558 (2.6)	3 (1.6)	562 (9.7)	6 (2.1)	562 (7.2)	8 (2.1)	550 (7.9)
Jordan	46 (3.6)	448 (6.9)	30 (3.6)	455 (6.5)	21 (3.0)	442 (7.7)	3 (1.3)	437 (31.7)
Kazakhstan	68 (3.9)	492 (4.7)	21 (3.4)	489 (12.7)	10 (2.7)	483 (10.3)	1 (0.6)	~ ~
Korea, Rep. of	69 (4.0)	559 (2.3)	20 (3.0)	565 (4.7)	11 (2.9)	552 (5.9)	0 (0.0)	~ ~
Lebanon	38 (4.3)	411 (9.2)	37 (4.4)	413 (10.0)	24 (3.5)	382 (9.8)	2 (1.1)	~ ~
Lithuania	93 (2.2)	514 (2.8)	4 (1.8)	517 (12.0)	2 (0.9)	~ ~	1 (0.9)	~ ~
Macedonia, Rep. of	56 (3.9)	422 (7.8)	33 (3.9)	414 (8.6)	9 (1.9)	335 (16.4)	1 (1.0)	~ ~
Malaysia	38 (3.2)	428 (9.2)	52 (3.3)	431 (9.0)	8 (1.8)	413 (30.1)	2 (1.2)	~ ~
Morocco	66 (2.9)	375 (3.0)	13 (2.2)	385 (8.5)	15 (2.6)	376 (6.9)	6 (1.7)	372 (8.5)
New Zealand	31 (4.2)	506 (7.6)	47 (5.1)	527 (6.2)	22 (4.2)	490 (9.7)	0 (0.3)	~ ~
Norway	37 (4.6)	497 (5.2)	36 (4.6)	497 (3.8)	24 (3.7)	490 (5.0)	3 (1.6)	479 (6.2)
Oman	54 (3.2)	412 (5.3)	22 (2.8)	434 (6.2)	17 (2.1)	425 (9.4)	8 (1.6)	420 (13.1)
Palestinian Nat'l Auth.	64 (3.8)	425 (4.8)	30 (3.6)	407 (7.1)	4 (1.7)	439 (20.2)	1 (0.9)	~ ~
Qatar	40 (0.3)	412 (5.3)	24 (0.3)	453 (7.0)	31 (0.5)	400 (7.2)	6 (0.1)	422 (9.0)
Romania	64 (4.3)	472 (5.0)	34 (4.4)	453 (5.7)	1 (1.0)	~ ~	1 (1.0)	~ ~
Russian Federation	79 (3.5)	545 (3.4)	11 (2.6)	529 (10.1)	8 (1.8)	534 (11.5)	2 (1.0)	~ ~
Saudi Arabia	53 (4.2)	439 (5.4)	32 (3.7)	429 (7.5)	12 (2.3)	444 (6.9)	3 (1.2)	443 (16.3)
Singapore	57 (0.0)	581 (6.0)	39 (0.0)	603 (6.3)	4 (0.0)	579 (17.0)	0 (0.0)	~ ~
Slovenia	83 (3.1)	543 (3.0)	14 (2.9)	544 (6.4)	1 (0.4)	~ ~	2 (1.2)	~ ~
Sweden	48 (4.6)	510 (4.0)	26 (3.8)	503 (6.6)	13 (2.9)	520 (9.9)	13 (3.6)	519 (6.1)
Syrian Arab Republic	37 (4.2)	425 (7.5)	32 (3.9)	432 (6.9)	20 (3.8)	432 (9.6)	10 (2.1)	406 (12.5)
Thailand	38 (3.9)	441 (6.7)	11 (2.1)	464 (14.8)	36 (3.9)	457 (7.7)	15 (2.9)	449 (10.4)
Tunisia	67 (3.3)	440 (3.3)	27 (3.2)	433 (4.5)	6 (1.7)	447 (17.8)	0 (0.0)	~ ~
Turkey	66 (3.0)	491 (4.4)	15 (2.5)	482 (9.6)	11 (2.3)	466 (7.7)	7 (1.6)	439 (9.7)
Ukraine	87 (3.3)	502 (3.5)	5 (1.8)	493 (13.6)	8 (2.8)	495 (17.3)	0 (0.0)	~ ~
United Arab Emirates	47 (2.2)	447 (3.4)	30 (2.0)	475 (5.3)	21 (1.7)	485 (5.7)	2 (0.6)	~ ~
United States	61 (2.6)	527 (4.1)	25 (1.9)	527 (5.4)	11 (1.6)	522 (11.0)	3 (0.7)	511 (17.0)
International Avg.	56 (0.5)	477 (0.9)	25 (0.5)	479 (1.5)	15 (0.4)	468 (1.9)	4 (0.2)	459 (3.6)

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

() 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.

Exhibit 5.11: Schools with Difficulties Filling Vacancies for Science Teachers (Continued)

Country	No Vacancies		Vacancies Are Easy to Fill		Vacancies Are Somewhat Difficult to Fill		Vacancies Are Very Difficult to Fill	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants								
Botswana	47 (4.4)	401 (5.8)	21 (3.8)	415 (7.5)	22 (3.4)	401 (8.3)	10 (2.6)	396 (7.8)
Honduras	57 (4.6)	366 (5.9)	19 (3.9)	368 (6.0)	16 (3.6)	373 (12.3)	8 (2.4)	376 (12.8)
South Africa	47 (3.6)	333 (6.9)	8 (2.1)	361 (19.9)	28 (3.3)	342 (9.4)	17 (2.6)	299 (9.1)
Benchmarking Participants								
Alberta, Canada	59 (4.3)	546 (2.9)	33 (4.3)	549 (4.4)	8 (2.6)	539 (6.6)	0 (0.0)	~ ~
Ontario, Canada	71 (4.4)	521 (3.2)	20 (3.8)	523 (6.2)	8 (2.7)	520 (5.8)	0 (0.0)	~ ~
Quebec, Canada	32 (3.5)	533 (4.7)	42 (4.2)	519 (5.2)	20 (3.6)	504 (6.1)	6 (2.3)	513 (7.6)
Abu Dhabi, UAE	51 (4.6)	443 (5.4)	30 (4.3)	476 (12.0)	17 (3.3)	487 (10.5)	1 (0.9)	~ ~
Dubai, UAE	22 (0.3)	451 (3.9)	39 (0.4)	499 (4.1)	37 (0.5)	494 (4.9)	2 (0.0)	~ ~
Alabama, US	r 74 (6.2)	487 (9.1)	18 (5.0)	478 (16.5)	8 (4.0)	493 (39.3)	0 (0.0)	~ ~
California, US	r 58 (6.5)	491 (7.0)	27 (6.2)	528 (7.7)	9 (3.8)	476 (16.7)	6 (3.3)	494 (12.3)
Colorado, US	51 (6.5)	547 (8.8)	33 (5.6)	549 (9.1)	16 (4.5)	508 (21.5)	0 (0.0)	~ ~
Connecticut, US	78 (5.5)	538 (8.2)	13 (5.2)	520 (20.9)	4 (2.6)	531 (18.1)	5 (3.3)	494 (63.6)
Florida, US	34 (5.6)	538 (14.1)	52 (6.6)	529 (12.2)	6 (3.5)	529 (12.2)	8 (3.8)	486 (13.7)
Indiana, US	r 78 (4.9)	536 (5.9)	16 (5.2)	539 (10.6)	6 (3.6)	534 (27.5)	0 (0.0)	~ ~
Massachusetts, US	53 (6.6)	557 (8.8)	22 (5.5)	586 (11.1)	18 (6.1)	560 (15.3)	6 (3.8)	568 (39.8)
Minnesota, US	59 (7.0)	550 (8.1)	29 (6.8)	560 (8.7)	9 (4.7)	557 (13.4)	3 (2.7)	563 (6.8)
North Carolina, US	57 (5.6)	533 (11.5)	30 (5.2)	526 (10.8)	11 (3.0)	537 (28.7)	3 (2.4)	524 (4.2)

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

Size of School Library

Libraries, both within schools and local communities, provide a range of reading materials and other resources from which teachers can draw to expand their instructional approaches, and from which students can choose books for their own learning and enjoyment. Also, with growing technology use, libraries increasingly are becoming media centers offering Internet access to a wide range of materials, with the potential to improve achievement in all areas, including science.

Exhibit 5.12 presents principals' reports about the existence and size of school libraries for participants in the TIMSS 2011 fourth grade assessment. In considering these results, it is important to realize that, because of variation in policies across countries regarding school libraries and classroom libraries, some countries have well-resourced classroom libraries rather than a larger central library, so the lack of a school library does not necessarily mean that children do not have access to a variety of books. Also, primary schools tend to be smaller than middle and secondary schools, and may have small libraries as a result of their small enrollments.

On average, across the fourth grade countries, 32 percent of the students attended schools (for the most part primary schools) having well-resourced school libraries with more than 5,000 book titles. Another 38 percent of the students attended schools having libraries with between 501 and 5,000 book titles, and 17 percent attended schools having smaller library collections of 500 book titles or fewer. On average internationally, 13 percent of fourth grade students attended schools with no school library.

Average science achievement was positively related to size of school library, with fourth grade students attending schools with well-resourced school libraries having the highest achievement (505) and students with no school library the lowest achievement (472). In the sixth grade countries, there were few students in schools with libraries having more than 5,000 book titles, and high percentages of students (50% or greater) with no school library.

Schools with Computers Available for Instruction

Recent research reviews suggest that computer use continues to grow in mathematics and science instruction, and that it can positively effect students' mathematics and science achievement. For example, a review of evaluation studies of computer use in US primary and secondary schools since 1990 found that computer tutorials in natural and social science classes have a strong record of effectiveness, and that simulation programs sometimes improve the effectiveness of science teaching, although the evidence is less definitive (Kulik, 2003).

Exhibit 5.13 shows principals' reports about the availability of computers for instruction for participants in the TIMSS fourth grade assessment. Internationally, 38 percent of the fourth grade students, on average, were in schools that had 1 computer for every 1–2 fourth grade students, 30 percent were in schools with 1 computer for every 3–5 fourth grade students, and 24 percent were in schools with 1 computer for 6 or more students. There was considerable variation from country to country, with the highest computer-to-student ratio in England (90% of students in schools with 1 computer for every 1–2 fourth grade students) and the lowest in Iran, Tunisia, and Yemen (7% or fewer students in such schools). On average, however, only 8 percent of the fourth grade students were in schools that did not have any computers available for instruction. The percentages of students in schools with no computers for instruction were higher for the sixth grade participants.

The relationship between computer availability and average science achievement is difficult to interpret because it is highly interrelated with socio-economic levels and instructional practices. In the primary grades, computer instruction can be used for remedial purposes as frequently (if not more frequently) because it can provide an increased variety of stimulating and challenging activities. However, the fourth grade students with access to computers for instruction had higher average science achievement than those students with no access to computers for instruction.

Exhibit 5.14 provides principals' reports about the availability of computers for instruction for participants in the TIMSS eighth grade assessment. Levels of computer availability are similar to the fourth grade (although a little more favorable), with 40 percent of the eighth grade students, on average, in schools that had 1 computer for every 1–2 eighth grade students, 28 percent in schools with 1 computer for every 3–5 eighth grade students, and 28 percent in schools with 1 computer for 6 or more students. Only 4 percent of the eighth grade students were in schools with no provision for computers for instruction. Eighth grade participants with 70 percent or more of students in schools with the highest computer-to-student ratio (1 computer for every 1–2 eighth grade students) included Australia, England, Georgia, Hungary, Macedonia, New Zealand, Norway, Slovenia, and, among benchmarking participants, Alberta, Colorado, and Indiana. Similar to the fourth grade, there was little relationship between computer-to-student ratio and science achievement, although average achievement was lower for the 4 percent of students in schools with no computers available for instruction.

Exhibit 5.12: Size of School Library
Reported by Principals (Does not include classroom libraries)

Country	More than 5,000 Book Titles		501–5,000 Book Titles		500 Book Titles or Fewer		No School Library	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	42 (4.0)	414 (5.8)	50 (3.9)	417 (5.1)	8 (2.3)	421 (13.3)	0 (0.5)	~ ~
Australia	56 (3.6)	519 (4.0)	42 (3.7)	514 (5.2)	1 (0.5)	~ ~	1 (0.0)	~ ~
Austria	1 (0.1)	~ ~	45 (4.5)	534 (3.5)	27 (4.2)	517 (5.4)	27 (3.6)	541 (4.6)
Azerbaijan	29 (3.6)	450 (9.7)	44 (4.1)	442 (10.3)	28 (3.7)	422 (9.9)	0 (0.0)	~ ~
Bahrain	27 (4.8)	478 (7.4)	48 (5.5)	443 (5.6)	25 (4.1)	433 (10.4)	0 (0.0)	~ ~
Belgium (Flemish)	1 (0.0)	~ ~	13 (3.3)	507 (5.8)	26 (3.8)	513 (4.0)	60 (4.6)	508 (2.7)
Chile	16 (2.8)	519 (7.5)	58 (4.2)	478 (4.5)	22 (3.1)	471 (7.8)	4 (1.3)	466 (8.1)
Chinese Taipei	90 (2.8)	553 (2.3)	9 (2.7)	543 (6.2)	0 (0.0)	~ ~	1 (0.8)	~ ~
Croatia	39 (4.2)	518 (3.0)	53 (4.3)	515 (2.9)	8 (1.8)	504 (10.2)	0 (0.0)	~ ~
Czech Republic	6 (1.6)	533 (6.7)	55 (4.1)	536 (3.6)	23 (3.6)	540 (4.8)	17 (3.5)	533 (6.2)
Denmark	r 68 (3.6)	533 (3.3)	26 (3.7)	524 (6.5)	2 (1.5)	~ ~	4 (1.3)	529 (13.9)
England	13 (2.9)	521 (10.5)	63 (4.6)	536 (4.3)	15 (3.6)	516 (9.8)	8 (2.3)	503 (18.2)
Finland	4 (1.7)	583 (8.7)	47 (4.3)	569 (2.8)	27 (3.8)	571 (5.3)	21 (3.4)	568 (6.2)
Georgia	35 (3.2)	457 (4.7)	49 (3.6)	456 (7.3)	13 (2.4)	447 (8.3)	2 (1.3)	~ ~
Germany	2 (1.0)	~ ~	39 (3.4)	531 (4.5)	33 (3.6)	523 (5.0)	26 (3.3)	533 (4.7)
Hong Kong SAR	82 (3.2)	541 (4.3)	18 (3.2)	529 (6.1)	0 (0.0)	~ ~	0 (0.0)	~ ~
Hungary	52 (4.0)	543 (4.7)	41 (4.3)	528 (6.9)	3 (1.3)	518 (19.0)	4 (1.6)	523 (29.8)
Iran, Islamic Rep. of	3 (1.2)	507 (29.5)	40 (4.0)	479 (6.4)	37 (3.6)	447 (5.7)	20 (3.1)	413 (10.4)
Ireland	7 (2.1)	498 (9.0)	30 (4.0)	516 (6.8)	14 (2.8)	524 (10.3)	49 (4.2)	519 (4.8)
Italy	5 (1.4)	514 (15.3)	41 (3.9)	529 (4.1)	42 (3.8)	519 (4.9)	12 (2.6)	521 (7.4)
Japan	81 (3.1)	560 (2.2)	18 (3.2)	552 (4.3)	0 (0.0)	~ ~	1 (0.7)	~ ~
Kazakhstan	65 (3.9)	496 (6.5)	30 (3.9)	490 (10.0)	5 (1.9)	452 (20.8)	0 (0.0)	~ ~
Korea, Rep. of	92 (2.5)	587 (2.1)	8 (2.4)	578 (3.4)	0 (0.0)	~ ~	1 (0.0)	~ ~
Kuwait	3 (1.5)	342 (16.3)	37 (4.4)	356 (8.2)	59 (4.1)	347 (6.6)	1 (0.7)	~ ~
Lithuania	46 (3.9)	515 (3.8)	45 (4.0)	513 (4.4)	6 (1.7)	540 (10.3)	3 (0.8)	497 (10.8)
Malta	11 (0.1)	474 (4.5)	58 (0.1)	453 (1.9)	17 (0.1)	428 (4.7)	14 (0.1)	418 (4.4)
Morocco	0 (0.3)	~ ~	6 (2.2)	309 (20.6)	24 (3.0)	301 (10.1)	70 (3.3)	247 (5.8)
Netherlands	--	--	--	--	--	--	--	--
New Zealand	46 (3.8)	499 (4.7)	53 (3.7)	496 (4.2)	0 (0.0)	~ ~	1 (1.0)	~ ~
Northern Ireland	r 3 (1.5)	501 (17.0)	51 (4.6)	516 (4.9)	15 (3.9)	497 (13.7)	31 (4.0)	530 (5.5)
Norway	18 (4.0)	497 (4.8)	73 (4.8)	493 (3.2)	4 (2.3)	498 (5.1)	4 (2.0)	483 (9.2)
Oman	r 11 (2.2)	364 (9.9)	58 (3.7)	372 (5.0)	10 (2.1)	403 (17.9)	21 (2.6)	359 (7.8)
Poland	65 (3.6)	508 (3.4)	32 (3.6)	498 (5.1)	2 (1.0)	~ ~	1 (0.9)	~ ~
Portugal	5 (2.0)	512 (10.0)	47 (5.4)	514 (5.9)	24 (4.0)	536 (8.9)	25 (4.1)	524 (5.4)
Qatar	52 (3.4)	408 (7.9)	34 (3.3)	367 (7.9)	13 (2.2)	383 (7.8)	1 (1.0)	~ ~
Romania	45 (3.9)	521 (7.8)	45 (4.2)	489 (9.6)	6 (1.7)	503 (15.4)	4 (1.7)	497 (28.6)
Russian Federation	65 (3.4)	555 (3.8)	31 (3.4)	551 (6.1)	3 (1.8)	538 (25.4)	1 (0.0)	~ ~
Saudi Arabia	3 (1.5)	461 (18.9)	17 (3.0)	430 (14.9)	55 (4.2)	432 (8.4)	25 (3.6)	426 (9.8)
Serbia	66 (4.0)	523 (4.1)	22 (3.5)	505 (6.0)	8 (2.5)	480 (14.8)	4 (1.6)	496 (9.8)
Singapore	77 (0.0)	583 (3.9)	22 (0.0)	584 (7.6)	1 (0.0)	~ ~	0 (0.0)	~ ~
Slovak Republic	11 (2.0)	529 (9.8)	58 (3.9)	533 (5.2)	20 (3.2)	519 (7.7)	12 (2.6)	539 (6.7)
Slovenia	66 (2.9)	518 (2.6)	27 (3.6)	521 (4.2)	6 (2.7)	539 (13.2)	1 (0.6)	~ ~
Spain	19 (3.2)	515 (6.6)	69 (4.0)	504 (3.6)	8 (1.8)	504 (13.1)	3 (1.6)	508 (19.4)
Sweden	r 18 (3.7)	536 (5.3)	52 (5.0)	533 (4.4)	12 (3.4)	539 (6.9)	18 (3.8)	528 (7.9)
Thailand	18 (3.1)	517 (8.6)	37 (4.6)	468 (8.1)	42 (3.7)	447 (9.0)	3 (1.6)	552 (22.6)
Tunisia	0 (0.1)	~ ~	5 (2.2)	350 (12.2)	61 (3.8)	352 (7.3)	34 (3.3)	332 (9.9)
Turkey	1 (0.7)	~ ~	38 (3.2)	480 (5.5)	36 (3.3)	470 (5.2)	24 (2.7)	415 (12.2)
United Arab Emirates	r 27 (1.4)	467 (5.6)	47 (2.3)	417 (3.9)	23 (2.1)	403 (6.2)	3 (0.8)	445 (23.9)
United States	62 (3.1)	550 (2.6)	34 (2.9)	538 (4.2)	3 (1.2)	535 (15.5)	1 (0.8)	~ ~
Yemen	r 1 (0.7)	~ ~	3 (1.0)	286 (7.7)	19 (3.3)	227 (17.6)	77 (3.4)	207 (8.3)
International Avg.	32 (0.4)	505 (1.4)	38 (0.5)	486 (1.0)	17 (0.4)	469 (1.8)	13 (0.3)	472 (2.4)

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

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

Exhibit 5.12: Size of School Library (Continued)

Country	More than 5,000 Book Titles		501–5,000 Book Titles		500 Book Titles or Fewer		No School Library	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants								
Botswana	3 (1.2)	432 (58.6)	12 (2.7)	420 (32.0)	33 (4.1)	369 (9.5)	52 (4.5)	352 (7.1)
Honduras	0 (0.0)	~ ~	15 (3.5)	488 (16.6)	30 (4.2)	435 (11.8)	55 (4.2)	417 (6.9)
Yemen	1 (0.0)	~ ~	4 (1.4)	408 (10.3)	21 (3.3)	354 (12.5)	73 (3.5)	339 (8.7)
Benchmarking Participants								
Alberta, Canada	70 (4.0)	544 (2.9)	30 (4.0)	537 (5.9)	0 (0.0)	~ ~	0 (0.0)	~ ~
Ontario, Canada	51 (4.3)	529 (4.5)	45 (4.3)	526 (4.1)	2 (1.5)	~ ~	1 (1.0)	~ ~
Quebec, Canada	42 (4.2)	517 (3.8)	52 (4.0)	517 (3.7)	5 (1.9)	517 (5.2)	2 (1.1)	~ ~
Abu Dhabi, UAE	r 22 (3.6)	433 (13.5)	46 (4.8)	407 (8.1)	27 (3.8)	398 (8.9)	5 (1.7)	448 (23.7)
Dubai, UAE	r 51 (0.2)	497 (3.4)	39 (0.2)	437 (3.0)	10 (0.2)	404 (5.0)	0 (0.0)	~ ~
Florida, US	r 65 (6.9)	544 (5.5)	30 (6.1)	546 (10.4)	3 (2.3)	514 (21.7)	2 (0.1)	~ ~
North Carolina, US	76 (6.2)	540 (6.1)	24 (6.2)	542 (10.9)	0 (0.0)	~ ~	0 (0.0)	~ ~

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

Does your school have a school library?

1) Yes
2) No

If Yes,

A. Approximately how many books with different titles does your school library have (exclude magazines and periodicals)?

1) 250 or fewer
2) 251–500
3) 501–2,000
4) 2,001–5,000
5) 5,001–10,000
6) More than 10,000

Exhibit 5.13: Schools with Computers Available for Instruction

Reported by Principals

Country	1 Computer for 1–2 Students		1 Computer for 3–5 Students		1 Computer for 6 or More Students		No Computers Available	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	26 (3.7)	415 (9.3)	46 (4.3)	415 (5.7)	24 (3.7)	411 (6.7)	4 (1.8)	437 (14.0)
Australia	65 (3.7)	519 (3.6)	26 (3.2)	511 (6.2)	9 (2.4)	519 (5.6)	0 (0.1)	~ ~
Austria	11 (2.4)	551 (8.2)	19 (2.7)	535 (4.7)	66 (3.7)	529 (3.1)	4 (3.0)	495 (24.0)
Azerbaijan	19 (3.2)	436 (19.1)	37 (4.1)	427 (8.0)	29 (3.7)	459 (9.4)	15 (3.2)	426 (14.6)
Bahrain	r 42 (3.9)	459 (6.2)	43 (4.4)	445 (6.6)	15 (2.8)	434 (15.9)	0 (0.0)	~ ~
Belgium (Flemish)	41 (4.3)	511 (3.7)	34 (3.7)	513 (2.9)	25 (4.0)	504 (3.3)	0 (0.0)	~ ~
Chile	r 58 (3.7)	477 (4.3)	32 (3.6)	487 (5.8)	7 (2.2)	501 (11.4)	2 (1.1)	~ ~
Chinese Taipei	23 (2.7)	537 (4.7)	41 (3.7)	553 (3.6)	36 (3.6)	562 (3.3)	0 (0.0)	~ ~
Croatia	12 (2.4)	514 (4.6)	21 (3.3)	519 (4.0)	50 (4.3)	516 (3.0)	17 (3.1)	515 (4.7)
Czech Republic	66 (3.5)	533 (3.5)	26 (3.1)	542 (3.5)	5 (1.9)	544 (5.8)	3 (1.5)	545 (8.6)
Denmark	s 44 (4.7)	529 (4.7)	42 (4.4)	533 (4.1)	14 (3.3)	542 (7.8)	0 (0.0)	~ ~
England	r 90 (2.8)	528 (3.6)	10 (2.8)	533 (15.2)	0 (0.0)	~ ~	0 (0.0)	~ ~
Finland	55 (4.3)	572 (3.5)	28 (4.1)	566 (4.3)	15 (3.2)	572 (4.6)	2 (1.2)	~ ~
Georgia	64 (3.7)	447 (4.6)	25 (3.6)	464 (10.0)	9 (2.7)	486 (8.5)	2 (1.1)	~ ~
Germany	21 (2.5)	523 (6.7)	49 (3.6)	533 (3.8)	28 (3.4)	531 (4.3)	1 (0.9)	~ ~
Hong Kong SAR	56 (4.3)	526 (7.3)	43 (4.2)	548 (4.7)	1 (0.7)	~ ~	0 (0.0)	~ ~
Hungary	53 (3.9)	527 (5.0)	26 (3.4)	543 (8.4)	11 (2.8)	566 (7.4)	10 (2.7)	523 (14.3)
Iran, Islamic Rep. of	1 (0.5)	~ ~	2 (0.8)	~ ~	23 (3.3)	471 (8.2)	74 (3.4)	443 (4.8)
Ireland	35 (4.0)	515 (7.0)	27 (3.2)	521 (6.1)	38 (4.2)	517 (5.8)	0 (0.0)	~ ~
Italy	20 (3.0)	523 (6.7)	34 (3.4)	523 (5.5)	45 (3.6)	524 (4.6)	1 (0.0)	~ ~
Japan	48 (3.3)	553 (2.9)	44 (4.0)	562 (2.6)	8 (2.1)	568 (5.0)	0 (0.0)	~ ~
Kazakhstan	35 (3.9)	499 (9.8)	24 (3.6)	498 (10.1)	27 (4.0)	480 (9.2)	14 (2.7)	505 (14.1)
Korea, Rep. of	22 (3.5)	577 (3.6)	46 (4.0)	587 (2.6)	30 (3.7)	592 (3.3)	2 (1.1)	~ ~
Kuwait	40 (4.3)	356 (8.3)	50 (4.5)	344 (7.6)	9 (2.6)	340 (14.9)	1 (0.9)	~ ~
Lithuania	29 (3.2)	503 (5.7)	24 (3.9)	513 (5.8)	42 (3.9)	525 (4.4)	5 (1.8)	510 (7.3)
Malta	15 (0.1)	459 (3.8)	67 (0.1)	439 (2.6)	18 (0.1)	454 (3.6)	0 (0.0)	~ ~
Morocco	11 (2.3)	293 (23.3)	9 (2.2)	271 (10.3)	49 (4.0)	264 (5.6)	31 (3.4)	248 (9.5)
Netherlands	r 34 (4.4)	528 (3.8)	38 (5.4)	537 (3.9)	28 (4.9)	532 (5.1)	0 (0.0)	~ ~
New Zealand	70 (3.3)	494 (3.9)	22 (3.1)	510 (8.0)	7 (2.0)	497 (14.7)	1 (0.7)	~ ~
Northern Ireland	r 77 (4.3)	514 (4.0)	17 (3.8)	524 (5.9)	5 (2.3)	523 (15.9)	0 (0.0)	~ ~
Norway	58 (5.1)	492 (3.2)	26 (4.2)	492 (4.5)	16 (3.6)	503 (4.5)	1 (0.0)	~ ~
Oman	r 22 (2.3)	360 (7.7)	13 (1.9)	368 (12.7)	61 (2.8)	377 (4.7)	3 (0.8)	287 (16.0)
Poland	31 (3.0)	494 (4.7)	29 (3.7)	510 (4.4)	25 (3.4)	515 (5.0)	15 (2.6)	501 (7.4)
Portugal	14 (3.2)	541 (9.0)	21 (5.2)	509 (12.2)	58 (5.3)	525 (4.5)	7 (2.4)	510 (11.8)
Qatar	42 (3.5)	391 (8.2)	32 (3.7)	376 (11.6)	26 (1.3)	428 (8.6)	1 (0.6)	~ ~
Romania	42 (3.7)	494 (9.7)	34 (3.9)	507 (10.5)	19 (3.4)	520 (15.2)	5 (1.7)	523 (17.6)
Russian Federation	28 (3.0)	550 (7.1)	33 (4.0)	549 (4.8)	34 (3.4)	552 (5.6)	6 (2.1)	580 (14.6)
Saudi Arabia	16 (2.9)	436 (18.5)	20 (4.1)	429 (12.8)	28 (3.7)	425 (8.8)	36 (4.0)	429 (8.4)
Serbia	16 (2.6)	510 (7.8)	36 (3.6)	515 (5.8)	35 (4.4)	517 (5.5)	12 (2.6)	515 (8.3)
Singapore	51 (0.0)	584 (4.8)	47 (0.0)	583 (5.6)	3 (0.0)	586 (32.4)	0 (0.0)	~ ~
Slovak Republic	81 (2.5)	530 (4.5)	14 (2.1)	535 (9.4)	4 (1.4)	538 (10.0)	0 (0.0)	~ ~
Slovenia	65 (3.3)	521 (3.2)	30 (3.7)	521 (4.2)	5 (1.6)	513 (8.4)	0 (0.0)	~ ~
Spain	50 (3.9)	497 (4.6)	35 (4.1)	513 (4.3)	10 (2.5)	528 (7.7)	6 (2.0)	498 (9.8)
Sweden	r 29 (3.6)	540 (5.4)	37 (4.6)	526 (4.9)	35 (4.4)	531 (4.9)	0 (0.0)	~ ~
Thailand	37 (3.8)	483 (7.0)	32 (4.2)	458 (10.7)	23 (3.6)	485 (12.7)	8 (2.6)	435 (18.6)
Tunisia	7 (1.7)	364 (9.3)	23 (2.9)	316 (11.7)	51 (3.9)	356 (8.0)	18 (3.2)	342 (11.4)
Turkey	18 (2.6)	464 (6.9)	27 (3.0)	463 (10.3)	43 (3.2)	468 (6.5)	11 (2.2)	431 (21.7)
United Arab Emirates	r 32 (2.0)	414 (4.5)	40 (2.3)	409 (4.1)	27 (2.0)	451 (7.0)	1 (0.5)	~ ~
United States	r 65 (2.8)	551 (2.9)	26 (2.4)	539 (4.4)	8 (1.5)	537 (8.5)	1 (0.0)	~ ~
Yemen	r 6 (2.0)	179 (20.3)	7 (2.6)	241 (39.0)	15 (3.5)	234 (15.1)	72 (4.2)	213 (8.5)
International Avg.	38 (0.5)	486 (1.2)	30 (0.5)	487 (1.3)	24 (0.5)	491 (1.4)	8 (0.3)	450 (2.8)

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

() 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.

Exhibit 5.13: Schools with Computers Available for Instruction (Continued)

Country	1 Computer for 1–2 Students		1 Computer for 3–5 Students		1 Computer for 6 or More Students		No Computers Available	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants								
Botswana	13 (3.1)	378 (27.2)	15 (3.2)	431 (22.3)	41 (4.5)	354 (7.6)	31 (4.1)	356 (9.9)
Honduras	24 (3.9)	459 (13.8)	24 (4.0)	447 (6.6)	15 (2.7)	464 (7.3)	37 (4.0)	398 (11.1)
Yemen	r 9 (2.7)	340 (14.7)	6 (2.5)	390 (25.2)	12 (3.5)	359 (23.9)	73 (4.6)	339 (9.6)
Benchmarking Participants								
Alberta, Canada	91 (3.3)	541 (2.8)	8 (3.2)	543 (5.9)	1 (0.0)	~ ~	0 (0.0)	~ ~
Ontario, Canada	74 (3.7)	523 (3.6)	19 (3.6)	541 (7.1)	7 (1.6)	539 (10.7)	0 (0.0)	~ ~
Quebec, Canada	64 (3.6)	521 (3.5)	29 (3.6)	513 (3.4)	7 (2.5)	510 (10.8)	0 (0.0)	~ ~
Abu Dhabi, UAE	r 30 (3.7)	394 (9.7)	43 (3.9)	405 (7.9)	25 (3.9)	417 (13.6)	2 (1.2)	~ ~
Dubai, UAE	r 35 (0.4)	463 (3.5)	35 (0.5)	427 (4.9)	29 (0.3)	471 (3.5)	0 (0.0)	~ ~
Florida, US	r 55 (6.2)	548 (5.3)	36 (6.2)	547 (8.4)	8 (3.4)	507 (7.8)	0 (0.0)	~ ~
North Carolina, US	62 (7.1)	538 (6.0)	31 (7.0)	539 (8.7)	7 (4.1)	565 (20.2)	0 (0.0)	~ ~

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

The number of students per computer was calculated by dividing the number of students by the number of computers.

- 1) **What is the total enrollment of fourth grade students in your school as of the first day of the month TIMSS 2011 testing begins?**

- 2) **What is the total number of computers that can be used for instructional purposes by fourth grade students?**

Exhibit 5.14: Schools with Computers Available for Instruction

Reported by Principals

Country	1 Computer for 1–2 Students		1 Computer for 3–5 Students		1 Computer for 6 or More Students		No Computers Available	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	24 (3.4)	433 (7.1)	50 (4.2)	438 (5.1)	26 (3.2)	444 (7.5)	0 (0.0)	~ ~
Australia	89 (2.4)	521 (5.2)	9 (2.4)	525 (12.9)	2 (1.2)	~ ~	0 (0.0)	~ ~
Bahrain	32 (0.3)	456 (3.7)	35 (0.3)	456 (3.2)	26 (0.3)	446 (3.1)	7 (0.1)	414 (15.9)
Chile	49 (4.1)	464 (4.4)	38 (4.0)	461 (5.1)	11 (2.6)	463 (10.9)	2 (1.1)	~ ~
Chinese Taipei	6 (1.8)	572 (17.2)	18 (2.9)	553 (9.4)	76 (3.3)	567 (2.6)	1 (0.7)	~ ~
England	99 (0.9)	537 (5.2)	1 (0.9)	~ ~	0 (0.0)	~ ~	0 (0.0)	~ ~
Finland	47 (3.8)	557 (3.4)	44 (4.0)	547 (3.5)	7 (2.1)	546 (7.9)	2 (1.2)	~ ~
Georgia	70 (3.2)	414 (4.2)	25 (3.5)	437 (7.2)	4 (1.7)	428 (11.0)	1 (0.0)	~ ~
Ghana	42 (4.0)	299 (8.2)	13 (2.5)	343 (21.3)	31 (3.6)	323 (9.8)	15 (3.4)	265 (13.1)
Hong Kong SAR	54 (4.9)	527 (6.8)	37 (4.6)	542 (7.8)	9 (3.0)	532 (14.5)	0 (0.0)	~ ~
Hungary	71 (3.9)	518 (4.3)	25 (3.6)	543 (6.7)	2 (0.9)	~ ~	2 (1.3)	~ ~
Indonesia	r 1 (0.5)	~ ~	11 (2.6)	423 (8.6)	87 (2.7)	411 (4.8)	2 (1.3)	~ ~
Iran, Islamic Rep. of	1 (0.9)	~ ~	5 (2.0)	538 (14.8)	44 (3.1)	483 (6.1)	49 (3.2)	456 (4.7)
Israel	19 (3.2)	523 (11.2)	35 (4.3)	520 (6.5)	41 (4.0)	512 (8.9)	4 (1.9)	516 (12.8)
Italy	16 (2.8)	503 (6.9)	43 (4.2)	499 (4.9)	41 (3.9)	505 (4.4)	0 (0.4)	~ ~
Japan	31 (2.4)	562 (6.0)	48 (3.2)	558 (3.2)	22 (2.7)	552 (4.4)	0 (0.0)	~ ~
Jordan	31 (3.1)	442 (7.3)	41 (4.0)	454 (7.7)	26 (2.9)	451 (6.1)	2 (1.2)	~ ~
Kazakhstan	57 (3.8)	494 (6.0)	26 (3.7)	479 (9.9)	17 (3.0)	494 (9.2)	0 (0.0)	~ ~
Korea, Rep. of	6 (2.3)	549 (7.9)	26 (3.6)	558 (3.6)	68 (4.0)	562 (2.3)	0 (0.0)	~ ~
Lebanon	38 (4.1)	422 (8.9)	40 (4.3)	405 (9.1)	16 (3.0)	405 (13.2)	5 (2.0)	347 (14.1)
Lithuania	62 (3.8)	507 (3.5)	30 (3.8)	521 (4.1)	8 (2.7)	536 (11.9)	0 (0.0)	~ ~
Macedonia, Rep. of	r 72 (3.8)	417 (6.8)	16 (2.9)	397 (15.5)	9 (2.3)	391 (18.6)	3 (1.3)	360 (51.0)
Malaysia	2 (1.1)	~ ~	13 (2.7)	425 (17.4)	78 (3.1)	421 (6.6)	6 (1.9)	445 (16.2)
Morocco	6 (1.5)	404 (11.4)	10 (1.5)	393 (10.4)	70 (2.8)	373 (3.0)	13 (2.6)	372 (5.3)
New Zealand	r 88 (4.2)	510 (4.9)	8 (3.4)	537 (10.2)	4 (2.7)	545 (19.7)	0 (0.0)	~ ~
Norway	73 (4.2)	497 (3.2)	23 (3.9)	486 (5.4)	4 (1.9)	501 (18.2)	0 (0.0)	~ ~
Oman	47 (3.1)	427 (4.4)	34 (3.2)	415 (6.4)	15 (2.5)	419 (11.5)	4 (1.6)	429 (21.5)
Palestinian Nat'l Auth.	25 (3.2)	452 (7.7)	21 (2.9)	433 (5.8)	49 (3.7)	405 (5.0)	5 (1.4)	378 (13.8)
Qatar	r 44 (0.5)	435 (6.8)	48 (0.5)	409 (4.8)	7 (0.1)	410 (6.6)	1 (0.0)	~ ~
Romania	45 (3.8)	465 (7.0)	34 (4.0)	457 (6.0)	19 (3.4)	480 (7.8)	2 (1.2)	~ ~
Russian Federation	50 (3.3)	546 (5.1)	40 (3.6)	541 (4.8)	10 (2.3)	538 (7.0)	0 (0.0)	~ ~
Saudi Arabia	14 (2.5)	440 (10.8)	17 (3.3)	453 (8.6)	37 (3.8)	430 (6.4)	32 (3.7)	435 (6.0)
Singapore	68 (0.0)	593 (5.2)	28 (0.0)	585 (8.4)	4 (0.0)	600 (29.0)	0 (0.0)	~ ~
Slovenia	70 (4.1)	546 (2.9)	28 (4.1)	537 (5.3)	1 (1.1)	~ ~	0 (0.0)	~ ~
Sweden	r 54 (4.3)	512 (3.8)	38 (4.3)	510 (5.0)	8 (2.6)	509 (8.0)	0 (0.0)	~ ~
Syrian Arab Republic	8 (2.4)	415 (15.6)	24 (4.0)	436 (10.1)	68 (3.9)	424 (3.7)	1 (0.7)	~ ~
Thailand	28 (3.4)	437 (7.0)	37 (4.1)	451 (9.2)	35 (4.2)	463 (8.0)	0 (0.0)	~ ~
Tunisia	5 (1.5)	414 (5.6)	10 (2.3)	441 (12.4)	86 (2.5)	441 (2.9)	0 (0.0)	~ ~
Turkey	16 (1.9)	476 (10.6)	33 (2.9)	495 (8.3)	41 (2.6)	476 (5.2)	10 (1.9)	476 (10.3)
Ukraine	35 (4.0)	494 (7.1)	39 (4.4)	497 (6.0)	25 (3.3)	516 (5.9)	1 (1.0)	~ ~
United Arab Emirates	37 (2.1)	465 (4.2)	41 (2.3)	458 (4.2)	21 (2.4)	480 (6.2)	1 (0.4)	~ ~
United States	58 (2.1)	528 (4.0)	32 (2.1)	522 (4.9)	9 (1.2)	523 (11.1)	0 (0.0)	~ ~
International Avg.	40 (0.5)	481 (1.2)	28 (0.5)	480 (1.4)	28 (0.4)	474 (1.7)	4 (0.2)	408 (5.6)

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

() 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.

Exhibit 5.14: Schools with Computers Available for Instruction (Continued)

Country	1 Computer for 1–2 Students		1 Computer for 3–5 Students		1 Computer for 6 or More Students		No Computers Available	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants								
Botswana	8 (2.1)	415 (17.8)	11 (2.4)	419 (7.6)	76 (3.2)	401 (4.2)	5 (2.0)	416 (19.0)
Honduras	23 (3.2)	391 (13.0)	20 (4.0)	366 (9.3)	22 (3.4)	370 (5.8)	35 (4.4)	353 (5.8)
South Africa	15 (1.9)	364 (14.7)	9 (1.8)	411 (21.5)	30 (3.8)	331 (8.7)	46 (4.1)	309 (6.0)
Benchmarking Participants								
Alberta, Canada	90 (2.9)	547 (2.7)	10 (2.8)	551 (6.1)	1 (0.0)	~ ~	0 (0.0)	~ ~
Ontario, Canada	62 (3.9)	521 (2.9)	27 (4.1)	524 (6.5)	11 (2.8)	516 (7.2)	0 (0.0)	~ ~
Quebec, Canada	51 (4.4)	524 (3.6)	35 (4.4)	518 (5.9)	14 (3.0)	519 (10.7)	0 (0.0)	~ ~
Abu Dhabi, UAE	36 (3.5)	459 (7.5)	42 (4.5)	459 (7.2)	20 (4.1)	467 (11.1)	2 (1.1)	~ ~
Dubai, UAE	r 45 (0.5)	490 (4.8)	32 (0.4)	474 (3.9)	23 (0.5)	511 (4.3)	0 (0.0)	~ ~
Alabama, US	r 63 (6.9)	483 (10.5)	31 (6.8)	494 (13.5)	6 (3.7)	479 (17.8)	0 (0.0)	~ ~
California, US	r 26 (6.9)	495 (13.8)	43 (6.5)	503 (9.0)	31 (5.9)	494 (12.6)	0 (0.0)	~ ~
Colorado, US	72 (6.1)	540 (5.4)	24 (5.9)	546 (12.5)	4 (3.0)	536 (63.9)	0 (0.0)	~ ~
Connecticut, US	r 59 (7.1)	525 (10.0)	38 (7.1)	539 (12.7)	3 (2.5)	504 (5.8)	0 (0.0)	~ ~
Florida, US	51 (7.1)	521 (12.9)	37 (6.3)	533 (11.5)	12 (4.7)	546 (23.2)	0 (0.0)	~ ~
Indiana, US	r 81 (6.4)	532 (6.0)	19 (6.4)	547 (15.8)	0 (0.0)	~ ~	0 (0.0)	~ ~
Massachusetts, US	51 (7.2)	556 (9.5)	45 (6.7)	581 (7.7)	4 (3.0)	561 (95.9)	0 (0.0)	~ ~
Minnesota, US	62 (7.7)	549 (7.6)	36 (7.4)	563 (7.3)	2 (2.2)	~ ~	0 (0.0)	~ ~
North Carolina, US	51 (6.9)	537 (8.6)	38 (7.3)	523 (14.7)	11 (4.5)	547 (23.9)	0 (0.0)	~ ~

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

The number of students per computer was calculated by dividing the number of students by the number of computers.

1) **What is the total enrollment of eighth grade students in your school as of the first day of the month TIMSS 2011 testing begins?**

2) **What is the total number of computers that can be used for instructional purposes by eighth grade students?**

Schools with Science Laboratories

Undertaking “hands-on” science investigations is an important component of science curricula in many countries. TIMSS 2011 collected information on the availability of science laboratories at the fourth and eighth grades, and the availability of instructional assistance when students are conducting experiments (at eighth grade only). Exhibit 5.15 presents results for principals’ reports of the availability of science laboratories among participants in the fourth grade assessment. Across fourth grade countries, 36 percent of students attended schools with a science laboratory, but among countries this percentage ranged from 0 percent (Ireland, Lithuania, and Northern Ireland) to 100 percent (Korea, Kuwait, and Singapore). On average across countries, students attending schools with a science laboratory had somewhat higher achievement (489) than students attending schools with no laboratory (483).

Exhibit 5.16 presents results for principals' reports of the availability of science laboratories and of assistance for teachers when students are conducting science experiments for participants in the eighth grade assessment. Across the eighth grade countries, a much higher percentage of students attended schools with science laboratories (80%) than at the fourth grade. In 29 of the 42 countries, more than 80 percent of students attended schools that had a science laboratory, and in only two countries (Lithuania and Ghana) was the percentage of students in schools with a laboratory less than 35 percent (13% and 2%, respectively). On average across countries, student science achievement in schools with laboratories was higher (485) than that of students at schools with no laboratories (451); this achievement difference also occurred within many countries. Across the eighth grade countries, 57 percent of students attended schools in which teachers had assistance when students were conducting science experiments, but among countries this percentage ranged from 9 percent (Chile and Italy) to 99 percent (Hong Kong SAR). On average across countries, the eighth grade students attending schools in which teachers had assistance had higher achievement (480) than students attending schools in which teachers did not have assistance (472).

Exhibit 5.15: Schools Have a Science Laboratory

Reported by Principals

Country	Yes		No	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Korea, Rep. of	100 (0.0)	587 (2.0)	0 (0.0)	~ ~
Kuwait	100 (0.0)	348 (4.7)	0 (0.0)	~ ~
Singapore	100 (0.0)	583 (3.4)	0 (0.0)	~ ~
Japan	99 (0.6)	559 (1.9)	1 (0.6)	~ ~
Chinese Taipei	89 (2.3)	551 (2.4)	11 (2.3)	562 (4.6)
Qatar	88 (2.1)	388 (4.8)	12 (2.1)	441 (13.1)
Bahrain	87 (3.0)	449 (3.9)	13 (3.0)	450 (10.6)
United Arab Emirates	84 (1.3)	417 (2.6)	16 (1.3)	469 (7.7)
Saudi Arabia	68 (4.0)	436 (7.1)	32 (4.0)	415 (10.1)
Turkey	66 (2.6)	478 (4.3)	34 (2.6)	432 (9.5)
Thailand	64 (3.8)	486 (6.1)	36 (3.8)	446 (10.1)
Armenia	60 (4.5)	415 (5.3)	40 (4.5)	418 (6.2)
Denmark	56 (3.6)	527 (3.9)	44 (3.6)	534 (4.3)
Iran, Islamic Rep. of	48 (3.7)	477 (6.1)	52 (3.7)	430 (5.3)
Romania	45 (4.1)	520 (9.0)	55 (4.1)	492 (8.5)
Chile	45 (3.5)	502 (4.3)	55 (3.5)	467 (4.3)
Italy	43 (3.4)	517 (4.5)	57 (3.4)	528 (3.9)
Kazakhstan	43 (4.4)	481 (8.7)	57 (4.4)	505 (6.6)
Hong Kong SAR	37 (4.0)	540 (5.6)	63 (4.0)	532 (5.8)
Czech Republic	36 (3.6)	537 (4.4)	64 (3.6)	536 (2.9)
Spain	34 (3.4)	510 (4.3)	66 (3.4)	504 (3.9)
Georgia	34 (3.9)	452 (6.6)	66 (3.9)	456 (5.0)
Oman	26 (2.1)	361 (6.3)	74 (2.1)	375 (5.8)
United States	25 (2.7)	549 (5.4)	75 (2.7)	545 (2.5)
Yemen	25 (3.6)	242 (11.8)	75 (3.6)	199 (8.4)
Sweden	24 (3.7)	527 (6.1)	76 (3.7)	534 (3.4)
Russian Federation	23 (2.9)	547 (7.2)	77 (2.9)	554 (3.4)
Slovak Republic	21 (3.1)	532 (6.9)	79 (3.1)	531 (4.3)
Slovenia	19 (2.7)	522 (4.7)	81 (2.7)	520 (3.2)
Portugal	18 (4.7)	519 (15.1)	82 (4.7)	522 (3.9)
Malta	18 (0.1)	477 (4.0)	82 (0.1)	440 (2.0)
Azerbaijan	17 (3.2)	443 (11.0)	83 (3.2)	437 (6.4)
Norway	17 (3.4)	496 (5.6)	83 (3.4)	493 (2.7)
Finland	16 (3.4)	566 (5.1)	84 (3.4)	571 (2.8)
Australia	13 (2.4)	535 (7.4)	87 (2.4)	514 (2.9)
Serbia	13 (2.9)	509 (11.1)	87 (2.9)	516 (3.4)
Hungary	13 (2.8)	551 (7.7)	87 (2.8)	533 (4.1)
Germany	13 (2.4)	519 (9.6)	87 (2.4)	531 (2.8)
Croatia	12 (2.9)	516 (5.7)	88 (2.9)	516 (2.4)
England	9 (2.1)	559 (10.6)	91 (2.1)	524 (3.5)
Poland	9 (2.4)	503 (11.2)	91 (2.4)	506 (2.7)
Austria	8 (2.5)	534 (9.6)	92 (2.5)	531 (2.9)
New Zealand	5 (1.9)	530 (13.9)	95 (1.9)	496 (2.6)
Tunisia	4 (1.4)	335 (14.9)	96 (1.4)	346 (5.3)
Morocco	3 (0.9)	324 (24.3)	97 (0.9)	261 (5.1)
Netherlands	3 (1.8)	535 (3.6)	97 (1.8)	532 (2.5)
Belgium (Flemish)	1 (0.0)	~ ~	99 (0.7)	510 (2.0)
Ireland	0 (0.0)	~ ~	100 (0.0)	517 (3.4)
Lithuania	0 (0.0)	~ ~	100 (0.0)	515 (2.5)
Northern Ireland	0 (0.0)	~ ~	100 (0.0)	517 (3.0)
International Avg.	36 (0.4)	489 (1.2)	64 (0.4)	483 (0.8)

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

() 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.

Exhibit 5.15: Schools Have a Science Laboratory (Continued)

Country	Yes		No	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Sixth Grade Participants				
Yemen	29 (3.7)	370 (11.1)	71 (3.7)	334 (8.7)
Honduras	12 (3.6)	475 (26.3)	88 (3.6)	426 (5.8)
Botswana	7 (2.1)	450 (40.2)	93 (2.1)	361 (5.0)
Benchmarking Participants				
Abu Dhabi, UAE	85 (2.6)	399 (4.8)	15 (2.6)	458 (15.6)
Dubai, UAE	78 (0.2)	450 (2.6)	22 (0.2)	500 (3.7)
Florida, US	49 (6.1)	537 (6.5)	51 (6.1)	550 (5.4)
North Carolina, US	17 (5.4)	553 (16.7)	83 (5.4)	538 (4.9)
Alberta, Canada	14 (3.1)	541 (4.8)	86 (3.1)	542 (2.9)
Quebec, Canada	14 (3.1)	530 (5.9)	86 (3.1)	515 (3.0)
Ontario, Canada	8 (2.3)	526 (12.6)	92 (2.3)	528 (3.2)

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

Exhibit 5.16: School Resources For Conducting Science Experiments

Reported by Principals

Country	Schools Have a Science Laboratory				Teachers Have Assistance Available When Students are Conducting Experiments			
	Yes		No		Yes		No	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Bahrain	100 (0.0)	452 (2.0)	0 (0.0)	~ ~	93 (0.1)	452 (2.1)	7 (0.1)	465 (4.8)
England	100 (0.0)	534 (5.2)	0 (0.0)	~ ~	75 (4.6)	532 (5.9)	25 (4.6)	546 (12.3)
Japan	100 (0.0)	558 (2.4)	0 (0.0)	~ ~	34 (4.1)	559 (4.1)	66 (4.1)	557 (3.3)
Korea, Rep. of	100 (0.0)	560 (2.0)	0 (0.0)	~ ~	63 (3.2)	562 (2.7)	37 (3.2)	557 (3.2)
Singapore	100 (0.0)	590 (4.4)	0 (0.0)	~ ~	89 (0.0)	590 (4.7)	11 (0.0)	591 (13.8)
New Zealand	100 (0.0)	514 (4.7)	0 (0.0)	~ ~	37 (4.8)	517 (7.4)	63 (4.8)	512 (6.6)
Australia	100 (0.1)	521 (5.0)	0 (0.1)	~ ~	66 (3.6)	525 (6.4)	34 (3.6)	514 (7.1)
Hong Kong SAR	99 (0.8)	533 (3.7)	1 (0.0)	~ ~	99 (1.0)	534 (3.7)	1 (1.0)	~ ~
Sweden	r 99 (0.8)	510 (3.0)	1 (0.8)	~ ~	r 11 (3.1)	505 (7.8)	89 (3.1)	511 (3.3)
Malaysia	99 (0.8)	426 (6.4)	1 (0.8)	~ ~	93 (2.0)	424 (6.5)	7 (2.0)	457 (21.5)
Qatar	99 (0.0)	416 (3.5)	1 (0.0)	~ ~	93 (0.4)	416 (3.7)	7 (0.4)	441 (11.1)
Chinese Taipei	99 (1.0)	564 (2.3)	1 (1.0)	~ ~	88 (2.7)	567 (2.5)	12 (2.7)	540 (10.2)
Oman	98 (1.0)	421 (3.2)	2 (1.0)	~ ~	93 (1.8)	423 (3.3)	7 (1.8)	377 (13.2)
United Arab Emirates	96 (1.2)	462 (2.3)	4 (1.2)	508 (16.5)	95 (0.8)	461 (2.3)	5 (0.8)	491 (8.2)
Thailand	94 (1.5)	451 (4.1)	6 (1.5)	455 (25.8)	23 (3.1)	444 (9.1)	77 (3.1)	453 (4.8)
Finland	91 (2.2)	552 (2.5)	9 (2.2)	555 (8.2)	10 (2.9)	550 (5.2)	90 (2.9)	552 (2.6)
Jordan	91 (2.5)	453 (4.4)	9 (2.5)	409 (16.7)	94 (1.4)	449 (4.2)	6 (1.4)	448 (13.4)
Norway	90 (2.9)	496 (3.0)	10 (2.9)	484 (6.4)	24 (4.1)	486 (5.6)	76 (4.1)	497 (3.0)
Ukraine	89 (2.8)	503 (3.5)	11 (2.8)	490 (8.5)	74 (3.5)	505 (3.4)	26 (3.5)	490 (8.4)
Saudi Arabia	89 (2.8)	438 (4.0)	11 (2.8)	425 (12.4)	93 (2.1)	438 (4.1)	7 (2.1)	415 (15.0)
Russian Federation	86 (2.7)	545 (3.9)	14 (2.7)	527 (8.6)	66 (3.2)	544 (3.7)	34 (3.2)	540 (6.7)
Israel	86 (2.7)	523 (4.8)	14 (2.7)	484 (11.1)	84 (2.4)	521 (4.7)	16 (2.4)	500 (7.9)
Tunisia	86 (2.3)	441 (2.7)	14 (2.3)	427 (5.9)	89 (2.2)	439 (2.8)	11 (2.2)	430 (5.0)
Turkey	83 (1.8)	489 (4.1)	17 (1.8)	454 (7.8)	12 (2.3)	489 (17.2)	88 (2.3)	482 (3.5)
Palestinian Nat'l Auth.	83 (3.1)	422 (3.7)	17 (3.1)	414 (12.3)	75 (3.1)	419 (3.8)	25 (3.1)	424 (8.7)
Kazakhstan	82 (3.0)	492 (4.8)	18 (3.0)	481 (11.1)	95 (1.2)	490 (4.3)	5 (1.2)	476 (13.5)
Lebanon	82 (3.3)	413 (5.6)	18 (3.3)	374 (15.8)	68 (3.8)	416 (5.6)	32 (3.8)	384 (10.7)
Morocco	82 (3.0)	377 (2.6)	18 (3.0)	373 (5.4)	60 (2.7)	378 (2.9)	40 (2.7)	373 (3.4)
United States	81 (2.0)	531 (3.0)	19 (2.0)	504 (8.5)	32 (2.5)	529 (6.3)	68 (2.5)	524 (2.9)
Iran, Islamic Rep. of	77 (3.2)	485 (4.2)	23 (3.2)	439 (7.1)	25 (3.2)	489 (8.6)	75 (3.2)	470 (4.5)
Syrian Arab Republic	75 (3.1)	431 (4.9)	25 (3.1)	412 (7.6)	76 (3.4)	432 (4.6)	24 (3.4)	406 (8.5)
Armenia	75 (4.0)	440 (4.1)	25 (4.0)	427 (6.3)	77 (3.7)	440 (3.8)	23 (3.7)	425 (7.6)
Italy	74 (3.2)	503 (2.8)	26 (3.2)	494 (6.4)	9 (1.6)	494 (9.6)	91 (1.6)	501 (2.7)
Indonesia	71 (4.0)	419 (4.8)	29 (4.0)	371 (7.9)	19 (3.1)	427 (10.0)	81 (3.1)	401 (4.9)
Romania	66 (4.1)	472 (3.8)	34 (4.1)	449 (6.8)	26 (3.3)	485 (6.5)	74 (3.3)	458 (4.5)
Chile	59 (3.8)	479 (4.6)	41 (3.8)	439 (3.7)	9 (2.4)	482 (17.1)	91 (2.4)	461 (2.9)
Slovenia	48 (3.6)	545 (4.6)	52 (3.6)	542 (3.3)	76 (3.2)	546 (2.7)	24 (3.2)	537 (7.3)
Georgia	47 (3.3)	423 (5.1)	53 (3.3)	419 (4.1)	19 (3.1)	440 (7.9)	81 (3.1)	417 (3.5)
Macedonia, Rep. of	37 (3.7)	436 (9.8)	63 (3.7)	392 (6.8)	74 (3.4)	412 (7.0)	26 (3.4)	393 (10.3)
Hungary	36 (4.3)	536 (4.9)	64 (4.3)	515 (4.7)	11 (2.6)	517 (7.6)	89 (2.6)	523 (3.6)
Lithuania	13 (3.3)	532 (6.2)	87 (3.3)	511 (3.0)	19 (3.4)	523 (7.2)	81 (3.4)	511 (3.0)
Ghana	2 (1.1)	~ ~	98 (1.1)	304 (5.3)	26 (4.2)	317 (13.6)	74 (4.2)	301 (5.9)
International Avg.	80 (0.4)	485 (0.7)	20 (0.4)	451 (1.9)	57 (0.5)	480 (1.1)	43 (0.5)	472 (1.3)

() 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 5.16: School Resources For Conducting Science Experiments (Continued)

Country	Schools Have a Science Laboratory				Teachers Have Assistance Available When Students are Conducting Experiments			
	Yes		No		Yes		No	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Ninth Grade Participants								
Botswana	91 (2.7)	401 (3.6)	9 (2.7)	431 (13.8)	48 (4.3)	410 (5.2)	52 (4.3)	399 (4.8)
Honduras	53 (3.9)	384 (6.2)	47 (3.9)	349 (4.2)	52 (4.4)	384 (6.5)	48 (4.4)	350 (5.5)
South Africa	44 (2.9)	377 (7.5)	56 (2.9)	295 (4.1)	52 (4.3)	325 (6.1)	48 (4.3)	340 (7.7)
Benchmarking Participants								
Quebec, Canada	99 (0.8)	520 (2.6)	1 (0.8)	~ ~	93 (1.9)	519 (2.9)	7 (1.9)	532 (8.5)
Minnesota, US	98 (2.0)	554 (5.6)	2 (2.0)	~ ~	33 (7.3)	541 (12.9)	67 (7.3)	560 (5.3)
Dubai, UAE	97 (0.0)	485 (2.8)	3 (0.0)	502 (5.0)	93 (0.1)	483 (2.9)	7 (0.1)	512 (4.2)
Abu Dhabi, UAE	94 (2.9)	458 (4.2)	6 (2.9)	508 (35.0)	96 (1.5)	458 (4.2)	4 (1.5)	476 (15.5)
Indiana, US	r 93 (4.1)	534 (5.8)	7 (4.1)	537 (8.3)	r 19 (6.0)	512 (7.8)	81 (6.0)	540 (6.6)
Florida, US	88 (4.9)	528 (8.6)	12 (4.9)	530 (22.9)	28 (7.0)	527 (19.3)	72 (7.0)	529 (8.4)
Alberta, Canada	85 (3.0)	547 (2.4)	15 (3.0)	538 (6.7)	23 (3.5)	548 (6.0)	77 (3.5)	546 (2.6)
Connecticut, US	84 (5.1)	536 (6.6)	16 (5.1)	509 (19.0)	21 (4.5)	545 (12.9)	79 (4.5)	528 (8.1)
Massachusetts, US	83 (5.6)	577 (6.3)	17 (5.6)	531 (24.0)	33 (7.0)	559 (10.0)	67 (7.0)	573 (6.5)
Colorado, US	82 (5.6)	549 (6.4)	18 (5.6)	509 (22.0)	22 (6.2)	534 (15.1)	78 (6.2)	545 (4.8)
Alabama, US	r 71 (8.8)	494 (7.8)	29 (8.8)	466 (11.5)	r 26 (7.0)	487 (13.3)	74 (7.0)	484 (8.1)
North Carolina, US	71 (7.2)	533 (7.3)	29 (7.2)	530 (18.4)	12 (4.8)	554 (14.4)	88 (4.8)	529 (7.7)
California, US	r 68 (6.1)	503 (5.2)	32 (6.1)	488 (14.3)	r 27 (6.5)	506 (11.4)	73 (6.5)	494 (6.5)
Ontario, Canada	52 (3.6)	525 (4.0)	48 (3.6)	518 (3.1)	13 (2.8)	522 (7.3)	87 (2.8)	521 (2.8)

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

