

# Chapter 4

## Home Environment Support for Mathematics Achievement

The importance of an early start in school was related to higher mathematics achievement in TIMSS 2011. Fourth grade students had higher mathematics achievement if their parents reported that they often engaged in early numeracy activities with their children, that their children attended preschool, and that they started school able to do early numeracy tasks (e.g., simple addition and subtraction). Home resources for learning and high expectation were related to higher average achievement at the fourth and eighth grades.

Considerable research supports the fundamental importance of a supportive home environment in shaping children’s achievement in school. Internationally, IEA studies in mathematics through four cycles of TIMSS have found a strong positive relationship between students’ mathematics achievement at the fourth and eighth grades and home environments that foster learning.

This chapter presents the fourth grade TIMSS 2011 mathematics achievement results in relation to parents’ reports about their children’s home resources for learning and early numeracy experiences. The parents’ data were collected using the *TIMSS & PIRLS 2011 Learning to Read Survey*, in which students’ parents or primary caregivers were asked to provide information about their child’s early literacy and numeracy experiences, and so are available only for countries that administered both TIMSS and PIRLS to the same fourth grade students. For the eighth grade, mathematics achievement is presented in relation to students’ own reports of aspects of their home environments.

### *Home Resources for Learning*

The *TIMSS & PIRLS 2011 Learning to Read Survey* asked students’ parents to report on the availability of three key home resources highly related to student achievement in school:

- ◆ Parents’ education;
- ◆ Parents’ occupation; and
- ◆ Number of children’s books in the home.

In addition, students were asked about:

- ◆ Number of books in the home; and
- ◆ Availability of two study supports—An Internet connection and their own room.

Research consistently shows a strong positive relationship between achievement and socioeconomic status (SES), or indicators of socioeconomic status such as parents’ or caregivers’ level of education or occupation. TIMSS, PIRLS, and PISA have found strong positive relationships between level of parents’ education and/or occupation and their children’s educational attainment. In general, higher levels of education can lead to careers in higher paying professions, higher socioeconomic status, and more home resources. Family income also has been shown to have a powerful influence on students’ achievement in reading and mathematics (Dahl & Lochner, 2005). However, the benefits of higher levels of parents’ education can extend to having more positive

beliefs and higher expectations toward educational achievement transfer to their children. Availability of reading material in the home likewise is strongly related to achievement in mathematics and science as well as in reading. IEA's TIMSS studies have consistently shown that students with a large number of books in the home have higher achievement in mathematics and science.

Exhibit 4.1 presents the results for the TIMSS 2011 Home Resources for Learning scale, which was created based on parents' and students' reports about the five types of home resources described above. Results are shown for countries that administered both TIMSS and PIRLS fourth grade assessments to the same fourth grade students. The second page of the exhibit provides detail about the questions forming the scale and the categorization of responses. Students were scored according to the availability of the five home resources, with **Many Resources** corresponding to more than 100 books in the home, having both their own room and an Internet connection, more than 25 children's books, at least one parent having completed university, and one with a professional occupation, on average. **Few Resources** corresponds, on average, to having 25 or fewer books, neither of the home study supports, 10 or fewer children's books, neither parent having gone beyond upper secondary school, and neither having a business, clerical, or professional occupation.

Countries are ordered by the percentage of students in the **Many Resources** category, with the fourth grade countries on the first page of the exhibit and the sixth grade and benchmarking participants on the second page. Internationally, on average, almost three-quarters of the fourth grade students (74%) were assigned to the **Some Resources** category. Seventeen percent, on average, were in the **Many Resources** category and nine percent internationally were in the **Few Resources** category, with a 119-point difference in their average mathematics achievement (555 vs. 436). Students in the countries participating at the sixth grade had relatively fewer home resources, comparable to the fourth-grade countries with the lowest levels.

Exhibit 4.2 provides supporting detail about the availability of the specific home resources included in the Home Resources for Learning scale for the fourth grade assessment. The exhibit presents data on two components (More than 100 Books in Their Home as well as both Own Room and Internet Connection in Home) for all participants in the fourth grade TIMSS assessment, as well as data on three additional resources for countries that participated in both TIMSS and PIRLS with the same students. On average, across all of the countries participating in TIMSS 2011 at the fourth grade, one-fourth of the

### Exhibit 4.1: Home Resources for Learning\*

Reported by Parents, except Number of Books and Study Supports Reported by Students

Students were scored according to their own and their parents' responses concerning the availability of five resources on the *Home Resources for Learning* scale. Students with **Many Resources** had a score of at least 11.9, which is the point on the scale corresponding to students reporting they had more than 100 books in the home and two home study supports, and parents reporting that they had more than 25 children's books in the home, that at least one parent had finished university, and that at least one parent had a professional occupation, on average. Students with **Few Resources** had a score no higher than 7.3, which is the scale point corresponding to students reporting that they had 25 or fewer books in the home and neither of the two home study supports, and parents reporting that they had 10 or fewer children's books in the home, that neither parent had gone beyond upper-secondary education, and that neither parent was a small business owner or had a clerical or professional occupation, on average. All other students were assigned to the **Some Resources** category.

Country	Many Resources		Some Resources		Few Resources		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Norway	42 (1.6)	517 (3.3)	57 (1.6)	483 (2.7)	0 (0.1)	~ ~	11.5 (0.06)
Australia <sup>s</sup>	41 (1.5)	566 (3.6)	59 (1.5)	510 (3.2)	1 (0.2)	~ ~	11.5 (0.06)
Sweden	39 (1.6)	535 (2.6)	60 (1.6)	493 (1.8)	1 (0.2)	~ ~	11.4 (0.05)
Finland	33 (1.4)	571 (2.7)	67 (1.4)	535 (2.7)	0 (0.1)	~ ~	11.2 (0.04)
Northern Ireland <sup>s</sup>	30 (1.5)	617 (4.7)	68 (1.6)	564 (3.9)	2 (0.4)	~ ~	10.9 (0.07)
Ireland	27 (1.4)	573 (3.3)	71 (1.4)	519 (2.4)	2 (0.3)	~ ~	10.8 (0.06)
Germany <sup>r</sup>	24 (1.4)	572 (2.8)	75 (1.4)	525 (2.1)	2 (0.3)	~ ~	10.7 (0.07)
Singapore	24 (0.9)	649 (3.3)	74 (0.9)	598 (3.2)	3 (0.3)	510 (7.9)	10.7 (0.03)
Hungary	21 (1.5)	585 (3.5)	69 (1.4)	516 (2.4)	11 (1.1)	425 (9.2)	10.1 (0.10)
Spain	19 (1.3)	524 (2.7)	77 (1.2)	481 (2.5)	5 (0.5)	434 (8.0)	10.3 (0.06)
Chinese Taipei	18 (1.0)	634 (2.3)	76 (1.0)	587 (2.0)	6 (0.4)	537 (5.4)	10.2 (0.06)
Czech Republic	18 (1.0)	552 (3.6)	81 (1.0)	505 (2.3)	1 (0.2)	~ ~	10.5 (0.04)
Slovenia	17 (0.8)	556 (2.9)	82 (0.9)	507 (2.3)	1 (0.2)	~ ~	10.4 (0.04)
Austria	17 (1.0)	547 (3.1)	82 (0.9)	504 (2.7)	2 (0.3)	~ ~	10.4 (0.06)
Portugal	16 (1.0)	569 (4.4)	75 (1.0)	533 (3.2)	9 (0.7)	493 (8.5)	9.9 (0.06)
Russian Federation	16 (1.0)	584 (4.3)	82 (1.1)	535 (3.7)	2 (0.4)	~ ~	10.4 (0.05)
Malta	16 (0.5)	545 (3.0)	83 (0.6)	497 (1.6)	1 (0.2)	~ ~	10.3 (0.02)
Poland	15 (1.0)	539 (3.3)	79 (1.0)	476 (1.8)	6 (0.6)	421 (6.4)	10.0 (0.06)
Slovak Republic	13 (0.8)	565 (4.5)	81 (1.1)	507 (2.9)	6 (1.0)	439 (12.8)	9.9 (0.06)
Qatar <sup>r</sup>	12 (0.9)	489 (10.4)	84 (0.9)	413 (3.3)	4 (0.4)	345 (10.0)	10.2 (0.05)
Hong Kong SAR	12 (1.0)	634 (3.7)	80 (0.9)	606 (2.6)	8 (0.7)	586 (5.6)	9.8 (0.08)
Georgia	12 (1.0)	501 (5.3)	80 (1.2)	451 (3.8)	8 (1.0)	402 (10.4)	9.9 (0.07)
Lithuania	11 (0.9)	588 (4.6)	83 (1.0)	532 (2.2)	6 (0.5)	478 (8.4)	9.8 (0.05)
United Arab Emirates	10 (0.5)	517 (4.7)	84 (0.6)	433 (2.1)	6 (0.4)	382 (4.9)	9.9 (0.03)
Italy	8 (0.7)	546 (5.4)	85 (0.8)	510 (2.6)	7 (0.6)	474 (6.6)	9.7 (0.05)
Croatia	7 (0.6)	537 (5.4)	88 (0.7)	489 (1.7)	5 (0.6)	442 (7.7)	9.7 (0.05)
Romania	7 (0.7)	580 (5.8)	67 (1.8)	496 (4.3)	26 (1.7)	426 (12.9)	8.7 (0.09)
Iran, Islamic Rep. of	4 (0.5)	534 (4.3)	57 (1.7)	450 (3.6)	39 (1.9)	394 (3.4)	8.1 (0.09)
Saudi Arabia	4 (0.6)	452 (10.4)	78 (1.2)	415 (5.5)	18 (1.2)	385 (9.3)	9.0 (0.07)
Oman	3 (0.3)	457 (9.4)	75 (0.8)	397 (3.2)	23 (0.8)	353 (3.9)	8.7 (0.04)
Morocco <sup>s</sup>	1 (0.2)	~ ~	46 (2.1)	355 (4.1)	53 (2.1)	336 (7.4)	7.2 (0.10)
Azerbaijan	1 (0.1)	~ ~	77 (1.3)	469 (6.5)	22 (1.3)	452 (6.1)	8.5 (0.04)
International Avg.	17 (0.2)	555 (0.9)	74 (0.2)	497 (0.6)	9 (0.1)	436 (1.8)	

\* Available only for countries that administered both TIMSS and PIRLS to the same fourth grade students because this item was included in the PIRLS Home Questionnaire completed by parents.

Centerpoint of scale set at 10.

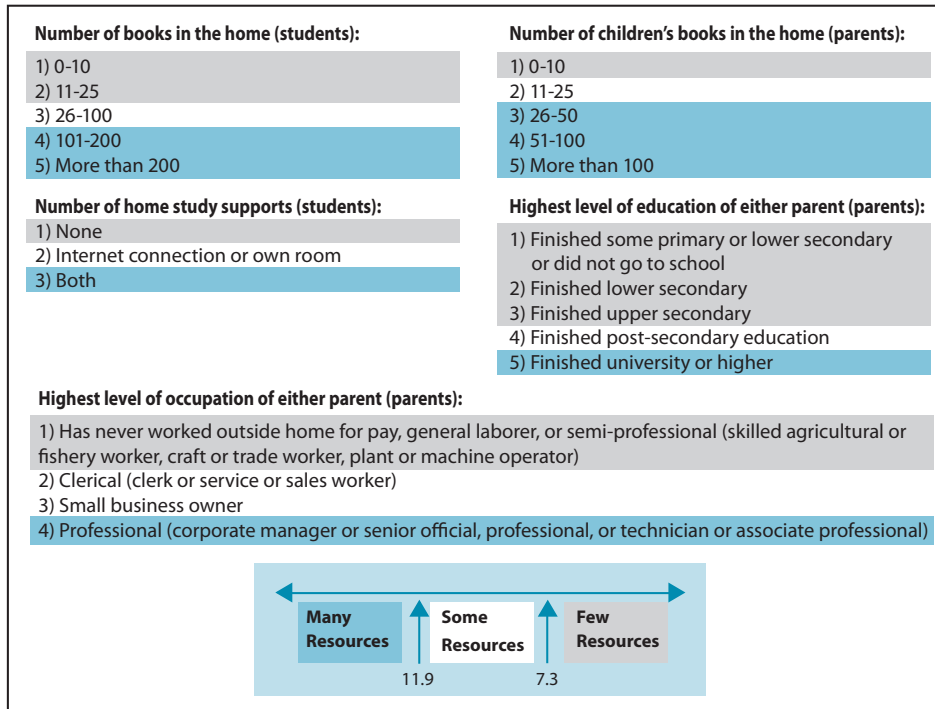
() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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.

**Exhibit 4.1: Home Resources for Learning\* (Continued)**

Country	Many Resources		Some Resources		Few Resources		Average Scale Score	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
<b>Sixth Grade Participants</b>								
Botswana	r	1 (0.4)	~ ~	57 (1.8)	449 (5.3)	42 (1.9)	401 (4.8)	7.7 (0.10)
Honduras	s	0 (0.1)	~ ~	44 (2.5)	434 (7.6)	56 (2.5)	387 (5.6)	7.1 (0.12)
<b>Benchmarking Participants</b>								
Quebec, Canada		29 (1.6)	559 (2.8)	71 (1.6)	526 (2.5)	0 (0.1)	~ ~	11.1 (0.05)
Dubai, UAE		21 (0.5)	543 (4.1)	77 (0.6)	461 (1.8)	3 (0.2)	381 (9.0)	10.6 (0.02)
Abu Dhabi, UAE		8 (1.2)	500 (11.8)	85 (1.3)	417 (4.0)	6 (0.7)	369 (7.4)	9.8 (0.07)



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

**Exhibit 4.2: Components of the Home Resources for Learning Scale\***

Columns 1-2 Reported by Students and Columns 3-5 Reported by Parents

Country	Percent of Students with				
	More than 100 Books in Their Home	Own Room and Internet Connection in Home	At Least One Parent with a University Degree or Higher	At Least One Parent in a Professional Occupation**	More than 25 Children's Books in Their Home
Armenia	29 (0.9)	30 (1.0)			
Australia	41 (1.0)	74 (1.0)	s	s	s
Austria	28 (1.3)	69 (1.0)			
Azerbaijan	8 (0.7)	10 (0.6)			
Bahrain	24 (1.0)	50 (1.5)			
Belgium (Flemish)	26 (1.1)	79 (0.9)			
Chile	15 (0.5)	46 (1.1)			
Chinese Taipei	30 (1.1)	52 (0.9)			
Croatia	16 (0.8)	64 (1.2)			
Czech Republic	34 (1.1)	58 (1.2)			
Denmark	28 (1.2)	90 (0.8)			
England	34 (1.3)	75 (1.4)			
Finland	38 (1.4)	78 (1.0)			
Georgia	35 (1.4)	34 (1.3)			
Germany	35 (1.5)	71 (1.0)	r	r	r
Hong Kong SAR	25 (1.2)	56 (1.3)			
Hungary	33 (1.5)	62 (1.4)			
Iran, Islamic Rep. of	14 (0.8)	23 (1.4)			
Ireland	33 (1.5)	71 (1.0)			
Italy	23 (1.0)	38 (0.8)			
Japan	22 (0.9)	57 (1.1)			
Kazakhstan	17 (1.3)	28 (1.6)			
Korea, Rep. of	65 (1.3)	54 (1.3)			
Kuwait	25 (1.1)	54 (1.5)			
Lithuania	16 (0.8)	48 (1.0)			
Malta	24 (0.7)	67 (0.7)	r	r	
Morocco	r	9 (0.6)	r	s	r
Netherlands	26 (1.3)	87 (0.9)			
New Zealand	38 (1.1)	69 (0.8)			
Northern Ireland	31 (1.4)	70 (1.1)	s	s	s
Norway	36 (1.4)	87 (0.8)			
Oman	22 (0.9)	19 (0.7)		r	
Poland	24 (0.9)	52 (1.1)			
Portugal	21 (1.2)	64 (1.3)			
Qatar	27 (0.9)	51 (1.1)	r	r	
Romania	15 (1.0)	42 (1.5)			
Russian Federation	25 (1.0)	40 (1.6)			
Saudi Arabia	20 (1.2)	28 (1.5)			
Serbia	16 (0.8)	57 (1.3)			
Singapore	31 (0.9)	49 (0.7)			
Slovak Republic	26 (1.0)	47 (1.1)			
Slovenia	27 (1.0)	67 (1.2)			
Spain	29 (1.5)	65 (1.1)			
Sweden	39 (1.4)	84 (0.8)	r	r	
Thailand	8 (0.7)	11 (0.7)			
Tunisia	11 (0.7)	20 (1.1)			
Turkey	14 (0.8)	26 (1.1)			
United Arab Emirates	22 (0.6)	42 (0.8)		r	
United States	28 (0.8)	64 (0.6)			
Yemen	9 (0.9)	7 (0.7)			
International Avg.	25 (0.2)	52 (0.2)	30 (0.2)	36 (0.2)	58 (0.2)

\* Data reported in columns 3-5 were from the PIRLS Home Questionnaire completed by parents, so data are available only for countries that administered both TIMSS and PIRLS to the same fourth grade students.

\*\* Includes corporate manager or senior official, professional, and technician or associate professional.

( ) 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 4.2: Components of the Home Resources for Learning Scale\* (Continued)**

Country	Percent of Students with						
	More than 100 Books in Their Home	Own Room and Internet Connection in Home	At Least One Parent with a University Degree or Higher	At Least One Parent in a Professional Occupation**	More than 25 Children's Books in Their Home		
<b>Sixth Grade Participants</b>							
Botswana	10 (0.7)	11 (1.0)	s	10 (1.5)	s	22 (1.7)	14 (0.8)
Honduras	6 (0.6)	17 (1.6)	s	10 (2.3)	s	13 (1.8)	11 (0.9)
Yemen	8 (0.5)	6 (0.6)					
<b>Benchmarking Participants</b>							
Alberta, Canada	40 (1.3)	79 (1.1)					
Ontario, Canada	37 (1.3)	74 (1.2)					
Quebec, Canada	28 (1.2)	82 (1.0)		45 (2.0)		55 (1.5)	78 (1.2)
Abu Dhabi, UAE	22 (1.1)	41 (1.5)		52 (1.7)		47 (1.8)	29 (1.7)
Dubai, UAE	26 (0.6)	49 (0.9)		67 (0.9)	r	63 (0.8)	50 (0.6)
Florida, US	21 (1.1)	66 (1.3)					
North Carolina, US	27 (1.6)	68 (1.7)					

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

students were from homes with more than 100 books in total, and more than half (52%) reported having both their own room and an Internet connection at home. Across the countries participating in both studies at the fourth grade, on average, 30 percent of the students had at least one parent that had earned a university degree and 36 percent had at least one parent in a professional occupation, and the majority of students (58%) had more than 25 children's books at home.

Exhibit 4.3 presents the results for the TIMSS 2011 eighth grade assessment for the Home Educational Resources scale, which was created based on students' reports about three of the five types of home resources that comprised the fourth grade Home Resources for Learning scale: number of books in the home, availability of two home study supports, and parents' education. The second page of the exhibit provides detail about the questions forming the scale and the categorization of responses. Students were scored according to the availability of the three home resources, with **Many Resources** corresponding to more than 100 books in the home, having their own room and an Internet connection, and at least one parent having completed university, on average. **Few Resources** corresponds, on average, to having 25 or fewer books, neither home study support, and neither parent having gone beyond upper secondary school.

Countries are ordered by the percentage of students in the **Many Resources** category, with the eighth grade countries on the first page of the exhibit and the ninth grade and benchmarking participants on the second page. Internationally, on average, two-thirds of the eighth-grade students (67%) were assigned to the **Some Resources** category. Twelve percent, on average, were in the **Many Resources** category and 21 percent internationally were in the **Few Resources** category, with a 115-point difference in their average mathematics achievement (530 vs. 415).

Exhibit 4.4 provides supporting detail about the availability of the specific home resources included in the Home Educational Resources scale for the eighth grade assessment. Across the countries participating at the eighth grade, on average, one-fourth of the students had more than 100 books in their home, more than half (53%) reported having both their own room and an Internet connection at home, and about one-third (32%) had at least one parent that had earned a university degree.



### *Students Spoke the Language of the Test*

TIMSS has previously shown that, with some exceptions, countries with large proportions of students from homes where the language of the test (and consequently the language of instruction) is not often spoken had lower average mathematics achievement than students who spoke the language of the test more often. Because learning any school subject is dependent on having a mastery of the language of instruction, which in turn is influenced by children's early language experiences, the language or languages spoken at home and how they are used are important factors in subsequent school achievement. As formal mathematics instruction begins, children are likely to be at an initial disadvantage if their knowledge of the language of instruction is substantially below the expected level for their age.

Exhibit 4.5 shows parents' reports about whether students who participated in the fourth grade TIMSS 2011 assessment spoke the language of the test before starting school. For students in the fourth grade, 91 percent across countries, on average, spoke the language of the test before starting school. However, the 9 percent who did not speak the language of the test before starting school had lower average achievement on TIMSS 2011 (477 vs. 501). The results for the sixth grade and benchmarking students show that only about one-fourth (26%) of the students in Botswana spoke the language of the test before starting school, and that these students had higher achievement.

### Exhibit 4.3: Home Educational Resources

Reported by Students

Students were scored according to their responses concerning the availability of three home educational resources on the *Home Educational Resources* scale. Students with **Many Resources** had a score of at least 12.5, which is the point on the scale corresponding to students reporting that they had more than 100 books in the home and two home study supports, and that at least one parent had finished university, on average. Students with **Few Resources** had a score no higher than 8.2, which is the scale point corresponding to students reporting that they had 25 or fewer books in the home, neither of the two home study supports, and that neither parent had gone beyond upper-secondary education, on average. All other students were assigned to the **Some Resources** category.

Country	Many Resources		Some Resources		Few Resources		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Korea, Rep. of	32 (1.4)	659 (3.1)	64 (1.3)	595 (2.5)	4 (0.3)	525 (7.8)	11.4 (0.06)
Norway	32 (1.2)	504 (2.8)	67 (1.1)	463 (2.3)	1 (0.2)	~ ~	11.6 (0.04)
Sweden	27 (1.0)	517 (2.6)	71 (1.0)	476 (1.8)	2 (0.2)	~ ~	11.3 (0.04)
United States	23 (0.8)	554 (3.8)	70 (0.8)	502 (2.3)	8 (0.4)	460 (5.0)	10.9 (0.04)
Finland	22 (1.0)	543 (2.9)	76 (1.0)	507 (2.4)	2 (0.2)	~ ~	11.2 (0.04)
Australia	22 (1.4)	558 (8.9)	75 (1.3)	494 (4.3)	4 (0.4)	430 (7.9)	11.2 (0.06)
Hungary	20 (1.0)	566 (3.2)	72 (1.0)	500 (2.9)	8 (0.9)	396 (8.3)	10.8 (0.06)
Armenia	20 (0.9)	502 (4.6)	72 (0.8)	463 (2.7)	8 (0.5)	416 (6.5)	10.8 (0.05)
New Zealand	19 (1.1)	539 (5.5)	76 (1.0)	483 (5.2)	5 (0.5)	414 (6.5)	10.9 (0.06)
Russian Federation	19 (0.9)	576 (4.1)	75 (0.9)	533 (3.5)	6 (0.6)	502 (8.5)	10.8 (0.05)
Georgia	17 (1.0)	494 (4.8)	71 (1.1)	428 (3.8)	12 (1.0)	365 (7.2)	10.5 (0.06)
Japan	17 (1.0)	608 (4.8)	78 (0.9)	565 (2.4)	5 (0.5)	492 (7.3)	10.8 (0.05)
England	17 (1.1)	564 (6.7)	79 (1.1)	500 (5.1)	5 (0.5)	427 (14.9)	10.8 (0.05)
Qatar	17 (0.9)	463 (7.0)	74 (1.1)	409 (3.0)	10 (0.7)	330 (7.9)	10.7 (0.04)
Israel	16 (1.1)	579 (6.7)	82 (1.1)	517 (4.3)	2 (0.3)	~ ~	11.0 (0.05)
Slovenia	16 (0.8)	546 (3.7)	82 (0.8)	499 (2.0)	2 (0.3)	~ ~	10.9 (0.03)
Chinese Taipei	15 (0.6)	675 (5.5)	73 (0.8)	610 (3.1)	12 (0.7)	527 (5.3)	10.4 (0.04)
Italy	13 (0.8)	541 (3.3)	75 (1.0)	498 (2.2)	12 (0.8)	453 (5.8)	10.3 (0.04)
Ukraine	12 (0.9)	530 (6.0)	79 (1.0)	481 (3.5)	9 (0.9)	408 (9.6)	10.4 (0.05)
Singapore	12 (0.6)	658 (4.1)	76 (0.7)	612 (3.6)	12 (0.6)	560 (6.6)	10.3 (0.04)
United Arab Emirates	11 (0.5)	501 (4.5)	76 (0.6)	457 (1.9)	12 (0.5)	414 (3.5)	10.3 (0.03)
Lithuania	11 (0.9)	553 (5.2)	81 (1.0)	503 (2.4)	8 (0.6)	429 (5.5)	10.4 (0.04)
Romania	10 (0.8)	557 (5.9)	71 (1.3)	463 (3.5)	19 (1.2)	390 (5.8)	9.9 (0.06)
Hong Kong SAR	10 (0.8)	632 (9.0)	72 (1.0)	589 (3.5)	19 (0.8)	554 (6.5)	9.9 (0.05)
Bahrain	9 (0.5)	476 (7.1)	78 (0.9)	412 (2.2)	14 (0.7)	365 (5.4)	10.1 (0.03)
Kazakhstan	8 (0.9)	524 (11.5)	77 (1.1)	488 (3.7)	15 (1.2)	461 (7.9)	10.0 (0.07)
Macedonia, Rep. of	7 (0.8)	512 (10.0)	77 (1.0)	434 (4.7)	16 (1.0)	356 (7.5)	9.9 (0.06)
Iran, Islamic Rep. of	7 (0.7)	516 (11.7)	45 (1.6)	437 (4.6)	49 (1.8)	381 (3.4)	8.6 (0.09)
Chile	6 (0.5)	487 (6.6)	72 (1.1)	422 (2.5)	21 (1.2)	378 (4.0)	9.7 (0.05)
Saudi Arabia	6 (0.5)	428 (8.8)	61 (1.4)	403 (4.6)	32 (1.6)	370 (5.9)	9.4 (0.08)
Jordan	6 (0.5)	447 (6.5)	67 (1.0)	419 (3.4)	27 (1.0)	372 (4.4)	9.5 (0.05)
Lebanon	6 (0.5)	502 (8.3)	64 (1.5)	459 (4.0)	30 (1.6)	420 (3.8)	9.4 (0.07)
Oman	5 (0.3)	436 (5.3)	57 (0.9)	386 (2.9)	38 (1.0)	332 (3.3)	9.0 (0.04)
Turkey	5 (0.7)	602 (17.7)	41 (1.4)	484 (4.7)	54 (1.7)	417 (3.6)	8.4 (0.09)
Palestinian Nat'l Auth.	4 (0.4)	452 (7.9)	63 (1.1)	416 (3.6)	33 (1.2)	378 (4.6)	9.2 (0.05)
Malaysia	4 (0.4)	525 (9.6)	61 (1.3)	457 (5.0)	35 (1.5)	402 (5.8)	9.1 (0.07)
Tunisia	3 (0.4)	493 (8.9)	58 (1.3)	436 (3.3)	38 (1.4)	403 (2.7)	9.0 (0.07)
Syrian Arab Republic	3 (0.3)	408 (9.8)	52 (1.4)	387 (5.0)	45 (1.5)	371 (5.0)	8.7 (0.07)
Thailand	3 (0.5)	526 (15.9)	45 (1.3)	445 (5.4)	52 (1.5)	408 (4.1)	8.5 (0.06)
Morocco	3 (0.2)	455 (7.8)	38 (1.0)	392 (2.4)	59 (1.1)	357 (2.4)	8.0 (0.05)
Ghana	1 (0.2)	~ ~	37 (1.7)	336 (6.1)	62 (1.8)	329 (4.2)	7.9 (0.08)
Indonesia	1 (0.1)	~ ~	46 (1.9)	397 (5.0)	54 (2.0)	377 (4.5)	8.4 (0.06)
International Avg.	12 (0.1)	530 (1.2)	67 (0.2)	470 (0.6)	21 (0.2)	415 (1.0)	

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.

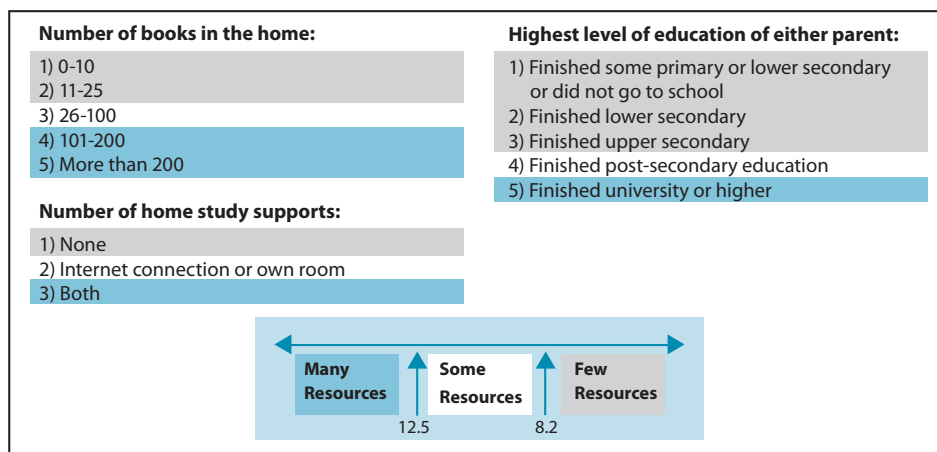
An "r" indicates data are available for at least 70% but less than 85% of the students.

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

**Exhibit 4.3: Home Educational Resources (Continued)**

Country	Many Resources		Some Resources		Few Resources		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
<b>Ninth Grade Participants</b>							
Honduras	3 (0.4)	380 (11.6)	43 (1.4)	353 (5.2)	53 (1.6)	324 (3.5)	8.5 (0.07)
South Africa	3 (0.2)	487 (8.3)	55 (0.8)	362 (2.8)	42 (0.8)	333 (2.7)	8.7 (0.03)
Botswana	2 (0.2)	~ ~	49 (1.0)	402 (3.4)	50 (1.1)	393 (2.1)	8.4 (0.04)
<b>Benchmarking Participants</b>							
Massachusetts, US	35 (2.1)	592 (6.9)	61 (2.0)	548 (4.9)	4 (0.5)	489 (10.9)	11.5 (0.08)
Connecticut, US	32 (1.8)	569 (5.5)	64 (1.8)	501 (4.4)	4 (0.6)	429 (10.3)	11.4 (0.08)
Minnesota, US	32 (2.1)	579 (5.7)	65 (1.9)	532 (4.0)	3 (0.5)	473 (9.0)	11.5 (0.07)
Colorado, US	28 (1.7)	561 (5.2)	63 (1.7)	508 (4.7)	9 (0.9)	456 (5.8)	11.0 (0.08)
Alberta, Canada	27 (1.2)	527 (3.7)	71 (1.1)	498 (2.5)	1 (0.2)	~ ~	11.4 (0.04)
Ontario, Canada	26 (1.4)	541 (3.7)	73 (1.3)	501 (2.4)	1 (0.3)	~ ~	11.4 (0.06)
North Carolina, US	24 (1.9)	582 (9.8)	69 (1.8)	526 (5.8)	7 (0.8)	487 (7.0)	11.0 (0.08)
Indiana, US	21 (1.7)	563 (5.1)	74 (1.5)	514 (4.8)	5 (0.5)	465 (7.1)	10.9 (0.07)
Quebec, Canada	19 (0.8)	563 (3.5)	80 (0.8)	525 (2.3)	1 (0.2)	~ ~	11.1 (0.03)
Florida, US	17 (1.4)	563 (7.9)	76 (1.4)	508 (6.2)	8 (1.0)	478 (9.0)	10.7 (0.08)
Alabama, US	16 (2.0)	519 (9.8)	75 (1.9)	461 (5.1)	9 (0.8)	419 (5.6)	10.5 (0.10)
Dubai, UAE	15 (0.6)	529 (5.8)	76 (0.7)	475 (1.9)	9 (0.4)	417 (5.6)	10.6 (0.03)
California, US	15 (1.1)	548 (6.2)	70 (1.1)	490 (5.2)	15 (1.1)	453 (6.7)	10.3 (0.07)
Abu Dhabi, UAE	11 (0.9)	489 (9.5)	76 (1.0)	451 (3.6)	13 (0.8)	408 (4.9)	10.3 (0.05)

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



Reported by Students

Country	Percent of Students with		
	More than 100 Books in Their Home	Own Room and Internet Connection in Home	At Least One Parent with a University Degree or Higher
Armenia	32 (1.1)	47 (1.2)	59 (1.4)
Australia	42 (1.4)	86 (0.8)	31 (1.8)
Bahrain	19 (0.7)	61 (0.7)	33 (1.1)
Chile	15 (0.7)	53 (1.0)	21 (1.0)
Chinese Taipei	34 (0.8)	57 (0.7)	26 (0.9)
England	33 (1.5)	89 (0.8)	31 (1.8)
Finland	41 (1.1)	91 (0.5)	42 (1.2)
Georgia	37 (1.4)	43 (1.1)	33 (1.5)
Ghana	8 (0.7)	5 (0.5)	10 (0.7)
Hong Kong SAR	24 (1.1)	58 (0.9)	20 (1.4)
Hungary	41 (1.3)	79 (1.0)	26 (1.3)
Indonesia	4 (0.4)	14 (1.1)	12 (1.0)
Iran, Islamic Rep. of	15 (0.9)	24 (1.2)	15 (1.2)
Israel	38 (1.2)	--	48 (1.2)
Italy	34 (0.9)	58 (1.0)	24 (1.1)
Japan	31 (1.2)	73 (1.1)	41 (1.4)
Jordan	16 (0.7)	26 (1.0)	35 (1.1)
Kazakhstan	17 (1.2)	37 (1.7)	36 (1.5)
Korea, Rep. of	56 (1.3)	70 (0.9)	49 (1.7)
Lebanon	16 (1.1)	39 (1.6)	25 (1.4)
Lithuania	24 (1.1)	67 (1.0)	24 (1.1)
Macedonia, Rep. of	13 (1.0)	71 (1.3)	29 (1.7)
Malaysia	10 (0.8)	31 (1.4)	15 (1.3)
Morocco	7 (0.4)	25 (0.9)	22 (0.8)
New Zealand	40 (1.5)	83 (0.9)	x x
Norway	45 (1.4)	96 (0.5)	62 (1.2)
Oman	21 (0.7)	22 (0.8)	24 (0.8)
Palestinian Nat'l Auth.	13 (0.8)	25 (1.0)	28 (1.1)
Qatar	25 (1.2)	67 (1.1)	65 (1.0)
Romania	19 (1.0)	61 (1.4)	20 (1.1)
Russian Federation	31 (1.0)	59 (1.3)	49 (1.5)
Saudi Arabia	14 (0.7)	40 (1.5)	37 (1.7)
Singapore	26 (0.8)	56 (0.7)	30 (0.9)
Slovenia	27 (0.9)	85 (0.8)	31 (1.1)
Sweden	42 (1.1)	94 (0.4)	47 (1.4)
Syrian Arab Republic	10 (0.6)	14 (0.9)	31 (1.3)
Thailand	7 (0.6)	23 (1.1)	17 (1.3)
Tunisia	9 (0.6)	33 (1.5)	19 (1.2)
Turkey	17 (1.1)	32 (1.5)	9 (1.0)
Ukraine	25 (1.1)	48 (1.9)	39 (1.3)
United Arab Emirates	21 (0.6)	55 (0.6)	52 (0.9)
United States	33 (0.9)	79 (0.5)	55 (1.0)
International Avg.	25 (0.2)	53 (0.2)	32 (0.2)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.  
 A dash (–) indicates comparable data not available.  
 An “x” indicates data are available for less than 50% of students.

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

**Exhibit 4.4: Components of the Home Educational Resources Scale (Continued)**

Country	Percent of Students with		
	More than 100 Books in Their Home	Own Room and Internet Connection in Home	At Least One Parent with a University Degree or Higher
<b>Ninth Grade Participants</b>			
Botswana	8 (0.5)	10 (0.6)	19 (0.9)
Honduras	8 (0.6)	24 (1.3)	15 (1.1)
South Africa	9 (0.4)	25 (0.7)	19 (0.7)
<b>Benchmarking Participants</b>			
Alberta, Canada	43 (1.2)	91 (0.8)	52 (1.7)
Ontario, Canada	41 (1.6)	86 (0.9)	51 (1.7)
Quebec, Canada	27 (0.9)	93 (0.6)	51 (1.3)
Abu Dhabi, UAE	21 (0.9)	55 (1.3)	52 (1.7)
Dubai, UAE	27 (1.0)	58 (0.8)	57 (1.1)
Alabama, US	23 (2.0)	79 (1.3)	51 (2.4)
California, US	25 (1.5)	67 (1.4)	40 (1.5)
Colorado, US	39 (1.7)	82 (1.6)	54 (2.0)
Connecticut, US	43 (1.6)	84 (1.0)	68 (2.6)
Florida, US	27 (1.6)	80 (1.3)	52 (2.2)
Indiana, US	32 (1.7)	82 (1.0)	53 (2.6)
Massachusetts, US	46 (2.0)	85 (0.8)	71 (2.1)
Minnesota, US	43 (2.1)	85 (0.9)	70 (1.6)
North Carolina, US	33 (2.0)	84 (1.0)	60 (2.2)

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

**Exhibit 4.5: Students Spoke the Language of the Test Before Starting School\***

Reported by Parents

Country	Spoke the Language		Did Not Speak the Language	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Australia	95 (0.6)	531 (3.2)	5 (0.6)	535 (14.7)
Austria	93 (0.6)	512 (2.7)	7 (0.6)	471 (4.7)
Azerbaijan	96 (0.9)	465 (5.7)	4 (0.9)	454 (14.5)
Chinese Taipei	97 (0.3)	593 (1.9)	3 (0.3)	558 (7.0)
Croatia	100 (0.1)	490 (1.9)	0 (0.1)	~ ~
Czech Republic	99 (0.3)	513 (2.3)	1 (0.3)	~ ~
Finland	99 (0.2)	547 (2.3)	1 (0.2)	~ ~
Georgia	98 (0.7)	453 (3.4)	2 (0.7)	~ ~
Germany	97 (0.3)	534 (2.2)	3 (0.3)	494 (6.0)
Hong Kong SAR	97 (0.4)	607 (2.7)	3 (0.4)	600 (6.8)
Hungary	99 (0.2)	519 (3.4)	1 (0.2)	~ ~
Iran, Islamic Rep. of	80 (1.5)	443 (3.4)	20 (1.5)	383 (5.5)
Ireland	93 (0.6)	533 (2.8)	7 (0.6)	504 (6.6)
Italy	94 (0.5)	512 (2.5)	6 (0.5)	488 (6.8)
Lithuania	98 (0.6)	535 (2.6)	2 (0.6)	~ ~
Malta	44 (0.8)	514 (1.9)	56 (0.8)	490 (2.0)
Morocco	83 (1.9)	337 (4.7)	17 (1.9)	328 (6.6)
Northern Ireland	98 (0.4)	579 (3.4)	2 (0.4)	~ ~
Norway	97 (0.4)	497 (2.8)	3 (0.4)	468 (7.9)
Oman	94 (0.3)	385 (3.2)	6 (0.3)	407 (4.8)
Poland	99 (0.1)	482 (2.2)	1 (0.1)	~ ~
Portugal	98 (0.3)	535 (3.2)	2 (0.3)	~ ~
Qatar	73 (1.7)	414 (4.6)	27 (1.7)	460 (6.0)
Romania	97 (1.1)	483 (5.9)	3 (1.1)	456 (17.1)
Russian Federation	96 (1.0)	543 (3.6)	4 (1.0)	536 (13.3)
Saudi Arabia	74 (1.4)	415 (5.9)	26 (1.4)	400 (6.9)
Singapore	82 (0.5)	611 (3.2)	18 (0.5)	587 (4.4)
Slovak Republic	98 (0.6)	510 (3.4)	2 (0.6)	~ ~
Slovenia	97 (0.3)	516 (2.1)	3 (0.3)	462 (6.9)
Spain	87 (1.1)	488 (2.7)	13 (1.1)	472 (4.6)
Sweden	95 (0.4)	509 (2.0)	5 (0.4)	474 (5.8)
United Arab Emirates	77 (0.8)	431 (2.1)	23 (0.8)	456 (3.2)
International Avg.	91 (0.1)	501 (0.6)	9 (0.1)	477 (1.8)

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

**Sixth Grade Participants**

Botswana	26 (1.3)	450 (6.5)	74 (1.3)	414 (3.3)
Honduras	97 (0.5)	396 (5.6)	3 (0.5)	393 (15.3)

**Benchmarking Participants**

Quebec, Canada	94 (0.8)	535 (2.6)	6 (0.8)	525 (5.1)
Abu Dhabi, UAE	81 (1.4)	412 (4.5)	19 (1.4)	448 (7.1)
Dubai, UAE	69 (0.7)	473 (2.3)	31 (0.7)	473 (2.4)

\* Available only for countries that administered both TIMSS and PIRLS to the same fourth grade students because this item was included in the PIRLS Home Questionnaire completed by parents.

( ) 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.

In the TIMSS 2011 eighth grade assessment, students themselves reported on how often they speak the language of the test at home. As shown in Exhibit 4.6, for the eighth grade students, on average across countries, 79 percent always or almost always speak the language of the test at home, with 17 percent sometimes speaking it and 4 percent never speaking it. As with the fourth grade, mathematics achievement was higher for students who frequently speak the language of the test at home (469), compared to those who sometimes (443) or never (421) do so. Among the ninth grade participants, both Botswana and South Africa had very low percentages of students always or almost always speaking the language of the test at home (12% and 26%, respectively).

**Exhibit 4.6: Students Speak the Language of the Test at Home**
*Reported by Students*

Country	Always or Almost Always		Sometimes		Never	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	94 (0.5)	469 (2.7)	5 (0.4)	440 (6.5)	1 (0.1)	~ ~
Australia	93 (0.9)	504 (5.0)	6 (0.8)	516 (10.4)	1 (0.2)	~ ~
Bahrain	77 (0.7)	405 (2.2)	18 (0.6)	439 (4.2)	5 (0.5)	384 (9.3)
Chile	96 (0.3)	419 (2.6)	4 (0.3)	362 (7.8)	0 (0.1)	~ ~
Chinese Taipei	92 (0.7)	616 (3.0)	7 (0.6)	535 (7.7)	1 (0.2)	~ ~
England	95 (0.7)	508 (5.5)	4 (0.6)	491 (11.9)	1 (0.2)	~ ~
Finland	97 (0.4)	515 (2.5)	2 (0.3)	~ ~	1 (0.1)	~ ~
Georgia	95 (0.9)	436 (3.9)	4 (0.9)	359 (13.4)	0 (0.1)	~ ~
Ghana	26 (1.1)	332 (5.9)	70 (1.2)	334 (4.3)	4 (0.7)	292 (8.0)
Hong Kong SAR	79 (1.9)	578 (3.7)	17 (1.6)	619 (9.2)	3 (0.5)	601 (16.0)
Hungary	98 (0.3)	506 (3.4)	1 (0.3)	~ ~	0 (0.1)	~ ~
Indonesia	36 (2.9)	389 (7.7)	56 (2.4)	386 (4.1)	7 (0.9)	377 (8.3)
Iran, Islamic Rep. of	64 (2.2)	433 (4.9)	21 (1.5)	383 (6.5)	15 (1.3)	382 (4.8)
Israel	93 (0.9)	517 (3.9)	6 (0.7)	515 (11.9)	1 (0.2)	~ ~
Italy	89 (1.0)	504 (2.2)	9 (0.8)	449 (7.0)	2 (0.3)	~ ~
Japan	99 (0.2)	569 (2.7)	1 (0.2)	~ ~	0 (0.1)	~ ~
Jordan	88 (0.8)	409 (3.6)	9 (0.6)	400 (6.9)	3 (0.4)	363 (13.0)
Kazakhstan	92 (0.8)	488 (4.1)	8 (0.8)	475 (6.1)	1 (0.2)	~ ~
Korea, Rep. of	100 (0.1)	613 (2.9)	0 (0.1)	~ ~	0 (0.1)	~ ~
Lebanon	20 (1.3)	466 (6.2)	64 (1.4)	446 (4.1)	16 (0.7)	442 (5.0)
Lithuania	96 (0.8)	504 (2.4)	3 (0.7)	460 (20.2)	1 (0.2)	~ ~
Macedonia, Rep. of	91 (1.0)	431 (5.2)	6 (0.7)	385 (10.9)	2 (0.5)	~ ~
Malaysia	62 (2.0)	425 (5.9)	25 (1.3)	463 (7.4)	13 (1.1)	469 (9.7)
Morocco	63 (1.2)	369 (2.4)	29 (0.9)	376 (2.3)	8 (0.6)	381 (6.3)
New Zealand	92 (0.9)	489 (5.1)	7 (0.7)	489 (11.5)	1 (0.2)	~ ~
Norway	94 (0.7)	477 (2.4)	5 (0.6)	449 (5.9)	1 (0.2)	~ ~
Oman	65 (1.3)	369 (3.2)	28 (1.1)	369 (3.6)	7 (0.5)	349 (7.4)
Palestinian Nat'l Auth.	93 (1.1)	405 (3.5)	5 (0.7)	395 (7.6)	2 (0.6)	~ ~
Qatar	65 (0.9)	401 (4.1)	29 (0.8)	437 (4.0)	6 (0.5)	375 (10.5)
Romania	98 (0.3)	460 (4.0)	1 (0.3)	~ ~	0 (0.1)	~ ~
Russian Federation	92 (1.9)	540 (3.7)	7 (1.7)	533 (9.4)	1 (0.3)	~ ~
Saudi Arabia	75 (2.0)	399 (4.8)	16 (1.2)	381 (8.4)	9 (1.1)	378 (7.6)
Singapore	57 (0.9)	622 (3.3)	38 (0.8)	597 (4.8)	5 (0.3)	592 (8.4)
Slovenia	88 (1.7)	510 (2.2)	8 (1.0)	463 (6.4)	4 (1.0)	483 (7.8)
Sweden	92 (0.6)	487 (1.9)	6 (0.5)	454 (5.2)	1 (0.2)	~ ~
Syrian Arab Republic	85 (1.5)	383 (4.3)	11 (1.0)	362 (8.7)	4 (0.8)	378 (25.0)
Thailand	66 (2.3)	441 (4.9)	30 (2.1)	402 (5.6)	3 (0.5)	388 (10.7)
Tunisia	19 (0.7)	412 (3.1)	56 (1.1)	427 (2.9)	25 (0.9)	429 (4.4)
Turkey	90 (1.2)	461 (4.3)	8 (1.0)	383 (7.2)	2 (0.3)	~ ~
Ukraine	61 (2.7)	478 (4.9)	27 (1.8)	481 (5.0)	12 (1.4)	484 (6.2)
United Arab Emirates	67 (1.2)	453 (2.0)	27 (0.9)	467 (3.2)	5 (0.4)	445 (5.3)
United States	91 (0.4)	513 (2.7)	8 (0.4)	487 (4.8)	1 (0.1)	~ ~
International Avg.	79 (0.2)	469 (0.6)	17 (0.2)	443 (1.3)	4 (0.1)	421 (2.4)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent. A tilde (~) indicates insufficient data to report achievement.

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



**Exhibit 4.6: Students Speak the Language of the Test at Home (Continued)**

Country	Always or Almost Always		Sometimes		Never	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
<b>Ninth Grade Participants</b>						
Botswana	12 (0.6)	414 (7.4)	82 (0.7)	397 (2.1)	7 (0.4)	367 (3.9)
Honduras	95 (0.4)	340 (3.7)	4 (0.4)	299 (13.0)	1 (0.1)	~ ~
South Africa	26 (1.0)	405 (4.5)	65 (1.2)	337 (2.2)	9 (0.6)	312 (4.9)
<b>Benchmarking Participants</b>						
Alberta, Canada	86 (1.6)	504 (2.6)	11 (1.2)	514 (5.1)	3 (0.7)	518 (6.7)
Ontario, Canada	89 (0.9)	509 (2.6)	10 (0.8)	525 (6.5)	1 (0.2)	~ ~
Quebec, Canada	89 (1.1)	532 (2.4)	8 (0.8)	522 (4.9)	3 (0.4)	552 (9.1)
Abu Dhabi, UAE	69 (1.8)	445 (3.9)	25 (1.4)	463 (6.1)	6 (0.7)	437 (8.1)
Dubai, UAE	62 (1.4)	479 (2.5)	34 (1.3)	477 (3.7)	4 (0.5)	467 (8.1)
Alabama, US	97 (0.5)	467 (6.0)	3 (0.5)	457 (12.5)	1 (0.2)	~ ~
California, US	81 (1.4)	498 (4.7)	18 (1.3)	477 (7.9)	2 (0.3)	~ ~
Colorado, US	88 (1.1)	524 (4.8)	11 (1.2)	475 (7.8)	1 (0.3)	~ ~
Connecticut, US	91 (0.7)	524 (4.7)	8 (0.6)	484 (7.4)	1 (0.2)	~ ~
Florida, US	88 (1.3)	515 (6.5)	11 (1.2)	517 (10.9)	1 (0.3)	~ ~
Indiana, US	96 (0.5)	524 (5.4)	3 (0.4)	480 (10.0)	1 (0.2)	~ ~
Massachusetts, US	91 (1.0)	564 (5.2)	8 (0.9)	525 (14.0)	1 (0.3)	~ ~
Minnesota, US	96 (0.8)	548 (4.5)	4 (0.8)	497 (9.1)	0 (0.2)	~ ~
North Carolina, US	95 (0.7)	539 (6.9)	5 (0.7)	513 (11.2)	0 (0.1)	~ ~

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

### *Parents' Educational Expectations for Their Children*

Studies over the past several years have found a positive relationship between parental aspirations for their children and academic achievement. For example, researchers studying longitudinal effects in the United States found that more communication between parents and students and higher parents' aspirations resulted in higher student achievement (Hong & Ho, 2005). Across four ethnic groups, parents' educational aspiration was the most powerful predictor in increasing student educational aspiration; ultimately, the greater the student's own educational expectations, the greater the student's academic achievement.

Exhibit 4.7 presents parents' reports about their educational expectations for their children according to four education levels from highest to lowest: postgraduate degree, university degree, post-secondary, and upper secondary (or lower). Results are shown for countries that administered both TIMSS and PIRLS fourth grade assessments to the same fourth grade students. Across the TIMSS 2011 participants, parents have very high educational expectations for their children (to the extent that some parents may have misunderstood the question). Nearly one-third (30%) of the fourth grade students have parents who expect them to attain a postgraduate degree and another third (35%) are expected to graduate from university. Still, there was considerable variation in results across and within countries.

Consistent with other research, the results show a positive relationship between parents' aspirations and students' average mathematics achievement. Across the fourth grade countries, students had higher average mathematics achievement with each higher education level of expectation, to the extent that there was a 79-point difference between students whose parents expected a postgraduate degree at one end of the continuum and those expecting upper secondary school (or lower) at the other end of the continuum (528 vs. 449). The results for the sixth grade and benchmarking participants mirror the results at the fourth grade.

Exhibit 4.8 presents students' reports of their educational aspirations from the TIMSS 2011 eighth grade assessment. As shown on the first page and similar to the parents of the fourth grade students, eighth grade students had high expectations for further education, such that some students also may have misunderstood the question. However, looking at the countries that administered TIMSS and PIRLS to the same students at the fourth grade and also participated at the eighth grade, there was some degree of correspondence between the parents' responses and those by eighth grade students. Almost

**Exhibit 4.7: Parents' Educational Expectations for Their Children\***

Reported by Parents

Country	Parents Expect Their Child to Complete							
	Postgraduate Degree**		University but Not Postgraduate Degree		Post-secondary but Not University		Upper Secondary Education or Less	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Iran, Islamic Rep. of	75 (0.9)	445 (3.8)	12 (0.5)	417 (5.5)	10 (0.6)	381 (5.8)	3 (0.4)	344 (9.0)
United Arab Emirates	59 (0.7)	457 (2.3)	31 (0.6)	419 (2.6)	6 (0.3)	409 (5.0)	5 (0.3)	368 (6.0)
Qatar	58 (1.0)	441 (4.1)	33 (1.1)	395 (5.0)	3 (0.3)	351 (11.1)	6 (0.4)	351 (9.7)
Poland	52 (1.2)	504 (2.5)	25 (0.9)	482 (2.6)	6 (0.5)	454 (3.9)	18 (0.9)	424 (3.8)
Saudi Arabia	49 (1.8)	428 (6.6)	32 (1.3)	403 (6.2)	8 (0.8)	379 (7.4)	11 (1.0)	382 (11.8)
Slovak Republic	48 (1.4)	544 (2.8)	6 (0.4)	513 (4.8)	13 (0.5)	499 (3.9)	33 (1.4)	463 (4.8)
Portugal	48 (1.0)	552 (2.9)	36 (0.9)	530 (3.6)	6 (0.6)	493 (7.0)	10 (0.7)	493 (6.9)
Oman	43 (0.7)	413 (3.5)	40 (0.7)	383 (3.1)	6 (0.3)	352 (6.3)	12 (0.5)	323 (5.3)
Morocco	r 42 (1.4)	359 (4.5)	21 (0.9)	333 (5.1)	0 (0.0)	~ ~	37 (1.5)	323 (8.5)
Chinese Taipei	42 (1.0)	615 (2.0)	44 (0.7)	586 (2.3)	9 (0.5)	562 (5.1)	5 (0.5)	506 (7.0)
Singapore	34 (0.8)	625 (3.5)	47 (0.8)	618 (3.0)	18 (0.8)	556 (3.5)	2 (0.2)	~ ~
Georgia	32 (1.4)	496 (3.7)	20 (1.0)	459 (5.7)	24 (1.2)	431 (5.6)	24 (1.2)	405 (6.5)
Spain	28 (1.1)	503 (3.3)	52 (1.2)	494 (2.8)	7 (0.5)	459 (5.2)	12 (0.8)	437 (4.5)
Ireland	27 (1.0)	552 (3.6)	42 (1.1)	544 (3.2)	26 (1.3)	504 (3.0)	5 (0.4)	473 (7.7)
Azerbaijan	27 (1.2)	482 (5.5)	40 (1.3)	471 (7.1)	15 (1.1)	443 (8.6)	18 (1.2)	445 (8.4)
Hong Kong SAR	26 (1.1)	620 (3.2)	62 (0.9)	609 (2.8)	6 (0.5)	579 (4.4)	6 (0.5)	569 (5.6)
Finland	26 (1.3)	576 (3.2)	29 (0.8)	554 (2.5)	12 (0.7)	540 (4.3)	33 (1.2)	521 (3.3)
Lithuania	23 (1.0)	579 (3.4)	32 (1.0)	551 (2.7)	34 (1.0)	511 (2.7)	11 (0.7)	464 (5.9)
Czech Republic	22 (1.0)	552 (3.6)	14 (0.7)	540 (3.4)	6 (0.5)	526 (5.1)	58 (1.3)	491 (2.3)
Romania	21 (1.3)	536 (4.4)	29 (1.5)	516 (4.6)	16 (1.0)	480 (6.5)	34 (2.1)	421 (11.2)
Germany	r 20 (1.1)	575 (2.8)	9 (0.5)	555 (3.6)	16 (0.8)	519 (2.9)	55 (1.3)	519 (2.6)
Northern Ireland	s 18 (1.1)	621 (4.4)	37 (1.4)	606 (3.6)	13 (0.8)	564 (5.8)	32 (1.5)	533 (5.6)
Australia	s 18 (1.1)	564 (7.4)	42 (1.5)	556 (3.8)	25 (1.2)	502 (4.0)	15 (0.9)	485 (5.9)
Hungary	16 (1.2)	592 (3.4)	30 (1.0)	554 (2.4)	24 (0.8)	510 (3.1)	30 (1.3)	451 (5.6)
Italy	15 (0.7)	517 (4.5)	49 (0.9)	525 (2.7)	12 (0.6)	487 (5.2)	24 (0.9)	492 (3.8)
Malta	13 (0.6)	541 (3.8)	25 (0.6)	531 (2.8)	29 (0.8)	508 (2.7)	33 (0.8)	457 (2.8)
Croatia	9 (0.4)	518 (4.6)	34 (1.1)	516 (2.2)	48 (1.0)	478 (2.0)	9 (0.6)	436 (4.1)
Slovenia	7 (0.5)	551 (4.9)	42 (1.1)	538 (2.5)	36 (0.9)	500 (2.5)	14 (0.8)	464 (3.8)
Norway	5 (0.5)	493 (7.5)	64 (1.6)	508 (3.1)	26 (1.4)	479 (3.3)	5 (0.6)	470 (7.9)
Russian Federation	3 (0.3)	586 (9.8)	69 (1.2)	556 (3.5)	23 (1.0)	508 (4.5)	6 (0.6)	505 (9.0)
Austria	--	--	--	--	--	--	--	--
Sweden	--	--	--	--	--	--	--	--
International Avg.	30 (0.2)	528 (0.8)	35 (0.2)	509 (0.7)	16 (0.1)	482 (1.0)	19 (0.2)	449 (1.2)

**Sixth Grade Participants**

Botswana	r	52 (1.9)	442 (5.4)	15 (0.8)	429 (6.6)	19 (1.1)	404 (5.3)	14 (1.0)	388 (4.9)
Honduras	r	36 (1.8)	428 (7.5)	22 (1.3)	409 (6.2)	14 (0.9)	391 (7.0)	28 (1.6)	360 (5.6)

**Benchmarking Participants**

Dubai, UAE		66 (0.8)	489 (2.3)	25 (0.8)	456 (3.5)	6 (0.5)	440 (7.6)	3 (0.3)	384 (5.9)
Abu Dhabi, UAE		59 (1.3)	441 (4.6)	32 (1.0)	398 (5.3)	5 (0.5)	380 (7.3)	5 (0.5)	351 (11.1)
Quebec, Canada		18 (1.4)	550 (4.4)	43 (1.3)	547 (2.4)	33 (1.5)	518 (2.9)	6 (0.7)	501 (6.6)

\* Available only for countries that administered both TIMSS and PIRLS to the same fourth grade students because this item was included in the PIRLS Home Questionnaire completed by parents.

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

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

A dash (-) indicates comparable data not available. 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 4.8: Students' Educational Expectations**
*Reported by Students*

Country	Postgraduate Degree*		University but Not Postgraduate Degree		Post-secondary but Not University		Upper Secondary Education or Less		Do Not Know	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Saudi Arabia	62 (1.3)	413 (4.7)	14 (0.7)	388 (6.1)	0 (0.0)	~ ~	10 (0.8)	325 (7.3)	15 (0.9)	362 (7.3)
Qatar	54 (1.0)	441 (3.7)	25 (0.9)	403 (4.9)	4 (0.4)	346 (9.4)	8 (0.5)	302 (7.0)	9 (0.6)	367 (10.6)
Iran, Islamic Rep. of	53 (1.0)	443 (5.5)	15 (0.6)	404 (3.5)	6 (0.3)	363 (5.6)	5 (0.4)	331 (7.9)	20 (0.7)	387 (4.2)
Israel	51 (1.2)	548 (4.0)	19 (0.8)	536 (3.8)	10 (0.6)	463 (6.3)	10 (0.8)	429 (7.1)	10 (0.5)	492 (7.4)
Palestinian Nat'l Auth.	49 (0.9)	436 (4.0)	11 (0.7)	421 (5.6)	6 (0.4)	381 (5.4)	12 (0.8)	338 (6.5)	22 (1.1)	374 (5.1)
Tunisia	49 (1.0)	448 (3.5)	5 (0.4)	442 (6.5)	13 (0.6)	396 (3.7)	7 (0.4)	377 (4.7)	27 (0.9)	406 (3.2)
United Arab Emirates	48 (0.7)	484 (2.3)	21 (0.5)	459 (2.8)	9 (0.3)	439 (3.1)	7 (0.3)	368 (3.5)	14 (0.5)	424 (3.0)
Oman	45 (0.8)	409 (2.9)	17 (0.5)	374 (3.6)	5 (0.3)	326 (7.6)	11 (0.5)	293 (4.9)	23 (0.7)	336 (4.1)
Jordan	45 (0.9)	445 (3.2)	19 (0.7)	410 (3.8)	6 (0.4)	360 (6.5)	9 (0.6)	320 (8.0)	21 (0.8)	388 (4.9)
Lebanon	42 (1.4)	476 (4.6)	29 (1.1)	452 (3.6)	8 (0.6)	401 (5.1)	6 (0.6)	397 (6.9)	15 (0.9)	427 (4.5)
Indonesia	42 (1.6)	403 (5.1)	19 (0.9)	392 (4.8)	7 (0.5)	375 (7.6)	13 (0.9)	361 (6.1)	20 (1.2)	366 (5.0)
United States	40 (0.7)	533 (3.2)	43 (0.5)	505 (2.3)	4 (0.2)	473 (4.6)	6 (0.3)	449 (4.9)	7 (0.3)	493 (4.1)
Bahrain	39 (0.9)	451 (2.5)	16 (0.6)	415 (4.1)	9 (0.5)	395 (4.4)	15 (0.5)	320 (6.3)	21 (0.8)	399 (5.3)
Morocco	37 (0.8)	406 (2.7)	16 (0.6)	366 (4.2)	0 (0.0)	~ ~	16 (0.7)	334 (3.2)	30 (1.0)	363 (2.5)
Singapore	33 (0.7)	639 (3.2)	36 (0.8)	621 (3.1)	18 (0.9)	553 (5.3)	1 (0.1)	~ ~	12 (0.5)	600 (6.3)
Macedonia, Rep. of	33 (1.3)	474 (5.8)	43 (1.1)	434 (5.1)	3 (0.3)	383 (11.7)	13 (0.8)	357 (7.0)	8 (0.6)	370 (12.1)
Hong Kong SAR	32 (1.2)	617 (4.3)	40 (1.1)	594 (3.5)	11 (0.7)	542 (5.3)	8 (0.8)	504 (7.6)	10 (0.5)	569 (7.1)
Armenia	29 (1.1)	508 (3.7)	8 (0.5)	484 (4.9)	13 (0.6)	453 (5.8)	22 (0.9)	416 (4.6)	29 (0.8)	468 (3.2)
Malaysia	28 (1.6)	472 (5.7)	20 (1.0)	455 (5.0)	24 (1.1)	423 (5.3)	10 (1.1)	377 (11.5)	17 (1.0)	432 (6.9)
Turkey	28 (1.1)	532 (6.7)	44 (0.9)	456 (3.3)	5 (0.3)	411 (7.0)	16 (0.8)	354 (4.1)	7 (0.4)	391 (7.3)
Chinese Taipei	27 (1.0)	674 (4.2)	46 (0.8)	611 (2.9)	5 (0.3)	573 (6.2)	12 (0.7)	492 (4.7)	10 (0.5)	592 (6.2)
Ghana	27 (1.7)	377 (5.9)	42 (1.4)	332 (3.7)	18 (1.0)	298 (6.6)	8 (0.6)	274 (6.1)	5 (0.6)	331 (15.2)
Thailand	25 (1.4)	469 (6.7)	32 (1.0)	441 (4.0)	7 (0.5)	401 (5.9)	22 (1.0)	388 (5.1)	13 (0.8)	402 (4.6)
Syrian Arab Republic	25 (1.0)	412 (5.0)	34 (1.2)	386 (4.7)	4 (0.3)	353 (7.9)	14 (1.2)	346 (7.2)	22 (0.9)	365 (6.6)
Hungary	22 (1.0)	572 (3.4)	20 (0.8)	537 (3.1)	23 (0.9)	490 (3.9)	26 (1.1)	434 (4.8)	8 (0.5)	511 (5.7)
Italy	22 (1.0)	524 (3.6)	28 (0.9)	527 (2.5)	12 (0.6)	482 (3.8)	31 (1.1)	467 (3.4)	8 (0.5)	489 (5.6)
England	20 (1.4)	554 (6.3)	17 (1.1)	545 (6.5)	25 (1.1)	490 (5.3)	21 (1.2)	461 (5.5)	16 (0.8)	497 (7.3)
Kazakhstan	20 (0.9)	500 (5.7)	40 (1.1)	499 (4.3)	15 (0.7)	473 (4.7)	18 (0.9)	465 (5.4)	7 (0.5)	482 (7.3)
Georgia	20 (1.2)	507 (5.2)	7 (0.7)	475 (6.8)	22 (1.1)	442 (4.9)	36 (1.2)	382 (4.6)	15 (0.9)	427 (6.9)
New Zealand	20 (0.9)	526 (6.2)	13 (0.7)	525 (7.4)	20 (0.6)	489 (4.5)	21 (1.0)	444 (5.1)	26 (0.9)	486 (5.6)
Australia	20 (1.2)	561 (8.2)	14 (0.7)	543 (6.7)	30 (1.0)	487 (4.0)	22 (1.1)	454 (4.6)	15 (0.7)	524 (6.7)
Lithuania	19 (0.8)	549 (3.8)	17 (0.8)	540 (3.0)	32 (0.9)	492 (3.0)	14 (0.7)	441 (4.2)	18 (0.7)	489 (4.6)
Korea, Rep. of	18 (0.6)	646 (5.1)	55 (0.7)	627 (2.7)	11 (0.5)	567 (4.7)	4 (0.3)	498 (6.2)	11 (0.6)	574 (4.8)
Romania	17 (0.9)	527 (5.3)	28 (1.0)	501 (4.3)	15 (0.6)	451 (5.1)	29 (1.3)	398 (5.3)	10 (0.6)	423 (8.0)
Chile	17 (0.8)	473 (4.1)	52 (1.0)	426 (2.4)	18 (0.7)	383 (3.8)	10 (0.6)	365 (4.5)	4 (0.3)	401 (8.4)
Slovenia	15 (0.8)	546 (3.4)	20 (0.8)	544 (3.0)	46 (1.0)	486 (2.6)	8 (0.5)	447 (4.9)	12 (0.6)	502 (4.4)
Finland	12 (0.7)	555 (3.6)	10 (0.5)	534 (3.7)	8 (0.4)	510 (4.8)	41 (1.2)	494 (2.3)	29 (1.0)	523 (3.1)
Norway	9 (0.6)	494 (5.8)	39 (1.0)	492 (3.1)	22 (0.7)	465 (2.9)	7 (0.5)	433 (5.9)	23 (0.9)	468 (3.4)
Russian Federation	6 (0.5)	583 (5.1)	53 (1.1)	561 (3.4)	18 (0.8)	507 (4.7)	15 (0.9)	500 (6.0)	7 (0.4)	514 (4.7)
Ukraine	4 (0.5)	538 (9.6)	30 (1.2)	518 (4.1)	21 (0.9)	467 (4.3)	38 (1.5)	455 (5.7)	6 (0.6)	468 (6.6)
Japan	2 (0.2)	~ ~	46 (1.0)	602 (3.3)	20 (0.7)	549 (3.4)	20 (0.8)	511 (3.4)	12 (0.6)	557 (4.3)
Sweden	--	--	--	--	--	--	--	--	--	--
International Avg.	29 (0.2)	504 (0.8)	27 (0.1)	482 (0.7)	14 (0.1)	445 (0.9)	15 (0.1)	402 (0.9)	15 (0.1)	450 (1.0)

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

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

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

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

**Exhibit 4.8: Students' Educational Expectations (Continued)**

Country	Postgraduate Degree*		University but Not Postgraduate Degree		Post-secondary but Not University		Upper Secondary Education or Less		Do Not Know	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
<b>Ninth Grade Participants</b>										
South Africa	45 (1.0)	398 (2.9)	9 (0.4)	374 (5.0)	15 (0.4)	332 (3.3)	25 (0.7)	309 (2.8)	6 (0.6)	313 (6.0)
Honduras	29 (1.3)	362 (6.5)	35 (0.8)	336 (3.4)	21 (1.0)	333 (4.0)	6 (0.5)	288 (6.3)	9 (0.7)	330 (6.5)
Botswana	27 (1.0)	449 (3.3)	19 (0.7)	410 (2.6)	28 (0.8)	384 (3.0)	20 (0.9)	349 (3.4)	4 (0.3)	378 (7.0)
<b>Benchmarking Participants</b>										
Dubai, UAE	51 (1.2)	501 (2.6)	19 (0.7)	479 (3.6)	12 (0.6)	455 (3.9)	5 (0.3)	367 (7.3)	13 (0.6)	459 (3.7)
Abu Dhabi, UAE	50 (1.1)	476 (4.1)	20 (0.8)	448 (5.5)	8 (0.6)	431 (5.9)	7 (0.5)	368 (5.8)	15 (0.7)	415 (5.5)
North Carolina, US	46 (1.9)	557 (7.5)	42 (1.5)	529 (5.6)	2 (0.5)	~ ~	4 (0.5)	462 (11.6)	6 (0.5)	520 (19.7)
Florida, US	46 (2.1)	535 (7.7)	39 (1.3)	507 (5.2)	3 (0.5)	472 (10.9)	6 (1.2)	467 (8.9)	7 (0.6)	494 (9.8)
Alberta, Canada	42 (1.1)	523 (3.1)	22 (0.8)	505 (3.2)	17 (0.8)	477 (2.7)	4 (0.5)	478 (8.0)	14 (0.6)	498 (4.4)
Massachusetts, US	42 (1.6)	583 (6.1)	43 (1.5)	552 (4.9)	3 (0.3)	516 (8.7)	3 (0.4)	489 (9.7)	9 (0.8)	545 (9.1)
Ontario, Canada	41 (1.3)	536 (2.9)	23 (0.8)	515 (3.0)	21 (1.0)	471 (3.8)	2 (0.3)	~ ~	14 (0.6)	498 (4.4)
Connecticut, US	41 (1.8)	544 (5.4)	41 (1.4)	515 (5.0)	3 (0.3)	471 (12.3)	5 (0.6)	436 (8.3)	9 (0.9)	508 (7.3)
Alabama, US	41 (1.8)	489 (7.7)	40 (1.3)	464 (5.1)	4 (0.5)	424 (9.5)	8 (1.0)	401 (6.3)	7 (0.6)	457 (7.3)
Colorado, US	41 (1.4)	541 (5.4)	43 (1.5)	514 (4.7)	3 (0.4)	473 (12.9)	6 (0.6)	450 (6.4)	7 (0.8)	493 (9.2)
Indiana, US	40 (1.8)	544 (5.4)	44 (1.2)	518 (4.7)	4 (0.5)	473 (10.0)	5 (0.6)	454 (7.5)	7 (0.5)	502 (9.4)
California, US	39 (1.6)	517 (5.6)	41 (1.2)	489 (4.7)	4 (0.5)	467 (13.1)	7 (0.8)	445 (10.2)	8 (0.4)	469 (8.6)
Minnesota, US	37 (1.3)	567 (4.6)	48 (1.2)	542 (5.0)	3 (0.4)	506 (8.8)	4 (0.6)	467 (12.5)	8 (0.7)	518 (5.0)
Quebec, Canada	34 (1.2)	553 (2.6)	26 (0.8)	541 (2.9)	23 (0.9)	502 (2.7)	4 (0.4)	480 (5.9)	13 (0.7)	529 (3.1)

one-third (29%) of the eighth grade students expect to attain a postgraduate degree and more than one-fourth (27%) expect to graduate from university. Fifteen percent of the eighth grade students indicated that they did not know how far in school they would go.

The eighth grade results also show a positive relationship between educational aspirations (in this case those of the students themselves) and average mathematics achievement. Across the eighth grade countries, the students at each higher education level of expectation had higher average mathematics achievement than the level below. Students expecting a postgraduate degree had a 102-point advantage in average achievement compared to those expecting to go no further than upper secondary school, a full standard deviation on the TIMSS achievement scale (504 vs. 402). The results for the ninth grade and benchmarking participants were similar to the results at the eighth grade.

### *Children Were Engaged In Numeracy Activities Before Beginning Primary School*

There is increasing evidence that participating in numeracy and literacy activities during the preschool years can have beneficial effects on children's later acquisition of numeracy and literacy skills. For example, a large study in England recently found that a composite variable of seven home activities—being read to, going to the library, playing with numbers, painting and drawing, being taught letters, being taught numbers, and songs/poems/rhymes—had greater predictive power for literacy and numeracy achievement than any other variables studied, including socio-economic status, parents' education, and household income (Melhuish et al., 2008).

To examine children's early numeracy experiences and as an accompaniment to the PIRLS Early Literacy Activities scale, TIMSS 2011 has included an Early Numeracy Activities scale in the fourth grade assessment for the first time. As with the other scales developed for TIMSS 2011, IRT was used to summarize the results.

Exhibit 4.9 presents the results for the TIMSS 2011 Early Numeracy Activities scale for countries that administered both TIMSS and PIRLS to the same fourth grade students. Students were scored according their parents' frequency of doing six activities with them: saying counting rhymes or singing counting songs, playing with number toys, counting different things, playing games involving shapes, playing with building blocks or construction toys, and playing board games or card games. Students **Often** engaged in early numeracy

activities had parents who reported “often” doing three of the six activities with them and “sometimes” doing the other three, on average. Students **Never or Almost Never** engaged in such activities had parents “never or almost never” doing three of the six activities with them and “sometimes” doing the other three, on average.

Internationally, across the countries at the fourth grade, 49 percent of the students had parents that **Often** engaged them in early numeracy activities, and an additional 45 percent had parents that **Sometimes** engaged them in early numeracy activities. The fourth grade students whose parents **Often** engaged them had higher average achievement than the students whose parents only **Sometimes** engaged them in numeracy activities (510 vs. 493). In several countries, a small percentage of students had parents who rarely did any of the numeracy activities with them, and these students typically had low average mathematics achievement. The countries that participated at the sixth grade had relatively high percentages of students with parents who **Never or Almost Never** engaged them in early numeracy activities, comparable to the country with the highest percentage at fourth grade.

### *Students Attended Preprimary Education*

Preprimary education, in the form of preschool, kindergarten, or an early childhood education program, plays an important role in preparing children for primary school. For example, PIRLS 2006 found a positive relationship between years of preprimary education and reading achievement in the fourth grade. Also, recent analyses of longitudinal data in the United States and England found that preschool attendance was positively related to enhanced school performance, and that the duration of attendance was associated with greater academic improvement (Tucker-Drob, 2012; Sammons et al., 2002). Besides giving students an early start in school and life, there are also broader reasons for countries to invest in preschool (Economist Intelligence Unit, 2012). For example, preprimary education provides an avenue for overcoming children’s disadvantages and can help to break the generational repetitive cycle of poverty and low achievement.

Although there is considerable variation across countries, according to the *TIMSS 2011 Encyclopedia*, some countries already have mandatory preprimary education (e.g., Austria, Hungary, and the Netherlands), some have nearly 100 percent enrollment even though attendance is not mandatory (e.g., Australia, Croatia, and Singapore), and a number of the remaining countries are working

**Exhibit 4.9: Early Numeracy Activities Before Beginning Primary School\***
*Reported by Parents*

Students were scored according to their parents' frequency of doing the six activities on the *Early Numeracy Activities* scale. Students **Often** engaged in early numeracy activities had a score on the scale of at least 10.3, which corresponds to their parents "often" doing three of the six activities with them and "sometimes" doing the other three, on average. Students **Never or Almost Never** engaged in such activities had a score no higher than 6.9, which corresponds to parents "never or almost never" doing three of the six activities with them and "sometimes" doing the other three, on average. All other students had parents who **Sometimes** engaged them in early numeracy activities.

Country	Often		Sometimes		Never or Almost Never		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Hungary	75 (0.9)	528 (2.9)	23 (0.8)	495 (4.9)	1 (0.4)	~ ~	11.1 (0.04)
Czech Republic	75 (0.8)	514 (2.3)	25 (0.8)	508 (3.6)	0 (0.1)	~ ~	11.0 (0.03)
Slovak Republic	73 (1.0)	514 (3.3)	25 (0.8)	499 (5.2)	2 (0.5)	~ ~	11.1 (0.05)
Northern Ireland <sup>s</sup>	70 (1.2)	583 (3.5)	29 (1.2)	566 (4.9)	1 (0.2)	~ ~	11.2 (0.05)
Russian Federation	69 (1.1)	547 (3.7)	29 (1.0)	533 (4.7)	2 (0.3)	~ ~	10.9 (0.04)
Poland	68 (0.9)	488 (2.3)	31 (0.9)	471 (3.0)	1 (0.2)	~ ~	10.8 (0.03)
Ireland	66 (0.9)	539 (2.9)	33 (0.8)	517 (3.7)	2 (0.3)	~ ~	10.9 (0.04)
Australia <sup>s</sup>	61 (1.2)	540 (3.7)	36 (1.2)	520 (4.1)	3 (0.4)	488 (13.4)	10.7 (0.05)
Austria	61 (0.9)	515 (2.6)	38 (0.9)	502 (3.5)	2 (0.2)	~ ~	10.4 (0.03)
Croatia	60 (0.8)	496 (2.3)	39 (0.8)	482 (2.6)	1 (0.2)	~ ~	10.5 (0.03)
Germany <sup>r</sup>	59 (1.0)	538 (2.3)	40 (1.0)	528 (2.8)	2 (0.2)	~ ~	10.4 (0.03)
Slovenia	58 (1.2)	518 (2.3)	41 (1.0)	510 (2.8)	2 (0.4)	~ ~	10.4 (0.04)
Malta	57 (0.9)	510 (1.6)	38 (0.8)	489 (2.7)	5 (0.4)	464 (5.8)	10.3 (0.03)
Italy	56 (1.0)	515 (2.8)	41 (0.9)	507 (2.9)	3 (0.3)	479 (10.1)	10.3 (0.03)
Spain	48 (0.9)	494 (3.0)	48 (0.9)	480 (3.0)	4 (0.4)	458 (7.8)	9.9 (0.03)
Lithuania	47 (0.9)	541 (2.8)	49 (0.9)	532 (3.1)	4 (0.4)	493 (7.1)	9.9 (0.03)
Romania	46 (1.6)	510 (4.8)	41 (1.4)	469 (8.0)	13 (1.5)	424 (12.7)	9.7 (0.10)
Portugal	45 (1.2)	543 (3.2)	50 (1.1)	530 (3.9)	5 (0.5)	509 (7.0)	9.9 (0.04)
United Arab Emirates	45 (0.7)	456 (2.1)	50 (0.6)	425 (2.3)	5 (0.3)	404 (5.8)	9.9 (0.03)
Norway	42 (1.3)	505 (2.9)	56 (1.2)	491 (3.3)	2 (0.3)	~ ~	9.8 (0.05)
Qatar	42 (1.1)	436 (4.8)	51 (0.9)	408 (3.6)	8 (0.6)	381 (7.0)	9.8 (0.05)
Singapore	40 (0.8)	619 (3.5)	52 (0.7)	602 (3.3)	8 (0.4)	581 (4.3)	9.7 (0.04)
Georgia	38 (1.3)	465 (4.3)	49 (1.0)	448 (3.9)	13 (1.1)	426 (9.9)	9.5 (0.08)
Saudi Arabia	37 (1.4)	424 (7.1)	54 (1.3)	407 (5.2)	10 (0.9)	387 (9.0)	9.5 (0.06)
Iran, Islamic Rep. of	34 (1.1)	451 (4.6)	54 (0.9)	429 (3.6)	12 (0.9)	387 (6.2)	9.2 (0.06)
Finland	33 (0.8)	554 (3.0)	63 (0.9)	544 (2.8)	3 (0.3)	523 (6.6)	9.5 (0.02)
Sweden	33 (1.0)	517 (2.8)	61 (0.9)	505 (2.0)	6 (0.4)	488 (5.6)	9.4 (0.03)
Chinese Taipei	32 (0.8)	613 (2.4)	53 (0.9)	587 (2.2)	14 (0.8)	561 (3.9)	9.2 (0.04)
Hong Kong SAR	29 (0.8)	617 (3.4)	60 (0.9)	604 (2.6)	11 (0.6)	597 (4.1)	9.1 (0.03)
Azerbaijan	28 (1.1)	469 (6.2)	59 (1.3)	466 (6.5)	13 (1.0)	454 (9.1)	9.1 (0.06)
Oman	26 (0.6)	413 (3.9)	60 (0.7)	382 (3.2)	14 (0.5)	359 (4.1)	8.9 (0.03)
Morocco	18 (0.9)	338 (6.8)	54 (1.5)	333 (4.3)	28 (1.8)	344 (8.8)	8.2 (0.10)
International Avg.	49 (0.2)	510 (0.7)	45 (0.2)	493 (0.7)	6 (0.1)	460 (1.8)	

\* Available only for countries that administered both TIMSS and PIRLS to the same fourth grade students because the items for this scale were included in the PIRLS Home Questionnaire completed by parents.

Centerpoint of scale set at 10.

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

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

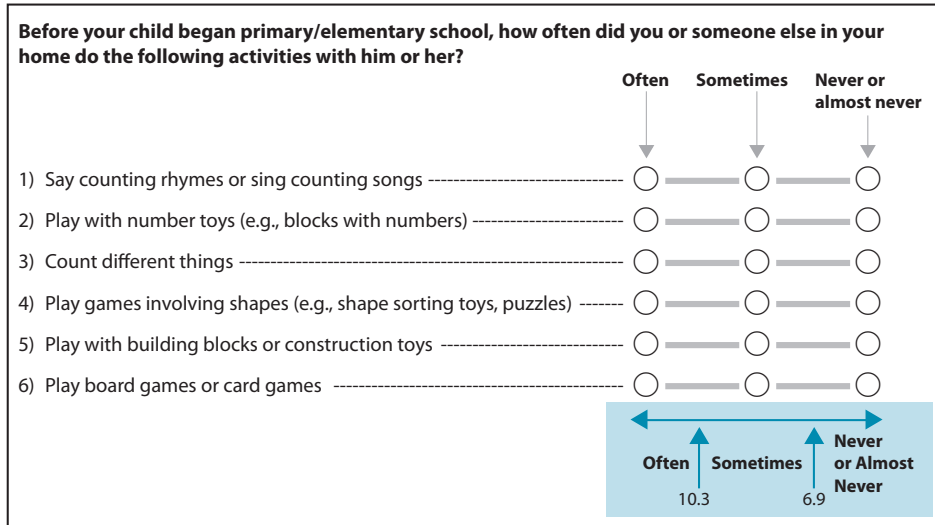
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

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



**Exhibit 4.9: Early Numeracy Activities Before Beginning Primary School\* (Continued)**

Country	Often		Sometimes		Never or Almost Never		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
<b>Sixth Grade Participants</b>							
Honduras	19 (1.1)	408 (9.6)	48 (1.2)	399 (5.3)	33 (1.3)	386 (6.8)	8.2 (0.08)
Botswana	18 (1.1)	458 (7.0)	53 (1.2)	424 (3.7)	28 (1.4)	401 (5.3)	8.3 (0.08)
<b>Benchmarking Participants</b>							
Quebec, Canada	57 (1.1)	539 (2.6)	41 (1.1)	530 (3.0)	2 (0.4)	~ ~	10.4 (0.04)
Dubai, UAE	52 (0.9)	494 (2.1)	43 (0.8)	455 (2.7)	5 (0.4)	429 (8.7)	10.2 (0.03)
Abu Dhabi, UAE	42 (1.2)	439 (4.6)	53 (1.1)	408 (4.8)	6 (0.5)	379 (9.8)	9.8 (0.05)



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

**Exhibit 4.10: Students Attended Preprimary Education\***

Curriculum Reported by National Research Coordinators and Preprimary Attendance Reported by Parents

Country	National Preprimary Curriculum Includes Mathematics Skills	Students Attended Preprimary Education							
		3 Years or More		Less than 3 Years but More than 1 Year		1 Year or Less		Did Not Attend	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Hungary	●	86 (0.9)	526 (3.1)	12 (0.7)	473 (6.6)	1 (0.3)	~ ~	0 (0.1)	~ ~
Italy	●	74 (0.9)	515 (2.6)	23 (0.8)	497 (3.4)	1 (0.2)	~ ~	1 (0.2)	~ ~
Germany	r ○	74 (0.9)	536 (2.3)	23 (0.9)	528 (3.0)	1 (0.2)	~ ~	1 (0.2)	~ ~
Sweden	●	74 (1.1)	513 (2.0)	20 (1.0)	499 (2.7)	2 (0.4)	~ ~	3 (0.4)	485 (8.5)
Norway	●	72 (1.6)	500 (3.1)	24 (1.4)	486 (3.8)	2 (0.2)	~ ~	3 (0.5)	490 (11.4)
Austria	○	69 (1.5)	511 (3.0)	27 (1.3)	509 (3.7)	3 (0.7)	500 (7.5)	1 (0.1)	~ ~
Russian Federation	○	68 (1.3)	545 (3.5)	14 (0.8)	542 (5.5)	3 (0.3)	530 (10.0)	15 (1.0)	531 (6.4)
Hong Kong SAR	●	68 (1.0)	609 (2.9)	31 (1.0)	604 (2.8)	1 (0.1)	~ ~	0 (0.1)	~ ~
Czech Republic	○	68 (1.1)	516 (2.8)	28 (0.9)	507 (3.2)	3 (0.4)	508 (7.2)	1 (0.2)	~ ~
Spain	●	66 (1.1)	492 (2.8)	28 (1.0)	474 (4.0)	4 (0.4)	466 (6.4)	3 (0.3)	469 (7.9)
Slovak Republic	●	65 (1.3)	520 (3.1)	24 (0.8)	497 (4.4)	8 (0.7)	483 (6.7)	4 (0.7)	464 (16.4)
Singapore	○	64 (0.7)	618 (3.2)	34 (0.7)	591 (3.6)	1 (0.1)	~ ~	1 (0.1)	~ ~
Slovenia	●	59 (1.3)	519 (2.3)	26 (1.1)	511 (3.5)	5 (0.5)	502 (4.7)	9 (0.7)	500 (4.9)
Romania	●	57 (1.9)	505 (4.6)	33 (1.3)	468 (8.1)	4 (0.7)	430 (16.6)	6 (1.0)	383 (19.2)
Lithuania	●	52 (1.2)	545 (2.8)	17 (0.6)	538 (4.7)	7 (0.5)	525 (5.1)	24 (1.3)	509 (4.9)
Finland	●	46 (1.3)	547 (2.6)	31 (1.0)	543 (3.3)	21 (1.1)	550 (3.5)	1 (0.3)	~ ~
Portugal	○	46 (1.3)	540 (3.2)	37 (1.3)	536 (4.0)	8 (0.7)	518 (6.5)	9 (0.8)	516 (5.4)
Croatia	○	44 (1.6)	505 (2.2)	19 (0.8)	489 (3.0)	10 (1.2)	471 (5.1)	27 (1.6)	475 (3.2)
Georgia	●	42 (1.3)	457 (4.1)	29 (0.9)	458 (4.2)	7 (0.6)	455 (8.2)	22 (1.3)	434 (6.7)
Chinese Taipei	●	38 (0.9)	598 (2.3)	56 (0.9)	590 (2.2)	4 (0.4)	576 (8.4)	1 (0.2)	~ ~
Poland	○	34 (1.3)	503 (2.9)	23 (1.0)	484 (3.0)	16 (1.1)	467 (4.3)	28 (1.9)	463 (3.0)
Morocco	r ●	21 (0.9)	351 (5.2)	39 (1.6)	338 (5.9)	17 (1.0)	324 (6.7)	23 (1.7)	333 (10.4)
Australia	s Varies by state	14 (0.9)	546 (8.5)	55 (1.4)	535 (3.6)	25 (1.2)	523 (3.2)	5 (0.5)	505 (9.0)
Qatar	●	12 (0.9)	417 (6.5)	51 (1.5)	436 (4.0)	19 (0.8)	405 (5.1)	18 (1.2)	378 (6.5)
United Arab Emirates	●	12 (0.3)	432 (4.3)	49 (0.9)	439 (2.1)	16 (0.4)	448 (3.1)	22 (0.7)	431 (3.4)
Malta	●	11 (0.6)	503 (4.1)	86 (0.6)	500 (1.4)	3 (0.3)	495 (8.7)	1 (0.2)	~ ~
Iran, Islamic Rep. of	●	10 (0.8)	454 (8.0)	29 (1.1)	448 (4.0)	40 (1.2)	433 (3.4)	21 (1.5)	396 (5.5)
Oman	●	8 (0.4)	389 (5.7)	36 (0.8)	405 (3.8)	25 (0.6)	384 (3.9)	31 (0.8)	367 (3.8)
Azerbaijan	○	7 (0.6)	469 (7.2)	20 (1.3)	468 (7.1)	8 (0.5)	451 (9.9)	64 (1.7)	465 (6.6)
Ireland	●	7 (0.6)	521 (5.5)	56 (1.4)	536 (3.0)	25 (1.1)	534 (3.9)	12 (0.7)	511 (6.7)
Northern Ireland	s ○	4 (0.5)	594 (13.1)	49 (1.7)	581 (4.2)	44 (1.7)	577 (3.8)	3 (0.4)	557 (15.8)
Saudi Arabia	●	3 (0.3)	428 (12.7)	20 (1.4)	428 (4.6)	25 (1.3)	418 (6.7)	52 (2.2)	400 (6.9)
Armenia	○								
Bahrain	○								
Belgium (Flemish)	●								
Chile	●								
Denmark	●								
England	●								
Japan	●								
Kazakhstan	●								
Korea, Rep. of	●								
Kuwait	○								
Netherlands	●								
New Zealand	●								
Serbia	●								
Thailand	○								
Tunisia	●								
Turkey	●								
United States	s Varies by state								
Yemen	○								
International Avg.		43 (0.2)	507 (0.9)	33 (0.2)	498 (0.7)	11 (0.1)	479 (1.4)	13 (0.2)	457 (1.9)

● Yes ○ No

\* Available only for countries that administered both TIMSS and PIRLS to the same fourth grade students because this item was included in the PIRLS Home Questionnaire completed by parents.

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

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

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

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

**Exhibit 4.10: Students Attended Preprimary Education\* (Continued)**

Country	National Preprimary Curriculum Includes Mathematics Skills	Students Attended Preprimary Education							
		3 Years or More		Less than 3 Years, but More than 1 Year		1 Year or Less		Did Not Attend	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
<b>Sixth Grade Participants</b>									
Honduras	<input type="radio"/>	21 (1.6)	377 (9.8)	36 (1.7)	410 (6.7)	28 (1.6)	399 (5.3)	15 (1.0)	390 (8.3)
Botswana	<input checked="" type="radio"/>	15 (0.8)	451 (6.4)	22 (1.2)	461 (6.8)	7 (0.6)	441 (6.9)	56 (1.9)	402 (3.9)
Yemen	<input type="radio"/>								
<b>Benchmarking Participants</b>									
Dubai, UAE	<input checked="" type="radio"/>	14 (0.6)	464 (3.8)	46 (0.8)	483 (2.5)	17 (0.6)	489 (4.9)	23 (1.0)	453 (4.0)
Abu Dhabi, UAE	<input checked="" type="radio"/>	12 (0.6)	419 (8.2)	50 (1.6)	422 (4.6)	18 (0.8)	426 (5.5)	21 (1.0)	411 (6.2)
Quebec, Canada	<input checked="" type="radio"/>	11 (0.7)	540 (4.1)	32 (1.5)	531 (2.7)	51 (1.6)	538 (2.8)	5 (0.5)	526 (6.6)
Alberta, Canada	<input checked="" type="radio"/>								
Ontario, Canada	<input checked="" type="radio"/>								
Florida, US	<input checked="" type="radio"/>								
North Carolina, US	<input checked="" type="radio"/>								

Yes    No

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

to increase enrollment in preprimary education. Of course, school policies of entering primary school at older ages (e.g., age 7 in Finland, Lithuania, and Sweden) permit opportunities for more years of preschool attendance than when children start primary school at younger ages (e.g., age 4 or 5 in England, Ireland, the Netherlands, New Zealand, and Northern Ireland). Exhibit C.1 in Appendix C contains information across countries, about the different policies and practices about the age of entry to primary school.

Exhibit 4.10 presents the TIMSS 2011 parents' reports on the number of years their children participated in preprimary education for countries that administered both TIMSS and PIRLS to the same fourth grade students. In addition, for all participants in the fourth grade TIMSS 2011 assessment, the exhibit presents National Research Coordinators' reports of whether or not there was a national preprimary curriculum that includes mathematics skills. It is noted that these preprimary curricula may involve only rudimentary numeric and spatial skills as well as perhaps experiencing some technology, yet two-thirds of the TIMSS 2011 fourth grade countries indicated that their preprimary curriculum made such provision, as did Botswana among the sixth grade countries and all the benchmarking participants.

Although attendance in preprimary education differed dramatically from country to country, on average, 43 percent of the fourth grade students had at least three years of preprimary education and another 33 percent had more than one year. These students had higher average achievement than their counterparts (11%) with only one year or less of preprimary education (507 and 498 vs. 479, respectively). Most notably, however, the 13 percent of students, on average, that did not attend preschool had much lower average mathematics achievement (457). There was a range across countries, but the majority of students did not attend preschool in Azerbaijan (64%) and Saudi Arabia (52%). Also, among the sixth grade participants, the majority of students in Botswana (56%) did not attend preprimary education.

### *Students Could Do Early Numeracy Tasks When Began Primary School*

Considering that 1) parents are students' first teachers and many parents make great efforts to foster their children's literacy and numeracy skills, and 2) substantial percentages of students in some countries have attended several years of preprimary education, it is not surprising that many students begin primary school with some numeracy skills. Again, however, it is recognized

that the earlier students start primary school, the fewer years they will have had available for preprimary education.

To provide information about the extent to which students enter primary school equipped with some basic skills as a foundation for formal mathematics instruction, the TIMSS 2011 fourth grade assessment has, for the first time, included a set of questions asking parents how well their child could do the following early numeracy tasks when he or she first entered primary school: count by himself/herself, recognize different shapes (e.g., square, triangle, and circle), recognize the written numbers from 1 to 10, write the numbers from 1 to 10, do simple addition, and do simple subtraction.

A number of recent studies have shown a positive relationship between early numeracy and literacy skills and later achievement in primary school. For example, an analysis of a national sample of kindergarten students from the US early childhood longitudinal study showed that fifth grade achievement in mathematics, science, and reading was positively related to their skills in these areas in their kindergarten entry year (Princiotta, Flanagan, & Hausken, 2006). Also, a recent Canadian meta-analysis of six longitudinal studies found school entry skills in mathematics and reading to be among the strongest predictors of later achievement across gender and socioeconomic backgrounds (Duncan, et al., 2007). More specifically, the authors found that early mathematics skills had the greatest predictive power.

Exhibit 4.11 presents the TIMSS 2011 results for the Early Numeracy Tasks scale. Students were scored according to their parents' responses to how well their children could do the six tasks, with some being able to do all six tasks **Very Well**, on average, and some doing the six tasks **Not Well**, on average. There was some variation, but across the fourth grade countries, on average, almost one-fourth of parents (25%) reported that their children entered primary school able to perform the six early numeracy tasks **Very Well**, and almost three-fourths (71%) **Moderately Well**. Internationally, mathematics achievement at the fourth grade was substantially higher for those students whose parents reported their children could perform the activities **Very Well** than for the students whose parents reported **Moderately Well** (524 vs. 492). Average achievement was much lower (451) for those students (4%) whose parents reported that their children could do all six numeracy tasks "not very well" or "not at all." This achievement relationship also was evident among the sixth grade and benchmarking participants.

### Exhibit 4.11: Could Do Early Numeracy Tasks When Began Primary School\*

Reported by Parents

Students were scored according to their parents' responses to how well their children could do the six tasks on the *Early Numeracy Tasks* scale. Students who could do numeracy tasks **Very Well** had a score on the scale of at least 12.5, which corresponds to their parents reporting that the students could do all six numeracy tasks (the first four at the highest level, as well as do simple addition and subtraction). Students doing the tasks **Not Well** had a score no higher than 6.4, which corresponds to parents reporting that students could do the first four tasks at a minimal level (responded in the second lowest category) and could not do simple addition and subtraction, on average. All other students could do the numeracy tasks **Moderately Well** when they began primary school.

Country	Very Well		Moderately Well		Not Well		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Chinese Taipei	64 (0.8)	603 (1.9)	35 (0.8)	573 (3.0)	0 (0.1)	~ ~	11.7 (0.02)
Hong Kong SAR	63 (0.8)	615 (2.6)	37 (0.8)	594 (3.2)	0 (0.1)	~ ~	11.7 (0.02)
Singapore	54 (1.0)	626 (3.0)	45 (1.0)	585 (3.5)	0 (0.1)	~ ~	11.4 (0.03)
Qatar	37 (0.9)	431 (4.2)	61 (0.9)	409 (3.8)	2 (0.2)	~ ~	10.6 (0.03)
Finland	36 (1.1)	573 (2.6)	62 (1.1)	533 (2.6)	1 (0.2)	~ ~	10.7 (0.05)
Oman	33 (0.7)	405 (3.4)	64 (0.7)	379 (3.2)	2 (0.2)	~ ~	10.5 (0.03)
Saudi Arabia	29 (1.2)	427 (5.1)	67 (1.2)	406 (6.4)	4 (0.9)	365 (20.0)	10.3 (0.08)
Russian Federation	29 (1.2)	568 (4.1)	68 (1.2)	533 (3.7)	3 (0.4)	492 (9.9)	10.4 (0.06)
United Arab Emirates	29 (0.5)	449 (2.6)	68 (0.5)	433 (2.1)	3 (0.2)	425 (6.2)	10.3 (0.03)
Spain	28 (0.9)	506 (3.0)	69 (0.9)	479 (2.8)	3 (0.3)	442 (7.8)	10.4 (0.04)
Romania	27 (1.4)	525 (5.1)	64 (1.5)	474 (6.1)	9 (1.3)	407 (13.1)	9.9 (0.11)
Croatia	27 (0.8)	516 (3.3)	72 (0.8)	481 (1.8)	1 (0.2)	~ ~	10.4 (0.03)
Sweden	25 (0.9)	535 (3.0)	72 (0.9)	500 (2.0)	2 (0.4)	~ ~	10.3 (0.04)
Malta	23 (0.9)	518 (2.6)	75 (0.9)	496 (1.3)	2 (0.2)	~ ~	10.2 (0.03)
Georgia	22 (1.0)	477 (3.9)	74 (0.9)	445 (4.1)	4 (0.4)	413 (14.2)	10.0 (0.05)
Lithuania	20 (0.7)	567 (3.1)	76 (0.8)	528 (2.6)	4 (0.5)	472 (8.1)	9.9 (0.04)
Czech Republic	20 (0.8)	544 (3.4)	79 (0.8)	505 (2.1)	1 (0.2)	~ ~	10.0 (0.03)
Hungary	18 (0.7)	554 (4.1)	78 (0.8)	513 (3.3)	4 (0.6)	453 (22.1)	9.7 (0.05)
Morocco	18 (0.8)	361 (6.6)	70 (1.2)	329 (4.4)	12 (1.4)	339 (16.6)	9.2 (0.10)
Azerbaijan	18 (1.1)	477 (8.1)	73 (1.1)	467 (5.9)	10 (1.0)	429 (10.8)	9.4 (0.09)
Iran, Islamic Rep. of	18 (0.8)	461 (4.9)	74 (1.1)	430 (3.7)	8 (0.9)	382 (8.5)	9.4 (0.07)
Germany <sup>r</sup>	17 (0.8)	557 (3.3)	80 (0.8)	529 (2.2)	3 (0.3)	500 (7.1)	9.8 (0.04)
Poland	16 (0.7)	515 (3.5)	79 (0.7)	478 (2.1)	5 (0.4)	428 (6.4)	9.7 (0.05)
Norway	15 (0.7)	531 (4.2)	82 (0.9)	493 (2.8)	4 (0.5)	451 (8.8)	9.5 (0.04)
Slovak Republic	14 (0.6)	545 (5.7)	80 (0.8)	506 (3.4)	6 (0.8)	472 (10.0)	9.3 (0.06)
Austria	14 (0.7)	537 (4.2)	81 (0.8)	506 (2.7)	5 (0.4)	479 (4.7)	9.4 (0.03)
Australia <sup>s</sup>	13 (0.7)	565 (7.4)	82 (0.9)	530 (3.3)	5 (0.5)	473 (7.2)	9.3 (0.04)
Portugal	13 (0.6)	563 (4.3)	82 (1.0)	531 (3.4)	5 (0.9)	520 (17.6)	9.4 (0.05)
Slovenia	12 (0.7)	553 (3.5)	81 (0.8)	511 (2.2)	7 (0.5)	482 (6.9)	9.3 (0.04)
Italy	10 (0.5)	540 (4.7)	83 (0.7)	509 (2.7)	7 (0.5)	489 (6.1)	9.1 (0.03)
Northern Ireland <sup>s</sup>	6 (0.8)	609 (8.8)	83 (0.9)	579 (3.4)	11 (0.7)	558 (7.8)	8.6 (0.05)
Ireland	--	--	--	--	--	--	--
International Avg.	25 (0.2)	524 (0.8)	71 (0.2)	492 (0.6)	4 (0.1)	451 (2.5)	

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

\* Available only for countries that administered both TIMSS and PIRLS to the same fourth grade students because the items for this scale were included in the PIRLS Home Questionnaire completed by parents.

Centerpoint of scale set at 10.

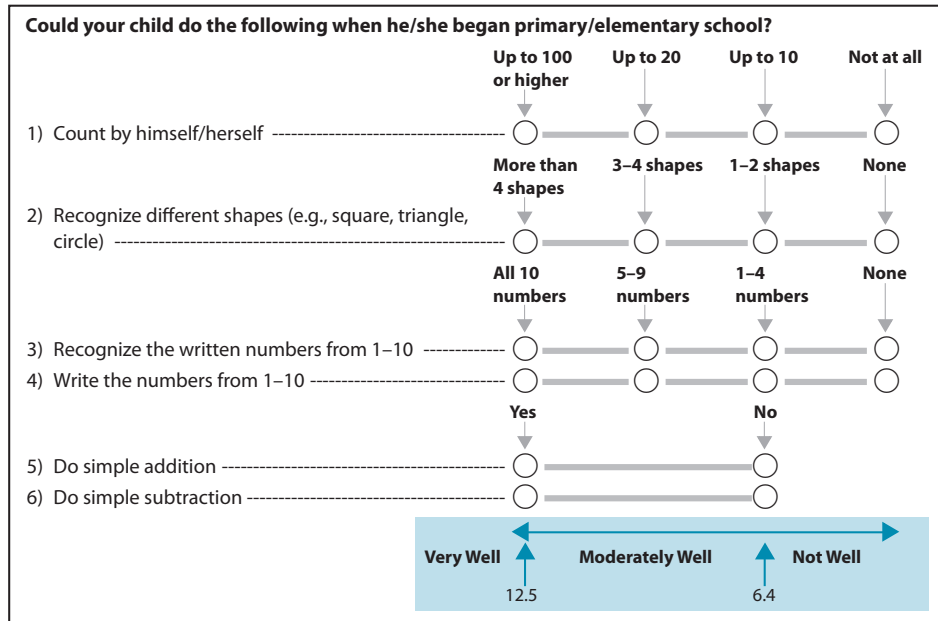
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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

**Exhibit 4.11: Could Do Early Numeracy Tasks When Began Primary School\* (Continued)**

Country	Very Well		Moderately Well		Not Well		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
<b>Sixth Grade Participants</b>							
Honduras	31 (1.3)	412 (7.1)	66 (1.3)	391 (5.4)	3 (0.5)	356 (16.2)	10.4 (0.07)
Botswana	14 (1.0)	475 (7.3)	75 (1.3)	420 (3.7)	11 (1.2)	384 (7.1)	9.1 (0.09)
<b>Benchmarking Participants</b>							
Abu Dhabi, UAE	31 (1.2)	435 (4.9)	66 (1.2)	412 (4.8)	2 (0.4)	~ ~	10.4 (0.05)
Dubai, UAE	24 (0.7)	485 (3.4)	72 (0.7)	471 (1.8)	4 (0.3)	462 (8.9)	10.0 (0.03)
Quebec, Canada	15 (0.7)	561 (5.0)	81 (0.8)	531 (2.4)	4 (0.4)	507 (5.6)	9.4 (0.04)



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

