

Chapter 8

Classroom Instruction

Overall, students with positive attitudes toward mathematics have higher achievement, but these attitudes deteriorate over time. Internationally, by the eighth grade, only about one-fourth like learning mathematics (compared to nearly half at the fourth grade) and only 14 percent are confident in their abilities (compared to one-third).

Engaging instruction as well as good nutrition and enough sleep were related to higher achievement. However, by the eighth grade, only one-quarter of the students reported being engaged in their mathematics lessons, and nearly as many reported being not engaged. Also, in the majority of eighth grade classrooms, instruction was limited because students were suffering from lack of sleep.

This chapter considers the learning environment of the classroom itself, because classroom instruction is at the core of student learning. Previous chapters of this report have described how teaching effectiveness can be greatly influenced by students' home and school environments as well as by the teacher's preparation. However, even though the curricular policies and school resources often set the tone for accomplishment, students' day-to-day classroom activities are likely to have a considerable direct impact on their mathematics learning.

TIMSS routinely presents very powerful evidence showing that, within countries, students with more positive attitudes toward mathematics have substantially higher achievement, and the results from TIMSS 2011 are consistent with previous assessments. In addition to being motivated to learn, students need the opportunity to learn. Thus, this chapter also provides information about the instructional time devoted to mathematics and the approaches teachers use to engage students in learning. It is difficult, however, for teachers to engage students in learning, for example, if students do not have the prerequisite skills or are too sleep deprived or disruptive to pay attention. Finally, an effective classroom environment for mathematics learning involves using a variety of instructional approaches, capitalizing on technology, and at the eighth grade, extending instruction with homework and regularly assessing student progress.

Students' Attitudes Toward Mathematics

Each successive TIMSS assessment has shown a strong positive relationship within countries between student attitudes toward mathematics and their mathematics achievement. Additionally, there is extensive research showing that students with more positive attitudes toward mathematics and science have higher average achievement in mathematics and science. For example, a recent meta-analysis of student attitudes toward school found that attitudes toward mathematics or science were related to mathematics and science achievement across 288 studies (Hattie, 2009). While positive attitudes and high achievement in mathematics go hand in hand, it should be understood that the relationship is bidirectional, with attitudes and achievement mutually influencing each other. Students who are good at mathematics also are more likely to enjoy learning mathematics.

Much research about students' attitudes toward learning has studied the complex phenomenon of motivation. For example, students' motivation to learn can be affected by whether they find the subject enjoyable and place value on the

subject. In addition, students' motivation can be affected by their self-confidence in learning the subject. TIMSS 2011 included scales about three motivational constructs: intrinsic value (interest), utility value, and ability beliefs. Essentially, intrinsic motivation refers to doing an activity because it is interesting or enjoyable, and the Students Like Learning Mathematics scale was developed to measure students' interest and liking of learning mathematics. In contrast, extrinsic motivation refers to doing something because it leads to a desirable outcome. There are many types of external motivation from teacher praise, to good grades, to being accepted to a good university, to having a successful career and daily life. In particular, the TIMSS 2011 Students Value Mathematics scale addresses students' attitudes about the importance of the subject and usefulness of the subject, sometimes called attainment value and utility value (Wigfield & Eccles, 2000). Finally, motivation to learn includes having the feeling that you can succeed. The Student Confidence with Mathematics scale assesses students' self-confidence or self-concept in their ability to learn mathematics. A strong self-concept encourages students to engage with the instruction and show persistence, effort, and attentiveness.

Students Like Learning Mathematics

Exhibit 8.1 presents the fourth grade results for the TIMSS 2011 Students Like Learning Mathematics scale. Students were scored according to the degree of their agreement with five statements such as “I enjoy learning mathematics,” “Mathematics is boring” (reverse coded), and “I learn many interesting things in mathematics” (see second page of the exhibit for details). Students in the **Like Learning Mathematics** category “agreed a lot” with three of the five statements and “agreed a little” with the other two, on average. In contrast, students who **Do Not Like Learning Mathematics** “disagreed a little” with three of the statements and “agreed a little” with the other two, on average.

For each TIMSS 2011 participant, the percentage of students in each category is shown together with the students' average mathematics achievement. The first page of the exhibit presents the results for countries participating at the fourth grade, and the average results across those countries. The second page of the exhibit presents the results for the sixth grade and benchmarking participants.

On average, nearly half of the fourth grade students internationally **Like Learning Mathematics**, substantially more than **Do Not Like Learning Mathematics** (48% vs. 16%). The remaining fourth grade students (36%, on

average) **Somewhat Like Learning Mathematics**. Looking across countries, some of the highest performing countries have the smallest percentages of students reporting positive attitudes toward learning mathematics, such as Chinese Taipei, Japan, and Korea. The tendency of smaller percentages of students in some East Asian countries to report positive attitudes is consistent with previous TIMSS assessments. The relatively low percentages of students who like learning mathematics may partially result from the high level of difficulty of the mathematics being studied, and also these countries have a cultural tradition of serious attitudes toward learning.

Most important, however, on average internationally, and in almost all TIMSS 2011 countries, including the sixth grade and benchmarking participants, students who liked learning mathematics had higher average mathematics achievement than those who only somewhat liked learning mathematics. In particular, those students who reported not liking learning mathematics had the lowest average mathematics achievement.

Exhibit 8.2 presents the corresponding results for the eighth grade on the Students Like Learning Mathematics scale. The first page of the exhibit presents the results for countries participating at the eighth grade, and the average results across those countries. The second page of the exhibit presents the results for the ninth grade and benchmarking participants.

Compared to the fourth grade, substantially fewer eighth grade students reported positive attitudes toward learning mathematics. By the eighth grade, more students reported an emerging dislike for learning mathematics than reported liking it, and the drop in positive attitudes between fourth and eighth grade occurred across countries. Only about one-fourth of the students, internationally, on average, **Like Learning Mathematics**, and another 42 percent **Somewhat Like Learning Mathematics**. Nearly one-third (31%) **Do Not Like Learning Mathematics**. The pattern of achievement in relation to attitudes mirrored that of the younger students, with a direct relationship between the two. Increasingly, more positive attitudes toward learning mathematics were associated with progressively higher average mathematics achievement. This pattern held generally across the ninth grade and benchmarking participants.

Students Value Mathematics

Exhibit 8.3 presents the results for the TIMSS 2011 Students Value Mathematics scale, which only was given at the eighth grade. The scale itself addresses six different aspects of valuing mathematics:

- ◆ I think learning mathematics will help me in my daily life;
- ◆ I need mathematics to learn other school subjects;
- ◆ I need to do well in mathematics to get into the university of my choice;
- ◆ I need to do well in mathematics to get the job I want;
- ◆ I would like a job that involves using mathematics; and
- ◆ It is important to do well in mathematics.

Students with a score corresponding to “agreeing a lot” with three of the statements and “agreeing a little” with the other three, on average, were considered to **Value** mathematics. In comparison, students in the **Do Not Value** mathematics category “disagreed a little” with three of the statements and “agreed a little” with the other three, on average.

Internationally, on average, eighth grade students placed a high value on mathematics. Apparently, even though many eighth grade students do not especially enjoy learning mathematics, they do appreciate the value of the subject; forty-six percent **Value** mathematics and another 39 percent **Somewhat Value** it. Only 15 percent **Do Not Value** the subject. Across the eighth grade, ninth grade, and benchmarking participants, students who said they valued mathematic typically had higher achievement than students who only valued it somewhat, and those students, in turn, had higher achievement than students who did not value mathematics.

Exhibit 8.1: Students Like Learning Mathematics

Reported by Students

Students were scored according to their degree of agreement with five statements on the *Students Like Learning Mathematics* scale. Students who **Like Learning Mathematics** had a score on the scale of at least 10.1, which corresponds to their “agreeing a lot” with three of the five statements and “agreeing a little” with the other two, on average. Students who **Do Not Like Learning Mathematics** had a score no higher than 8.1, which corresponds to their “disagreeing a little” with three of the five statements and “agreeing a little” with the other two, on average. All other students **Somewhat Like Learning Mathematics**.

| Country | Like Learning Mathematics | | Somewhat Like Learning Mathematics | | Do Not Like Learning Mathematics | | Average Scale Score |
|-----------------------|---------------------------|---------------------|------------------------------------|---------------------|----------------------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Georgia | 76 (0.9) | 469 (3.2) | 20 (0.9) | 414 (6.6) | 4 (0.3) | 401 (11.8) | 11.3 (0.03) |
| Turkey | 70 (1.1) | 495 (3.2) | 26 (0.9) | 422 (6.2) | 4 (0.4) | 394 (15.4) | 11.0 (0.04) |
| Armenia | 70 (1.0) | 467 (3.5) | 24 (0.8) | 429 (5.1) | 6 (0.5) | 395 (7.4) | 11.0 (0.04) |
| Tunisia | 69 (1.6) | 381 (3.8) | 26 (1.5) | 320 (5.1) | 5 (0.4) | 313 (8.1) | 11.1 (0.05) |
| Kazakhstan | 66 (1.3) | 513 (4.4) | 31 (1.2) | 484 (5.7) | 3 (0.3) | 469 (10.7) | 10.8 (0.05) |
| Iran, Islamic Rep. of | 63 (1.4) | 449 (3.4) | 28 (1.0) | 398 (4.3) | 8 (0.9) | 410 (6.7) | 10.7 (0.06) |
| Poland | 62 (0.9) | 493 (2.5) | 28 (0.8) | 466 (3.0) | 10 (0.5) | 459 (4.0) | 10.6 (0.03) |
| Lithuania | 58 (1.2) | 547 (2.7) | 30 (0.8) | 521 (2.7) | 12 (0.7) | 507 (4.9) | 10.4 (0.04) |
| Russian Federation | 58 (1.2) | 554 (4.0) | 34 (1.1) | 530 (4.0) | 8 (0.6) | 514 (6.2) | 10.5 (0.04) |
| Romania | 58 (1.4) | 510 (5.5) | 32 (1.1) | 450 (7.6) | 10 (0.9) | 443 (10.7) | 10.5 (0.05) |
| Saudi Arabia | 57 (1.7) | 433 (5.7) | 33 (1.3) | 382 (6.9) | 10 (0.7) | 377 (9.3) | 10.5 (0.07) |
| Portugal | 57 (1.5) | 548 (3.9) | 34 (1.1) | 515 (3.7) | 9 (0.9) | 502 (5.1) | 10.4 (0.06) |
| United Arab Emirates | 56 (0.9) | 459 (2.1) | 34 (0.7) | 405 (2.9) | 11 (0.5) | 409 (5.5) | 10.4 (0.04) |
| Oman | 54 (1.1) | 419 (3.2) | 39 (1.0) | 352 (3.4) | 7 (0.5) | 329 (5.2) | 10.5 (0.04) |
| Norway | 54 (1.7) | 502 (3.1) | 30 (1.3) | 494 (3.7) | 16 (1.5) | 477 (4.9) | 10.2 (0.08) |
| Malta | 51 (0.7) | 516 (1.8) | 32 (0.8) | 480 (2.5) | 17 (0.5) | 469 (3.7) | 10.1 (0.03) |
| Bahrain | 51 (1.7) | 461 (3.2) | 34 (1.2) | 414 (4.2) | 15 (0.9) | 421 (5.1) | 10.2 (0.07) |
| Italy | 50 (1.1) | 521 (2.7) | 34 (0.7) | 500 (3.7) | 16 (0.8) | 488 (4.2) | 10.0 (0.05) |
| Thailand | 50 (1.8) | 480 (4.6) | 42 (1.6) | 441 (5.9) | 8 (0.7) | 418 (8.6) | 10.2 (0.06) |
| Hungary | 48 (1.0) | 540 (3.1) | 34 (0.7) | 497 (4.9) | 17 (0.8) | 491 (5.1) | 10.0 (0.05) |
| Singapore | 48 (0.8) | 625 (3.1) | 33 (0.6) | 597 (3.8) | 19 (0.7) | 577 (3.8) | 9.9 (0.03) |
| Spain | 47 (1.4) | 499 (2.6) | 35 (0.9) | 472 (3.9) | 18 (1.0) | 465 (4.2) | 10.0 (0.07) |
| Kuwait | 47 (1.5) | 376 (4.2) | 38 (1.2) | 320 (4.1) | 15 (1.0) | 329 (5.5) | 10.1 (0.06) |
| New Zealand | 47 (1.1) | 491 (3.4) | 35 (0.8) | 486 (3.0) | 18 (0.8) | 481 (3.4) | 9.9 (0.05) |
| Hong Kong SAR | 47 (1.0) | 619 (4.0) | 36 (0.8) | 591 (3.6) | 17 (0.8) | 582 (3.7) | 9.9 (0.04) |
| Slovak Republic | 45 (1.1) | 524 (4.2) | 37 (0.8) | 499 (3.5) | 17 (0.8) | 482 (4.7) | 9.9 (0.05) |
| Australia | 45 (1.2) | 535 (3.5) | 33 (0.9) | 508 (3.6) | 22 (0.9) | 495 (3.8) | 9.7 (0.05) |
| Serbia | 45 (1.5) | 531 (3.8) | 37 (1.1) | 503 (4.5) | 18 (1.1) | 507 (4.8) | 9.8 (0.07) |
| Chile | 45 (1.1) | 485 (2.5) | 37 (0.9) | 444 (3.0) | 18 (0.8) | 447 (4.0) | 9.9 (0.05) |
| Sweden | 45 (1.2) | 508 (2.8) | 36 (0.9) | 505 (2.6) | 19 (1.0) | 498 (2.8) | 9.8 (0.06) |
| Morocco | 45 (1.7) | 371 (4.6) | 46 (1.4) | 313 (4.5) | 10 (0.9) | 291 (7.3) | 10.2 (0.06) |
| United States | 45 (0.8) | 552 (2.3) | 33 (0.5) | 536 (2.1) | 22 (0.8) | 531 (2.0) | 9.7 (0.04) |
| Slovenia | 45 (1.2) | 524 (2.3) | 37 (1.0) | 507 (3.1) | 19 (0.9) | 502 (3.5) | 9.8 (0.05) |
| England | 44 (1.4) | 548 (4.4) | 37 (1.1) | 543 (4.0) | 19 (1.1) | 530 (5.5) | 9.8 (0.06) |
| Austria | 44 (1.2) | 516 (3.6) | 33 (0.8) | 507 (2.7) | 23 (1.1) | 496 (3.3) | 9.6 (0.06) |
| Qatar | 44 (1.4) | 456 (4.2) | 41 (1.1) | 390 (4.3) | 15 (0.8) | 387 (7.3) | 10.0 (0.06) |
| Czech Republic | 43 (1.1) | 523 (3.3) | 37 (1.0) | 504 (3.0) | 19 (1.0) | 498 (3.5) | 9.8 (0.05) |
| Germany | 42 (0.9) | 540 (2.8) | 36 (0.8) | 527 (3.0) | 22 (0.8) | 518 (2.8) | 9.7 (0.04) |
| Ireland | 41 (1.6) | 535 (3.8) | 36 (1.0) | 529 (3.2) | 23 (1.1) | 517 (3.3) | 9.6 (0.07) |
| Denmark | 37 (1.3) | 548 (3.3) | 42 (1.0) | 537 (2.6) | 21 (1.1) | 526 (3.7) | 9.5 (0.05) |
| Northern Ireland | 36 (1.3) | 576 (3.8) | 38 (1.0) | 564 (3.5) | 26 (1.2) | 546 (5.6) | 9.4 (0.06) |
| Croatia | 34 (0.9) | 505 (2.7) | 30 (0.8) | 487 (2.8) | 35 (1.1) | 480 (1.9) | 9.0 (0.05) |
| Chinese Taipei | 34 (1.1) | 613 (2.8) | 34 (0.7) | 589 (2.6) | 32 (1.0) | 572 (2.5) | 9.2 (0.06) |
| Finland | 34 (1.2) | 556 (2.9) | 35 (1.0) | 548 (3.3) | 31 (1.3) | 533 (2.6) | 9.2 (0.06) |
| Yemen | 34 (2.1) | 291 (7.0) | 52 (1.9) | 239 (6.6) | 15 (1.4) | 206 (9.6) | 9.7 (0.07) |
| Belgium (Flemish) | 33 (1.0) | 560 (2.6) | 36 (0.8) | 551 (2.6) | 32 (1.1) | 536 (2.4) | 9.1 (0.05) |
| Netherlands | 32 (1.1) | 550 (2.3) | 41 (1.0) | 540 (1.9) | 26 (1.1) | 529 (3.3) | 9.2 (0.05) |
| Japan | 29 (1.1) | 607 (2.8) | 48 (1.0) | 586 (2.3) | 23 (1.1) | 558 (2.9) | 9.3 (0.05) |
| Azerbaijan | 28 (1.2) | 495 (6.7) | 68 (1.1) | 468 (6.1) | 5 (0.4) | 435 (9.1) | 9.8 (0.04) |
| Korea, Rep. of | 23 (0.7) | 627 (2.7) | 48 (0.9) | 606 (2.3) | 29 (1.0) | 586 (2.7) | 9.0 (0.03) |
| International Avg. | 48 (0.2) | 509 (0.5) | 36 (0.1) | 478 (0.6) | 16 (0.1) | 466 (0.9) | |

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.

Exhibit 8.1: Students Like Learning Mathematics (Continued)

| Country | Like Learning Mathematics | | Somewhat Like Learning Mathematics | | Do Not Like Learning Mathematics | | Average Scale Score |
|----------------------------------|---------------------------|---------------------|------------------------------------|---------------------|----------------------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Sixth Grade Participants | | | | | | | |
| Botswana | 46 (1.3) | 457 (3.2) | 42 (1.0) | 392 (4.3) | 12 (0.7) | 381 (8.1) | 10.0 (0.05) |
| Yemen | 41 (1.7) | 382 (6.1) | 47 (1.5) | 328 (6.0) | 12 (0.9) | 328 (7.3) | 9.9 (0.06) |
| Honduras | 34 (1.6) | 424 (5.6) | 54 (1.6) | 379 (6.0) | 12 (1.0) | 405 (9.7) | 9.7 (0.06) |
| Benchmarking Participants | | | | | | | |
| Dubai, UAE | 58 (1.0) | 489 (2.1) | 31 (0.8) | 445 (3.1) | 11 (0.6) | 445 (4.9) | 10.4 (0.05) |
| Abu Dhabi, UAE | 54 (1.7) | 444 (4.2) | 35 (1.3) | 386 (5.5) | 12 (0.9) | 393 (10.1) | 10.4 (0.07) |
| North Carolina, US | 49 (1.4) | 563 (4.0) | 34 (1.3) | 551 (5.2) | 17 (1.0) | 542 (6.1) | 10.0 (0.07) |
| Florida, US | 45 (1.2) | 557 (3.7) | 34 (1.1) | 541 (3.7) | 21 (1.0) | 531 (4.4) | 9.8 (0.06) |
| Quebec, Canada | 42 (1.2) | 547 (2.5) | 37 (0.9) | 532 (3.1) | 22 (1.2) | 510 (3.9) | 9.7 (0.05) |
| Alberta, Canada | 36 (1.2) | 520 (3.2) | 40 (0.9) | 505 (3.1) | 25 (1.1) | 491 (3.0) | 9.4 (0.06) |
| Ontario, Canada | 35 (1.1) | 533 (4.2) | 39 (0.9) | 517 (3.3) | 26 (1.1) | 500 (3.1) | 9.3 (0.06) |

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

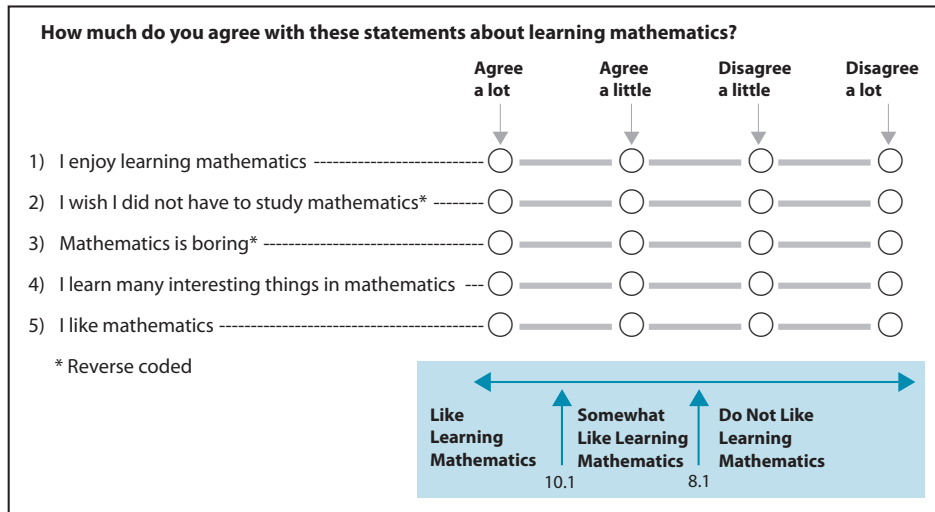


Exhibit 8.2: Students Like Learning Mathematics

Reported by Students

Students were scored according to their degree of agreement with five statements on the *Students Like Learning Mathematics* scale. Students who **Like Learning Mathematics** had a score on the scale of at least 11.3, which corresponds to their “agreeing a lot” with three of the five statements and “agreeing a little” with the other two, on average. Students who **Do Not Like Learning Mathematics** had a score no higher than 9.0, which corresponds to their “disagreeing a little” with three of the five statements and “agreeing a little” with the other two, on average. All other students **Somewhat Like Learning Mathematics**.

| Country | Like Learning Mathematics | | Somewhat Like Learning Mathematics | | Do Not Like Learning Mathematics | | Average Scale Score |
|-------------------------|---------------------------|---------------------|------------------------------------|---------------------|----------------------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Morocco | 48 (0.7) | 398 (2.4) | 40 (0.7) | 353 (2.2) | 12 (0.5) | 340 (4.6) | 11.2 (0.03) |
| Armenia | 43 (1.0) | 499 (3.1) | 39 (0.8) | 451 (3.4) | 18 (1.0) | 437 (4.8) | 10.9 (0.05) |
| Jordan | 42 (1.5) | 442 (3.7) | 39 (1.0) | 388 (4.2) | 19 (0.9) | 376 (4.8) | 10.9 (0.06) |
| Georgia | 42 (1.3) | 463 (5.0) | 40 (1.0) | 423 (4.1) | 18 (1.0) | 405 (6.2) | 10.8 (0.06) |
| Malaysia | 39 (1.3) | 463 (5.0) | 46 (0.9) | 430 (5.6) | 15 (0.9) | 413 (8.1) | 10.8 (0.05) |
| Iran, Islamic Rep. of | 39 (1.1) | 450 (5.4) | 40 (0.8) | 396 (4.2) | 22 (0.9) | 388 (4.5) | 10.6 (0.05) |
| Ghana | 38 (1.4) | 370 (4.8) | 51 (1.2) | 314 (4.0) | 10 (0.5) | 299 (6.7) | 10.9 (0.05) |
| Oman | 38 (0.8) | 420 (3.0) | 45 (0.8) | 342 (3.6) | 17 (0.7) | 324 (4.4) | 10.8 (0.04) |
| Kazakhstan | 38 (1.5) | 506 (4.4) | 52 (1.3) | 478 (4.4) | 10 (0.7) | 475 (7.4) | 10.9 (0.05) |
| Tunisia | 38 (1.0) | 448 (3.4) | 40 (0.8) | 415 (3.2) | 23 (0.9) | 405 (3.3) | 10.6 (0.05) |
| Syrian Arab Republic | 37 (1.1) | 408 (5.2) | 44 (1.0) | 373 (4.8) | 19 (0.9) | 353 (6.3) | 10.7 (0.05) |
| Ukraine | 36 (1.7) | 502 (4.9) | 43 (1.2) | 477 (4.1) | 20 (1.2) | 450 (4.9) | 10.6 (0.07) |
| Lebanon | 35 (1.2) | 475 (4.6) | 43 (1.0) | 441 (4.2) | 21 (1.1) | 425 (5.6) | 10.6 (0.06) |
| Singapore | 32 (0.7) | 637 (3.9) | 44 (0.7) | 610 (4.1) | 23 (0.7) | 578 (4.4) | 10.4 (0.03) |
| Turkey | 31 (1.0) | 504 (6.0) | 42 (0.7) | 436 (3.9) | 26 (1.0) | 420 (3.5) | 10.3 (0.05) |
| United Arab Emirates | 31 (0.7) | 488 (2.3) | 42 (0.6) | 448 (2.5) | 27 (0.8) | 432 (2.5) | 10.2 (0.04) |
| Palestinian Nat'l Auth. | 31 (1.1) | 447 (5.0) | 43 (1.0) | 394 (4.1) | 26 (1.1) | 375 (5.1) | 10.3 (0.05) |
| Russian Federation | 29 (1.1) | 567 (4.7) | 49 (0.9) | 537 (3.6) | 22 (1.0) | 509 (4.1) | 10.3 (0.04) |
| Saudi Arabia | 29 (1.3) | 436 (5.6) | 40 (1.0) | 389 (5.4) | 32 (1.4) | 364 (4.1) | 10.1 (0.07) |
| Qatar | 27 (1.0) | 456 (4.5) | 43 (0.8) | 401 (3.7) | 31 (1.2) | 386 (4.8) | 10.0 (0.05) |
| Thailand | 26 (1.1) | 456 (5.6) | 57 (0.9) | 420 (4.5) | 16 (1.0) | 408 (5.1) | 10.3 (0.05) |
| Israel | 26 (0.8) | 536 (5.1) | 40 (0.7) | 523 (4.3) | 35 (1.0) | 496 (5.1) | 9.9 (0.04) |
| Macedonia, Rep. of | 24 (1.0) | 462 (6.2) | 40 (1.0) | 422 (6.3) | 36 (1.4) | 425 (6.0) | 9.8 (0.06) |
| Bahrain | 24 (0.6) | 454 (4.6) | 38 (0.9) | 413 (2.7) | 38 (0.8) | 381 (3.4) | 9.8 (0.03) |
| Lithuania | 22 (1.0) | 531 (3.7) | 44 (1.0) | 506 (2.7) | 34 (1.1) | 482 (3.3) | 9.8 (0.05) |
| Chile | 22 (0.9) | 449 (3.5) | 40 (0.9) | 416 (2.9) | 38 (1.0) | 398 (2.9) | 9.8 (0.04) |
| Indonesia | 20 (1.4) | 396 (6.1) | 70 (1.2) | 385 (4.5) | 10 (0.8) | 382 (6.3) | 10.4 (0.04) |
| United States | 19 (0.6) | 536 (3.2) | 40 (0.6) | 515 (3.0) | 40 (0.8) | 494 (2.8) | 9.5 (0.04) |
| Hong Kong SAR | 19 (0.8) | 635 (4.4) | 44 (1.0) | 595 (3.8) | 37 (1.3) | 551 (4.6) | 9.6 (0.05) |
| Romania | 18 (1.0) | 516 (6.1) | 40 (1.0) | 459 (4.3) | 41 (1.2) | 438 (4.8) | 9.5 (0.05) |
| Italy | 18 (0.9) | 538 (3.6) | 42 (0.9) | 507 (2.8) | 40 (1.3) | 472 (3.2) | 9.6 (0.05) |
| New Zealand | 17 (1.0) | 525 (6.9) | 41 (1.0) | 497 (5.7) | 42 (1.5) | 467 (4.8) | 9.5 (0.06) |
| Norway | 17 (0.9) | 511 (4.1) | 42 (1.0) | 482 (2.6) | 42 (1.4) | 453 (2.8) | 9.4 (0.05) |
| Australia | 16 (0.9) | 553 (7.5) | 40 (0.9) | 520 (5.6) | 45 (1.4) | 476 (4.4) | 9.3 (0.06) |
| Hungary | 15 (0.7) | 549 (5.6) | 35 (1.0) | 508 (4.8) | 50 (1.3) | 491 (3.8) | 9.2 (0.05) |
| England | 14 (1.0) | 548 (8.9) | 44 (1.3) | 517 (5.7) | 42 (1.7) | 484 (5.2) | 9.4 (0.07) |
| Chinese Taipei | 14 (0.7) | 681 (4.3) | 33 (0.9) | 645 (3.6) | 53 (1.2) | 568 (3.2) | 9.0 (0.06) |
| Sweden | 13 (0.6) | 524 (4.0) | 42 (0.7) | 498 (1.8) | 44 (1.0) | 462 (2.1) | 9.4 (0.04) |
| Finland | 10 (0.6) | 560 (4.1) | 34 (1.0) | 532 (2.8) | 57 (1.1) | 496 (2.6) | 8.8 (0.05) |
| Japan | 9 (0.6) | 621 (5.1) | 38 (1.1) | 589 (3.3) | 53 (1.4) | 545 (3.1) | 9.1 (0.05) |
| Korea, Rep. of | 8 (0.3) | 677 (4.7) | 36 (0.7) | 649 (3.3) | 56 (0.8) | 581 (2.9) | 8.9 (0.03) |
| Slovenia | 6 (0.4) | 544 (5.3) | 31 (1.1) | 521 (3.0) | 63 (1.3) | 494 (2.4) | 8.6 (0.05) |
| International Avg. | 26 (0.2) | 504 (0.8) | 42 (0.1) | 467 (0.6) | 31 (0.2) | 443 (0.7) | |

Centerpoint of scale set at 10.

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

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

Exhibit 8.2: Students Like Learning Mathematics (Continued)

| Country | Like Learning Mathematics | | Somewhat Like Learning Mathematics | | Do Not Like Learning Mathematics | | Average Scale Score |
|----------------------------------|---------------------------|---------------------|------------------------------------|---------------------|----------------------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Ninth Grade Participants | | | | | | | |
| Botswana | 47 (1.1) | 427 (2.5) | 38 (0.8) | 376 (2.6) | 16 (0.8) | 370 (4.3) | 11.0 (0.05) |
| South Africa | 41 (0.9) | 378 (2.0) | 44 (0.7) | 339 (2.9) | 15 (0.6) | 348 (5.3) | 10.8 (0.04) |
| Honduras | 23 (1.0) | 364 (4.6) | 49 (0.9) | 332 (4.2) | 28 (1.1) | 334 (4.8) | 10.1 (0.06) |
| Benchmarking Participants | | | | | | | |
| Abu Dhabi, UAE | 32 (1.2) | 485 (4.4) | 42 (1.0) | 441 (3.6) | 26 (1.4) | 420 (4.9) | 10.3 (0.06) |
| Dubai, UAE | 29 (1.0) | 508 (3.5) | 41 (0.9) | 473 (3.1) | 30 (1.0) | 456 (3.1) | 10.1 (0.05) |
| Ontario, Canada | 26 (1.1) | 546 (3.5) | 41 (1.0) | 513 (3.4) | 34 (1.4) | 481 (3.0) | 9.9 (0.06) |
| North Carolina, US | 24 (1.8) | 556 (7.6) | 44 (1.1) | 542 (7.8) | 31 (2.3) | 516 (7.0) | 9.9 (0.11) |
| Connecticut, US | 22 (1.5) | 552 (6.0) | 40 (1.2) | 526 (5.2) | 38 (1.8) | 495 (5.4) | 9.7 (0.08) |
| Colorado, US | 20 (1.6) | 548 (5.9) | 38 (1.7) | 528 (4.8) | 42 (2.1) | 495 (5.8) | 9.4 (0.10) |
| Massachusetts, US | 19 (1.3) | 585 (6.1) | 40 (1.0) | 568 (5.4) | 41 (1.7) | 543 (5.4) | 9.4 (0.09) |
| Minnesota, US | 18 (1.5) | 578 (6.8) | 41 (0.9) | 555 (4.7) | 41 (1.6) | 521 (4.6) | 9.5 (0.08) |
| Alabama, US | 18 (1.9) | 475 (10.7) | 37 (0.9) | 471 (6.7) | 45 (1.7) | 460 (5.3) | 9.3 (0.11) |
| Florida, US | 17 (1.1) | 552 (9.7) | 38 (1.4) | 525 (6.9) | 45 (1.7) | 493 (6.2) | 9.4 (0.08) |
| California, US | 17 (0.9) | 519 (6.4) | 42 (1.3) | 496 (6.1) | 41 (1.8) | 480 (5.0) | 9.4 (0.07) |
| Alberta, Canada | 16 (0.9) | 531 (4.7) | 44 (1.0) | 514 (2.5) | 40 (1.4) | 486 (3.1) | 9.4 (0.06) |
| Indiana, US | 16 (1.4) | 547 (6.2) | 39 (1.3) | 529 (5.3) | 45 (2.0) | 507 (5.0) | 9.3 (0.10) |
| Quebec, Canada | 12 (0.7) | 557 (3.9) | 43 (0.9) | 540 (2.4) | 44 (1.2) | 517 (2.6) | 9.3 (0.05) |

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

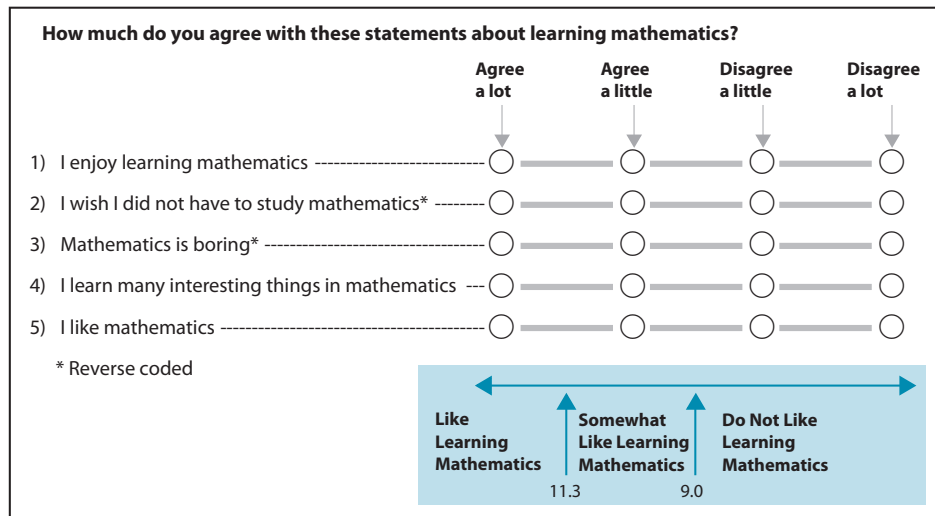


Exhibit 8.3: Students Value Mathematics

Reported by Students

Students were scored according to their degree of agreement with six statements on the *Students Value Mathematics* scale. Students who **Value** mathematics had a score on the scale of at least 10.3, which corresponds to their “agreeing a lot” with three of the six statements and “agreeing a little” with the other three, on average. Students who **Do Not Value** mathematics had a score no higher than 7.9, which corresponds to their “disagreeing a little” with three of the six statements and “agreeing a little” with the other three, on average. All other students **Somewhat Value** mathematics.

| Country | Value | | Somewhat Value | | Do Not Value | | Average Scale Score |
|-------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Ghana | 78 (0.8) | 343 (4.4) | 18 (0.7) | 304 (5.3) | 4 (0.5) | 281 (6.7) | 11.5 (0.04) |
| Morocco | 78 (0.6) | 380 (2.2) | 18 (0.5) | 351 (2.8) | 4 (0.3) | 334 (6.8) | 11.5 (0.03) |
| Jordan | 69 (0.8) | 422 (3.4) | 24 (0.7) | 393 (4.1) | 7 (0.5) | 340 (8.4) | 11.1 (0.04) |
| Oman | 67 (0.7) | 386 (2.5) | 26 (0.6) | 342 (4.2) | 7 (0.4) | 298 (6.5) | 10.9 (0.04) |
| Palestinian Nat'l Auth. | 67 (1.0) | 421 (3.8) | 26 (0.8) | 381 (4.1) | 8 (0.6) | 346 (6.4) | 10.9 (0.05) |
| Syrian Arab Republic | 65 (1.0) | 392 (4.5) | 27 (0.9) | 367 (5.4) | 8 (0.6) | 346 (7.1) | 10.9 (0.05) |
| Tunisia | 64 (0.9) | 434 (3.0) | 28 (0.9) | 414 (3.5) | 8 (0.5) | 397 (4.1) | 10.8 (0.04) |
| Georgia | 62 (1.1) | 442 (4.3) | 31 (0.7) | 429 (4.4) | 7 (0.5) | 403 (8.1) | 10.6 (0.04) |
| Israel | 61 (1.0) | 525 (4.2) | 31 (0.9) | 512 (4.7) | 8 (0.5) | 471 (9.0) | 10.6 (0.04) |
| Iran, Islamic Rep. of | 55 (1.1) | 423 (4.9) | 34 (0.8) | 410 (4.7) | 11 (0.6) | 393 (5.6) | 10.3 (0.04) |
| Chile | 54 (0.9) | 424 (3.1) | 37 (0.8) | 410 (2.8) | 9 (0.5) | 399 (4.3) | 10.3 (0.03) |
| Ukraine | 54 (1.4) | 488 (4.1) | 34 (1.1) | 473 (4.8) | 12 (1.0) | 466 (6.1) | 10.1 (0.06) |
| United Arab Emirates | 54 (0.7) | 466 (2.3) | 36 (0.6) | 451 (2.2) | 11 (0.4) | 427 (3.8) | 10.3 (0.03) |
| Lebanon | 53 (1.4) | 461 (4.2) | 36 (1.2) | 442 (4.5) | 11 (0.7) | 419 (6.3) | 10.4 (0.06) |
| Kazakhstan | 53 (1.2) | 490 (4.3) | 40 (1.2) | 485 (4.3) | 7 (0.5) | 489 (8.3) | 10.4 (0.05) |
| United States | 51 (0.7) | 521 (2.9) | 38 (0.6) | 503 (2.7) | 11 (0.5) | 488 (3.5) | 10.2 (0.03) |
| Thailand | 51 (1.2) | 442 (4.5) | 42 (1.1) | 416 (4.6) | 7 (0.5) | 392 (6.6) | 10.2 (0.04) |
| Saudi Arabia | 51 (1.4) | 408 (5.6) | 35 (1.0) | 387 (4.2) | 13 (0.9) | 363 (6.0) | 10.2 (0.06) |
| Macedonia, Rep. of | 49 (1.4) | 428 (5.5) | 36 (1.2) | 436 (5.8) | 15 (0.9) | 434 (7.8) | 10.2 (0.07) |
| Qatar | 49 (1.0) | 432 (3.9) | 35 (0.8) | 401 (3.6) | 16 (0.9) | 370 (5.7) | 10.1 (0.06) |
| Malaysia | 49 (1.5) | 453 (5.1) | 40 (0.9) | 433 (5.7) | 11 (0.8) | 411 (8.6) | 10.1 (0.06) |
| Bahrain | 48 (0.8) | 425 (2.7) | 36 (0.7) | 411 (2.9) | 16 (0.6) | 372 (5.6) | 10.0 (0.04) |
| England | 48 (1.2) | 513 (6.1) | 43 (1.1) | 506 (5.8) | 10 (0.6) | 479 (6.6) | 10.1 (0.05) |
| Armenia | 47 (1.0) | 478 (3.2) | 34 (0.8) | 460 (3.9) | 19 (0.7) | 460 (3.9) | 10.1 (0.04) |
| Lithuania | 46 (1.0) | 513 (3.0) | 41 (0.9) | 499 (2.9) | 12 (0.6) | 479 (4.1) | 10.0 (0.03) |
| Turkey | 46 (1.0) | 476 (5.3) | 39 (0.8) | 442 (3.7) | 15 (0.6) | 410 (4.3) | 10.0 (0.04) |
| Australia | 46 (0.9) | 521 (5.6) | 40 (0.8) | 499 (4.8) | 14 (0.7) | 475 (6.1) | 10.0 (0.04) |
| New Zealand | 46 (1.1) | 498 (5.7) | 41 (0.9) | 489 (5.7) | 13 (0.7) | 464 (5.6) | 10.0 (0.04) |
| Russian Federation | 43 (1.4) | 547 (4.5) | 41 (0.9) | 534 (3.6) | 15 (0.8) | 532 (4.6) | 9.8 (0.05) |
| Norway | 43 (1.3) | 484 (3.1) | 44 (1.3) | 473 (3.1) | 13 (0.8) | 451 (4.6) | 9.9 (0.05) |
| Singapore | 43 (0.7) | 619 (4.0) | 47 (0.7) | 608 (3.9) | 10 (0.5) | 591 (5.6) | 10.0 (0.03) |
| Hungary | 34 (0.9) | 519 (5.2) | 46 (0.8) | 502 (3.4) | 20 (0.8) | 489 (4.5) | 9.5 (0.04) |
| Indonesia | 31 (1.3) | 392 (5.6) | 61 (1.1) | 386 (4.1) | 8 (0.5) | 367 (7.0) | 9.7 (0.05) |
| Sweden | 30 (0.8) | 501 (2.6) | 54 (0.8) | 483 (2.0) | 16 (0.7) | 465 (2.8) | 9.4 (0.03) |
| Romania | 30 (1.1) | 472 (5.7) | 41 (1.1) | 462 (4.8) | 29 (1.2) | 445 (4.6) | 9.2 (0.05) |
| Hong Kong SAR | 26 (0.8) | 617 (4.5) | 49 (1.0) | 589 (3.9) | 25 (1.0) | 548 (5.3) | 9.2 (0.04) |
| Slovenia | 23 (0.8) | 520 (3.1) | 57 (0.9) | 506 (2.4) | 20 (1.0) | 486 (3.3) | 9.1 (0.03) |
| Italy | 20 (0.7) | 521 (3.4) | 51 (0.8) | 499 (2.7) | 28 (0.9) | 481 (3.0) | 8.9 (0.03) |
| Finland | 15 (0.8) | 540 (4.0) | 45 (1.0) | 523 (2.6) | 40 (1.3) | 495 (2.9) | 8.5 (0.05) |
| Korea, Rep. of | 14 (0.6) | 663 (5.5) | 52 (0.8) | 625 (3.1) | 34 (0.8) | 572 (3.0) | 8.6 (0.03) |
| Chinese Taipei | 13 (0.6) | 658 (5.1) | 41 (0.7) | 633 (3.8) | 46 (1.0) | 574 (3.4) | 8.3 (0.04) |
| Japan | 13 (0.7) | 599 (5.9) | 50 (0.9) | 578 (3.0) | 38 (1.1) | 546 (2.9) | 8.5 (0.03) |
| International Avg. | 46 (0.2) | 482 (0.7) | 39 (0.1) | 463 (0.6) | 15 (0.1) | 439 (0.9) | |

Centerpoint of scale set at 10.

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

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

Exhibit 8.3: Students Value Mathematics (Continued)

| Country | Value | | Somewhat Value | | Do Not Value | | Average Scale Score |
|----------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Ninth Grade Participants | | | | | | | |
| South Africa | 72 (0.8) | 364 (2.3) | 21 (0.5) | 341 (3.9) | 7 (0.4) | 309 (5.3) | 11.2 (0.04) |
| Botswana | 72 (0.8) | 414 (2.3) | 22 (0.7) | 367 (3.8) | 6 (0.4) | 324 (5.3) | 11.2 (0.04) |
| Honduras | 71 (1.0) | 338 (3.8) | 24 (0.8) | 343 (4.7) | 5 (0.4) | 332 (7.4) | 11.0 (0.05) |
| Benchmarking Participants | | | | | | | |
| North Carolina, US | 56 (1.6) | 546 (6.5) | 38 (1.4) | 528 (8.2) | 6 (0.6) | 513 (9.5) | 10.4 (0.06) |
| Abu Dhabi, UAE | 55 (1.2) | 462 (4.3) | 35 (1.0) | 440 (3.7) | 10 (0.7) | 412 (6.1) | 10.4 (0.05) |
| Ontario, Canada | 55 (1.2) | 526 (2.9) | 37 (1.0) | 497 (3.1) | 8 (0.5) | 471 (5.2) | 10.4 (0.04) |
| Minnesota, US | 55 (1.2) | 560 (5.0) | 36 (1.1) | 532 (5.2) | 9 (0.6) | 514 (4.5) | 10.3 (0.04) |
| Alabama, US | 52 (1.1) | 472 (7.4) | 38 (1.1) | 466 (5.4) | 10 (1.1) | 445 (7.3) | 10.2 (0.06) |
| Colorado, US | 52 (1.8) | 528 (5.3) | 37 (1.2) | 513 (5.5) | 11 (1.1) | 490 (8.1) | 10.2 (0.08) |
| Dubai, UAE | 51 (0.9) | 484 (2.8) | 37 (0.9) | 478 (2.6) | 12 (0.5) | 453 (4.4) | 10.2 (0.04) |
| Connecticut, US | 51 (1.7) | 533 (5.3) | 39 (1.4) | 515 (5.0) | 10 (0.8) | 484 (7.2) | 10.2 (0.07) |
| Indiana, US | 51 (1.6) | 533 (5.1) | 38 (1.2) | 515 (5.6) | 11 (1.1) | 497 (6.5) | 10.1 (0.07) |
| California, US | 49 (1.3) | 499 (5.4) | 40 (1.2) | 491 (4.6) | 11 (0.8) | 480 (7.8) | 10.1 (0.05) |
| Massachusetts, US | 48 (1.3) | 572 (6.0) | 40 (1.3) | 554 (4.9) | 12 (1.0) | 540 (6.4) | 10.0 (0.04) |
| Alberta, Canada | 47 (1.1) | 515 (3.2) | 41 (0.9) | 503 (2.5) | 13 (0.7) | 480 (4.4) | 10.0 (0.04) |
| Florida, US | 47 (1.5) | 528 (6.7) | 40 (1.2) | 506 (6.9) | 13 (1.2) | 497 (9.7) | 10.0 (0.06) |
| Quebec, Canada | 44 (1.0) | 540 (2.7) | 46 (0.9) | 529 (2.6) | 10 (0.6) | 508 (3.8) | 10.0 (0.04) |

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

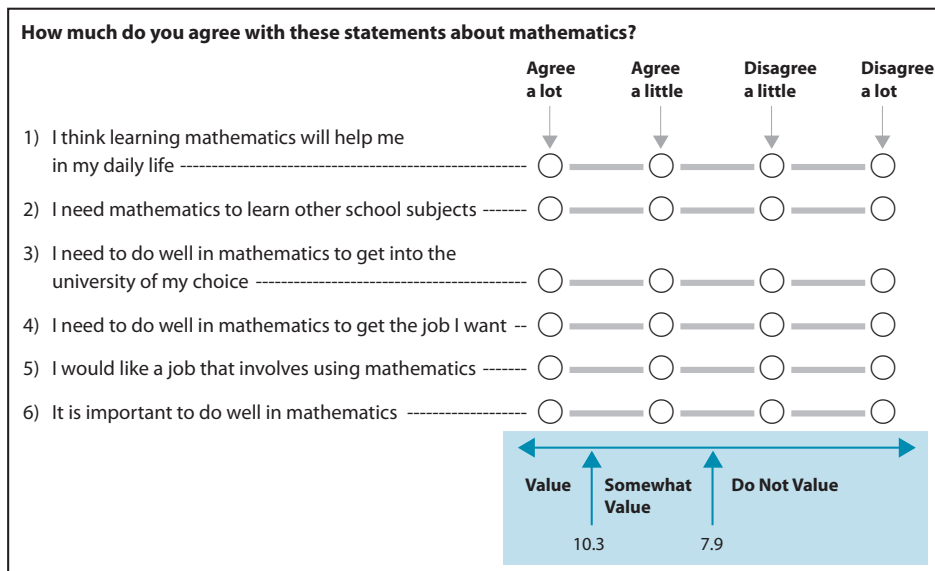


Exhibit 8.4: Students Confident in Mathematics

Reported by Students

Students were scored according to their degree of agreement with seven statements on the *Students Confident in Mathematics* scale. Students **Confident** in mathematics had a score on the scale of at least 10.6, which corresponds to their “agreeing a lot” with four of the seven statements and “agreeing a little” with the other three, on average. Students who were **Not Confident** had a score no higher than 8.5, which corresponds to their “disagreeing a little” with four of the seven statements and “agreeing a little” with the other three, on average. All other students were **Somewhat Confident** with mathematics.

| Country | Confident | | Somewhat Confident | | Not Confident | | Average Scale Score |
|-----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Poland | 49 (0.8) | 509 (2.4) | 38 (0.8) | 469 (2.6) | 13 (0.6) | 421 (4.0) | 10.6 (0.03) |
| Norway | 45 (1.2) | 515 (3.0) | 43 (1.6) | 485 (3.7) | 12 (1.1) | 459 (4.1) | 10.5 (0.05) |
| Georgia | 44 (1.2) | 486 (3.3) | 43 (1.0) | 434 (4.4) | 13 (0.7) | 423 (6.6) | 10.5 (0.05) |
| Malta | 44 (0.8) | 531 (1.9) | 37 (0.8) | 479 (1.9) | 20 (0.7) | 455 (3.2) | 10.4 (0.03) |
| Austria | 43 (0.9) | 533 (3.2) | 39 (1.0) | 501 (3.1) | 18 (0.8) | 468 (3.2) | 10.4 (0.04) |
| Ireland | 43 (1.2) | 552 (3.7) | 41 (1.0) | 520 (3.5) | 16 (0.8) | 489 (4.4) | 10.3 (0.05) |
| Slovenia | 43 (1.1) | 543 (2.4) | 44 (1.1) | 501 (2.5) | 13 (0.5) | 459 (4.8) | 10.5 (0.04) |
| Hungary | 42 (0.9) | 564 (3.0) | 37 (0.7) | 499 (4.0) | 21 (0.7) | 452 (5.2) | 10.3 (0.04) |
| Oman | 42 (1.1) | 429 (3.2) | 45 (0.9) | 365 (2.8) | 13 (0.5) | 322 (6.1) | 10.5 (0.04) |
| United Arab Emirates | 42 (0.8) | 466 (2.2) | 45 (0.6) | 416 (2.6) | 13 (0.4) | 405 (4.3) | 10.4 (0.03) |
| Kazakhstan | 42 (1.4) | 518 (4.7) | 46 (1.3) | 493 (5.3) | 13 (0.9) | 486 (5.5) | 10.5 (0.06) |
| Iran, Islamic Rep. of | 41 (1.3) | 461 (4.0) | 45 (1.2) | 417 (3.7) | 14 (0.6) | 389 (5.5) | 10.5 (0.06) |
| United States | 40 (0.6) | 575 (1.8) | 41 (0.6) | 530 (2.4) | 19 (0.6) | 500 (1.9) | 10.2 (0.03) |
| Croatia | 40 (0.9) | 523 (2.4) | 37 (0.8) | 482 (2.4) | 23 (0.8) | 448 (2.8) | 10.2 (0.04) |
| Sweden | 40 (1.1) | 527 (2.4) | 47 (0.9) | 496 (2.1) | 13 (0.6) | 472 (4.3) | 10.3 (0.04) |
| Saudi Arabia | 40 (1.6) | 441 (6.2) | 50 (1.4) | 396 (5.6) | 10 (0.8) | 369 (10.3) | 10.4 (0.06) |
| Germany | 40 (0.8) | 557 (2.7) | 40 (0.8) | 525 (2.3) | 20 (0.7) | 488 (3.1) | 10.2 (0.04) |
| Turkey | 39 (1.0) | 520 (4.1) | 44 (0.7) | 451 (4.1) | 16 (0.7) | 411 (6.1) | 10.3 (0.04) |
| Romania | 39 (1.2) | 535 (4.2) | 41 (1.1) | 461 (7.7) | 19 (1.1) | 430 (9.8) | 10.2 (0.05) |
| Australia | 38 (0.9) | 550 (3.5) | 41 (0.9) | 507 (3.1) | 21 (0.7) | 478 (4.3) | 10.1 (0.04) |
| Armenia | 37 (1.1) | 481 (3.8) | 42 (1.0) | 447 (4.2) | 20 (0.7) | 417 (5.4) | 10.2 (0.04) |
| Kuwait | 37 (1.1) | 380 (3.8) | 51 (1.2) | 330 (4.0) | 12 (0.8) | 313 (5.9) | 10.3 (0.05) |
| Bahrain | 37 (1.0) | 472 (3.7) | 50 (0.8) | 428 (3.2) | 13 (0.7) | 395 (6.5) | 10.2 (0.04) |
| Netherlands | 37 (0.9) | 568 (2.1) | 41 (0.9) | 536 (2.0) | 22 (0.7) | 502 (2.5) | 10.1 (0.04) |
| Qatar | 36 (1.3) | 462 (4.4) | 49 (1.1) | 398 (3.6) | 15 (0.7) | 375 (6.8) | 10.2 (0.05) |
| Serbia | 36 (1.0) | 560 (3.4) | 46 (1.0) | 508 (3.3) | 18 (1.1) | 452 (5.9) | 10.1 (0.05) |
| Slovak Republic | 35 (1.0) | 546 (3.5) | 43 (0.8) | 499 (3.8) | 22 (0.8) | 461 (4.1) | 10.0 (0.05) |
| Northern Ireland | 35 (1.3) | 598 (4.0) | 44 (1.2) | 557 (3.0) | 21 (0.8) | 519 (5.0) | 10.0 (0.05) |
| Spain | 35 (1.1) | 518 (2.7) | 42 (0.9) | 475 (3.2) | 23 (1.0) | 446 (3.7) | 10.0 (0.06) |
| Finland | 35 (0.8) | 579 (3.0) | 42 (0.7) | 543 (2.6) | 23 (0.7) | 503 (3.2) | 9.9 (0.03) |
| Azerbaijan | 34 (1.4) | 509 (6.1) | 50 (1.3) | 459 (6.0) | 16 (0.8) | 444 (6.9) | 10.1 (0.06) |
| England | 33 (1.0) | 572 (4.6) | 48 (0.9) | 538 (3.8) | 19 (0.7) | 503 (4.4) | 10.0 (0.04) |
| Tunisia | 33 (1.5) | 392 (5.4) | 54 (1.2) | 352 (4.0) | 13 (0.8) | 322 (6.1) | 10.1 (0.06) |
| Russian Federation | 33 (1.0) | 571 (4.3) | 41 (0.7) | 544 (4.2) | 26 (0.8) | 504 (4.0) | 9.8 (0.04) |
| Czech Republic | 31 (1.1) | 540 (3.6) | 46 (1.0) | 510 (2.8) | 23 (1.0) | 474 (3.3) | 9.8 (0.04) |
| Italy | 30 (0.9) | 534 (3.3) | 53 (0.8) | 506 (2.9) | 17 (0.7) | 471 (4.0) | 9.9 (0.04) |
| Denmark | 30 (1.0) | 571 (2.9) | 51 (0.9) | 535 (2.7) | 19 (0.8) | 497 (4.0) | 9.9 (0.04) |
| Lithuania | 30 (0.9) | 577 (3.1) | 47 (0.9) | 527 (2.8) | 23 (0.7) | 492 (3.3) | 9.8 (0.04) |
| Belgium (Flemish) | 28 (0.9) | 584 (2.6) | 50 (1.1) | 546 (2.2) | 22 (0.7) | 511 (2.7) | 9.8 (0.04) |
| New Zealand | 25 (0.7) | 520 (3.7) | 50 (0.8) | 484 (2.9) | 25 (0.6) | 459 (3.6) | 9.6 (0.03) |
| Portugal | 25 (1.3) | 579 (3.6) | 50 (1.3) | 530 (3.4) | 25 (1.3) | 490 (4.9) | 9.6 (0.05) |
| Hong Kong SAR | 24 (0.9) | 641 (3.1) | 44 (0.9) | 600 (5.1) | 31 (1.0) | 575 (2.9) | 9.4 (0.05) |
| Chile | 23 (0.7) | 518 (2.7) | 46 (0.8) | 459 (2.4) | 31 (0.9) | 428 (3.2) | 9.4 (0.04) |
| Morocco | 22 (1.1) | 380 (4.9) | 58 (1.2) | 330 (4.9) | 19 (1.4) | 308 (6.7) | 9.7 (0.05) |
| Singapore | 21 (0.8) | 658 (2.8) | 41 (0.7) | 614 (3.3) | 38 (1.0) | 570 (3.1) | 9.2 (0.04) |
| Chinese Taipei | 20 (0.7) | 634 (2.6) | 42 (0.8) | 597 (2.4) | 38 (0.9) | 564 (2.4) | 9.2 (0.04) |
| Yemen | 18 (1.4) | 300 (7.9) | 58 (1.4) | 249 (5.8) | 24 (1.4) | 217 (8.0) | 9.5 (0.06) |
| Thailand | 13 (0.7) | 493 (6.2) | 64 (1.0) | 458 (5.2) | 23 (1.1) | 442 (5.6) | 9.3 (0.04) |
| Korea, Rep. of | 11 (0.5) | 660 (4.3) | 50 (0.9) | 622 (1.9) | 38 (1.0) | 567 (2.0) | 9.0 (0.03) |
| Japan | 9 (0.5) | 640 (3.9) | 43 (0.8) | 605 (2.1) | 48 (0.9) | 558 (1.9) | 8.6 (0.03) |
| International Avg. | 34 (0.1) | 527 (0.5) | 46 (0.1) | 484 (0.5) | 21 (0.1) | 452 (0.7) | |

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.

Exhibit 8.4: Students Confident in Mathematics (Continued)

| Country | Confident | | Somewhat Confident | | Not Confident | | Average Scale Score |
|----------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Sixth Grade Participants | | | | | | | |
| Yemen | 20 (1.2) | 397 (6.2) | 59 (1.4) | 344 (5.8) | 21 (1.3) | 322 (7.7) | 9.6 (0.05) |
| Botswana | 19 (0.9) | 473 (5.1) | 52 (1.0) | 408 (3.4) | 29 (1.0) | 410 (5.3) | 9.4 (0.04) |
| Honduras | 18 (1.0) | 442 (7.5) | 61 (1.3) | 388 (5.7) | 21 (1.0) | 389 (6.3) | 9.5 (0.04) |
| Benchmarking Participants | | | | | | | |
| North Carolina, US | 42 (1.5) | 585 (3.9) | 40 (1.2) | 544 (4.7) | 18 (1.3) | 508 (4.7) | 10.3 (0.07) |
| Abu Dhabi, UAE | 41 (1.6) | 452 (4.6) | 46 (1.4) | 398 (5.0) | 13 (0.8) | 385 (8.4) | 10.4 (0.06) |
| Florida, US | 41 (1.3) | 578 (3.5) | 38 (1.0) | 533 (3.4) | 21 (1.0) | 507 (3.7) | 10.3 (0.06) |
| Dubai, UAE | 41 (1.0) | 500 (2.4) | 45 (0.8) | 454 (2.4) | 15 (0.7) | 442 (3.7) | 10.4 (0.04) |
| Quebec, Canada | 37 (1.0) | 562 (2.5) | 44 (1.1) | 527 (2.9) | 19 (1.0) | 490 (3.7) | 10.1 (0.05) |
| Alberta, Canada | 35 (1.1) | 537 (2.8) | 44 (1.0) | 501 (2.7) | 21 (0.9) | 468 (3.8) | 10.0 (0.05) |
| Ontario, Canada | 33 (1.0) | 558 (3.5) | 46 (0.9) | 510 (3.2) | 21 (0.9) | 475 (3.0) | 10.0 (0.05) |

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

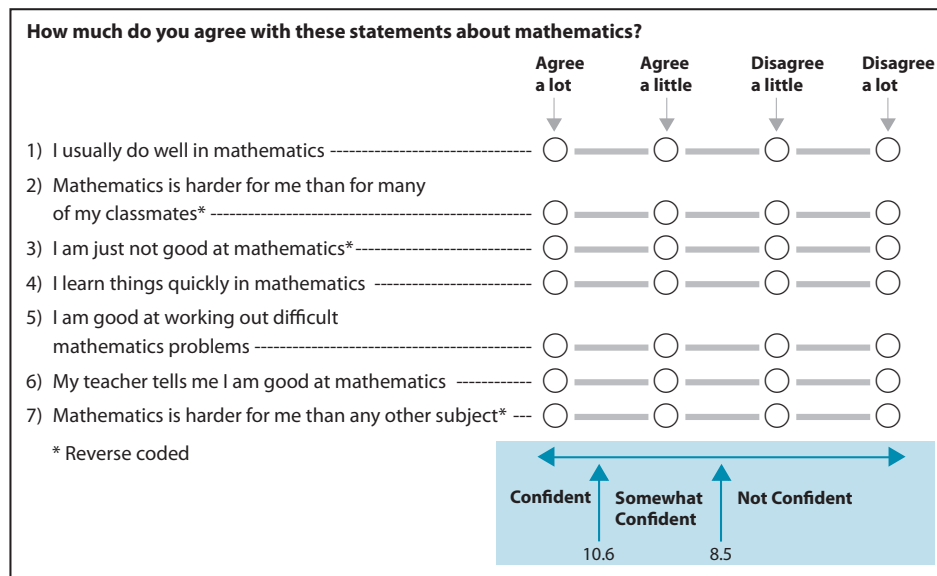


Exhibit 8.5: Students Confident in Mathematics

Reported by Students

Students were scored according to their degree of agreement with nine statements on the *Students Confident in Mathematics* scale. Students **Confident** in mathematics had a score on the scale of at least 12.0, which corresponds to their “agreeing a lot” with five of the nine statements and “agreeing a little” with the other four, on average. Students who were **Not Confident** had a score no higher than 9.4, which corresponds to their “disagreeing a little” with five of the nine statements and “agreeing a little” with the other four, on average. All other students were **Somewhat Confident** with mathematics.

| Country | Confident | | Somewhat Confident | | Not Confident | | Average Scale Score |
|-------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Israel | 31 (1.0) | 573 (4.1) | 47 (0.9) | 504 (3.9) | 22 (0.9) | 463 (5.5) | 11.1 (0.05) |
| United States | 24 (0.8) | 556 (3.1) | 44 (0.7) | 514 (2.7) | 33 (0.8) | 474 (3.0) | 10.5 (0.04) |
| Jordan | 22 (0.8) | 482 (3.9) | 54 (0.8) | 399 (3.7) | 24 (0.8) | 365 (4.7) | 10.7 (0.04) |
| Norway | 22 (0.8) | 533 (2.3) | 44 (0.9) | 481 (2.7) | 34 (1.2) | 430 (2.7) | 10.4 (0.06) |
| Saudi Arabia | 21 (1.2) | 464 (5.7) | 52 (0.8) | 392 (4.8) | 27 (1.1) | 348 (3.5) | 10.6 (0.07) |
| United Arab Emirates | 20 (0.5) | 516 (2.6) | 53 (0.5) | 451 (2.1) | 27 (0.6) | 422 (2.5) | 10.6 (0.03) |
| Lebanon | 19 (1.1) | 500 (4.8) | 53 (1.0) | 447 (4.3) | 28 (1.1) | 420 (4.0) | 10.5 (0.06) |
| Qatar | 18 (0.8) | 484 (5.4) | 52 (0.8) | 404 (3.3) | 30 (0.9) | 379 (3.8) | 10.5 (0.04) |
| Iran, Islamic Rep. of | 18 (0.8) | 489 (6.9) | 46 (0.8) | 413 (4.1) | 35 (1.1) | 381 (3.8) | 10.3 (0.05) |
| Australia | 17 (1.1) | 581 (6.8) | 46 (0.8) | 516 (4.8) | 37 (1.4) | 456 (3.8) | 10.2 (0.07) |
| Palestinian Nat'l Auth. | 17 (0.7) | 478 (5.0) | 54 (1.0) | 404 (3.9) | 29 (1.1) | 364 (4.1) | 10.5 (0.04) |
| Oman | 17 (0.6) | 457 (3.2) | 59 (0.9) | 362 (3.1) | 24 (0.8) | 322 (4.4) | 10.6 (0.03) |
| Bahrain | 16 (0.5) | 490 (3.9) | 45 (0.8) | 417 (2.5) | 39 (0.8) | 372 (3.1) | 10.2 (0.03) |
| New Zealand | 16 (1.0) | 561 (6.6) | 45 (1.0) | 501 (5.3) | 39 (1.3) | 448 (4.6) | 10.1 (0.06) |
| Ghana | 16 (0.8) | 389 (5.4) | 57 (0.8) | 328 (4.1) | 27 (1.0) | 314 (5.2) | 10.5 (0.05) |
| Hungary | 16 (0.7) | 593 (4.4) | 35 (0.9) | 521 (4.0) | 49 (1.1) | 466 (4.0) | 9.8 (0.05) |
| England | 16 (1.1) | 571 (6.2) | 53 (1.1) | 514 (5.4) | 32 (1.6) | 465 (5.4) | 10.3 (0.07) |
| Sweden | 15 (0.5) | 551 (2.9) | 50 (0.8) | 496 (2.1) | 35 (0.9) | 441 (2.1) | 10.2 (0.03) |
| Georgia | 15 (0.7) | 534 (4.6) | 44 (1.3) | 444 (4.2) | 41 (1.2) | 391 (4.1) | 10.1 (0.04) |
| Finland | 15 (0.8) | 580 (2.9) | 39 (0.8) | 533 (2.5) | 46 (1.2) | 477 (2.5) | 9.8 (0.06) |
| Syrian Arab Republic | 15 (0.7) | 426 (5.9) | 56 (1.0) | 382 (4.7) | 29 (1.1) | 359 (5.2) | 10.4 (0.04) |
| Macedonia, Rep. of | 14 (0.8) | 527 (6.5) | 42 (1.1) | 429 (6.4) | 44 (1.2) | 404 (4.8) | 10.0 (0.05) |
| Tunisia | 14 (0.6) | 488 (4.7) | 50 (0.9) | 426 (3.1) | 36 (1.0) | 398 (2.9) | 10.2 (0.04) |
| Turkey | 14 (0.8) | 586 (8.1) | 37 (0.9) | 459 (4.1) | 49 (1.0) | 411 (3.0) | 9.8 (0.05) |
| Kazakhstan | 14 (1.0) | 531 (5.4) | 53 (1.0) | 491 (4.4) | 33 (1.3) | 467 (4.8) | 10.3 (0.06) |
| Singapore | 14 (0.5) | 662 (4.1) | 46 (0.8) | 628 (3.6) | 40 (0.9) | 574 (4.3) | 10.0 (0.04) |
| Armenia | 13 (0.6) | 542 (4.1) | 44 (1.1) | 477 (3.1) | 42 (1.0) | 438 (3.6) | 9.9 (0.03) |
| Morocco | 13 (0.5) | 434 (3.9) | 54 (0.7) | 374 (2.4) | 33 (0.8) | 347 (3.1) | 10.2 (0.03) |
| Lithuania | 13 (0.5) | 579 (2.9) | 41 (1.2) | 519 (3.3) | 46 (1.3) | 467 (2.6) | 9.8 (0.05) |
| Italy | 12 (0.6) | 559 (3.9) | 44 (0.9) | 519 (2.6) | 43 (0.9) | 460 (2.7) | 9.9 (0.04) |
| Russian Federation | 12 (0.7) | 603 (4.7) | 43 (1.0) | 561 (3.5) | 45 (1.0) | 501 (3.9) | 9.9 (0.04) |
| Chile | 11 (0.5) | 499 (4.5) | 36 (1.0) | 433 (3.0) | 53 (1.1) | 389 (2.5) | 9.6 (0.04) |
| Slovenia | 11 (0.6) | 586 (3.8) | 49 (1.0) | 521 (2.1) | 40 (1.1) | 464 (2.4) | 10.0 (0.04) |
| Romania | 9 (0.6) | 573 (6.9) | 32 (1.0) | 485 (5.3) | 59 (1.2) | 428 (4.4) | 9.3 (0.05) |
| Hong Kong SAR | 7 (0.4) | 655 (5.5) | 37 (1.0) | 610 (4.4) | 55 (1.1) | 561 (4.0) | 9.3 (0.04) |
| Chinese Taipei | 7 (0.4) | 709 (5.0) | 26 (0.7) | 670 (3.4) | 67 (0.9) | 575 (2.9) | 8.6 (0.05) |
| Ukraine | 5 (0.5) | 574 (8.5) | 48 (1.4) | 507 (4.1) | 48 (1.4) | 445 (3.9) | 9.6 (0.04) |
| Korea, Rep. of | 3 (0.2) | 723 (6.7) | 34 (0.8) | 669 (2.9) | 63 (0.8) | 577 (2.8) | 9.1 (0.03) |
| Malaysia | 3 (0.3) | 532 (10.4) | 39 (1.0) | 453 (6.3) | 58 (1.1) | 427 (4.8) | 9.3 (0.04) |
| Indonesia | 3 (0.5) | 394 (12.1) | 52 (1.7) | 383 (5.7) | 45 (1.8) | 390 (3.9) | 9.7 (0.05) |
| Japan | 2 (0.3) | ~ ~ | 24 (0.8) | 623 (3.2) | 73 (0.9) | 548 (2.8) | 8.6 (0.04) |
| Thailand | 2 (0.3) | ~ ~ | 44 (1.1) | 434 (4.8) | 54 (1.2) | 420 (4.0) | 9.3 (0.03) |
| International Avg. | 14 (0.1) | 539 (0.9) | 45 (0.1) | 478 (0.6) | 41 (0.2) | 435 (0.6) | |

Centerpoint of scale set at 10.

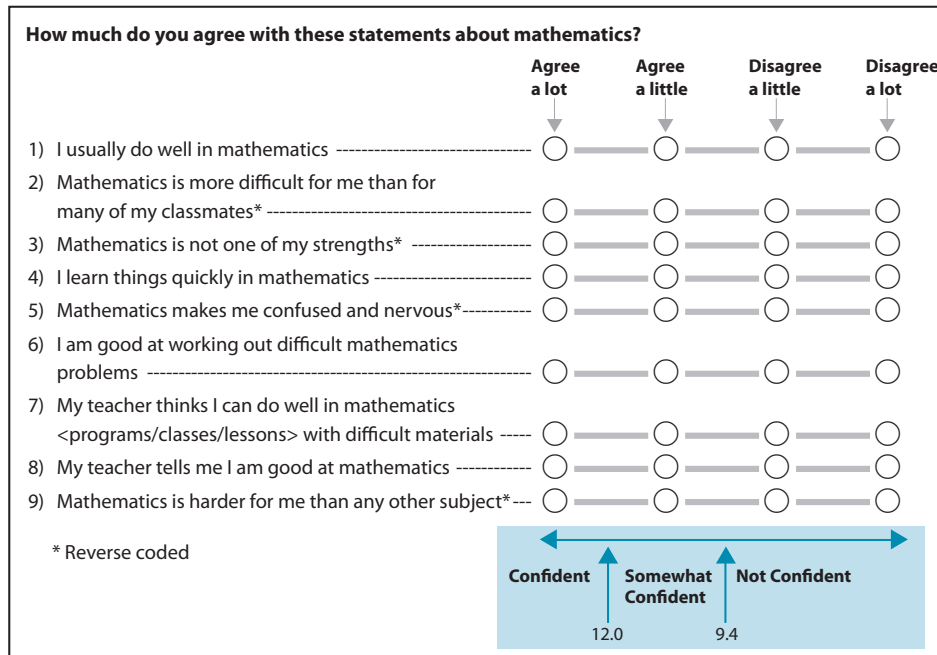
() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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

Exhibit 8.5: Students Confident in Mathematics (Continued)

| Country | Confident | | Somewhat Confident | | Not Confident | | Average Scale Score |
|----------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Ninth Grade Participants | | | | | | | |
| South Africa | 10 (0.4) | 427 (4.9) | 54 (0.8) | 349 (2.7) | 35 (0.9) | 344 (3.0) | 10.0 (0.03) |
| Botswana | 9 (0.5) | 481 (4.5) | 48 (0.9) | 397 (2.6) | 44 (1.1) | 385 (2.6) | 9.7 (0.04) |
| Honduras | 8 (0.5) | 403 (6.9) | 41 (1.0) | 345 (4.0) | 51 (1.2) | 326 (4.0) | 9.6 (0.04) |
| Benchmarking Participants | | | | | | | |
| Ontario, Canada | 32 (0.9) | 564 (2.5) | 40 (0.8) | 508 (2.9) | 28 (0.9) | 454 (2.9) | 11.0 (0.05) |
| North Carolina, US | 30 (2.3) | 578 (7.6) | 44 (1.4) | 532 (6.7) | 26 (2.0) | 501 (5.9) | 10.9 (0.13) |
| Connecticut, US | 29 (1.2) | 568 (4.4) | 43 (1.3) | 518 (4.9) | 28 (1.4) | 475 (5.9) | 10.9 (0.07) |
| Massachusetts, US | 27 (1.6) | 604 (6.2) | 43 (1.5) | 562 (5.3) | 30 (1.7) | 520 (4.3) | 10.7 (0.10) |
| Minnesota, US | 25 (1.7) | 593 (5.3) | 44 (1.1) | 552 (4.4) | 31 (1.5) | 497 (4.1) | 10.6 (0.09) |
| Alberta, Canada | 24 (0.8) | 555 (2.6) | 43 (0.9) | 511 (2.7) | 33 (1.0) | 461 (2.7) | 10.5 (0.06) |
| Florida, US | 23 (1.5) | 569 (7.7) | 43 (1.4) | 518 (6.7) | 34 (2.2) | 476 (5.2) | 10.5 (0.10) |
| Colorado, US | 22 (1.3) | 573 (4.6) | 44 (1.2) | 524 (4.7) | 33 (1.7) | 473 (4.5) | 10.5 (0.09) |
| Indiana, US | 22 (1.4) | 563 (5.4) | 44 (1.2) | 532 (4.6) | 34 (1.8) | 483 (5.0) | 10.4 (0.10) |
| Dubai, UAE | 21 (0.9) | 538 (4.2) | 49 (0.9) | 476 (2.7) | 30 (1.1) | 441 (2.5) | 10.5 (0.05) |
| Quebec, Canada | 21 (0.9) | 574 (2.8) | 47 (0.9) | 540 (2.3) | 32 (1.1) | 492 (2.8) | 10.5 (0.05) |
| Abu Dhabi, UAE | 20 (0.9) | 512 (4.9) | 54 (0.8) | 443 (3.3) | 26 (1.1) | 413 (4.4) | 10.6 (0.05) |
| California, US | 20 (1.1) | 542 (5.2) | 43 (1.3) | 501 (5.2) | 37 (1.7) | 459 (4.7) | 10.3 (0.08) |
| Alabama, US | 20 (1.5) | 514 (9.7) | 41 (1.2) | 469 (6.4) | 39 (2.1) | 441 (5.2) | 10.2 (0.13) |

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



Students Confident in Mathematics

Exhibit 8.4 presents the fourth grade results for the TIMSS 2011 Students Confident in Mathematics scale, which includes seven such statements as “Mathematics is harder for me than for many of my classmates” (reverse coded) and “My teacher tells me I am good at mathematics” (see second page of exhibit for all seven statements). **Confident** students “agreed a lot” with four of the seven statements and “agreed a little” to the other three, on average. Students **Not Confident** in mathematics “disagreed a little” with four of the statements and “agreed a little” with the other three, on average.

Internationally, on average, 34 percent of the fourth grade students expressed confidence in their mathematics ability. Average mathematics achievement was highest for the **Confident** fourth grade students and lowest (by 75 points) for the students lacking confidence (21% across countries). Looking across countries, the majority of fourth grade students were not very confident about their mathematics ability. Also, similar to the results for “liking” to learn mathematics, students in some of the highest performing countries expressed the least confidence. For the sixth grade participants, somewhat fewer students expressed confidence (18–20%), but similar percentages expressed a lack of confidence (21–29%).

Exhibit 8.5 presents the eighth grade results for the Students Confident in Mathematics scale, which contained nine statements. Compared to the fourth grade scale, two additional statements at the eighth grade addressed the issue of the increasing difficulty of the subject, such as “Mathematics makes me confused and nervous” (reverse coded, see the second page of the exhibit for details). **Confident** students had a score corresponding to “agreeing a lot” with five of the nine statements and “agreeing a little” with the other four, on average. Internationally, on average, only 14 percent of the eighth grade students expressed confidence in their mathematics ability. Primarily the students were divided equally between those expressing some confidence (45%) and those expressing little confidence (41%). At the eighth grade, on average, the confidence gap was particular large—104 points—between the small percentage of **Confident** students and those **Not Confident**. To at least some extent, the eighth grade results held constant across the ninth grade and benchmarking participants.

Instructional Time

Instructional Time Spent on Mathematics

It is difficult to examine the effect of instructional time on student achievement, because a wide variety of factors influence the productivity of instruction hours—most importantly, the quality of the curriculum and instructional approaches (and all of the variables influencing them). In addition, the relationship between instructional time and student achievement is highly dependent on the effectiveness of the educational system. If an education system essentially is ineffective, increasing the amount of instruction time will have diminishing returns. Also, most countries set levels of instructional time across their systems as a matter of policy, so that any variation is unintended and rarely related to achievement.

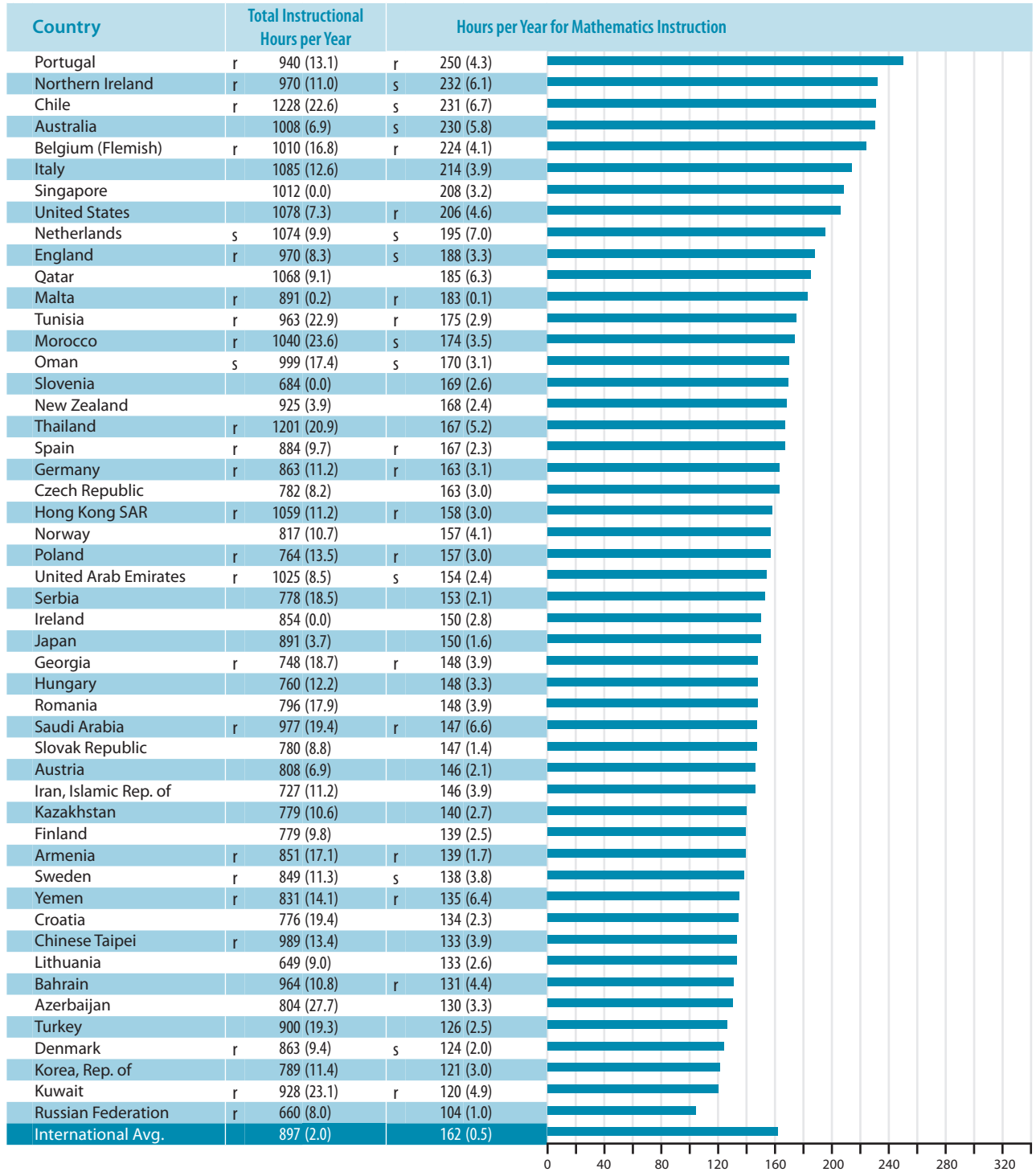
Despite the difficulties in studying its effects, instructional time remains a crucial resource in considering students' opportunity to learn. If everything else about schooling was equal and of high quality, more instructional time should result in increased student learning. For example, a recent study published by the London School of Economics used data from PISA 2006 and from 10- and 13-year-olds in Israel to compare achievement estimates for the same students across curriculum subjects, and found that instructional time has a positive and significant effect on achievement (Lavy, 2010).

Exhibits 8.6 and 8.7 present principals' and teachers' reports about the instructional hours per year spent on mathematics instruction, respectively, at the fourth and eighth grades. The results for the time spent on mathematics instruction were based on a series of calculations. As explained on the second page of the exhibits, principals provided the number of school days per year and the number of instructional hours per day. This information was combined to show the yearly total number of instructional hours in each country shown in the first column of the exhibit. There was substantial variation across countries, but the fourth grade students in the TIMSS 2011 countries averaged about 900 hours per year of instruction, while those in the eighth grade averaged about 1,000 hours.

Teachers reported the weekly amount of instruction in mathematics. This information was combined with the data provided by principals to estimate yearly amounts of instructional time in mathematics for each TIMSS 2011 participant (second column in the exhibits). The countries are listed in the exhibits from most to least yearly instructional time in mathematics. It should be emphasized that at both the fourth and eighth grades, including the sixth

Exhibit 8.6: Instructional Time Spent on Mathematics

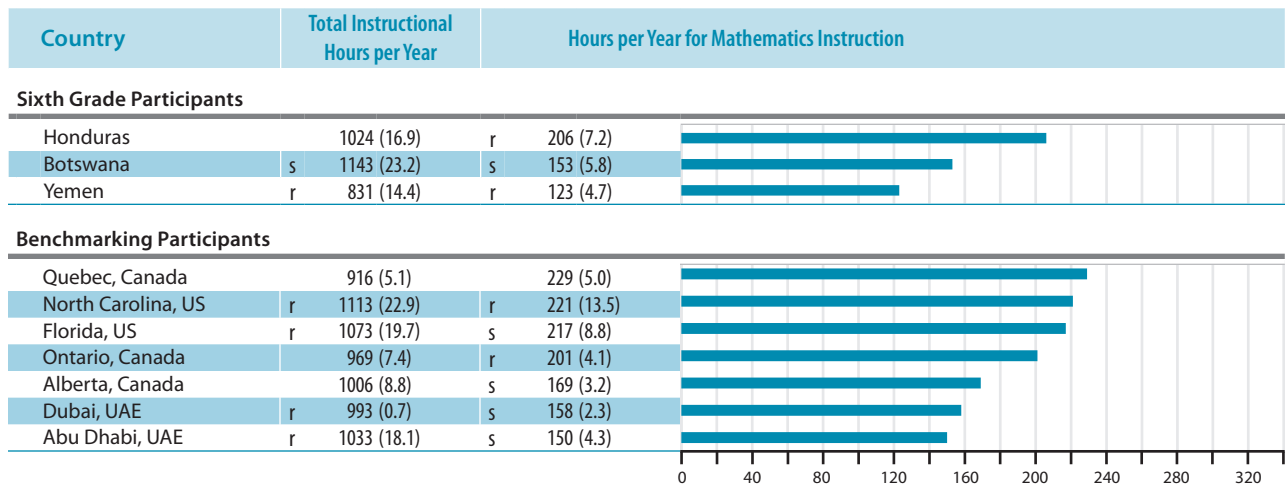
Reported by Principals and Teachers



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. 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 8.6: Instructional Time Spent on Mathematics (Continued)

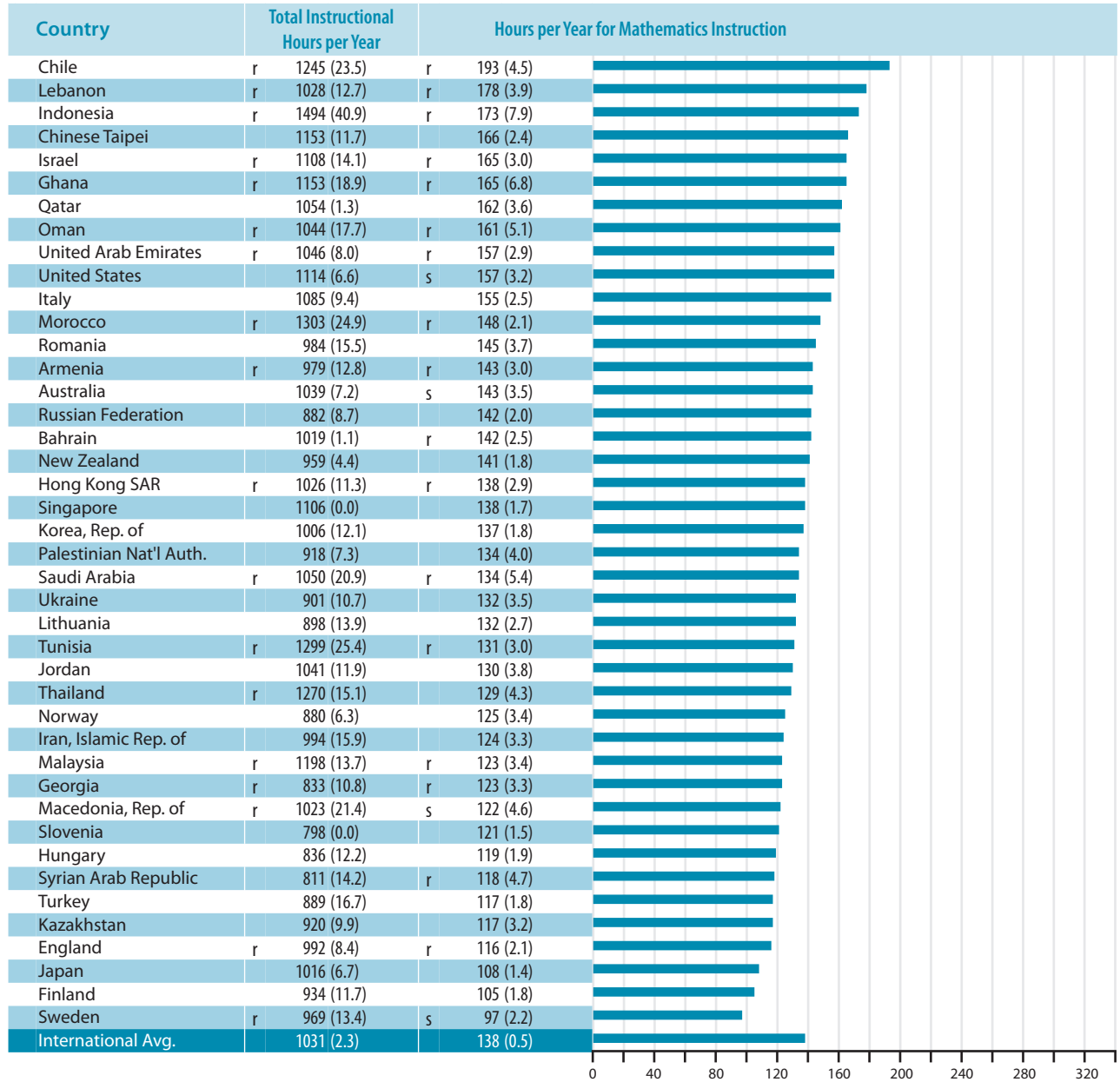


SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

| | | | | |
|---|---|---|----------|--|
| Total Instructional Hours per Year | = | Principal Reports of School Days per Year | X | Principal Reports of Instructional Hours per Day |
| Hours per Year for Mathematics Instruction | = | Teacher Reports of Weekly Mathematics Instructional Hours | X | Principal Reports of School Days per Year |
| | | Principal Reports of School Days per Week | | |

Exhibit 8.7: Instructional Time Spent on Mathematics

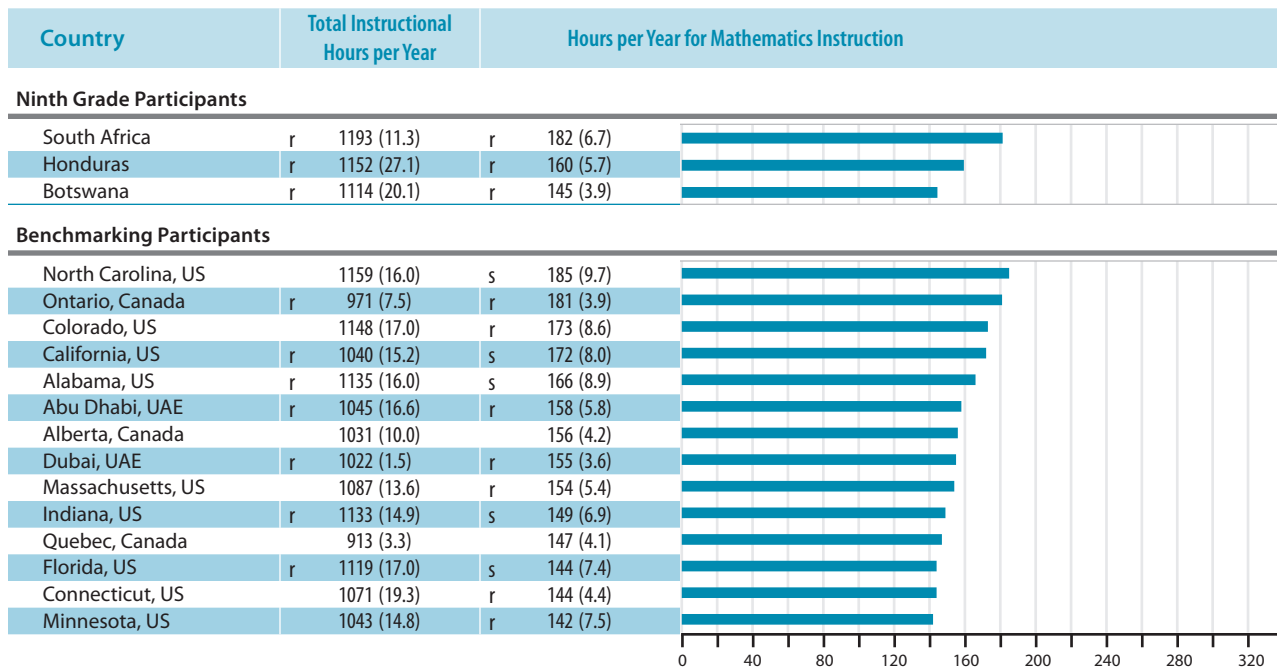
Reported by Principals and Teachers



() 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 8.7: Instructional Time Spent on Mathematics (Continued)



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

| | | | | |
|---|---|---|---|--|
| Total Instructional Hours per Year | = | Principal Reports of School Days per Year | x | Principal Reports of Instructional Hours per Day |
| Hours per Year for Mathematics Instruction | = | Teacher Reports of Weekly Mathematics Instructional Hours | x | Principal Reports of School Days per Year |
| | | Principal Reports of School Days per Week | | |

and ninth grades, and the benchmarking participants, there was considerable variation across countries in the amount of time provided for mathematics instruction. Countries spend different amounts of time on total schooling, and allocate different amounts of the total time to mathematics instruction. Also, some countries are more efficient than others. Providing time for instruction is a necessary but not sufficient condition for student learning. The time allocated for instruction is a resource that needs to be used effectively, and efficiently.

Students Taught the TIMSS Mathematics Topics

The mathematics content and topic areas assessed in TIMSS 2011 are elaborated in the Mathematics Framework, with each topic area for the fourth and eighth grades presented as comprehensive lists of objectives. Developed collaboratively by the participating countries, the TIMSS topics do not represent the “least common denominator” but rather a forward-looking conception of mathematics teaching and learning.

Exhibit 8.8 presents teachers’ reports about the TIMSS mathematics topics that actually had been taught to students in fourth grade classrooms either prior to or during the year of the assessment. The exhibit shows, for each TIMSS participant, the percentage of students whose teachers reported that the students had been taught each of the topics, averaged across all mathematics topics and across all topics within each mathematics content domain. The topics are shown on the second page of the exhibit. At the fourth grade, teachers were asked about a total of 18 topics, including eight in number, seven in geometric shapes and measures, and three in data and chance.

At the fourth grade, according to their teachers, 72 percent of students, on average, had been taught the TIMSS mathematics topics overall. There was considerable variation across countries, from 93 percent in Northern Ireland to 47 percent in Morocco. On average, the percentage of students taught various topics was similar across the three content domains, although somewhat lower for geometric shapes and measures (65%) than for both number and for data display (76%). In general, these patterns also were found at the sixth grade and for the benchmarking participants. However, including the fourth grade, there was considerable variation from topic to topic and from participant to participant.

Exhibit 8.9 presents teachers’ reports about the TIMSS mathematics topics that actually had been taught to students in eighth grade mathematics classrooms either prior to or during the year of the assessment. The exhibit shows, for each TIMSS participant, the percentage of students whose teachers

reported that the students had been taught each of the topics, averaged across all mathematics topics and across all topics within each mathematics content domain. The topics are shown on the second page of the exhibit. At the eighth grade, teachers were asked about a total of 19 topics, including five in number, five in algebra, six in geometry, and three in data and chance.

At the eighth grade, on average, 80 percent of students had been taught the mathematics topics overall. Teachers' reports about the degree of implementation ranged from 95 percent in Macedonia and Romania to 52 percent in Norway. Almost all of the students, 98 percent, on average, had been taught the number topics by the eighth grade. The coverage for algebra and geometry was similar, with 75 percent of the students being taught the topics in each of those two content areas. The least instructional attention was given to the topics in data and chance, with 66 percent of students taught the topics in this domain, on average. It should be emphasized that there was considerable variation across countries, particularly in the percentages of students taught the data and chance topics. Also, although these patterns were similar for the benchmarking participants, according to their teachers smaller percentages of ninth grade students had been taught the topics, especially in Honduras.

National Research Coordinators were asked to indicate whether each of the TIMSS 2011 mathematics topics was included in their countries' intended curriculum through the fourth or eighth grade, and if so, whether the topics were intended to be taught to "all or almost all students" or "only the more able students." The results for the fourth and eighth grades are summarized in Exhibits 8.10 and 8.11. On average, across countries, the majority of the assessment topics were intended for all students—13 out of 18 at the fourth grade, and 16 out of 19 at the eighth grade.

At the fourth grade, the results varied topic by topic and country by country. However, of the eight number topics, on average, six were included in the curriculum and two were not; of the seven geometry topics, five were included and two were not; and of the three data display topics, two were included and one was not. At the eighth grade, there was also considerable variation across countries. However, on average, all five of the number topics were covered. In algebra, of the five topics, on average, four were included and one was not; and of the six geometry topics, five were included and one was not. In data and chance, approximately three-fourths of the countries appear to include this area in their curriculum and cover all three topics. On the other hand, Georgia, Indonesia, and the Ukraine did not include any of the data and chance topics in their curriculum.

Exhibit 8.8: Percentage of Students Taught the TIMSS Mathematics Topics*

Reported by Teachers

| Country | All Mathematics (18 Topics) | Number (8 Topics) | Geometric Shapes and Measures (7 Topics) | Data Display (3 Topics) |
|-----------------------|--------------------------------|----------------------|--|----------------------------|
| Armenia | 70 (1.1) | 63 (0.8) | 72 (1.7) | 81 (2.7) |
| Australia | r 87 (1.0) | r 85 (1.2) | r 86 (1.4) | r 94 (1.3) |
| Austria | 59 (1.3) | 56 (1.3) | 67 (1.7) | 48 (2.7) |
| Azerbaijan | 58 (1.9) | 61 (1.8) | 60 (2.4) | 49 (3.6) |
| Bahrain | 80 (2.6) | 85 (2.4) | 73 (2.8) | 84 (4.9) |
| Belgium (Flemish) | 81 (1.1) | 94 (0.8) | 69 (1.5) | 78 (2.5) |
| Chile | r 81 (1.1) | r 79 (1.3) | r 81 (1.4) | r 89 (2.7) |
| Chinese Taipei | 82 (1.0) | 94 (0.7) | 69 (1.6) | 82 (2.8) |
| Croatia | 51 (0.6) | 48 (0.4) | 70 (1.0) | 16 (2.2) |
| Czech Republic | 54 (1.0) | 53 (0.7) | 53 (1.5) | 57 (2.8) |
| Denmark | r 72 (1.1) | r 75 (1.3) | r 76 (1.7) | r 55 (3.5) |
| England | 91 (0.9) | 91 (0.8) | 89 (1.5) | 96 (1.2) |
| Finland | 73 (1.1) | 88 (1.1) | 53 (2.2) | 83 (2.2) |
| Georgia | 59 (1.3) | 59 (0.9) | 49 (2.1) | 81 (2.8) |
| Germany | 67 (0.9) | 64 (1.0) | 63 (1.5) | 86 (2.1) |
| Hong Kong SAR | 78 (0.8) | 83 (1.1) | 66 (1.4) | 95 (1.6) |
| Hungary | 67 (0.9) | 65 (0.6) | 65 (1.4) | 77 (2.8) |
| Iran, Islamic Rep. of | 58 (1.5) | 62 (1.6) | 60 (1.4) | 43 (3.8) |
| Ireland | 78 (1.0) | 87 (0.9) | 63 (1.5) | 87 (2.3) |
| Italy | 79 (1.0) | 85 (1.0) | 71 (1.4) | 84 (2.5) |
| Japan | 79 (0.7) | 95 (0.5) | 63 (1.1) | 73 (2.4) |
| Kazakhstan | -- | -- | -- | -- |
| Korea, Rep. of | 76 (1.0) | 93 (0.9) | 63 (1.3) | 65 (3.3) |
| Kuwait | 92 (0.6) | 99 (0.4) | 82 (1.4) | 97 (0.7) |
| Lithuania | 82 (0.8) | 86 (0.8) | 71 (1.5) | 98 (0.5) |
| Malta | 76 (0.0) | 87 (0.0) | 58 (0.1) | 88 (0.1) |
| Morocco | r 47 (1.3) | r 50 (1.5) | r 50 (2.0) | r 32 (4.0) |
| Netherlands | r 59 (1.7) | r 63 (1.8) | r 43 (2.5) | r 84 (2.5) |
| New Zealand | 74 (1.0) | 74 (1.1) | 66 (1.6) | 90 (1.8) |
| Northern Ireland | r 93 (0.6) | r 97 (0.6) | r 88 (1.3) | r 96 (1.5) |
| Norway | 68 (1.3) | 64 (1.4) | 74 (1.8) | 65 (3.7) |
| Oman | 81 (0.6) | 87 (0.7) | 70 (1.0) | 93 (0.9) |
| Poland | 51 (1.0) | 54 (1.1) | 43 (1.2) | 61 (3.0) |
| Portugal | 89 (0.7) | 85 (0.9) | 89 (1.0) | 99 (0.5) |
| Qatar | 76 (1.4) | 84 (1.6) | 62 (2.0) | 84 (2.4) |
| Romania | 76 (1.3) | 75 (1.1) | 74 (1.7) | 82 (2.7) |
| Russian Federation | -- | -- | -- | -- |
| Saudi Arabia | 86 (1.0) | 87 (1.1) | 87 (1.8) | 82 (2.2) |
| Serbia | 65 (1.2) | 65 (1.0) | 69 (1.2) | 60 (3.9) |
| Singapore | 85 (0.5) | 100 (0.2) | 65 (1.1) | 94 (1.0) |
| Slovak Republic | 51 (1.1) | 55 (0.9) | 48 (1.2) | 47 (2.9) |
| Slovenia | 60 (0.6) | 57 (0.7) | 47 (1.0) | 97 (0.8) |
| Spain | 69 (1.0) | 78 (1.6) | 53 (1.9) | 84 (2.7) |
| Sweden | r 53 (1.4) | r 61 (1.7) | r 38 (1.8) | r 69 (3.6) |
| Thailand | 76 (1.5) | 78 (1.8) | 66 (2.1) | 91 (2.1) |
| Tunisia | 53 (0.9) | 47 (0.6) | 61 (1.5) | 52 (3.2) |
| Turkey | 81 (0.8) | 92 (0.7) | 62 (1.7) | 97 (0.9) |
| United Arab Emirates | 71 (1.0) | 77 (1.0) | 59 (1.3) | 81 (1.5) |
| United States | r 87 (0.9) | r 90 (1.0) | r 82 (1.4) | r 93 (1.2) |
| Yemen | 58 (1.6) | 83 (1.9) | 42 (2.3) | 27 (3.3) |
| International Avg. | 72 (0.2) | 76 (0.2) | 65 (0.2) | 76 (0.4) |

* Percentage mostly taught before or in the assessment year averaged across topics.

() 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

| Country | All Mathematics (18 Topics) | Number (8 Topics) | Geometric Shapes and Measures (7 Topics) | Data Display (3 Topics) |
|----------------------------------|--------------------------------|----------------------|--|----------------------------|
| Sixth Grade Participants | | | | |
| Botswana | r 96 (0.8) | r 98 (0.5) | r 94 (1.4) | r 96 (1.5) |
| Honduras | 75 (1.8) | 93 (1.1) | 64 (2.8) | 50 (4.0) |
| Yemen | 73 (1.4) | 91 (1.1) | 57 (2.0) | 63 (4.0) |
| Benchmarking Participants | | | | |
| Alberta, Canada | r 64 (1.7) | r 75 (1.8) | r 44 (2.6) | r 81 (2.8) |
| Ontario, Canada | 78 (1.1) | 72 (1.5) | 77 (1.5) | 98 (0.8) |
| Quebec, Canada | 82 (1.0) | 83 (1.1) | 81 (1.3) | 81 (3.0) |
| Abu Dhabi, UAE | 71 (1.9) | 77 (1.8) | 59 (2.8) | 81 (2.9) |
| Dubai, UAE | r 74 (0.9) | r 82 (1.0) | r 60 (1.3) | r 85 (1.8) |
| Florida, US | s 89 (1.0) | s 90 (1.0) | s 88 (1.4) | s 87 (3.5) |
| North Carolina, US | 91 (1.2) | 97 (0.8) | 81 (2.7) | 96 (2.2) |

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

TIMSS 2011 Mathematics Topics

A. Number

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

B. Geometric Shapes and Measures

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

C. Data Display

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

Exhibit 8.9: Percentage of Students Taught the TIMSS Mathematics Topics*
Reported by Teachers

| Country | All Mathematics (19 Topics) | Number (5 Topics) | Algebra (5 Topics) | Geometry (6 Topics) | Data and Chance (3 Topics) |
|-------------------------|--------------------------------|----------------------|-----------------------|------------------------|-------------------------------|
| Armenia | 93 (0.5) | 100 (0.3) | 99 (0.3) | 84 (1.0) | 86 (2.0) |
| Australia | r 80 (1.1) | r 97 (0.6) | s 71 (1.5) | r 75 (1.8) | r 73 (2.9) |
| Bahrain | 90 (0.5) | 100 (0.2) | 90 (1.1) | 83 (0.8) | 88 (1.1) |
| Chile | 73 (1.5) | 98 (0.7) | 60 (2.6) | 72 (1.9) | 56 (3.7) |
| Chinese Taipei | 79 (0.5) | 99 (0.3) | 97 (0.6) | 84 (1.2) | 4 (1.5) |
| England | 84 (1.3) | 97 (0.7) | 77 (1.8) | 78 (2.0) | 86 (2.1) |
| Finland | 60 (0.7) | 94 (0.7) | 51 (1.3) | 63 (1.2) | 15 (2.2) |
| Georgia | 72 (1.0) | 100 (0.1) | 76 (1.3) | 52 (1.8) | 58 (2.8) |
| Ghana | 73 (1.3) | 95 (1.0) | 77 (1.5) | 55 (2.4) | 67 (2.7) |
| Hong Kong SAR | 84 (0.9) | 99 (0.5) | 87 (1.7) | 80 (1.7) | 61 (2.2) |
| Hungary | 87 (0.6) | 100 (0.0) | 77 (0.8) | 90 (0.8) | 76 (2.0) |
| Indonesia | 69 (1.9) | 97 (1.6) | 84 (2.6) | 61 (2.5) | 12 (2.8) |
| Iran, Islamic Rep. of | 80 (0.7) | 100 (0.2) | 74 (1.2) | 81 (1.4) | 58 (1.8) |
| Israel | 89 (0.6) | 99 (0.2) | 94 (0.7) | 79 (1.1) | 82 (1.8) |
| Italy | 82 (0.7) | 100 (0.1) | 61 (1.5) | 91 (1.0) | 71 (2.6) |
| Japan | 91 (0.6) | 99 (0.9) | 92 (1.0) | 93 (0.9) | 75 (2.3) |
| Jordan | 90 (0.7) | 100 (0.1) | 97 (0.8) | 81 (1.4) | 81 (1.9) |
| Kazakhstan | -- | -- | -- | -- | -- |
| Korea, Rep. of | 92 (0.5) | 100 (0.2) | 91 (0.7) | 92 (0.7) | 81 (1.7) |
| Lebanon | 69 (1.2) | 96 (0.7) | 64 (1.8) | 62 (1.9) | 49 (2.9) |
| Lithuania | 70 (0.7) | 100 (0.1) | 59 (1.3) | 59 (1.1) | 62 (1.9) |
| Macedonia, Rep. of | r 95 (0.7) | r 100 (0.2) | s 96 (0.9) | r 96 (0.8) | r 85 (2.6) |
| Malaysia | 84 (0.8) | 98 (0.7) | 73 (1.8) | 93 (1.1) | 63 (2.1) |
| Morocco | 62 (0.9) | 97 (0.5) | 61 (1.6) | 46 (1.1) | 35 (2.2) |
| New Zealand | 78 (1.0) | 96 (0.7) | 68 (1.6) | 72 (1.6) | 76 (2.3) |
| Norway | 52 (1.1) | 92 (1.3) | 29 (2.1) | 41 (1.8) | 47 (2.6) |
| Oman | 83 (0.6) | 99 (0.2) | 72 (1.2) | 83 (0.9) | 76 (2.1) |
| Palestinian Nat'l Auth. | 76 (0.9) | 100 (0.2) | 62 (1.5) | 63 (1.4) | 85 (1.7) |
| Qatar | 86 (0.8) | 99 (0.3) | 80 (1.2) | 82 (1.5) | 84 (1.3) |
| Romania | 95 (0.4) | 100 (0.0) | 97 (0.5) | 95 (0.6) | 83 (1.6) |
| Russian Federation | -- | -- | -- | -- | -- |
| Saudi Arabia | 92 (0.8) | 99 (0.5) | 85 (1.4) | 93 (1.0) | 88 (2.0) |
| Singapore | 88 (0.4) | 99 (0.4) | 94 (0.7) | 75 (0.8) | 83 (1.2) |
| Slovenia | 69 (0.7) | 100 (0.1) | 60 (1.3) | 63 (0.9) | 46 (1.9) |
| Sweden | r 60 (0.9) | r 97 (0.7) | r 47 (1.9) | r 44 (1.3) | r 51 (2.2) |
| Syrian Arab Republic | 70 (1.4) | 95 (1.1) | 62 (2.1) | 64 (2.0) | 53 (3.0) |
| Thailand | 77 (1.4) | 98 (1.0) | 62 (2.1) | 80 (2.0) | 65 (2.6) |
| Tunisia | 68 (1.2) | 97 (0.6) | 49 (2.2) | 67 (1.6) | 54 (2.7) |
| Turkey | 94 (0.5) | 100 (0.2) | 92 (0.9) | 89 (1.1) | 98 (0.9) |
| Ukraine | 74 (0.7) | 100 (0.3) | 75 (1.0) | 62 (1.1) | 51 (2.4) |
| United Arab Emirates | 79 (0.6) | 98 (0.6) | 70 (1.1) | 74 (1.0) | 72 (1.7) |
| United States | r 90 (0.6) | r 99 (0.3) | r 86 (1.1) | r 87 (1.2) | r 91 (1.0) |
| International Avg. | 80 (0.1) | 98 (0.1) | 75 (0.2) | 75 (0.2) | 66 (0.3) |

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

* Percentage mostly taught before or in the assessment year averaged across topics.

() 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.

Exhibit 8.9: Percentage of Students Taught the TIMSS Mathematics Topics* (Continued)

| Country | All Mathematics (19 Topics) | Number (5 Topics) | Algebra (5 Topics) | Geometry (6 Topics) | Data and Chance (3 Topics) |
|----------------------------------|--------------------------------|----------------------|-----------------------|------------------------|-------------------------------|
| Ninth Grade Participants | | | | | |
| Botswana | 77 (1.0) | 97 (1.2) | 71 (2.1) | 76 (1.6) | 59 (2.2) |
| Honduras | 62 (1.7) | r 97 (1.0) | r 75 (2.4) | r 43 (2.9) | r 24 (3.9) |
| South Africa | 83 (1.1) | 93 (1.5) | 81 (1.6) | 83 (1.6) | 68 (2.6) |
| Benchmarking Participants | | | | | |
| Alberta, Canada | 78 (1.2) | 98 (0.7) | 62 (2.4) | 75 (2.1) | 77 (2.5) |
| Ontario, Canada | 85 (0.8) | 94 (0.9) | 73 (1.9) | 87 (1.3) | 86 (2.0) |
| Quebec, Canada | 81 (0.7) | 99 (0.4) | 67 (1.3) | 86 (1.1) | 64 (2.5) |
| Abu Dhabi, UAE | 78 (1.0) | 99 (0.5) | 69 (1.8) | 71 (1.8) | 71 (3.0) |
| Dubai, UAE | 80 (0.8) | 99 (0.6) | 74 (1.5) | 73 (1.6) | 69 (1.9) |
| Alabama, US | r 93 (1.1) | r 100 (0.0) | r 91 (1.7) | r 91 (2.2) | r 89 (3.2) |
| California, US | s 89 (2.4) | s 100 (0.4) | s 90 (2.9) | s 79 (4.9) | s 89 (3.1) |
| Colorado, US | r 87 (1.6) | r 98 (1.8) | r 79 (3.6) | r 82 (2.7) | r 92 (2.0) |
| Connecticut, US | r 89 (1.3) | r 100 (0.2) | r 73 (3.0) | r 91 (1.8) | r 91 (2.5) |
| Florida, US | r 92 (1.5) | r 100 (0.3) | s 91 (2.4) | r 86 (2.8) | r 92 (2.0) |
| Indiana, US | r 91 (1.6) | r 100 (0.3) | r 92 (1.8) | r 88 (2.9) | r 84 (4.1) |
| Massachusetts, US | r 94 (1.0) | r 100 (0.0) | r 90 (2.1) | r 92 (2.3) | r 92 (2.6) |
| Minnesota, US | r 91 (0.9) | r 100 (0.2) | r 95 (1.3) | r 80 (2.4) | r 91 (3.2) |
| North Carolina, US | r 96 (1.1) | r 100 (0.0) | r 96 (1.2) | r 91 (2.7) | r 98 (1.0) |

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

TIMSS 2011 Mathematics Topics

A. Number

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

B. Algebra

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

C. Geometry

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

D. Data and Chance

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

Exhibit 8.10: Number of TIMSS Mathematics Topics Intended to Be Taught by the End of Fourth Grade

Reported by National Research Coordinators

| Country | All Mathematics (18 Topics) | | | Number (8 Topics) | | | Geometric Shapes and Measures (7 Topics) | | | Data Display (3 Topics) | | |
|-----------------------|---|--|--|---|--|--|---|--|--|---|--|--|
| | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 4 | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 4 | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 4 | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 4 |
| Armenia | 11 | 0 | 7 | 6 | 0 | 2 | 5 | 0 | 2 | 0 | 0 | 3 |
| Australia | 16 | 2 | 0 | 6 | 2 | 0 | 7 | 0 | 0 | 3 | 0 | 0 |
| Austria | 11 | 0 | 7 | 5 | 0 | 3 | 4 | 0 | 3 | 2 | 0 | 1 |
| Azerbaijan | 9 | 0 | 9 | 4 | 0 | 4 | 5 | 0 | 2 | 0 | 0 | 3 |
| Bahrain | 18 | 0 | 0 | 8 | 0 | 0 | 7 | 0 | 0 | 3 | 0 | 0 |
| Belgium (Flemish) | 17 | 0 | 1 | 8 | 0 | 0 | 6 | 0 | 1 | 3 | 0 | 0 |
| Chile | 9 | 0 | 9 | 3 | 0 | 5 | 5 | 0 | 2 | 1 | 0 | 2 |
| Chinese Taipei | 17 | 0 | 1 | 8 | 0 | 0 | 6 | 0 | 1 | 3 | 0 | 0 |
| Croatia | 13 | 0 | 5 | 4 | 0 | 4 | 6 | 0 | 1 | 3 | 0 | 0 |
| Czech Republic | 10 | 0 | 8 | 4 | 0 | 4 | 4 | 0 | 3 | 2 | 0 | 1 |
| Denmark | 10 | 0 | 8 | 2 | 0 | 6 | 5 | 0 | 2 | 3 | 0 | 0 |
| England | 17 | 1 | 0 | 7 | 1 | 0 | 7 | 0 | 0 | 3 | 0 | 0 |
| Finland | 13 | 0 | 5 | 5 | 0 | 3 | 5 | 0 | 2 | 3 | 0 | 0 |
| Georgia | 2 | 8 | 8 | 2 | 3 | 3 | 0 | 2 | 5 | 0 | 3 | 0 |
| Germany | 10 | 3 | 5 | 4 | 1 | 3 | 3 | 2 | 2 | 3 | 0 | 0 |
| Hong Kong SAR | 14 | 0 | 4 | 7 | 0 | 1 | 4 | 0 | 3 | 3 | 0 | 0 |
| Hungary | 13 | 0 | 5 | 4 | 0 | 4 | 6 | 0 | 1 | 3 | 0 | 0 |
| Iran, Islamic Rep. of | 17 | 0 | 1 | 8 | 0 | 0 | 6 | 0 | 1 | 3 | 0 | 0 |
| Ireland | 17 | 0 | 1 | 7 | 0 | 1 | 7 | 0 | 0 | 3 | 0 | 0 |
| Italy | 8 | 3 | 7 | 5 | 1 | 2 | 1 | 1 | 5 | 2 | 1 | 0 |
| Japan | 17 | 0 | 1 | 8 | 0 | 0 | 6 | 0 | 1 | 3 | 0 | 0 |
| Kazakhstan | 8 | 0 | 10 | 4 | 0 | 4 | 4 | 0 | 3 | 0 | 0 | 3 |
| Korea, Rep. of | 15 | 0 | 3 | 8 | 0 | 0 | 4 | 0 | 3 | 3 | 0 | 0 |
| Kuwait | 18 | 0 | 0 | 8 | 0 | 0 | 7 | 0 | 0 | 3 | 0 | 0 |
| Lithuania | 11 | 3 | 4 | 5 | 1 | 2 | 3 | 2 | 2 | 3 | 0 | 0 |
| Malta | 17 | 0 | 1 | 8 | 0 | 0 | 6 | 0 | 1 | 3 | 0 | 0 |
| Morocco | 11 | 0 | 7 | 5 | 0 | 3 | 4 | 0 | 3 | 2 | 0 | 1 |
| Netherlands | 7 | 0 | 11 | 3 | 0 | 5 | 2 | 0 | 5 | 2 | 0 | 1 |
| New Zealand | 15 | 2 | 1 | 7 | 1 | 0 | 6 | 1 | 0 | 2 | 0 | 1 |
| Northern Ireland | 18 | 0 | 0 | 8 | 0 | 0 | 7 | 0 | 0 | 3 | 0 | 0 |
| Norway | 14 | 0 | 4 | 5 | 0 | 3 | 7 | 0 | 0 | 2 | 0 | 1 |
| Oman | 15 | 0 | 3 | 7 | 0 | 1 | 5 | 0 | 2 | 3 | 0 | 0 |
| Poland | 6 | 0 | 12 | 3 | 0 | 5 | 3 | 0 | 4 | 0 | 0 | 3 |
| Portugal | 17 | 0 | 1 | 7 | 0 | 1 | 7 | 0 | 0 | 3 | 0 | 0 |
| Qatar | 14 | 2 | 2 | 8 | 0 | 0 | 3 | 2 | 2 | 3 | 0 | 0 |
| Romania | 13 | 0 | 5 | 6 | 0 | 2 | 4 | 0 | 3 | 3 | 0 | 0 |
| Russian Federation | 6 | 1 | 11 | 2 | 1 | 5 | 4 | 0 | 3 | 0 | 0 | 3 |
| Saudi Arabia | 18 | 0 | 0 | 8 | 0 | 0 | 7 | 0 | 0 | 3 | 0 | 0 |
| Serbia | 8 | 1 | 9 | 4 | 1 | 3 | 4 | 0 | 3 | 0 | 0 | 3 |
| Singapore | 16 | 0 | 2 | 8 | 0 | 0 | 5 | 0 | 2 | 3 | 0 | 0 |
| Slovak Republic | 7 | 0 | 11 | 4 | 0 | 4 | 2 | 0 | 5 | 1 | 0 | 2 |
| Slovenia | 10 | 1 | 7 | 3 | 1 | 4 | 4 | 0 | 3 | 3 | 0 | 0 |
| Spain | 10 | 0 | 8 | 4 | 0 | 4 | 4 | 0 | 3 | 2 | 0 | 1 |
| Sweden | 16 | 0 | 2 | 7 | 0 | 1 | 6 | 0 | 1 | 3 | 0 | 0 |
| Thailand | 18 | 0 | 0 | 8 | 0 | 0 | 7 | 0 | 0 | 3 | 0 | 0 |
| Tunisia | 7 | 0 | 11 | 4 | 0 | 4 | 2 | 0 | 5 | 1 | 0 | 2 |
| Turkey | 16 | 0 | 2 | 7 | 0 | 1 | 6 | 0 | 1 | 3 | 0 | 0 |
| United Arab Emirates | 18 | 0 | 0 | 8 | 0 | 0 | 7 | 0 | 0 | 3 | 0 | 0 |
| United States | 17 | 0 | 1 | 8 | 0 | 0 | 7 | 0 | 0 | 2 | 0 | 1 |
| Yemen | 14 | 0 | 4 | 8 | 0 | 0 | 3 | 0 | 4 | 3 | 0 | 0 |
| International Avg. | 13 | 1 | 4 | 6 | 0 | 2 | 5 | 0 | 2 | 2 | 0 | 1 |

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

Because of rounding some results may appear inconsistent.

Exhibit 8.10: Number of TIMSS Mathematics Topics Intended to Be Taught by the End of Fourth Grade (Continued)

| Country | All Mathematics (18 Topics) | | | Number (8 Topics) | | | Geometric Shapes and Measures (7 Topics) | | | Data Display (3 Topics) | | |
|----------------------------------|---|--|--|---|--|--|---|--|--|---|--|--|
| | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 4 | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 4 | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 4 | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 4 |
| Sixth Grade Participants | | | | | | | | | | | | |
| Botswana | 8 | 0 | 10 | 8 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 3 |
| Honduras | 18 | 0 | 0 | 8 | 0 | 0 | 7 | 0 | 0 | 3 | 0 | 0 |
| Benchmarking Participants | | | | | | | | | | | | |
| Alberta, Canada | 15 | 0 | 3 | 7 | 0 | 1 | 5 | 0 | 2 | 3 | 0 | 0 |
| Ontario, Canada | 17 | 0 | 1 | 7 | 0 | 1 | 7 | 0 | 0 | 3 | 0 | 0 |
| Quebec, Canada | 10 | 3 | 5 | 4 | 1 | 3 | 5 | 0 | 2 | 1 | 2 | 0 |
| Abu Dhabi, UAE | 17 | 0 | 1 | 8 | 0 | 0 | 7 | 0 | 0 | 2 | 0 | 1 |
| Dubai, UAE | 18 | 0 | 0 | 8 | 0 | 0 | 7 | 0 | 0 | 3 | 0 | 0 |
| Florida, US | 15 | 0 | 3 | 7 | 0 | 1 | 5 | 0 | 2 | 3 | 0 | 0 |
| North Carolina, US | 16 | 0 | 2 | 8 | 0 | 0 | 5 | 0 | 2 | 3 | 0 | 0 |

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

Exhibit 8.11: Number of TIMSS Mathematics Topics Intended to Be Taught by the End of Eighth Grade

Reported by National Research Coordinators

| Country | All Mathematics (19 Topics) | | | Number (5 Topics) | | | Algebra (5 Topics) | | |
|-------------------------|---|--|--|---|--|--|---|--|--|
| | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 8 | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 8 | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 8 |
| Armenia | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Australia | 18 | 0 | 1 | 5 | 0 | 0 | 4 | 0 | 1 |
| Bahrain | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Chile | 17 | 0 | 2 | 5 | 0 | 0 | 5 | 0 | 0 |
| Chinese Taipei | 15 | 0 | 4 | 5 | 0 | 0 | 5 | 0 | 0 |
| England | 18 | 1 | 0 | 5 | 0 | 0 | 4 | 1 | 0 |
| Finland | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Georgia | 9 | 9 | 1 | 4 | 1 | 0 | 3 | 2 | 0 |
| Ghana | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Hong Kong SAR | 14 | 4 | 1 | 5 | 0 | 0 | 4 | 0 | 1 |
| Hungary | 18 | 0 | 1 | 5 | 0 | 0 | 4 | 0 | 1 |
| Indonesia | 1 | 4 | 14 | 0 | 0 | 5 | 0 | 3 | 2 |
| Iran, Islamic Rep. of | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Israel | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Italy | 17 | 0 | 2 | 5 | 0 | 0 | 3 | 0 | 2 |
| Japan | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Jordan | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Kazakhstan | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Korea, Rep. of | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Lebanon | 16 | 2 | 1 | 5 | 0 | 0 | 5 | 0 | 0 |
| Lithuania | 15 | 0 | 4 | 5 | 0 | 0 | 4 | 0 | 1 |
| Macedonia, Rep. of | 18 | 1 | 0 | 5 | 0 | 0 | 4 | 1 | 0 |
| Malaysia | 14 | 0 | 5 | 5 | 0 | 0 | 3 | 0 | 2 |
| Morocco | 15 | 0 | 4 | 5 | 0 | 0 | 3 | 0 | 2 |
| New Zealand | 13 | 4 | 2 | 5 | 0 | 0 | 0 | 3 | 2 |
| Norway | 12 | 0 | 7 | 4 | 0 | 1 | 1 | 0 | 4 |
| Oman | 16 | 0 | 3 | 5 | 0 | 0 | 3 | 0 | 2 |
| Palestinian Nat'l Auth. | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Qatar | 14 | 0 | 5 | 2 | 0 | 3 | 4 | 0 | 1 |
| Romania | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Russian Federation | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Saudi Arabia | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Singapore | 17 | 0 | 2 | 5 | 0 | 0 | 5 | 0 | 0 |
| Slovenia | 15 | 0 | 4 | 5 | 0 | 0 | 3 | 0 | 2 |
| Sweden | 15 | 0 | 4 | 5 | 0 | 0 | 4 | 0 | 1 |
| Syrian Arab Republic | 16 | 0 | 3 | 5 | 0 | 0 | 5 | 0 | 0 |
| Thailand | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Tunisia | 7 | 0 | 12 | 1 | 0 | 4 | 2 | 0 | 3 |
| Turkey | 18 | 0 | 1 | 5 | 0 | 0 | 4 | 0 | 1 |
| Ukraine | 14 | 0 | 5 | 5 | 0 | 0 | 5 | 0 | 0 |
| United Arab Emirates | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| United States | 18 | 1 | 0 | 5 | 0 | 0 | 4 | 1 | 0 |
| International Avg. | 16 | 1 | 2 | 5 | 0 | 0 | 4 | 0 | 1 |

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

Because of rounding some results may appear inconsistent.

Exhibit 8.11: Number of TIMSS Mathematics Topics Intended to Be Taught by the End of Eighth Grade (Continued)

| Country | Geometry (6 Topics) | | | Data and Chance (3 Topics) | | |
|-------------------------|---|--|--|---|--|--|
| | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 8 | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 8 |
| Armenia | 6 | 0 | 0 | 3 | 0 | 0 |
| Australia | 6 | 0 | 0 | 3 | 0 | 0 |
| Bahrain | 6 | 0 | 0 | 3 | 0 | 0 |
| Chile | 4 | 0 | 2 | 3 | 0 | 0 |
| Chinese Taipei | 4 | 0 | 2 | 1 | 0 | 2 |
| England | 6 | 0 | 0 | 3 | 0 | 0 |
| Finland | 6 | 0 | 0 | 3 | 0 | 0 |
| Georgia | 2 | 3 | 1 | 0 | 3 | 0 |
| Ghana | 6 | 0 | 0 | 3 | 0 | 0 |
| Hong Kong SAR | 4 | 2 | 0 | 1 | 2 | 0 |
| Hungary | 6 | 0 | 0 | 3 | 0 | 0 |
| Indonesia | 1 | 1 | 4 | 0 | 0 | 3 |
| Iran, Islamic Rep. of | 6 | 0 | 0 | 3 | 0 | 0 |
| Israel | 6 | 0 | 0 | 3 | 0 | 0 |
| Italy | 6 | 0 | 0 | 3 | 0 | 0 |
| Japan | 6 | 0 | 0 | 3 | 0 | 0 |
| Jordan | 6 | 0 | 0 | 3 | 0 | 0 |
| Kazakhstan | 6 | 0 | 0 | 3 | 0 | 0 |
| Korea, Rep. of | 6 | 0 | 0 | 3 | 0 | 0 |
| Lebanon | 4 | 2 | 0 | 2 | 0 | 1 |
| Lithuania | 4 | 0 | 2 | 2 | 0 | 1 |
| Macedonia, Rep. of | 6 | 0 | 0 | 3 | 0 | 0 |
| Malaysia | 5 | 0 | 1 | 1 | 0 | 2 |
| Morocco | 5 | 0 | 1 | 2 | 0 | 1 |
| New Zealand | 5 | 1 | 0 | 3 | 0 | 0 |
| Norway | 4 | 0 | 2 | 3 | 0 | 0 |
| Oman | 5 | 0 | 1 | 3 | 0 | 0 |
| Palestinian Nat'l Auth. | 6 | 0 | 0 | 3 | 0 | 0 |
| Qatar | 5 | 0 | 1 | 3 | 0 | 0 |
| Romania | 6 | 0 | 0 | 3 | 0 | 0 |
| Russian Federation | 6 | 0 | 0 | 3 | 0 | 0 |
| Saudi Arabia | 6 | 0 | 0 | 3 | 0 | 0 |
| Singapore | 5 | 0 | 1 | 2 | 0 | 1 |
| Slovenia | 6 | 0 | 0 | 1 | 0 | 2 |
| Sweden | 3 | 0 | 3 | 3 | 0 | 0 |
| Syrian Arab Republic | 4 | 0 | 2 | 2 | 0 | 1 |
| Thailand | 6 | 0 | 0 | 3 | 0 | 0 |
| Tunisia | 2 | 0 | 4 | 2 | 0 | 1 |
| Turkey | 6 | 0 | 0 | 3 | 0 | 0 |
| Ukraine | 4 | 0 | 2 | 0 | 0 | 3 |
| United Arab Emirates | 6 | 0 | 0 | 3 | 0 | 0 |
| United States | 6 | 0 | 0 | 3 | 0 | 0 |
| International Avg. | 5 | 0 | 1 | 2 | 0 | 0 |

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

Exhibit 8.11: Number of TIMSS Mathematics Topics Intended to Be Taught by the End of Eighth Grade (Continued)

| Country | All Mathematics (19 Topics) | | | Number (5 Topics) | | | Algebra (5 Topics) | | |
|----------------------------------|---|--|--|---|--|--|---|--|--|
| | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 8 | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 8 | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 8 |
| Ninth Grade Participants | | | | | | | | | |
| Botswana | 15 | 0 | 4 | 5 | 0 | 0 | 4 | 0 | 1 |
| Honduras | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| South Africa | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Benchmarking Participants | | | | | | | | | |
| Alberta, Canada | 18 | 0 | 1 | 5 | 0 | 0 | 4 | 0 | 1 |
| Ontario, Canada | 18 | 0 | 1 | 5 | 0 | 0 | 4 | 0 | 1 |
| Quebec, Canada | 16 | 0 | 3 | 5 | 0 | 0 | 3 | 0 | 2 |
| Abu Dhabi, UAE | 18 | 0 | 1 | 5 | 0 | 0 | 5 | 0 | 0 |
| Dubai, UAE | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Alabama, US | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| California, US | 18 | 1 | 0 | 5 | 0 | 0 | 4 | 1 | 0 |
| Colorado, US | 17 | 0 | 2 | 5 | 0 | 0 | 4 | 0 | 1 |
| Connecticut, US | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Florida, US | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Indiana, US | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| Massachusetts, US | 18 | 0 | 1 | 5 | 0 | 0 | 4 | 0 | 1 |
| Minnesota, US | 19 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| North Carolina, US | 18 | 0 | 1 | 5 | 0 | 0 | 4 | 0 | 1 |

| Country | Geometry (6 Topics) | | | Data and Chance (3 Topics) | | |
|----------------------------------|---|--|--|---|--|--|
| | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 8 | Topics Taught to All or Almost All Students | Topics Taught to Only the More Able Students (Top Track) | Not Included in the Curriculum Through Grade 8 |
| Ninth Grade Participants | | | | | | |
| Botswana | 5 | 0 | 1 | 1 | 0 | 2 |
| Honduras | 6 | 0 | 0 | 3 | 0 | 0 |
| South Africa | 6 | 0 | 0 | 3 | 0 | 0 |
| Benchmarking Participants | | | | | | |
| Alberta, Canada | 6 | 0 | 0 | 3 | 0 | 0 |
| Ontario, Canada | 6 | 0 | 0 | 3 | 0 | 0 |
| Quebec, Canada | 5 | 0 | 1 | 3 | 0 | 0 |
| Abu Dhabi, UAE | 5 | 0 | 1 | 3 | 0 | 0 |
| Dubai, UAE | 6 | 0 | 0 | 3 | 0 | 0 |
| Alabama, US | 6 | 0 | 0 | 3 | 0 | 0 |
| California, US | 6 | 0 | 0 | 3 | 0 | 0 |
| Colorado, US | 5 | 0 | 1 | 3 | 0 | 0 |
| Connecticut, US | 6 | 0 | 0 | 3 | 0 | 0 |
| Florida, US | 6 | 0 | 0 | 3 | 0 | 0 |
| Indiana, US | 6 | 0 | 0 | 3 | 0 | 0 |
| Massachusetts, US | 6 | 0 | 0 | 3 | 0 | 0 |
| Minnesota, US | 6 | 0 | 0 | 3 | 0 | 0 |
| North Carolina, US | 6 | 0 | 0 | 3 | 0 | 0 |

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

Collaborate to Improve Teaching

Part of creating a school learning environment focused on academic success involves a staff that collaborates on curricular activities. For example, a study including a comprehensive theoretical review and a meta-analysis of studies about professional communities indicated a small but positive effect of professional communities on student achievement (Lomos, Roelande, & Bosker, 2011). Because teacher collaboration with colleagues is important in building a professional community, TIMSS 2011 included the Collaborate to Improve Teaching scale. Although the idea of teacher collegiality and collaboration can involve a variety of theoretical perspectives and terms, the TIMSS 2011 scale was designed to focus on the idea of collaboration for the purpose of improving teaching. Therefore, the scale was based on how often teachers interacted with other teachers regarding each of five areas:

- ◆ Discuss how to teach a particular topic;
- ◆ Collaborate in planning and preparing instructional materials;
- ◆ Share what I have learned about my teaching experiences;
- ◆ Visit another classroom to learn more about teaching; and
- ◆ Work together to try out new ideas.

Students were scored according to their teachers responses, with **Very Collaborative** teachers having interactions with other teachers at least “one to three times per week” in each of three of the five areas and “two or three times per month” in each of the other two, on average.

Exhibit 8.12 presents the results for the fourth grade. In general, most mathematics teachers of fourth grade students reported a high degree of collaboration with other teachers with the goal of improving teaching and learning. Internationally, on average, about one-third of the fourth grade students (36%) had **Very Collaborative** teachers. Another 53 percent of students, on average, had teachers that reported being **Collaborative** (e.g., interacting two or three times a month for all areas). Few fourth grade students (11%, on average) had mathematics teachers that were only **Somewhat Collaborative** (e.g., never or almost never interacting in three of the five areas).

Looking across countries at the fourth and sixth grades as well as the benchmarking participants, it is clear that there are differences from country to country. However, primarily these differences were between the percentages

of students with **Very Collaborative** and **Collaborative** teachers, and they had very similar achievement, on average (493 and 491, respectively).

Exhibit 8.13 presents the teacher collaboration results for the eighth grade. The mathematics teachers of eighth grade students reported a degree of collaboration with other teachers comparable to their colleagues at the fourth grade. More than one-quarter of the eighth grade students (28%) had **Very Collaborative** teachers and another 57 percent had **Collaborative** teachers, with 15 percent having only **Somewhat Collaborative** teachers. Just like at the fourth grade, the eighth grade students had essentially the same average mathematics achievement whether their teachers were **Very Collaborative** or **Collaborative** (467 and 468, respectively). In general, the ninth grade and benchmarking students also had teachers that reported a considerable amount of collaboration with other teachers. According to TIMSS 2011 reports from mathematics teachers, almost all students have the benefit of teachers who collaborate with other teachers to improve instruction.

Instruction to Engage Students in Learning

Historically, educational studies, including TIMSS, have struggled to link student achievement to instructional activities. Typically, teachers are asked to report how frequently they use various instruction activities and strategies, and such information can be very useful. However, in light of the growing body of evidence about the complexities of teaching and learning, researchers are beginning to understand these lists of activities cannot be used as proxies for the characteristics of good teaching.

To help build a better bridge between curriculum and instruction, TIMSS 2011 collected information about the concept of student content engagement as described by McLaughlin et al. (2005). According to this work, supported by the US National Center for Education Statistics, student content engagement focuses on the importance of the activity that brings the student and the subject matter content together. Engagement refers to the cognitive interaction between the student and instructional content, and may take the form of listening to the teacher or providing an explanation of a problem solution. It is the student's in-the-moment cognitive interaction with instructional content.

To measure aspects of student content engagement, TIMSS 2011 developed both a teacher scale, called the Engaging Students in Learning scale, and a student scale called the Engaged in Mathematics Lessons scale.

Exhibit 8.14 presents the fourth grade results for the Engaging Students in Learning scale. The scale contains six items related to teachers' instructional practices intended to interest students and reinforce learning:

- ◆ Summarizing the lesson's learning goals;
- ◆ Relating the lesson to students' daily lives;
- ◆ Questioning to elicit reasons and explanations;
- ◆ Encouraging students to show improvement;
- ◆ Praising students for good effort; and
- ◆ Bringing interesting materials to class.

Students were categorized according to their teachers' responses, with **Most Lessons** corresponding to teachers who used three of the six practices in "every or almost every lesson" and the other three in "about half the lessons," on average.

Many fourth grade students, 69 percent on average, internationally, had mathematics teachers that made efforts to engage them in instruction by using a variety of strategies in **Most Lessons**, and most of the remaining students had teachers that used engaging instructional practices in **About Half the Lessons** (with a few exceptions). Across the fourth grade, sixth grade, and benchmarking participants, students often had slightly higher average mathematics achievement if their teachers used engaging instruction in **Most Lessons** rather than **About Half the Lessons**.

Exhibit 8.15 presents the eighth grade results based on a somewhat shorter Engaging Students in Learning scale. At the eighth grade, two items were removed from the scale because relatively small percentages of students had teachers that frequently related lessons to students' daily lives, and even smaller percentages had teachers that routinely brought interesting materials to class (see exhibit 8.16). Perhaps eighth grade teachers should make greater efforts to make mathematics relevant to students' daily lives and provide interesting materials, especially in light of the drop by the eighth grade in students' liking mathematics learning. On the other hand, teachers in some of the highest achieving countries reported the least use of these instructional practices.

Based on the shorter four-item scale, on average, 80 percent of the eighth grade students had teachers that reported using engaging practices in most lessons, and almost all of the rest had teachers that reported using engaging practices in about half of the lessons. Across the eighth grade, ninth grade,

Exhibit 8.12: Collaborate to Improve Teaching

Reported by Teachers

Students were scored according to their teachers' responses to how often they interacted with other teachers in each of five teaching areas on the *Collaborate to Improve Teaching* scale. Students with **Very Collaborative** teachers had a score on the scale of at least 11.0, which corresponds to their teachers having interactions with other teachers at least "one to three times per week" in each of three of the five areas and "two or three times per month" in each of the other two, on average. Students with **Somewhat Collaborative** teachers had a score no higher than 7.3, which corresponds to their teachers interacting with other teachers "never or almost never" in each of three of the five areas and "two or three times per month" in each of the other two, on average. All other students had **Collaborative** teachers.

| Country | Very Collaborative | | Collaborative | | Somewhat Collaborative | | Average Scale Score |
|-----------------------|---------------------|---------------------|---------------------|---------------------|------------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Slovenia | 74 (3.5) | 513 (2.5) | 25 (3.4) | 512 (4.0) | 2 (0.8) | ~ ~ | 11.8 (0.14) |
| Kuwait | 71 (3.1) | 340 (4.5) | 26 (3.1) | 349 (5.6) | 3 (1.0) | 330 (17.2) | 11.4 (0.12) |
| Romania | 68 (3.8) | 480 (7.0) | 31 (3.9) | 482 (8.0) | 1 (0.6) | ~ ~ | 11.4 (0.12) |
| Kazakhstan | 59 (3.9) | 498 (5.4) | 41 (4.0) | 508 (7.8) | 0 (0.3) | ~ ~ | 11.1 (0.08) |
| Armenia | 57 (3.8) | 456 (4.6) | 42 (3.9) | 450 (5.1) | 1 (0.9) | ~ ~ | 11.1 (0.11) |
| Qatar | 54 (4.6) | 404 (7.4) | 40 (4.6) | 420 (7.3) | 6 (2.0) | 441 (29.5) | 10.7 (0.16) |
| Oman | 54 (2.9) | 391 (3.6) | 44 (3.0) | 380 (4.4) | 2 (0.6) | ~ ~ | 10.8 (0.07) |
| Serbia | 52 (4.0) | 523 (3.7) | 46 (4.0) | 508 (4.6) | 2 (0.9) | ~ ~ | 10.8 (0.13) |
| Korea, Rep. of | 51 (3.7) | 610 (2.8) | 46 (3.5) | 600 (2.7) | 4 (1.8) | 593 (5.3) | 10.6 (0.16) |
| Azerbaijan | 49 (3.9) | 462 (8.0) | 46 (3.9) | 468 (7.6) | 5 (1.9) | 437 (31.1) | 10.6 (0.13) |
| United States | 49 (2.6) | 544 (2.4) | 40 (2.5) | 544 (3.5) | 11 (1.8) | 533 (6.7) | 10.4 (0.14) |
| Slovak Republic | 49 (3.4) | 510 (5.4) | 48 (3.4) | 506 (4.1) | 3 (1.1) | 452 (18.7) | 10.7 (0.11) |
| England | 47 (4.0) | 541 (6.0) | 44 (4.0) | 550 (5.4) | 9 (1.9) | 538 (13.3) | 10.5 (0.14) |
| Portugal | 45 (4.8) | 532 (6.1) | 50 (4.9) | 532 (4.2) | 5 (1.4) | 541 (8.1) | 10.6 (0.18) |
| Turkey | 44 (3.3) | 468 (8.2) | 46 (2.9) | 469 (7.0) | 9 (1.8) | 475 (9.3) | 10.2 (0.12) |
| Australia | r 43 (3.7) | 525 (5.8) | 44 (3.9) | 517 (5.7) | 12 (2.6) | 509 (8.0) | 10.3 (0.15) |
| Hungary | 43 (4.0) | 516 (6.2) | 53 (3.9) | 513 (5.7) | 4 (1.1) | 518 (10.7) | 10.5 (0.11) |
| United Arab Emirates | 42 (2.7) | 441 (4.0) | 55 (2.8) | 429 (3.4) | 3 (0.7) | 459 (15.3) | 10.5 (0.07) |
| Croatia | 41 (3.8) | 493 (3.4) | 57 (3.8) | 489 (2.6) | 2 (0.9) | ~ ~ | 10.5 (0.11) |
| New Zealand | 41 (3.2) | 487 (4.9) | 54 (3.0) | 487 (3.8) | 6 (1.4) | 473 (12.0) | 10.4 (0.11) |
| Chile | 39 (4.2) | 468 (4.9) | 40 (4.4) | 461 (5.5) | 22 (3.5) | 451 (9.4) | 9.7 (0.19) |
| Thailand | 38 (3.5) | 459 (7.6) | 57 (3.8) | 458 (6.2) | 5 (1.7) | 456 (13.2) | 10.5 (0.15) |
| Spain | 38 (3.8) | 492 (3.6) | 51 (3.8) | 479 (4.3) | 11 (2.3) | 467 (6.9) | 9.9 (0.17) |
| Lithuania | 38 (3.3) | 536 (4.2) | 57 (3.3) | 533 (3.8) | 5 (1.5) | 531 (10.4) | 10.3 (0.10) |
| Georgia | 36 (3.2) | 454 (6.9) | 60 (3.2) | 451 (4.4) | 4 (1.1) | 412 (30.6) | 10.4 (0.12) |
| Norway | 36 (4.3) | 493 (4.4) | 53 (4.3) | 497 (3.4) | 12 (3.2) | 490 (13.3) | 10.0 (0.17) |
| Bahrain | 35 (4.6) | 448 (6.2) | 57 (4.5) | 430 (4.7) | 8 (2.4) | 426 (14.4) | 10.2 (0.15) |
| Japan | 35 (3.7) | 590 (2.5) | 59 (4.0) | 585 (2.4) | 6 (1.9) | 573 (7.4) | 10.2 (0.09) |
| Sweden | r 33 (4.1) | 502 (4.4) | 53 (4.3) | 503 (2.8) | 13 (3.4) | 517 (6.3) | 9.8 (0.21) |
| Poland | 32 (3.0) | 476 (3.4) | 66 (3.1) | 484 (2.8) | 2 (0.9) | ~ ~ | 10.3 (0.08) |
| Russian Federation | 31 (3.8) | 540 (6.8) | 67 (4.0) | 543 (4.0) | 1 (0.8) | ~ ~ | 10.3 (0.08) |
| Iran, Islamic Rep. of | 31 (3.0) | 429 (7.1) | 60 (2.9) | 429 (4.7) | 9 (2.0) | 447 (10.7) | 10.0 (0.14) |
| Singapore | 30 (2.4) | 604 (6.3) | 64 (2.5) | 608 (3.8) | 6 (1.2) | 580 (10.3) | 9.9 (0.08) |
| Italy | 26 (3.2) | 512 (5.2) | 59 (3.3) | 509 (3.8) | 15 (2.1) | 500 (6.9) | 9.4 (0.14) |
| Finland | 26 (2.8) | 551 (4.8) | 60 (2.7) | 545 (2.6) | 14 (1.9) | 541 (7.2) | 9.6 (0.13) |
| Germany | 23 (2.9) | 532 (4.0) | 59 (3.7) | 525 (2.8) | 18 (2.6) | 535 (4.8) | 9.4 (0.12) |
| Chinese Taipei | 23 (3.5) | 593 (4.3) | 57 (3.9) | 592 (2.7) | 20 (3.6) | 587 (4.7) | 9.4 (0.18) |
| Northern Ireland | r 22 (4.1) | 562 (6.5) | 55 (4.8) | 563 (4.3) | 23 (3.6) | 565 (8.2) | 9.4 (0.21) |
| Austria | 21 (3.3) | 500 (7.3) | 54 (3.8) | 509 (3.0) | 24 (3.1) | 515 (4.1) | 9.1 (0.15) |
| Belgium (Flemish) | 20 (2.5) | 549 (3.4) | 62 (3.5) | 548 (2.5) | 18 (2.8) | 555 (4.7) | 9.3 (0.14) |
| Malta | 18 (0.1) | 505 (2.9) | 50 (0.1) | 497 (1.8) | 31 (0.1) | 489 (2.6) | 8.6 (0.01) |
| Netherlands | r 18 (3.9) | 539 (5.6) | 57 (4.6) | 540 (3.1) | 26 (4.5) | 537 (4.3) | 9.0 (0.19) |
| Denmark | 17 (2.9) | 544 (5.0) | 66 (3.4) | 539 (2.7) | 16 (2.5) | 542 (6.3) | 9.3 (0.14) |
| Czech Republic | 16 (2.7) | 502 (4.9) | 71 (3.7) | 513 (3.0) | 13 (3.1) | 509 (6.0) | 9.4 (0.15) |
| Ireland | 16 (2.6) | 534 (8.9) | 59 (3.6) | 523 (3.0) | 25 (3.1) | 534 (4.5) | 8.8 (0.14) |
| Saudi Arabia | 16 (2.9) | 415 (8.8) | 74 (3.4) | 407 (5.4) | 11 (2.6) | 427 (24.7) | 9.4 (0.14) |
| Morocco | 15 (2.9) | 361 (16.2) | 43 (4.3) | 345 (6.9) | 43 (4.3) | 324 (7.1) | 8.1 (0.23) |
| Hong Kong SAR | 14 (2.7) | 610 (6.3) | 75 (3.1) | 598 (4.1) | 12 (2.7) | 617 (10.4) | 9.2 (0.13) |
| Tunisia | 14 (2.9) | 368 (11.0) | 57 (4.3) | 360 (5.7) | 29 (3.6) | 353 (7.4) | 8.5 (0.17) |
| Yemen | 12 (2.9) | 248 (15.5) | 57 (4.2) | 258 (7.5) | 31 (3.9) | 228 (10.8) | 8.6 (0.18) |
| International Avg. | 36 (0.5) | 493 (0.9) | 53 (0.5) | 491 (0.7) | 11 (0.3) | 488 (2.0) | |

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

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 8.12: Collaborate to Improve Teaching (Continued)

| Country | Very Collaborative | | Collaborative | | Somewhat Collaborative | | Average Scale Score |
|----------------------------------|---------------------|---------------------|---------------------|---------------------|------------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Sixth Grade Participants | | | | | | | |
| Botswana | 47 (4.2) | 418 (5.2) | 43 (4.3) | 419 (6.8) | 10 (2.8) | 439 (21.7) | 10.6 (0.21) |
| Honduras | 35 (4.8) | 391 (14.1) | 51 (4.6) | 398 (5.2) | 14 (2.4) | 405 (9.3) | 9.9 (0.23) |
| Yemen | 14 (2.7) | 339 (14.9) | 58 (4.6) | 360 (6.4) | 28 (4.3) | 330 (12.7) | 8.7 (0.17) |
| Benchmarking Participants | | | | | | | |
| North Carolina, US | 64 (6.1) | 550 (5.8) | 33 (5.4) | 558 (5.8) | 4 (2.0) | 555 (12.5) | 11.1 (0.25) |
| Dubai, UAE | 57 (4.3) | 477 (5.0) | 41 (4.3) | 462 (8.3) | 2 (0.3) | ~ ~ | 11.0 (0.08) |
| Florida, US | 53 (4.9) | 547 (5.0) | 39 (4.9) | 543 (5.6) | 7 (3.0) | 523 (16.8) | 10.7 (0.22) |
| Abu Dhabi, UAE | 41 (4.2) | 417 (7.6) | 58 (4.3) | 419 (6.7) | 1 (0.8) | ~ ~ | 10.7 (0.14) |
| Alberta, Canada | 32 (4.0) | 506 (4.5) | 54 (4.8) | 506 (4.2) | 14 (3.2) | 509 (4.0) | 9.8 (0.19) |
| Ontario, Canada | 26 (3.4) | 516 (4.9) | 57 (3.9) | 520 (3.8) | 17 (2.9) | 520 (5.9) | 9.7 (0.18) |
| Quebec, Canada | 21 (4.1) | 530 (4.8) | 62 (4.6) | 533 (3.3) | 18 (3.1) | 535 (4.9) | 9.3 (0.17) |

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

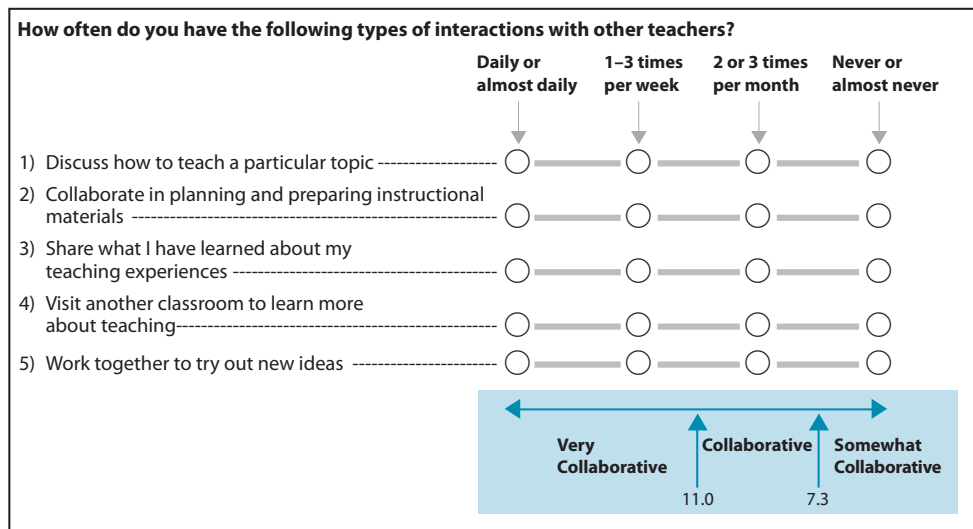


Exhibit 8.13: Collaborate to Improve Teaching

Reported by Teachers

Students were scored according to their teachers' responses to how often they interacted with other teachers in each of five teaching areas on the *Collaborate to Improve Teaching* scale. Students with **Very Collaborative** teachers had a score on the scale of at least 11.4, which corresponds to their teachers having interactions with other teachers at least "one to three times per week" in each of three of the five areas and "two or three times per month" in each of the other two, on average. Students with **Somewhat Collaborative** teachers had a score no higher than 7.5, which corresponds to their teachers interacting with other teachers "never or almost never" in each of three of the five areas and "two or three times per month" in the other two, on average. All other students had **Collaborative** teachers.

| Country | Very Collaborative | | Collaborative | | Somewhat Collaborative | | Average Scale Score |
|-------------------------|---------------------|---------------------|---------------------|---------------------|------------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Israel | 62 (3.0) | 526 (5.8) | 36 (3.0) | 509 (7.5) | 2 (0.7) | ~ ~ | 11.4 (0.09) |
| Bahrain | 51 (3.4) | 410 (4.5) | 42 (3.1) | 413 (6.0) | 8 (1.9) | 392 (8.3) | 11.0 (0.14) |
| Qatar | 51 (4.4) | 397 (8.9) | 46 (4.4) | 417 (8.1) | 4 (0.9) | 488 (18.5) | 11.1 (0.12) |
| Kazakhstan | 48 (3.8) | 486 (5.7) | 52 (3.8) | 487 (5.7) | 1 (0.5) | ~ ~ | 11.2 (0.10) |
| Indonesia | 45 (4.1) | 381 (6.9) | 50 (4.3) | 391 (7.1) | 5 (1.7) | 370 (23.1) | 10.7 (0.15) |
| Romania | 43 (4.2) | 466 (7.9) | 55 (4.2) | 452 (6.3) | 2 (1.1) | ~ ~ | 11.1 (0.13) |
| Slovenia | 42 (2.7) | 505 (3.7) | 51 (2.8) | 503 (2.7) | 7 (1.8) | 509 (9.0) | 10.7 (0.11) |
| Armenia | 42 (3.3) | 467 (5.0) | 57 (3.3) | 466 (3.5) | 1 (0.8) | ~ ~ | 11.0 (0.11) |
| United States | r 39 (2.7) | 509 (5.7) | 40 (2.9) | 510 (4.5) | 22 (2.1) | 520 (6.4) | 10.0 (0.15) |
| Oman | 38 (3.5) | 374 (5.1) | 54 (3.5) | 364 (5.0) | 7 (1.7) | 343 (10.3) | 10.6 (0.11) |
| Macedonia, Rep. of | r 38 (3.7) | 424 (10.9) | 53 (3.6) | 421 (8.8) | 9 (2.5) | 441 (16.4) | 10.5 (0.15) |
| United Arab Emirates | 36 (2.7) | 456 (4.6) | 60 (2.5) | 454 (3.4) | 4 (1.1) | 458 (10.2) | 10.6 (0.09) |
| Lebanon | 36 (4.1) | 454 (6.2) | 49 (3.8) | 450 (5.5) | 16 (3.4) | 437 (10.0) | 10.2 (0.18) |
| Georgia | 34 (3.9) | 434 (7.2) | 64 (3.8) | 431 (4.7) | 2 (1.2) | ~ ~ | 10.7 (0.14) |
| Ghana | 33 (4.1) | 328 (5.4) | 54 (4.2) | 326 (6.4) | 12 (2.7) | 357 (15.8) | 10.4 (0.18) |
| Australia | r 32 (3.9) | 510 (10.0) | 55 (4.0) | 509 (8.1) | 12 (2.1) | 490 (8.8) | 10.0 (0.15) |
| Ukraine | 31 (4.2) | 485 (6.8) | 69 (4.2) | 476 (5.3) | 0 (0.0) | ~ ~ | 10.6 (0.10) |
| Chile | 29 (3.5) | 419 (6.4) | 43 (3.9) | 420 (5.5) | 28 (3.8) | 408 (5.9) | 9.4 (0.22) |
| Malaysia | 28 (3.5) | 431 (10.4) | 64 (4.0) | 448 (5.9) | 7 (2.3) | 411 (19.6) | 10.2 (0.12) |
| Turkey | 28 (3.0) | 463 (10.2) | 55 (3.4) | 451 (5.3) | 17 (2.4) | 438 (8.7) | 9.9 (0.14) |
| Thailand | 26 (3.6) | 427 (8.6) | 58 (4.1) | 424 (6.5) | 16 (3.1) | 441 (13.9) | 10.0 (0.21) |
| Norway | 26 (4.0) | 479 (5.2) | 56 (4.2) | 475 (2.8) | 18 (3.5) | 470 (4.3) | 9.8 (0.17) |
| Saudi Arabia | 25 (2.7) | 401 (9.1) | 58 (3.2) | 399 (6.4) | 17 (2.6) | 376 (9.0) | 9.8 (0.14) |
| Jordan | 24 (3.6) | 406 (6.9) | 61 (4.1) | 412 (5.0) | 14 (2.9) | 380 (12.4) | 9.9 (0.14) |
| England | 24 (3.8) | 502 (12.4) | 57 (4.2) | 505 (7.9) | 20 (3.1) | 512 (16.5) | 9.7 (0.15) |
| Sweden | r 23 (3.2) | 491 (4.8) | 54 (3.7) | 485 (2.7) | 23 (3.1) | 480 (4.2) | 9.4 (0.16) |
| Hungary | 23 (3.0) | 494 (9.1) | 70 (3.0) | 507 (4.0) | 7 (1.7) | 511 (13.0) | 10.1 (0.12) |
| Palestinian Nat'l Auth. | 22 (3.6) | 400 (6.8) | 69 (4.1) | 403 (5.1) | 9 (2.4) | 421 (12.3) | 10.1 (0.12) |
| New Zealand | 22 (3.3) | 461 (9.2) | 62 (4.2) | 497 (6.6) | 16 (2.5) | 477 (9.4) | 9.6 (0.13) |
| Finland | 19 (2.7) | 509 (5.4) | 63 (3.5) | 515 (2.7) | 17 (3.0) | 517 (4.9) | 9.7 (0.13) |
| Singapore | 17 (1.7) | 611 (9.4) | 70 (2.3) | 610 (4.8) | 13 (1.8) | 616 (10.9) | 9.6 (0.08) |
| Russian Federation | 17 (2.7) | 543 (6.4) | 79 (2.5) | 540 (4.3) | 4 (1.4) | 515 (12.7) | 10.2 (0.11) |
| Syrian Arab Republic | 15 (2.9) | 372 (11.0) | 64 (4.0) | 385 (5.4) | 20 (3.4) | 365 (10.3) | 9.4 (0.16) |
| Japan | 15 (2.7) | 572 (9.1) | 61 (3.8) | 569 (4.0) | 24 (3.4) | 571 (5.0) | 9.1 (0.18) |
| Korea, Rep. of | 15 (2.3) | 613 (7.5) | 62 (2.9) | 613 (3.7) | 23 (2.6) | 610 (6.8) | 9.1 (0.12) |
| Italy | 13 (2.7) | 499 (10.5) | 56 (3.8) | 502 (3.9) | 31 (3.6) | 495 (4.4) | 8.8 (0.18) |
| Chinese Taipei | 13 (2.9) | 610 (9.4) | 56 (4.4) | 614 (5.0) | 31 (3.8) | 601 (8.0) | 9.0 (0.17) |
| Lithuania | 13 (2.1) | 495 (7.7) | 70 (3.1) | 505 (3.6) | 17 (2.8) | 495 (8.0) | 9.5 (0.11) |
| Iran, Islamic Rep. of | 12 (2.0) | 422 (10.4) | 65 (3.5) | 415 (5.5) | 24 (2.9) | 411 (8.8) | 9.2 (0.13) |
| Hong Kong SAR | 11 (3.0) | 584 (13.2) | 71 (3.7) | 581 (5.5) | 18 (3.1) | 608 (9.1) | 9.2 (0.16) |
| Morocco | 11 (2.0) | 381 (6.9) | 45 (3.0) | 375 (3.2) | 44 (2.7) | 365 (3.6) | 8.2 (0.13) |
| Tunisia | 9 (2.2) | 416 (6.3) | 52 (3.9) | 425 (4.0) | 40 (4.0) | 426 (5.1) | 8.3 (0.15) |
| International Avg. | 28 (0.5) | 467 (1.2) | 57 (0.6) | 468 (0.8) | 15 (0.4) | 465 (1.9) | |

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 8.13: Collaborate to Improve Teaching (Continued)

| Country | Very Collaborative | | Collaborative | | Somewhat Collaborative | | Average Scale Score |
|----------------------------------|---------------------|---------------------|---------------------|---------------------|------------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Ninth Grade Participants | | | | | | | |
| Botswana | 48 (4.0) | 394 (3.5) | 44 (4.1) | 396 (4.3) | 8 (2.4) | 413 (12.2) | 10.9 (0.18) |
| South Africa | 35 (3.0) | 353 (5.5) | 53 (3.6) | 352 (5.2) | 12 (2.0) | 351 (7.1) | 10.3 (0.12) |
| Honduras | 23 (4.6) | 334 (10.3) | 50 (4.4) | 347 (6.9) | 26 (4.1) | 321 (5.5) | 9.4 (0.24) |
| Benchmarking Participants | | | | | | | |
| North Carolina, US | r 48 (6.8) | 527 (9.6) | 43 (6.6) | 552 (12.9) | 9 (4.2) | 562 (10.7) | 10.8 (0.30) |
| Dubai, UAE | 40 (4.1) | 473 (6.6) | 55 (4.2) | 478 (4.9) | 6 (1.3) | 475 (12.2) | 10.8 (0.09) |
| Colorado, US | r 35 (7.8) | 513 (9.4) | 46 (7.3) | 524 (12.8) | 19 (5.3) | 513 (17.8) | 10.0 (0.34) |
| Ontario, Canada | 33 (3.4) | 516 (3.9) | 49 (3.6) | 511 (4.0) | 18 (3.0) | 511 (5.8) | 10.1 (0.20) |
| Abu Dhabi, UAE | 33 (4.5) | 451 (7.6) | 63 (4.3) | 449 (6.6) | 4 (1.6) | 442 (20.5) | 10.6 (0.16) |
| Connecticut, US | 32 (6.6) | 516 (16.0) | 44 (6.6) | 526 (9.4) | 23 (6.2) | 516 (17.1) | 9.6 (0.37) |
| California, US | r 31 (5.2) | 471 (11.2) | 49 (7.5) | 504 (10.3) | 20 (5.6) | 497 (12.7) | 9.9 (0.27) |
| Alabama, US | r 31 (6.8) | 478 (10.9) | 46 (6.6) | 461 (11.4) | 23 (5.5) | 467 (11.4) | 9.6 (0.39) |
| Florida, US | r 31 (6.0) | 532 (17.8) | 50 (6.4) | 502 (7.3) | 19 (5.3) | 542 (9.4) | 9.9 (0.30) |
| Minnesota, US | 27 (6.4) | 529 (16.9) | 50 (6.1) | 555 (6.8) | 23 (5.6) | 543 (11.5) | 9.5 (0.37) |
| Alberta, Canada | 24 (3.9) | 502 (6.0) | 50 (4.3) | 507 (3.6) | 26 (3.4) | 503 (3.9) | 9.5 (0.19) |
| Indiana, US | r 23 (5.8) | 510 (12.0) | 57 (6.4) | 518 (5.9) | 21 (5.0) | 530 (12.2) | 9.6 (0.27) |
| Massachusetts, US | 21 (5.7) | 564 (18.0) | 53 (7.2) | 562 (8.6) | 26 (6.6) | 548 (13.6) | 9.4 (0.31) |
| Quebec, Canada | 11 (2.8) | 536 (8.2) | 66 (4.0) | 530 (3.4) | 23 (3.4) | 538 (5.7) | 9.2 (0.16) |

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

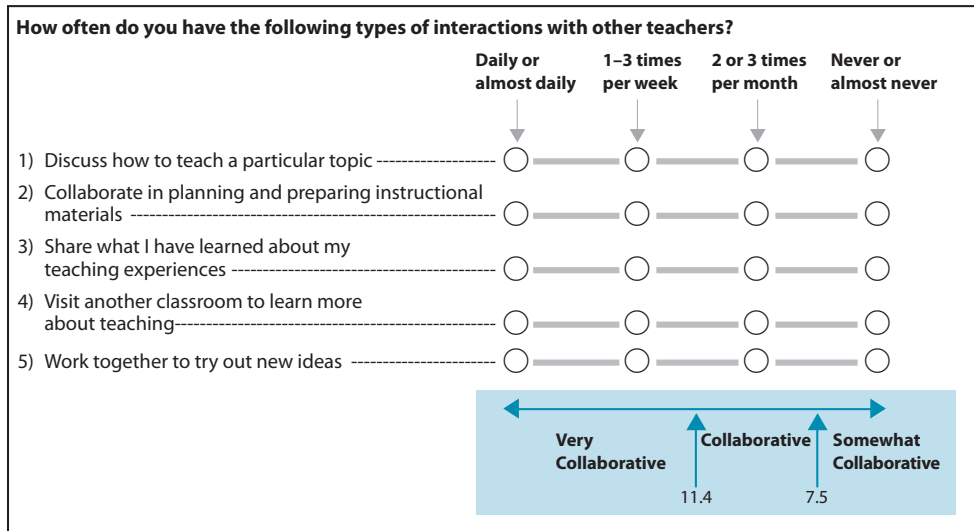


Exhibit 8.14: Instruction to Engage Students in Learning

Reported by Teachers

Students were scored according to their teachers' responses to how often they used each of six instructional practices on the *Engaging Students in Learning* scale. Students with teachers who used engagement practices in **Most Lessons** had a score on the scale of at least 9.1, which corresponds to their teachers using three of the six practices "every or almost every lesson" and using the other three in "about half the lessons," on average. Students with teachers who used engagement practices in **Some Lessons** had a score no higher than 6.0, which corresponds to their teachers using three of the six practices in "some lessons" and using the other three in "about half the lessons," on average. All other students had teachers who used engagement practices in **About Half the Lessons**.

| Country | Most Lessons | | About Half the Lessons | | Some Lessons | | Average Scale Score |
|-----------------------|---------------------|---------------------|------------------------|---------------------|---------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Romania | 94 (1.8) | 481 (6.3) | 6 (1.5) | 483 (14.4) | 1 (0.0) | ~ ~ | 11.4 (0.15) |
| Lithuania | 93 (1.6) | 534 (2.6) | 7 (1.6) | 532 (10.2) | 0 (0.0) | ~ ~ | 11.0 (0.11) |
| United States | r 90 (1.3) | 541 (2.2) | 9 (1.2) | 555 (6.8) | 1 (0.5) | ~ ~ | 10.9 (0.09) |
| Portugal | 89 (2.1) | 533 (3.9) | 10 (2.1) | 528 (7.9) | 0 (0.0) | ~ ~ | 10.8 (0.13) |
| Kazakhstan | 89 (2.1) | 503 (5.0) | 11 (2.1) | 494 (11.3) | 0 (0.0) | ~ ~ | 11.6 (0.14) |
| Hungary | 87 (2.1) | 515 (3.9) | 12 (2.0) | 508 (10.5) | 0 (0.2) | ~ ~ | 10.6 (0.11) |
| Croatia | 87 (2.2) | 491 (2.0) | 12 (2.2) | 484 (7.0) | 0 (0.2) | ~ ~ | 10.5 (0.10) |
| United Arab Emirates | 87 (1.5) | 437 (2.2) | 13 (1.5) | 416 (8.3) | 0 (0.4) | ~ ~ | 10.9 (0.08) |
| England | 86 (3.1) | 545 (3.9) | 14 (3.1) | 538 (11.8) | 0 (0.0) | ~ ~ | 10.3 (0.14) |
| Qatar | 84 (3.7) | 412 (4.1) | 16 (3.7) | 415 (16.8) | 0 (0.0) | ~ ~ | 11.0 (0.18) |
| Slovenia | 84 (2.8) | 512 (2.4) | 16 (2.8) | 519 (7.4) | 0 (0.0) | ~ ~ | 10.5 (0.13) |
| Chile | 83 (3.5) | 460 (2.9) | 17 (3.5) | 472 (9.1) | 0 (0.0) | ~ ~ | 11.0 (0.16) |
| Oman | 82 (2.6) | 391 (3.1) | 17 (2.6) | 364 (6.9) | 1 (0.6) | ~ ~ | 10.5 (0.10) |
| Russian Federation | 82 (3.0) | 542 (3.8) | 17 (2.9) | 540 (8.1) | 1 (0.7) | ~ ~ | 10.7 (0.16) |
| Slovak Republic | 82 (2.7) | 506 (4.3) | 17 (2.7) | 511 (6.0) | 0 (0.3) | ~ ~ | 10.5 (0.12) |
| Northern Ireland | r 80 (3.5) | 560 (3.9) | 18 (3.5) | 576 (7.4) | 2 (1.3) | ~ ~ | 9.8 (0.14) |
| Malta | 79 (0.1) | 495 (1.3) | 20 (0.1) | 499 (3.4) | 0 (0.0) | ~ ~ | 10.2 (0.00) |
| Serbia | 78 (3.4) | 517 (3.5) | 22 (3.4) | 512 (6.0) | 0 (0.4) | ~ ~ | 10.3 (0.12) |
| Australia | r 77 (3.5) | 522 (4.0) | 23 (3.5) | 510 (6.1) | 0 (0.2) | ~ ~ | 10.0 (0.13) |
| Italy | 76 (3.0) | 509 (3.1) | 22 (2.9) | 507 (5.3) | 2 (0.9) | ~ ~ | 10.4 (0.14) |
| Georgia | 76 (2.6) | 453 (4.0) | 23 (2.6) | 444 (10.3) | 1 (0.4) | ~ ~ | 10.5 (0.13) |
| Iran, Islamic Rep. of | 75 (2.7) | 434 (4.7) | 24 (2.8) | 420 (6.8) | 1 (0.4) | ~ ~ | 10.3 (0.13) |
| Poland | 74 (3.1) | 480 (2.4) | 25 (3.1) | 485 (4.6) | 1 (0.6) | ~ ~ | 10.2 (0.12) |
| Czech Republic | 73 (3.5) | 513 (2.5) | 27 (3.5) | 504 (6.3) | 1 (0.8) | ~ ~ | 9.7 (0.11) |
| Bahrain | 71 (5.4) | 439 (5.0) | 28 (5.4) | 430 (5.7) | 1 (0.6) | ~ ~ | 10.1 (0.20) |
| Thailand | 69 (3.5) | 463 (5.3) | 29 (3.5) | 450 (9.0) | 2 (1.0) | ~ ~ | 10.0 (0.17) |
| Armenia | 69 (3.7) | 453 (3.8) | 31 (3.7) | 451 (7.8) | 1 (0.5) | ~ ~ | 10.1 (0.16) |
| Azerbaijan | 69 (3.3) | 466 (6.4) | 31 (3.3) | 458 (10.8) | 0 (0.0) | ~ ~ | 10.0 (0.14) |
| Ireland | 68 (3.1) | 524 (3.0) | 31 (3.1) | 534 (5.7) | 1 (0.5) | ~ ~ | 9.8 (0.12) |
| New Zealand | 67 (3.0) | 486 (3.6) | 33 (3.0) | 487 (4.9) | 0 (0.1) | ~ ~ | 9.7 (0.10) |
| Tunisia | 67 (4.3) | 360 (4.9) | 31 (4.1) | 361 (6.1) | 2 (1.1) | ~ ~ | 9.9 (0.18) |
| Morocco | 66 (3.5) | 343 (5.7) | 33 (3.4) | 328 (5.3) | 1 (0.4) | ~ ~ | 10.0 (0.19) |
| Saudi Arabia | 66 (3.6) | 418 (7.0) | 33 (3.6) | 395 (7.6) | 1 (0.6) | ~ ~ | 10.0 (0.15) |
| Spain | 66 (3.5) | 483 (3.4) | 33 (3.5) | 483 (5.6) | 2 (1.1) | ~ ~ | 9.9 (0.16) |
| Korea, Rep. of | 65 (4.2) | 607 (2.6) | 34 (4.2) | 601 (3.4) | 1 (0.9) | ~ ~ | 10.2 (0.19) |
| Turkey | 64 (3.5) | 480 (5.9) | 34 (3.4) | 449 (8.7) | 2 (0.9) | ~ ~ | 9.9 (0.13) |
| Singapore | 60 (2.7) | 606 (4.7) | 36 (2.7) | 603 (5.7) | 4 (1.1) | 626 (14.2) | 9.3 (0.10) |
| Kuwait | 57 (3.4) | 343 (4.9) | 41 (3.6) | 341 (5.3) | 2 (1.0) | ~ ~ | 9.6 (0.14) |
| Belgium (Flemish) | 56 (3.2) | 551 (2.4) | 43 (3.3) | 547 (2.8) | 1 (0.5) | ~ ~ | 9.1 (0.10) |
| Hong Kong SAR | 52 (4.3) | 609 (4.1) | 44 (4.2) | 598 (4.6) | 4 (1.8) | 555 (51.1) | 9.1 (0.18) |
| Japan | 52 (4.0) | 586 (2.0) | 46 (4.0) | 584 (2.8) | 2 (1.0) | ~ ~ | 9.0 (0.13) |
| Austria | 51 (3.5) | 505 (2.9) | 46 (3.3) | 512 (4.4) | 3 (1.1) | 497 (15.6) | 9.0 (0.12) |
| Sweden | r 49 (4.2) | 508 (3.3) | 49 (4.4) | 503 (3.6) | 2 (1.1) | ~ ~ | 8.8 (0.14) |
| Germany | 47 (3.1) | 527 (3.3) | 48 (3.0) | 527 (2.7) | 5 (1.6) | 544 (6.4) | 8.7 (0.10) |
| Netherlands | r 41 (3.9) | 536 (3.4) | 55 (4.2) | 540 (3.0) | 4 (2.0) | 546 (17.6) | 8.5 (0.11) |
| Norway | 41 (4.6) | 500 (5.1) | 55 (4.7) | 490 (3.5) | 4 (1.9) | 506 (11.7) | 8.6 (0.13) |
| Chinese Taipei | 39 (4.3) | 588 (3.4) | 46 (3.8) | 596 (3.2) | 15 (3.1) | 588 (5.9) | 8.5 (0.21) |
| Finland | 34 (3.1) | 551 (3.0) | 60 (3.2) | 543 (3.4) | 6 (1.4) | 549 (5.8) | 8.3 (0.10) |
| Yemen | 31 (4.0) | 269 (12.2) | 62 (4.4) | 234 (6.7) | 7 (2.3) | 268 (17.4) | 8.4 (0.14) |
| Denmark | 24 (3.2) | 536 (5.8) | 65 (3.6) | 542 (2.7) | 12 (2.6) | 532 (9.3) | 7.8 (0.12) |
| International Avg. | 69 (0.5) | 492 (0.6) | 30 (0.5) | 488 (1.0) | 2 (0.1) | ~ ~ | |

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.

Exhibit 8.14: Instruction to Engage Students in Learning (Continued)

| Country | Most Lessons | | About Half the Lessons | | Some Lessons | | Average Scale Score |
|----------------------------------|---------------------|---------------------|------------------------|---------------------|---------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Sixth Grade Participants | | | | | | | |
| Honduras | 79 (4.1) | 403 (5.7) | 20 (4.1) | 370 (14.5) | 1 (1.0) | ~ ~ | 10.3 (0.18) |
| Botswana | 73 (4.1) | 419 (5.0) | 26 (4.1) | 425 (8.8) | 2 (1.1) | ~ ~ | 10.2 (0.18) |
| Yemen | 31 (4.2) | 358 (9.6) | 61 (4.6) | 342 (7.2) | 9 (2.7) | 350 (15.6) | 8.3 (0.15) |
| Benchmarking Participants | | | | | | | |
| Florida, US | r 95 (1.9) | 544 (3.8) | 5 (1.9) | 556 (29.0) | 0 (0.0) | ~ ~ | 11.1 (0.16) |
| Dubai, UAE | r 92 (1.6) | 476 (2.7) | 8 (1.6) | 418 (15.1) | 0 (0.0) | ~ ~ | 11.2 (0.11) |
| Abu Dhabi, UAE | 90 (2.5) | 418 (4.9) | 10 (2.5) | 419 (23.1) | 0 (0.0) | ~ ~ | 11.1 (0.14) |
| North Carolina, US | 90 (3.0) | 553 (4.8) | 9 (2.7) | 561 (11.2) | 1 (1.3) | ~ ~ | 10.8 (0.16) |
| Alberta, Canada | r 82 (3.9) | 507 (2.8) | 18 (3.9) | 504 (8.2) | 0 (0.0) | ~ ~ | 10.2 (0.13) |
| Ontario, Canada | 79 (3.2) | 520 (3.2) | 21 (3.2) | 515 (6.4) | 0 (0.0) | ~ ~ | 10.0 (0.13) |
| Quebec, Canada | 60 (4.0) | 533 (3.5) | 39 (4.1) | 532 (3.4) | 1 (0.6) | ~ ~ | 9.4 (0.12) |

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

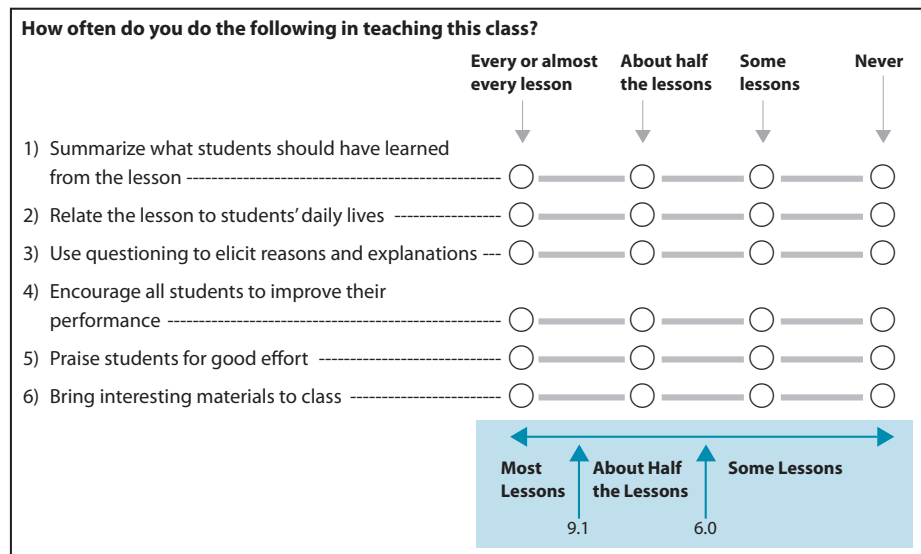


Exhibit 8.15: Instruction to Engage Students in Learning

Reported by Teachers

Students were scored according to their teachers' responses to how often they used each of four instructional practices on the *Engaging Students in Learning* scale. Students with teachers who used engagement practices in **Most Lessons** had a score on the scale of at least 8.7, which corresponds to their teachers using two of the four practices "every or almost every lesson" and using the other two in "about half the lessons," on average. Students with teachers who used engagement practices in **Some Lessons** had a score no higher than 5.7, which corresponds to their teachers using two of the four practices in "some lessons" and using the other two in "about half the lessons," on average. All other students had teachers who used engagement practices in **About Half the Lessons**.

| Country | Most Lessons | | About Half the Lessons | | Some Lessons | | Average Scale Score |
|-------------------------|---------------------|---------------------|------------------------|---------------------|---------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Lithuania | 93 (1.6) | 502 (2.7) | 6 (1.5) | 501 (10.4) | 1 (0.6) | ~ ~ | 10.5 (0.11) |
| United States | r 93 (1.2) | 511 (3.2) | 7 (1.1) | 526 (16.6) | 0 (0.2) | ~ ~ | 10.8 (0.07) |
| Indonesia | 93 (3.1) | 389 (4.1) | 5 (1.7) | 383 (18.7) | 3 (2.7) | 282 (13.1) | 10.7 (0.25) |
| United Arab Emirates | 93 (1.1) | 456 (2.2) | 7 (1.0) | 449 (10.7) | 1 (0.4) | ~ ~ | 10.9 (0.08) |
| England | 92 (1.8) | 508 (5.9) | 6 (1.9) | 512 (31.3) | 2 (1.6) | ~ ~ | 10.6 (0.16) |
| Romania | 91 (2.6) | 461 (4.2) | 8 (2.4) | 430 (10.2) | 1 (0.8) | ~ ~ | 10.9 (0.14) |
| Ghana | 91 (2.5) | 330 (4.6) | 9 (2.5) | 341 (14.1) | 0 (0.0) | ~ ~ | 10.7 (0.13) |
| Ukraine | 91 (2.7) | 480 (4.2) | 9 (2.7) | 468 (10.9) | 0 (0.0) | ~ ~ | 10.6 (0.15) |
| Bahrain | 90 (1.7) | 413 (2.1) | 9 (1.9) | 378 (7.5) | 1 (0.8) | ~ ~ | 10.3 (0.11) |
| Kazakhstan | 90 (2.6) | 493 (4.2) | 9 (2.5) | 440 (14.6) | 1 (0.9) | ~ ~ | 10.8 (0.15) |
| Palestinian Nat'l Auth. | 90 (2.4) | 405 (3.9) | 10 (2.3) | 397 (9.8) | 1 (0.6) | ~ ~ | 10.5 (0.13) |
| Qatar | 89 (2.7) | 417 (4.0) | 11 (2.7) | 363 (16.6) | 0 (0.0) | ~ ~ | 10.9 (0.13) |
| Slovenia | 89 (1.4) | 505 (2.3) | 10 (1.3) | 508 (6.4) | 1 (0.3) | ~ ~ | 10.3 (0.08) |
| Syrian Arab Republic | 88 (3.2) | 379 (4.9) | 11 (3.1) | 376 (14.6) | 1 (0.8) | ~ ~ | 10.2 (0.16) |
| Chile | 88 (2.4) | 414 (3.0) | 11 (2.3) | 441 (12.2) | 1 (0.8) | ~ ~ | 10.5 (0.13) |
| Saudi Arabia | 87 (2.8) | 397 (4.5) | 12 (2.8) | 381 (14.2) | 1 (0.0) | ~ ~ | 10.4 (0.16) |
| Jordan | 86 (2.4) | 409 (4.0) | 13 (2.3) | 385 (11.4) | 1 (0.7) | ~ ~ | 10.3 (0.13) |
| Morocco | 86 (2.4) | 374 (2.2) | 14 (2.4) | 355 (4.5) | 0 (0.4) | ~ ~ | 10.4 (0.13) |
| Lebanon | 86 (3.2) | 452 (4.1) | 12 (3.0) | 437 (9.7) | 3 (1.3) | 433 (8.5) | 10.4 (0.15) |
| Turkey | 86 (2.3) | 455 (4.3) | 12 (2.1) | 444 (12.1) | 3 (1.1) | 403 (19.4) | 10.0 (0.12) |
| Macedonia, Rep. of | r 85 (2.8) | 432 (6.8) | 11 (2.1) | 388 (11.4) | 4 (1.6) | 396 (16.3) | 10.5 (0.17) |
| Israel | 84 (2.0) | 519 (4.7) | 14 (2.1) | 516 (12.1) | 2 (0.9) | ~ ~ | 10.2 (0.12) |
| Tunisia | 84 (2.6) | 427 (3.3) | 14 (2.3) | 412 (5.7) | 2 (1.3) | ~ ~ | 10.3 (0.15) |
| Georgia | 83 (3.0) | 433 (4.5) | 15 (2.8) | 420 (9.1) | 2 (1.2) | ~ ~ | 10.3 (0.15) |
| Iran, Islamic Rep. of | 82 (2.3) | 416 (4.9) | 16 (2.3) | 417 (11.7) | 2 (1.0) | ~ ~ | 10.1 (0.11) |
| Oman | 82 (2.2) | 373 (3.1) | 17 (2.2) | 334 (8.3) | 1 (0.5) | ~ ~ | 10.1 (0.10) |
| Russian Federation | 79 (3.1) | 541 (4.1) | 19 (2.9) | 539 (7.5) | 2 (0.8) | ~ ~ | 9.9 (0.13) |
| New Zealand | 79 (3.0) | 487 (5.2) | 20 (2.8) | 492 (14.4) | 2 (1.1) | ~ ~ | 9.7 (0.12) |
| Italy | 79 (3.2) | 498 (3.2) | 20 (3.1) | 503 (6.0) | 1 (0.9) | ~ ~ | 9.8 (0.15) |
| Hungary | 76 (2.8) | 505 (3.9) | 20 (2.5) | 505 (7.6) | 4 (1.8) | 481 (20.9) | 9.7 (0.14) |
| Australia | r 75 (4.0) | 508 (6.7) | 22 (3.7) | 505 (10.0) | 3 (1.4) | 533 (34.8) | 9.5 (0.16) |
| Malaysia | 73 (3.6) | 448 (5.8) | 22 (3.2) | 421 (12.3) | 5 (1.6) | 417 (25.1) | 9.5 (0.16) |
| Thailand | 71 (3.4) | 428 (5.2) | 24 (3.3) | 426 (10.8) | 4 (1.6) | 419 (18.2) | 9.6 (0.15) |
| Armenia | 71 (3.3) | 470 (3.6) | 25 (3.2) | 457 (7.4) | 4 (1.4) | 458 (15.6) | 9.7 (0.14) |
| Korea, Rep. of | 65 (3.0) | 616 (4.1) | 28 (2.6) | 609 (5.8) | 7 (1.6) | 598 (11.7) | 9.3 (0.14) |
| Sweden | r 65 (3.1) | 486 (2.5) | 31 (3.1) | 488 (4.4) | 4 (1.3) | 479 (6.3) | 8.9 (0.12) |
| Singapore | 63 (2.5) | 615 (4.4) | 27 (2.3) | 609 (6.4) | 10 (1.5) | 594 (16.1) | 9.0 (0.11) |
| Japan | 55 (4.3) | 571 (4.7) | 38 (4.2) | 567 (4.2) | 6 (2.1) | 573 (11.0) | 8.8 (0.20) |
| Hong Kong SAR | 52 (4.2) | 586 (5.5) | 42 (4.4) | 592 (6.8) | 6 (2.0) | 552 (37.3) | 8.7 (0.18) |
| Norway | 51 (3.7) | 472 (3.8) | 40 (4.0) | 477 (3.3) | 9 (2.2) | 485 (5.4) | 8.5 (0.15) |
| Finland | 51 (3.2) | 517 (2.9) | 41 (3.1) | 511 (3.9) | 8 (1.8) | 518 (5.6) | 8.5 (0.11) |
| Chinese Taipei | 46 (4.2) | 621 (5.5) | 35 (3.6) | 593 (6.0) | 19 (3.2) | 612 (8.7) | 8.4 (0.22) |
| International Avg. | 80 (0.4) | 469 (0.7) | 17 (0.4) | 459 (1.8) | 3 (0.2) | 484 (4.5) | |

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 8.15: Instruction to Engage Students in Learning (Continued)

| Country | Most Lessons | | About Half the Lessons | | Some Lessons | | Average Scale Score | |
|----------------------------------|---------------------|---------------------|------------------------|---------------------|---------------------|---------------------|---------------------|-------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | | |
| Ninth Grade Participants | | | | | | | | |
| Honduras | r | 85 (3.4) | 338 (5.2) | 13 (3.0) | 335 (9.0) | 2 (1.7) | ~ ~ | 10.3 (0.18) |
| Botswana | | 85 (3.0) | 396 (2.8) | 13 (2.9) | 394 (7.9) | 3 (1.3) | 390 (14.4) | 9.9 (0.15) |
| South Africa | | 77 (3.5) | 353 (3.6) | 19 (3.2) | 350 (9.7) | 4 (1.4) | 347 (9.2) | 9.9 (0.18) |
| Benchmarking Participants | | | | | | | | |
| California, US | s | 97 (1.8) | 491 (6.5) | 3 (1.8) | 505 (49.1) | 0 (0.0) | ~ ~ | 10.8 (0.20) |
| Connecticut, US | r | 95 (2.7) | 524 (5.5) | 3 (2.1) | 562 (9.3) | 2 (1.7) | ~ ~ | 10.9 (0.14) |
| Abu Dhabi, UAE | | 95 (1.9) | 447 (3.9) | 5 (1.9) | 505 (17.4) | 0 (0.0) | ~ ~ | 10.9 (0.12) |
| Alabama, US | r | 94 (2.9) | 467 (8.7) | 4 (2.2) | 454 (36.0) | 2 (1.9) | ~ ~ | 11.0 (0.23) |
| North Carolina, US | r | 94 (3.2) | 537 (6.9) | 6 (3.2) | 557 (52.4) | 0 (0.0) | ~ ~ | 11.2 (0.17) |
| Massachusetts, US | r | 93 (3.0) | 558 (6.3) | 7 (3.0) | 596 (12.6) | 1 (0.8) | ~ ~ | 10.7 (0.17) |
| Florida, US | r | 92 (4.1) | 523 (6.9) | 8 (4.1) | 458 (23.0) | 0 (0.0) | ~ ~ | 10.9 (0.19) |
| Dubai, UAE | | 91 (1.2) | 482 (2.7) | 9 (1.2) | 423 (13.1) | 0 (0.0) | ~ ~ | 11.0 (0.07) |
| Colorado, US | r | 87 (4.3) | 519 (6.5) | 11 (4.1) | 504 (17.4) | 1 (0.1) | ~ ~ | 10.6 (0.19) |
| Alberta, Canada | | 87 (2.6) | 505 (3.1) | 12 (2.5) | 504 (6.0) | 1 (0.9) | ~ ~ | 10.4 (0.14) |
| Indiana, US | r | 84 (4.4) | 513 (5.6) | 15 (4.9) | 533 (9.7) | 1 (1.1) | ~ ~ | 10.6 (0.23) |
| Minnesota, US | r | 83 (5.1) | 549 (7.3) | 17 (5.1) | 540 (14.8) | 0 (0.0) | ~ ~ | 10.1 (0.25) |
| Ontario, Canada | | 82 (3.0) | 514 (2.8) | 16 (2.9) | 507 (5.4) | 2 (1.0) | ~ ~ | 10.1 (0.13) |
| Quebec, Canada | | 64 (3.7) | 528 (3.0) | 31 (3.4) | 540 (4.8) | 4 (2.0) | 567 (11.8) | 9.1 (0.16) |

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

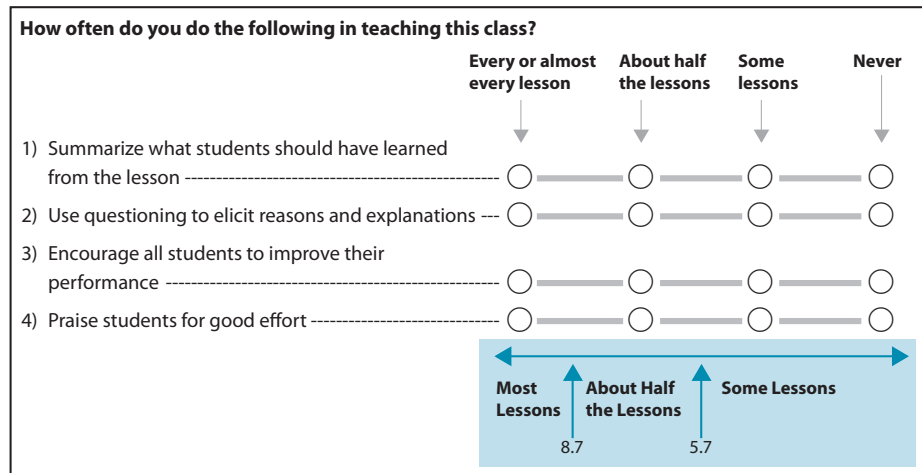


Exhibit 8.16: Teachers Relate Lessons to Students' Daily Lives and Bring Interesting Materials to Class

Reported by Teachers

| Country | Relate Lessons to Students' Daily Lives | | | | Bring Interesting Materials to Class | | | |
|-------------------------|---|---------------------|--------------------------------|---------------------|--------------------------------------|---------------------|--------------------------------|---------------------|
| | Every Lesson or Almost Every Lesson | | About Half the Lessons or Less | | Every Lesson or Almost Every Lesson | | About Half the Lessons or Less | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Armenia | 45 (3.7) | 471 (4.9) | 55 (3.7) | 462 (4.8) | 10 (2.4) | 483 (13.2) | 90 (2.4) | 463 (2.8) |
| Australia | r 25 (3.4) | 512 (12.2) | 75 (3.4) | 507 (5.8) | r 8 (2.3) | 523 (17.3) | 92 (2.3) | 507 (5.8) |
| Bahrain | 53 (3.6) | 406 (5.6) | 47 (3.6) | 414 (5.1) | 12 (2.1) | 404 (10.5) | 88 (2.1) | 410 (2.8) |
| Chile | 70 (3.3) | 406 (3.8) | 30 (3.3) | 442 (5.0) | 25 (3.7) | 399 (6.8) | 75 (3.7) | 423 (3.7) |
| Chinese Taipei | 21 (3.6) | 614 (8.3) | 79 (3.6) | 608 (3.7) | 6 (1.7) | 618 (25.0) | 94 (1.7) | 609 (3.1) |
| England | 15 (2.9) | 504 (15.0) | 85 (2.9) | 506 (6.1) | 7 (1.7) | 480 (21.0) | 93 (1.7) | 508 (5.8) |
| Finland | 18 (3.0) | 504 (6.2) | 82 (3.0) | 517 (2.4) | 4 (1.6) | 515 (8.2) | 96 (1.6) | 514 (2.6) |
| Georgia | 38 (3.5) | 438 (8.2) | 62 (3.5) | 427 (4.7) | 30 (3.4) | 444 (9.9) | 70 (3.4) | 426 (4.2) |
| Ghana | 65 (3.9) | 330 (5.7) | 35 (3.9) | 332 (7.9) | 33 (3.8) | 333 (7.3) | 67 (3.8) | 330 (5.4) |
| Hong Kong SAR | 9 (2.7) | 571 (17.6) | 91 (2.7) | 588 (4.3) | 10 (2.4) | 570 (15.8) | 90 (2.4) | 588 (4.2) |
| Hungary | 45 (3.6) | 504 (5.6) | 55 (3.6) | 505 (5.5) | 14 (2.2) | 517 (10.8) | 86 (2.2) | 502 (3.8) |
| Indonesia | 78 (4.0) | 389 (4.5) | 22 (4.0) | 374 (12.3) | 39 (4.1) | 396 (6.2) | 61 (4.1) | 379 (6.0) |
| Iran, Islamic Rep. of | 29 (3.1) | 427 (8.0) | 71 (3.1) | 410 (5.1) | 17 (2.9) | 426 (8.2) | 83 (2.9) | 413 (4.9) |
| Israel | 35 (3.0) | 514 (7.0) | 65 (3.0) | 521 (5.6) | 29 (3.2) | 533 (9.7) | 71 (3.2) | 513 (5.0) |
| Italy | 41 (3.8) | 502 (4.0) | 59 (3.8) | 497 (3.9) | 14 (2.8) | 502 (5.3) | 86 (2.8) | 499 (3.0) |
| Japan | 10 (2.3) | 575 (7.1) | 90 (2.3) | 569 (3.0) | 5 (1.7) | 576 (11.9) | 95 (1.7) | 569 (2.8) |
| Jordan | 60 (3.8) | 401 (5.8) | 40 (3.8) | 413 (5.7) | 15 (2.5) | 412 (10.0) | 85 (2.5) | 405 (4.6) |
| Kazakhstan | 53 (4.1) | 489 (5.5) | 47 (4.1) | 486 (6.5) | 49 (3.8) | 488 (6.7) | 51 (3.8) | 487 (5.8) |
| Korea, Rep. of | 21 (2.5) | 617 (6.1) | 79 (2.5) | 611 (3.2) | 15 (2.5) | 617 (7.7) | 85 (2.5) | 612 (3.0) |
| Lebanon | 33 (4.0) | 443 (6.3) | 67 (4.0) | 453 (4.4) | 16 (3.0) | 437 (8.5) | 84 (3.0) | 453 (4.2) |
| Lithuania | 30 (3.3) | 499 (6.0) | 70 (3.3) | 504 (3.0) | 16 (2.8) | 493 (10.2) | 84 (2.8) | 504 (2.7) |
| Macedonia, Rep. of | r 60 (4.5) | 422 (6.9) | 40 (4.5) | 428 (10.7) | r 38 (4.5) | 432 (10.2) | 62 (4.5) | 421 (7.7) |
| Malaysia | 39 (3.9) | 441 (9.6) | 61 (3.9) | 440 (7.0) | 13 (2.4) | 416 (19.2) | 87 (2.4) | 444 (5.2) |
| Morocco | 32 (3.1) | 376 (4.6) | 68 (3.1) | 369 (3.1) | 13 (2.0) | 387 (6.6) | 87 (2.0) | 369 (2.4) |
| New Zealand | 21 (2.3) | 469 (13.1) | 79 (2.3) | 494 (5.8) | 7 (1.9) | 487 (18.3) | 93 (1.9) | 489 (5.9) |
| Norway | 21 (3.0) | 472 (5.8) | 79 (3.0) | 476 (2.6) | 9 (2.5) | 469 (7.7) | 91 (2.5) | 476 (2.5) |
| Oman | 36 (3.3) | 373 (5.7) | 64 (3.3) | 362 (4.3) | 12 (2.2) | 384 (12.4) | 88 (2.2) | 363 (3.3) |
| Palestinian Nat'l Auth. | 50 (4.4) | 406 (5.3) | 50 (4.4) | 402 (5.4) | 21 (3.5) | 408 (8.2) | 79 (3.5) | 403 (4.2) |
| Qatar | 49 (3.2) | 410 (5.8) | 51 (3.2) | 411 (6.5) | 38 (4.3) | 409 (9.2) | 62 (4.3) | 412 (6.2) |
| Romania | 63 (4.1) | 464 (5.6) | 37 (4.1) | 448 (6.8) | 34 (3.6) | 471 (8.1) | 66 (3.6) | 451 (5.5) |
| Russian Federation | 26 (3.4) | 547 (6.7) | 74 (3.4) | 536 (4.2) | 19 (2.7) | 545 (10.3) | 81 (2.7) | 538 (3.5) |
| Saudi Arabia | 58 (4.3) | 397 (5.4) | 42 (4.3) | 392 (7.1) | 20 (3.2) | 398 (7.8) | 80 (3.2) | 394 (5.1) |
| Singapore | 16 (1.7) | 605 (10.2) | 84 (1.7) | 613 (4.2) | 4 (1.1) | 601 (13.6) | 96 (1.1) | 612 (3.8) |
| Slovenia | 46 (2.7) | 504 (3.3) | 54 (2.7) | 506 (2.7) | 8 (1.4) | 499 (8.7) | 92 (1.4) | 506 (2.0) |
| Sweden | r 18 (2.5) | 491 (6.0) | 82 (2.5) | 485 (2.4) | r 10 (2.3) | 495 (5.8) | 90 (2.3) | 485 (2.2) |
| Syrian Arab Republic | 53 (4.2) | 373 (6.6) | 47 (4.2) | 385 (5.7) | 19 (3.6) | 383 (9.6) | 81 (3.6) | 378 (4.9) |
| Thailand | 42 (4.2) | 437 (7.7) | 58 (4.2) | 419 (6.3) | 19 (3.1) | 446 (13.4) | 81 (3.1) | 423 (4.9) |
| Tunisia | 20 (2.7) | 413 (6.6) | 80 (2.7) | 428 (3.7) | 7 (2.0) | 411 (10.1) | 93 (2.0) | 426 (3.1) |
| Turkey | 51 (3.5) | 450 (6.6) | 49 (3.5) | 455 (5.1) | 19 (2.5) | 460 (12.0) | 81 (2.5) | 451 (4.3) |
| Ukraine | 33 (3.9) | 499 (7.1) | 67 (3.9) | 469 (4.7) | 21 (3.1) | 476 (7.1) | 79 (3.1) | 480 (4.7) |
| United Arab Emirates | 58 (2.5) | 451 (3.7) | 42 (2.5) | 460 (3.7) | 27 (1.9) | 453 (5.9) | 73 (1.9) | 456 (2.5) |
| United States | r 40 (2.4) | 499 (4.4) | 60 (2.4) | 520 (4.1) | r 18 (2.4) | 511 (8.3) | 82 (2.4) | 512 (3.6) |
| International Avg. | 39 (0.5) | 467 (1.2) | 61 (0.5) | 468 (0.8) | 18 (0.4) | 469 (1.8) | 82 (0.4) | 467 (0.7) |

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. 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 8.16: Teachers Relate Lessons to Students' Daily Lives and Bring Interesting Materials to Class (Continued)

| Country | Relate Lessons to Students' Daily Lives | | | | Bring Interesting Materials to Class | | | |
|----------------------------------|---|---------------------|--------------------------------|---------------------|--------------------------------------|---------------------|--------------------------------|---------------------|
| | Every Lesson or Almost Every Lesson | | About Half the Lessons or Less | | Every Lesson or Almost Every Lesson | | About Half the Lessons or Less | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Ninth Grade Participants | | | | | | | | |
| Botswana | 72 (4.1) | 396 (3.3) | 28 (4.1) | 395 (5.7) | 13 (3.0) | 408 (7.7) | 87 (3.0) | 394 (2.6) |
| Honduras | r 67 (4.2) | 337 (6.0) | 33 (4.2) | 337 (7.1) | r 18 (3.6) | 330 (8.8) | 82 (3.6) | 338 (5.2) |
| South Africa | 49 (4.0) | 337 (4.1) | 51 (4.0) | 367 (5.6) | 23 (3.4) | 320 (5.9) | 77 (3.4) | 361 (3.5) |
| Benchmarking Participants | | | | | | | | |
| Alberta, Canada | 41 (3.6) | 507 (4.6) | 59 (3.6) | 503 (3.5) | 12 (2.5) | 499 (8.1) | 88 (2.5) | 506 (2.8) |
| Ontario, Canada | 52 (3.9) | 510 (3.4) | 48 (3.9) | 517 (3.9) | 16 (2.7) | 512 (5.0) | 84 (2.7) | 514 (3.0) |
| Quebec, Canada | 23 (3.3) | 535 (5.9) | 77 (3.3) | 532 (2.7) | 14 (2.7) | 527 (8.6) | 86 (2.7) | 534 (2.7) |
| Abu Dhabi, UAE | 61 (4.3) | 446 (5.9) | 39 (4.3) | 456 (6.1) | 25 (3.4) | 445 (11.7) | 75 (3.4) | 451 (4.2) |
| Dubai, UAE | 51 (4.7) | 471 (5.4) | 49 (4.7) | 482 (5.8) | 33 (3.3) | 477 (6.1) | 67 (3.3) | 476 (3.9) |
| Alabama, US | r 40 (5.7) | 468 (11.0) | 60 (5.7) | 466 (10.8) | r 12 (4.2) | 443 (11.2) | 88 (4.2) | 470 (9.5) |
| California, US | s 33 (6.6) | 481 (10.7) | 67 (6.6) | 497 (8.4) | s 19 (5.5) | 461 (11.2) | 81 (5.5) | 499 (6.6) |
| Colorado, US | r 33 (6.6) | 527 (15.0) | 67 (6.6) | 512 (8.1) | r 18 (4.0) | 546 (8.9) | 82 (4.0) | 510 (6.5) |
| Connecticut, US | r 36 (4.8) | 520 (9.8) | 64 (4.8) | 527 (7.5) | r 14 (4.0) | 512 (22.8) | 86 (4.0) | 526 (6.0) |
| Florida, US | r 41 (6.1) | 513 (13.0) | 59 (6.1) | 521 (9.4) | r 12 (3.5) | 547 (21.4) | 88 (3.5) | 514 (8.4) |
| Indiana, US | r 26 (6.3) | 503 (11.7) | 74 (6.3) | 522 (5.1) | r 15 (5.2) | 507 (12.8) | 85 (5.2) | 519 (5.9) |
| Massachusetts, US | r 27 (6.6) | 533 (12.0) | 73 (6.6) | 571 (7.9) | r 13 (4.8) | 532 (18.1) | 87 (4.8) | 565 (6.7) |
| Minnesota, US | r 27 (5.3) | 551 (12.4) | 73 (5.3) | 545 (6.7) | r 17 (4.8) | 555 (20.4) | 83 (4.8) | 545 (6.0) |
| North Carolina, US | r 45 (6.3) | 549 (10.7) | 55 (6.3) | 530 (9.8) | r 17 (5.6) | 518 (15.7) | 83 (5.6) | 543 (8.0) |

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

Exhibit 8.17: Students Engaged in Mathematics Lessons

Reported by Students

Students were scored according to their degree of agreement with five statements on the *Engaged in Mathematics Lessons* scale. Students **Engaged** in mathematics lessons had a score on the scale of at least 10.2, which corresponds to their “agreeing a lot” with three of the five statements and “agreeing a little” with the other two, on average. Students who were **Not Engaged** had a score no higher than 7.4, which corresponds to their “disagreeing a little” with three of the five statements and “agreeing a little” with the other two, on average. All other students were **Somewhat Engaged** in mathematics lessons.

| Country | Engaged | | Somewhat Engaged | | Not Engaged | | Average Scale Score |
|-----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Tunisia | 65 (1.5) | 376 (4.1) | 32 (1.5) | 339 (4.9) | 3 (0.3) | 295 (9.5) | 11.2 (0.07) |
| Iran, Islamic Rep. of | 59 (1.2) | 442 (3.5) | 36 (1.0) | 418 (4.6) | 4 (0.4) | 390 (9.4) | 10.8 (0.05) |
| Romania | 59 (1.6) | 507 (5.4) | 36 (1.4) | 454 (7.5) | 5 (0.7) | 422 (16.6) | 10.8 (0.07) |
| Malta | 57 (0.7) | 512 (1.4) | 37 (0.7) | 478 (2.5) | 6 (0.4) | 460 (6.4) | 10.7 (0.03) |
| Armenia | 56 (1.3) | 471 (4.0) | 36 (1.0) | 438 (4.1) | 8 (0.7) | 399 (5.3) | 10.8 (0.06) |
| Russian Federation | 56 (1.0) | 551 (3.9) | 40 (0.9) | 533 (4.4) | 5 (0.4) | 523 (5.7) | 10.6 (0.05) |
| Poland | 52 (0.9) | 493 (2.4) | 43 (0.9) | 473 (2.7) | 5 (0.3) | 454 (5.9) | 10.4 (0.03) |
| Portugal | 52 (1.6) | 544 (4.1) | 46 (1.5) | 521 (3.5) | 3 (0.4) | 508 (8.6) | 10.4 (0.07) |
| Hungary | 52 (1.0) | 538 (3.5) | 43 (0.8) | 494 (4.1) | 6 (0.5) | 491 (9.0) | 10.4 (0.04) |
| Kazakhstan | 51 (1.8) | 518 (4.4) | 46 (1.7) | 489 (5.2) | 3 (0.3) | 443 (10.5) | 10.6 (0.07) |
| Bahrain | 49 (1.2) | 457 (2.9) | 44 (1.2) | 426 (3.7) | 6 (0.6) | 407 (8.2) | 10.4 (0.06) |
| Turkey | 49 (1.2) | 505 (3.4) | 47 (1.0) | 445 (4.7) | 4 (0.4) | 380 (7.0) | 10.4 (0.05) |
| Oman | 49 (1.0) | 414 (2.9) | 46 (0.9) | 367 (3.4) | 6 (0.4) | 316 (6.6) | 10.4 (0.04) |
| Serbia | 49 (1.5) | 527 (3.3) | 45 (1.1) | 508 (3.9) | 6 (0.7) | 498 (7.3) | 10.3 (0.07) |
| Slovenia | 48 (1.3) | 520 (2.2) | 47 (1.1) | 509 (2.9) | 5 (0.4) | 484 (8.4) | 10.2 (0.05) |
| Thailand | 48 (1.7) | 470 (4.9) | 47 (1.5) | 451 (5.2) | 5 (0.6) | 415 (11.1) | 10.2 (0.07) |
| Lithuania | 48 (1.1) | 544 (2.5) | 48 (1.1) | 526 (3.2) | 4 (0.4) | 515 (5.9) | 10.2 (0.04) |
| United Arab Emirates | 48 (0.9) | 457 (2.4) | 46 (0.8) | 419 (2.7) | 6 (0.3) | 395 (6.8) | 10.4 (0.04) |
| Czech Republic | 48 (1.4) | 518 (3.0) | 45 (1.1) | 505 (2.5) | 7 (0.7) | 510 (6.2) | 10.2 (0.06) |
| Saudi Arabia | 47 (1.5) | 431 (4.8) | 47 (1.3) | 396 (6.9) | 6 (0.6) | 373 (11.5) | 10.4 (0.07) |
| Kuwait | 46 (1.5) | 369 (3.6) | 46 (1.3) | 330 (4.1) | 9 (0.6) | 318 (8.8) | 10.3 (0.06) |
| United States | 46 (0.8) | 555 (2.0) | 47 (0.7) | 533 (2.1) | 7 (0.3) | 521 (3.4) | 10.1 (0.03) |
| Spain | 45 (1.4) | 499 (2.6) | 47 (1.2) | 472 (3.5) | 7 (0.8) | 468 (5.7) | 10.1 (0.07) |
| Morocco | 45 (1.6) | 363 (5.1) | 47 (1.3) | 319 (4.0) | 8 (1.0) | 293 (8.3) | 10.2 (0.08) |
| Ireland | 45 (1.3) | 538 (3.6) | 47 (1.1) | 522 (3.3) | 8 (0.6) | 516 (5.0) | 10.0 (0.06) |
| Georgia | 44 (1.0) | 474 (3.8) | 53 (1.0) | 443 (3.8) | 3 (0.3) | 409 (10.5) | 10.4 (0.04) |
| Azerbaijan | 43 (1.8) | 495 (7.6) | 54 (1.7) | 461 (4.9) | 3 (0.4) | 410 (11.9) | 10.3 (0.07) |
| Norway | 43 (1.6) | 504 (3.2) | 49 (1.3) | 492 (3.2) | 8 (0.8) | 479 (7.6) | 9.9 (0.07) |
| Germany | 42 (1.0) | 537 (3.0) | 50 (1.0) | 527 (2.8) | 7 (0.5) | 520 (4.6) | 9.9 (0.04) |
| Australia | 41 (1.2) | 534 (3.1) | 50 (1.1) | 506 (3.8) | 9 (0.5) | 503 (5.3) | 9.9 (0.05) |
| England | 41 (1.6) | 548 (4.8) | 51 (1.4) | 540 (3.7) | 8 (0.6) | 538 (7.7) | 9.8 (0.06) |
| Slovak Republic | 40 (1.2) | 521 (4.4) | 54 (1.1) | 500 (3.5) | 7 (0.5) | 485 (7.8) | 9.9 (0.05) |
| Italy | 40 (1.2) | 520 (3.1) | 54 (1.1) | 502 (2.9) | 6 (0.5) | 489 (5.7) | 9.8 (0.04) |
| Northern Ireland | 39 (1.3) | 574 (4.1) | 53 (1.1) | 558 (3.7) | 8 (0.7) | 545 (8.2) | 9.8 (0.05) |
| Austria | 39 (1.1) | 514 (3.2) | 50 (1.0) | 506 (3.0) | 10 (0.8) | 505 (3.7) | 9.8 (0.05) |
| Chile | 39 (1.1) | 483 (3.1) | 54 (0.9) | 452 (2.4) | 7 (0.5) | 437 (5.4) | 9.9 (0.04) |
| Qatar | 39 (1.1) | 454 (4.6) | 52 (1.0) | 399 (4.0) | 9 (0.6) | 379 (8.7) | 10.0 (0.05) |
| Croatia | 38 (1.1) | 497 (2.4) | 52 (1.0) | 488 (2.4) | 10 (0.9) | 480 (4.8) | 9.8 (0.05) |
| New Zealand | 36 (1.0) | 495 (3.1) | 56 (0.9) | 484 (3.0) | 8 (0.4) | 477 (6.1) | 9.7 (0.04) |
| Singapore | 36 (0.8) | 626 (3.2) | 51 (0.7) | 598 (3.4) | 13 (0.6) | 587 (4.3) | 9.6 (0.04) |
| Yemen | 34 (1.8) | 279 (6.8) | 54 (1.6) | 242 (6.1) | 11 (0.9) | 219 (7.4) | 9.8 (0.09) |
| Sweden | 33 (1.3) | 509 (2.9) | 59 (1.0) | 505 (2.0) | 9 (0.8) | 491 (4.8) | 9.5 (0.05) |
| Hong Kong SAR | 33 (1.1) | 618 (4.2) | 52 (0.9) | 595 (3.6) | 15 (0.8) | 590 (4.7) | 9.5 (0.06) |
| Chinese Taipei | 30 (1.1) | 602 (3.0) | 53 (0.9) | 591 (2.4) | 18 (1.1) | 576 (3.5) | 9.3 (0.06) |
| Belgium (Flemish) | 29 (1.1) | 556 (2.7) | 63 (1.1) | 549 (2.1) | 7 (0.5) | 530 (4.5) | 9.4 (0.04) |
| Netherlands | 28 (1.0) | 546 (2.9) | 63 (1.0) | 539 (1.7) | 9 (0.6) | 529 (4.1) | 9.4 (0.04) |
| Denmark | 21 (1.0) | 551 (3.6) | 64 (1.1) | 538 (2.6) | 15 (0.9) | 526 (3.9) | 9.0 (0.04) |
| Finland | 21 (0.9) | 559 (3.1) | 59 (0.9) | 545 (2.5) | 21 (1.0) | 536 (3.3) | 8.8 (0.05) |
| Korea, Rep. of | 13 (0.7) | 629 (4.0) | 62 (0.9) | 607 (2.0) | 25 (1.1) | 589 (3.3) | 8.5 (0.04) |
| Japan | 9 (0.7) | 595 (3.9) | 57 (1.2) | 589 (2.2) | 33 (1.5) | 579 (2.8) | 8.1 (0.05) |
| International Avg. | 42 (0.2) | 507 (0.5) | 49 (0.2) | 482 (0.5) | 8 (0.1) | 464 (1.0) | |

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

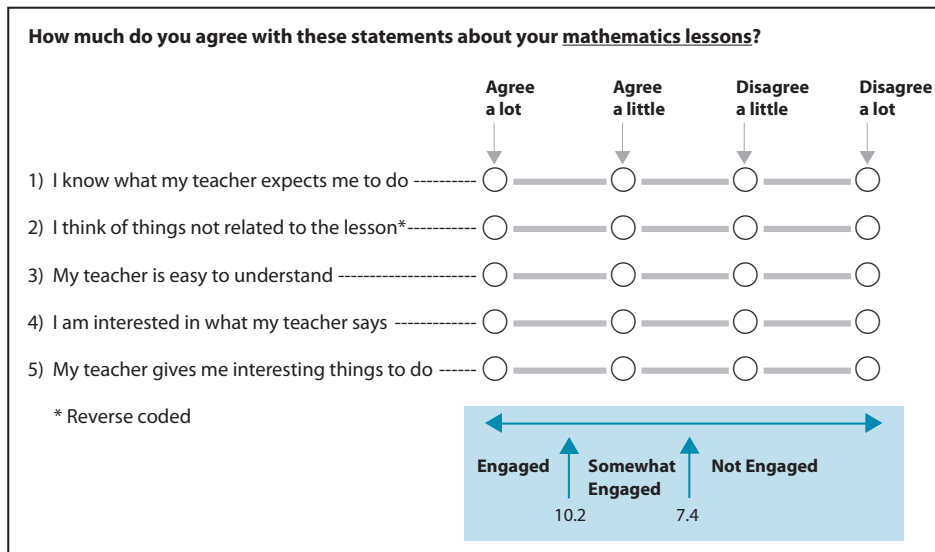
Centerpoint of scale set at 10.

() 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.

Exhibit 8.17: Students Engaged in Mathematics Lessons (Continued)

| Country | Engaged | | Somewhat Engaged | | Not Engaged | | Average Scale Score |
|----------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Sixth Grade Participants | | | | | | | |
| Honduras | 39 (1.3) | 404 (5.5) | 58 (1.2) | 394 (6.0) | 4 (0.4) | 394 (11.1) | 10.0 (0.05) |
| Yemen | 38 (1.7) | 365 (6.9) | 55 (1.4) | 343 (6.0) | 7 (0.7) | 322 (9.2) | 10.0 (0.07) |
| Botswana | 37 (1.2) | 457 (3.6) | 51 (1.0) | 407 (4.1) | 12 (0.8) | 367 (8.3) | 9.7 (0.06) |
| Benchmarking Participants | | | | | | | |
| Dubai, UAE | 50 (1.2) | 490 (2.2) | 44 (1.1) | 455 (2.2) | 6 (0.4) | 424 (7.5) | 10.4 (0.05) |
| Abu Dhabi, UAE | 48 (1.8) | 438 (5.0) | 46 (1.5) | 405 (5.3) | 7 (0.7) | 375 (10.8) | 10.3 (0.08) |
| North Carolina, US | 47 (1.9) | 565 (4.8) | 48 (1.6) | 549 (4.0) | 6 (0.6) | 525 (9.1) | 10.2 (0.08) |
| Florida, US | 47 (1.0) | 559 (3.7) | 47 (1.0) | 535 (3.2) | 6 (0.6) | 539 (6.1) | 10.2 (0.04) |
| Alberta, Canada | 45 (1.4) | 516 (2.9) | 49 (1.2) | 501 (3.0) | 6 (0.5) | 484 (7.0) | 10.1 (0.06) |
| Ontario, Canada | 43 (1.2) | 529 (3.2) | 50 (1.1) | 512 (3.6) | 7 (0.5) | 499 (5.5) | 10.0 (0.05) |
| Quebec, Canada | 39 (1.1) | 545 (2.6) | 52 (1.0) | 528 (3.1) | 8 (0.6) | 514 (5.0) | 9.8 (0.05) |



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

Exhibit 8.18: Students Engaged in Mathematics Lessons

Reported by Students

Students were scored according to their degree of agreement with five statements on the *Engaged in Mathematics Lessons* scale. Students **Engaged** in mathematics lessons had a score on the scale of at least 11.4, which corresponds to their “agreeing a lot” with three of the five statements and “agreeing a little” with the other two, on average. Students who were **Not Engaged** had a score no higher than 8.3, which corresponds to their “disagreeing a little” with three of the five statements and “agreeing a little” with the other two, on average. All other students were **Somewhat Engaged** in mathematics lessons.

| Country | Engaged | | Somewhat Engaged | | Not Engaged | | Average Scale Score |
|-------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Armenia | 51 (1.1) | 483 (3.0) | 42 (1.0) | 456 (3.4) | 7 (0.5) | 445 (5.4) | 11.4 (0.05) |
| Syrian Arab Republic | 47 (1.3) | 395 (4.8) | 45 (1.1) | 372 (4.9) | 8 (0.7) | 361 (9.8) | 11.2 (0.05) |
| Morocco | 45 (0.9) | 387 (2.3) | 47 (0.8) | 363 (2.4) | 8 (0.4) | 354 (6.3) | 11.1 (0.03) |
| Jordan | 44 (1.1) | 435 (3.6) | 48 (0.9) | 393 (4.0) | 8 (0.7) | 369 (8.4) | 11.1 (0.05) |
| Tunisia | 42 (0.9) | 432 (2.7) | 48 (0.7) | 420 (3.6) | 10 (0.6) | 419 (4.6) | 10.9 (0.04) |
| Georgia | 42 (1.5) | 458 (4.8) | 49 (1.2) | 423 (4.4) | 9 (0.7) | 408 (8.4) | 11.0 (0.07) |
| Ghana | 42 (1.2) | 352 (5.0) | 53 (1.1) | 323 (4.4) | 5 (0.4) | 293 (7.5) | 11.1 (0.05) |
| Palestinian Nat'l Auth. | 42 (1.2) | 427 (3.8) | 49 (1.0) | 395 (3.9) | 9 (0.7) | 362 (6.7) | 11.0 (0.05) |
| Ukraine | 39 (1.4) | 493 (4.1) | 52 (1.1) | 478 (4.3) | 10 (0.9) | 446 (6.4) | 10.7 (0.07) |
| Macedonia, Rep. of | 39 (1.4) | 450 (5.5) | 50 (1.2) | 423 (5.4) | 11 (0.8) | 419 (8.4) | 10.8 (0.07) |
| Iran, Islamic Rep. of | 38 (1.1) | 419 (5.3) | 50 (0.9) | 415 (4.6) | 12 (0.8) | 406 (4.8) | 10.7 (0.05) |
| Oman | 38 (0.8) | 401 (2.7) | 54 (0.7) | 355 (3.2) | 9 (0.6) | 311 (7.5) | 10.8 (0.04) |
| Lebanon | 35 (1.5) | 459 (4.4) | 52 (1.3) | 447 (4.3) | 13 (1.0) | 433 (7.3) | 10.6 (0.07) |
| United Arab Emirates | 31 (0.8) | 473 (2.2) | 54 (0.7) | 450 (2.4) | 14 (0.6) | 444 (3.5) | 10.4 (0.04) |
| Bahrain | 30 (0.9) | 427 (3.0) | 54 (1.1) | 408 (3.2) | 16 (0.8) | 389 (6.1) | 10.3 (0.04) |
| Saudi Arabia | 30 (1.3) | 421 (5.7) | 56 (1.0) | 387 (4.7) | 14 (1.0) | 369 (6.2) | 10.3 (0.07) |
| Kazakhstan | 29 (1.6) | 501 (4.6) | 62 (1.5) | 485 (4.5) | 9 (0.9) | 472 (8.7) | 10.5 (0.07) |
| Turkey | 28 (1.0) | 493 (6.8) | 59 (0.9) | 443 (3.5) | 13 (0.7) | 411 (6.0) | 10.3 (0.04) |
| Qatar | 28 (1.6) | 441 (4.7) | 54 (1.3) | 405 (3.9) | 18 (1.0) | 386 (6.2) | 10.2 (0.07) |
| Russian Federation | 24 (1.2) | 557 (4.8) | 58 (1.2) | 540 (3.8) | 17 (1.0) | 513 (4.4) | 10.1 (0.06) |
| Israel | 24 (0.8) | 527 (4.7) | 55 (0.8) | 518 (4.2) | 21 (0.9) | 504 (5.6) | 9.9 (0.04) |
| Malaysia | 24 (1.2) | 440 (5.6) | 59 (0.9) | 442 (5.5) | 17 (1.3) | 436 (8.3) | 10.0 (0.07) |
| Romania | 23 (1.1) | 490 (6.1) | 56 (1.0) | 458 (4.3) | 21 (1.0) | 436 (4.3) | 9.9 (0.06) |
| Chile | 21 (0.9) | 433 (4.0) | 59 (0.9) | 414 (2.8) | 20 (1.1) | 409 (4.5) | 9.9 (0.05) |
| United States | 19 (0.7) | 519 (3.6) | 55 (0.6) | 513 (2.7) | 25 (0.7) | 500 (4.3) | 9.7 (0.04) |
| Hungary | 18 (1.0) | 527 (5.3) | 54 (1.0) | 505 (3.8) | 27 (1.3) | 493 (4.1) | 9.6 (0.06) |
| Thailand | 18 (1.0) | 432 (5.4) | 71 (0.9) | 426 (4.3) | 10 (0.8) | 435 (8.3) | 10.0 (0.04) |
| Lithuania | 17 (1.0) | 516 (3.8) | 57 (1.0) | 503 (2.7) | 25 (1.2) | 496 (3.5) | 9.6 (0.06) |
| Singapore | 16 (0.7) | 620 (4.7) | 59 (0.8) | 614 (3.9) | 25 (0.9) | 599 (4.8) | 9.6 (0.04) |
| Indonesia | 15 (1.2) | 373 (6.6) | 80 (1.1) | 388 (4.1) | 6 (0.7) | 398 (9.1) | 10.0 (0.05) |
| England | 14 (1.0) | 536 (8.6) | 58 (1.2) | 512 (5.4) | 27 (1.7) | 483 (6.6) | 9.4 (0.08) |
| Norway | 14 (0.9) | 496 (4.2) | 58 (0.9) | 480 (2.8) | 28 (1.1) | 454 (3.0) | 9.4 (0.05) |
| Australia | 14 (0.9) | 535 (7.7) | 56 (1.4) | 513 (5.5) | 30 (1.5) | 479 (5.7) | 9.3 (0.06) |
| Italy | 13 (0.8) | 520 (4.3) | 65 (0.9) | 501 (2.6) | 21 (1.3) | 478 (3.5) | 9.6 (0.05) |
| New Zealand | 12 (0.7) | 510 (6.9) | 56 (1.2) | 496 (5.8) | 32 (1.4) | 470 (5.0) | 9.3 (0.06) |
| Hong Kong SAR | 10 (0.8) | 626 (6.4) | 55 (1.2) | 595 (4.0) | 35 (1.6) | 561 (4.8) | 9.1 (0.07) |
| Sweden | 8 (0.5) | 510 (4.8) | 59 (0.9) | 491 (2.3) | 33 (1.0) | 470 (2.5) | 9.1 (0.04) |
| Slovenia | 7 (0.5) | 526 (6.6) | 59 (1.3) | 508 (2.5) | 34 (1.5) | 495 (3.0) | 9.0 (0.05) |
| Chinese Taipei | 6 (0.5) | 669 (7.5) | 43 (1.4) | 637 (3.9) | 51 (1.7) | 579 (3.7) | 8.5 (0.06) |
| Finland | 6 (0.5) | 543 (5.7) | 50 (1.3) | 524 (2.8) | 44 (1.5) | 500 (2.8) | 8.7 (0.06) |
| Japan | 3 (0.4) | 609 (10.5) | 35 (1.5) | 586 (3.7) | 62 (1.7) | 558 (2.9) | 8.1 (0.06) |
| Korea, Rep. of | 2 (0.2) | ~ ~ | 34 (1.2) | 644 (4.0) | 64 (1.2) | 594 (3.0) | 8.0 (0.04) |
| International Avg. | 25 (0.2) | 484 (0.8) | 54 (0.2) | 468 (0.6) | 21 (0.2) | 449 (0.9) | |

Centerpoint of scale set at 10.

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

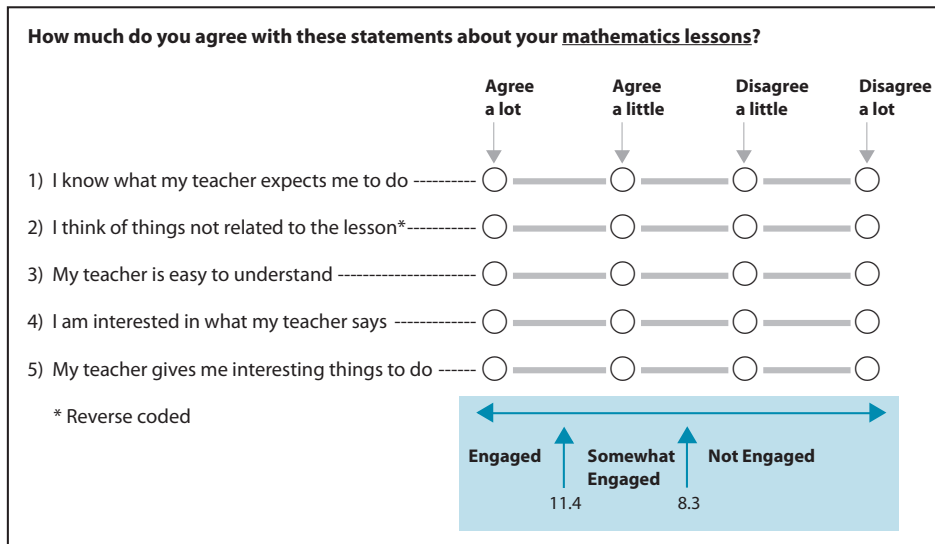
A tilde (~) indicates insufficient data to report achievement.

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

Exhibit 8.18: Students Engaged in Mathematics Lessons (Continued)

| Country | Engaged | | Somewhat Engaged | | Not Engaged | | Average Scale Score |
|----------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Ninth Grade Participants | | | | | | | |
| Botswana | 38 (1.2) | 419 (2.5) | 50 (0.9) | 391 (2.7) | 12 (0.7) | 367 (6.2) | 10.7 (0.05) |
| South Africa | 35 (1.0) | 366 (2.3) | 54 (0.7) | 352 (2.7) | 10 (0.6) | 346 (7.0) | 10.7 (0.05) |
| Honduras | 32 (1.2) | 348 (4.3) | 57 (1.1) | 333 (3.8) | 11 (1.0) | 351 (7.7) | 10.6 (0.06) |
| Benchmarking Participants | | | | | | | |
| Abu Dhabi, UAE | 30 (1.2) | 471 (3.9) | 55 (1.0) | 442 (4.4) | 15 (1.0) | 434 (6.9) | 10.3 (0.06) |
| Dubai, UAE | 29 (1.1) | 488 (3.4) | 54 (1.1) | 477 (2.7) | 16 (0.8) | 466 (4.1) | 10.2 (0.05) |
| Ontario, Canada | 24 (1.2) | 528 (3.4) | 59 (1.1) | 509 (2.9) | 17 (1.1) | 492 (4.9) | 10.0 (0.06) |
| North Carolina, US | 22 (1.7) | 548 (8.5) | 57 (1.5) | 537 (7.6) | 20 (2.3) | 527 (8.9) | 9.9 (0.11) |
| Connecticut, US | 21 (1.5) | 545 (6.3) | 57 (1.2) | 521 (5.0) | 22 (1.6) | 495 (6.2) | 9.7 (0.08) |
| Alabama, US | 19 (2.2) | 471 (7.8) | 54 (1.6) | 464 (7.1) | 27 (2.2) | 470 (6.4) | 9.6 (0.12) |
| California, US | 18 (1.3) | 504 (7.6) | 56 (1.4) | 494 (5.3) | 27 (1.8) | 486 (4.9) | 9.6 (0.08) |
| Colorado, US | 17 (1.7) | 542 (5.9) | 54 (1.7) | 522 (5.2) | 29 (2.5) | 497 (6.5) | 9.5 (0.11) |
| Massachusetts, US | 16 (1.6) | 571 (6.5) | 57 (1.9) | 564 (5.9) | 26 (2.3) | 549 (6.3) | 9.5 (0.10) |
| Minnesota, US | 16 (1.3) | 563 (6.7) | 58 (1.3) | 549 (5.1) | 26 (1.7) | 527 (5.3) | 9.5 (0.08) |
| Florida, US | 15 (1.2) | 528 (7.3) | 57 (1.6) | 517 (6.8) | 28 (1.8) | 505 (7.9) | 9.5 (0.08) |
| Indiana, US | 15 (1.3) | 534 (7.1) | 56 (1.6) | 525 (5.8) | 29 (2.3) | 510 (6.1) | 9.4 (0.10) |
| Alberta, Canada | 14 (0.9) | 513 (4.7) | 59 (1.2) | 510 (2.5) | 27 (1.6) | 490 (3.8) | 9.5 (0.07) |
| Quebec, Canada | 13 (0.8) | 542 (4.1) | 60 (1.0) | 536 (2.4) | 27 (1.4) | 519 (2.7) | 9.4 (0.06) |

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



and benchmarking participants, students often had somewhat higher average mathematics achievement if their teachers used engaging instruction in **Most Lessons** rather than **About Half the Lessons**.

Exhibits 8.17 and 8.18 present the results for the TIMSS 2011 Engaged in Mathematics Lessons scale that looks at engagement from the student perspective. This scale asks how much students agree with the following five statements:

- ◆ I know what my teacher expects me to do;
- ◆ I think of things not related to the lesson (reverse coded);
- ◆ My teacher is easy to understand;
- ◆ I am interested in what my teacher says; and
- ◆ My teacher gives me interesting things to do.

Students considered to be **Engaged** “agreed a lot” with three of the statements and “agreed a little” with the other two, on average, whereas students in the **Not Engaged** category “agreed a little” with two statements and “disagreed a little” with the other three, on average. All other students were considered to be **Somewhat Engaged**.

At the fourth grade, internationally, on average, 42 percent of the fourth grade students reported being **Engaged** during their mathematics lessons, another 49 percent reported being **Somewhat Engaged**, and only 8 percent reported being **Not Engaged**. Across the fourth grade, sixth grade, and benchmarking participants, there was a positive relationship between students’ reports about being more engaged and average mathematics achievement. **Engaged** students had higher achievement than their counterparts who reported being only **Somewhat Engaged**, and students **Not Engaged** had the lowest achievement (507 vs. 482 and 464, respectively).

At the eighth grade, internationally, on average, smaller percentages of students than at the fourth grade reported being engaged in their mathematics lessons. Only 25 percent of eighth grade students, on average, reported being **Engaged** during their mathematics lessons. The majority (54%) reported being **Somewhat Engaged** and 21 percent reported being **Not Engaged**. In general, across the eighth grade, ninth grade, and benchmarking participants, there was a direct relationship between student engagement and average mathematics achievement—the more engaged students reported being, the higher their average mathematics achievement.

Students Ready to Learn

Instruction Limited by Students Lacking Prerequisite Knowledge or Skills

The characteristics of the students themselves can be very important to the classroom atmosphere. To begin, students need the prerequisite mathematics skills before they can make gains in achievement. Because prior knowledge guides learning, effective mathematics teachers assess students' knowledge, skills, and conceptual understanding, and link new ideas, skills, and competencies to prior understandings. Lack of prerequisite knowledge and skills are psychological barriers to further mathematics learning, because it is well known that students' new learning depends on that prior knowledge: "Every new thing that a person learns must be attached to what the person already knows" (McLaughlin et al., 2005, p. 5).

Exhibit 8.19 presents teachers' reports at the fourth grade about whether their mathematics instruction was limited by students lacking prerequisite knowledge or skills. On average, internationally, 27 percent of the fourth grade students were in classes where students had the necessary prerequisite skills for mathematics instruction to proceed according to teachers' plans, and 61 percent were in classes where instruction was limited to some extent. It is consistent with teachers' reports that the students in classes where instruction was progressing unimpeded had higher average mathematics achievement than did their counterparts in classes where instruction was limited to some extent (506 vs. 489). Also consistent with teachers' reports, average mathematics achievement was substantially lower (467) for the fourth grade students in classrooms where instruction was limited "a lot" because students lacked the prerequisite knowledge or skills. This overall pattern also was evidenced at sixth grade and for the benchmarking participants.

Exhibit 8.20 presents teachers' reports at the eighth grade about whether their mathematics instruction was limited by students lacking prerequisite knowledge or skills. On average, internationally, only 15 percent of the eighth grade students were in classes where students had the necessary prerequisite skills for mathematics instruction to proceed according to teachers' plans. According to their teachers, 57 percent were in classes where instruction was limited to some extent and 28 percent in classes where instruction was limited "a lot." As students progress through school, the curriculum becomes increasingly advanced and, not surprisingly, greater percentages of students fall behind, which typically results in some differentiation in instruction for different groups of students. Especially, taking into account some type of tailored curriculum

Exhibit 8.19: Instruction Limited by Students Lacking Prerequisite Knowledge or Skills

Reported by Teachers

| Country | Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills | | | | | |
|-----------------------|--|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Not At All | | Some | | A Lot | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Kazakhstan | 64 (3.6) | 504 (5.3) | 30 (3.6) | 492 (9.9) | 5 (1.8) | 532 (14.0) |
| Japan | 55 (3.9) | 590 (2.4) | 42 (4.0) | 581 (2.8) | 3 (1.3) | 571 (5.9) |
| Russian Federation | 43 (3.8) | 543 (5.5) | 45 (3.3) | 544 (5.1) | 12 (2.6) | 528 (6.8) |
| Denmark | 43 (3.8) | 548 (2.8) | 53 (3.8) | 533 (3.6) | 4 (1.4) | 533 (16.5) |
| Norway | 43 (4.6) | 504 (3.9) | 54 (4.8) | 491 (4.2) | 3 (1.7) | 457 (12.8) |
| Finland | 42 (3.5) | 554 (2.6) | 56 (3.5) | 541 (3.4) | 2 (0.5) | ~ ~ |
| Belgium (Flemish) | 41 (3.3) | 555 (2.7) | 50 (3.4) | 548 (2.8) | 8 (1.8) | 527 (7.1) |
| Slovak Republic | 39 (3.5) | 523 (3.6) | 54 (3.4) | 500 (5.3) | 7 (1.3) | 466 (14.1) |
| Azerbaijan | 38 (3.6) | 486 (10.1) | 60 (3.7) | 452 (6.4) | 2 (0.8) | ~ ~ |
| Ireland | 37 (3.7) | 543 (3.5) | 55 (4.0) | 524 (4.0) | 8 (1.9) | 480 (7.1) |
| Georgia | 36 (3.5) | 455 (6.8) | 62 (3.6) | 450 (5.0) | 2 (0.7) | ~ ~ |
| Croatia | 35 (3.2) | 492 (3.1) | 61 (3.4) | 489 (2.8) | 4 (1.6) | 487 (11.8) |
| Slovenia | 33 (3.9) | 527 (3.6) | 57 (3.7) | 509 (2.6) | 11 (2.3) | 494 (3.5) |
| Sweden r | 32 (4.2) | 513 (4.3) | 61 (4.3) | 504 (3.1) | 7 (1.6) | 481 (6.4) |
| Netherlands r | 32 (4.1) | 551 (2.9) | 62 (4.3) | 534 (2.9) | 6 (2.3) | 527 (9.0) |
| Australia r | 31 (3.2) | 543 (7.1) | 60 (4.1) | 513 (4.1) | 10 (2.4) | 479 (6.7) |
| Austria | 30 (3.1) | 520 (3.0) | 56 (2.7) | 509 (3.1) | 14 (2.6) | 477 (5.1) |
| Hungary | 28 (3.1) | 539 (7.5) | 62 (3.2) | 511 (4.7) | 9 (2.1) | 464 (13.5) |
| Spain | 28 (3.7) | 497 (4.6) | 62 (3.7) | 482 (3.1) | 10 (2.2) | 444 (10.3) |
| Romania | 28 (3.5) | 507 (8.6) | 67 (3.5) | 475 (7.1) | 5 (1.4) | 415 (51.0) |
| Korea, Rep. of | 28 (3.9) | 608 (4.3) | 57 (4.1) | 606 (2.5) | 15 (3.0) | 594 (4.9) |
| Czech Republic | 28 (3.8) | 520 (3.8) | 69 (3.7) | 509 (2.8) | 3 (1.3) | 461 (30.6) |
| Singapore | 27 (2.6) | 642 (5.7) | 58 (3.0) | 603 (3.5) | 15 (2.1) | 549 (8.3) |
| Qatar | 27 (4.5) | 442 (10.0) | 62 (5.1) | 408 (5.4) | 10 (2.2) | 366 (10.9) |
| Hong Kong SAR | 27 (4.0) | 618 (5.6) | 65 (4.5) | 601 (3.4) | 8 (2.4) | 559 (16.4) |
| Armenia | 26 (3.3) | 456 (6.8) | 70 (3.4) | 451 (4.4) | 4 (1.7) | 451 (21.8) |
| Northern Ireland r | 26 (3.6) | 574 (7.4) | 68 (3.9) | 560 (4.2) | 6 (2.1) | 543 (14.9) |
| Serbia | 24 (3.4) | 530 (5.1) | 70 (3.6) | 514 (3.5) | 6 (2.5) | 487 (16.8) |
| Portugal | 24 (3.5) | 544 (5.4) | 65 (3.9) | 530 (4.7) | 10 (2.1) | 516 (7.8) |
| New Zealand | 24 (3.1) | 503 (5.8) | 64 (3.0) | 486 (2.8) | 12 (1.6) | 453 (7.6) |
| England | 23 (3.3) | 578 (7.3) | 65 (4.1) | 541 (4.3) | 13 (2.9) | 501 (10.0) |
| Germany | 23 (3.3) | 541 (3.6) | 68 (3.4) | 528 (2.7) | 9 (1.9) | 498 (11.0) |
| United Arab Emirates | 22 (2.0) | 465 (5.7) | 65 (2.2) | 429 (3.4) | 13 (1.6) | 408 (8.8) |
| Italy | 21 (2.4) | 499 (6.3) | 55 (3.7) | 513 (3.7) | 24 (3.4) | 509 (6.2) |
| Poland | 20 (2.9) | 486 (5.9) | 71 (3.4) | 482 (2.3) | 10 (2.0) | 467 (7.7) |
| Chinese Taipei | 19 (3.1) | 600 (4.5) | 74 (3.5) | 591 (2.4) | 7 (2.1) | 568 (10.6) |
| Oman | 19 (1.9) | 398 (5.2) | 55 (2.8) | 384 (4.3) | 26 (2.7) | 381 (5.3) |
| Malta | 17 (0.1) | 508 (2.3) | 64 (0.1) | 497 (1.7) | 19 (0.1) | 480 (3.0) |
| Saudi Arabia | 17 (3.1) | 430 (10.4) | 60 (4.1) | 410 (7.2) | 23 (3.2) | 398 (9.6) |
| Lithuania | 16 (2.1) | 549 (6.5) | 74 (2.7) | 532 (2.8) | 10 (2.1) | 521 (5.8) |
| Iran, Islamic Rep. of | 16 (2.6) | 467 (8.9) | 64 (3.7) | 430 (5.0) | 20 (2.9) | 401 (8.8) |
| United States r | 16 (2.5) | 566 (4.8) | 65 (2.9) | 544 (2.5) | 19 (1.9) | 518 (4.1) |
| Bahrain | 15 (3.6) | 473 (11.3) | 72 (4.2) | 433 (4.6) | 13 (2.5) | 411 (6.0) |
| Chile | 15 (3.1) | 482 (9.4) | 65 (3.9) | 462 (4.2) | 20 (3.2) | 450 (8.7) |
| Yemen | 14 (2.6) | 268 (16.5) | 62 (4.2) | 247 (7.3) | 25 (4.1) | 236 (11.8) |
| Kuwait | 12 (2.7) | 347 (8.5) | 70 (3.5) | 341 (4.1) | 17 (2.9) | 340 (8.1) |
| Thailand | 12 (2.3) | 500 (12.3) | 70 (3.8) | 459 (5.0) | 18 (3.4) | 432 (12.9) |
| Morocco | 10 (2.3) | 343 (12.0) | 52 (4.4) | 346 (8.4) | 38 (4.5) | 326 (5.4) |
| Tunisia | 8 (1.7) | 376 (9.9) | 61 (4.3) | 366 (5.2) | 31 (4.1) | 344 (7.0) |
| Turkey | 6 (1.7) | 510 (13.1) | 60 (3.5) | 481 (6.6) | 34 (3.4) | 441 (7.8) |
| International Avg. | 27 (0.5) | 506 (1.0) | 61 (0.5) | 489 (0.6) | 12 (0.3) | 467 (1.9) |

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 8.19: Instruction Limited by Students Lacking Prerequisite Knowledge or Skills (Continued)

| Country | Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills | | | | | |
|----------------------------------|--|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Not At All | | Some | | A Lot | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Sixth Grade Participants | | | | | | |
| Honduras | 20 (3.7) | 422 (16.9) | 68 (4.1) | 386 (6.1) | 12 (2.8) | 404 (12.8) |
| Yemen | 13 (2.9) | 351 (16.7) | 67 (4.4) | 351 (6.9) | 20 (3.7) | 336 (13.5) |
| Botswana | 6 (2.3) | 494 (27.7) | 56 (4.3) | 428 (4.9) | 38 (4.0) | 398 (5.5) |
| Benchmarking Participants | | | | | | |
| Dubai, UAE | r 34 (3.8) | 492 (7.3) | 60 (3.9) | 463 (5.0) | 6 (1.2) | 463 (14.4) |
| Quebec, Canada | 27 (3.9) | 550 (4.4) | 58 (4.8) | 528 (2.8) | 15 (2.9) | 520 (4.4) |
| Abu Dhabi, UAE | 23 (3.6) | 440 (9.8) | 66 (4.3) | 414 (5.8) | 12 (2.9) | 403 (20.0) |
| Alberta, Canada | r 18 (3.9) | 514 (7.6) | 67 (4.7) | 508 (2.8) | 15 (3.2) | 489 (9.2) |
| Ontario, Canada | 16 (2.6) | 540 (4.6) | 66 (3.7) | 520 (3.8) | 18 (3.0) | 495 (5.5) |
| Florida, US | r 12 (3.1) | 573 (14.6) | 65 (5.2) | 548 (3.9) | 23 (4.9) | 520 (6.3) |
| North Carolina, US | 7 (2.2) | 595 (14.7) | 62 (4.9) | 556 (5.2) | 32 (4.9) | 541 (7.1) |

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

Exhibit 8.20: Instruction Limited by Students Lacking Prerequisite Knowledge or Skills

Reported by Teachers

| Country | Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills | | | | | |
|-------------------------|--|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Not At All | | Some | | A Lot | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Kazakhstan | 54 (3.6) | 494 (5.6) | 36 (3.5) | 480 (7.0) | 10 (2.5) | 479 (12.5) |
| Japan | 42 (3.9) | 590 (4.1) | 53 (3.9) | 557 (3.6) | 6 (1.8) | 538 (10.2) |
| Korea, Rep. of | 30 (2.6) | 623 (6.5) | 52 (3.1) | 612 (4.7) | 18 (2.6) | 598 (6.4) |
| Lebanon | 28 (3.8) | 461 (6.9) | 57 (4.5) | 446 (5.7) | 15 (3.0) | 440 (10.2) |
| Russian Federation | 27 (3.0) | 568 (6.7) | 43 (3.0) | 536 (5.3) | 30 (3.1) | 518 (6.1) |
| Israel | 27 (3.0) | 560 (8.4) | 52 (2.9) | 519 (5.7) | 21 (2.6) | 469 (8.8) |
| Malaysia | 26 (3.5) | 465 (12.9) | 52 (3.6) | 449 (6.0) | 22 (3.4) | 391 (10.1) |
| England | 24 (3.3) | 552 (9.0) | 60 (4.4) | 507 (6.3) | 15 (3.1) | 428 (13.6) |
| Sweden | r 24 (3.0) | 509 (4.3) | 59 (3.4) | 485 (2.6) | 17 (2.6) | 457 (5.2) |
| Singapore | 22 (2.0) | 659 (6.7) | 64 (2.6) | 605 (4.3) | 14 (2.0) | 561 (11.0) |
| Australia | r 19 (3.0) | 567 (12.1) | 62 (4.0) | 507 (6.5) | 19 (2.9) | 452 (8.7) |
| Qatar | 18 (3.0) | 431 (15.7) | 62 (2.8) | 411 (5.5) | 20 (2.4) | 385 (7.3) |
| Finland | 17 (3.0) | 539 (4.1) | 68 (3.3) | 515 (2.3) | 15 (2.9) | 484 (6.7) |
| Macedonia, Rep. of | r 16 (2.6) | 397 (11.6) | 58 (3.8) | 436 (7.4) | 26 (3.9) | 413 (13.5) |
| Ghana | 15 (3.0) | 342 (9.9) | 70 (3.7) | 332 (5.5) | 15 (2.9) | 311 (5.7) |
| Italy | 15 (2.9) | 516 (6.4) | 59 (3.6) | 505 (3.1) | 26 (3.5) | 477 (6.4) |
| Hong Kong SAR | 15 (3.1) | 613 (12.4) | 72 (4.0) | 596 (5.0) | 13 (2.3) | 485 (14.2) |
| New Zealand | 15 (3.5) | 534 (7.2) | 59 (3.7) | 492 (7.7) | 26 (2.7) | 453 (5.9) |
| Slovenia | 14 (2.0) | 538 (5.3) | 66 (2.5) | 507 (2.2) | 19 (1.9) | 476 (5.2) |
| United Arab Emirates | 14 (1.6) | 472 (7.6) | 72 (2.1) | 457 (3.0) | 15 (1.5) | 430 (5.5) |
| Norway | 13 (2.9) | 486 (4.0) | 67 (4.2) | 477 (3.0) | 20 (3.4) | 462 (4.6) |
| Hungary | 13 (2.1) | 550 (9.8) | 70 (3.2) | 506 (3.6) | 17 (2.7) | 462 (9.4) |
| United States | r 12 (1.7) | 566 (10.5) | 59 (2.5) | 516 (3.5) | 29 (2.3) | 480 (4.6) |
| Chinese Taipei | 12 (2.4) | 647 (14.7) | 46 (3.7) | 617 (4.6) | 43 (3.8) | 591 (5.9) |
| Morocco | 11 (1.8) | 399 (9.0) | 38 (2.9) | 385 (3.7) | 51 (3.1) | 355 (3.2) |
| Chile | 11 (2.2) | 446 (7.4) | 40 (4.2) | 438 (5.8) | 49 (4.1) | 394 (4.3) |
| Romania | 11 (2.4) | 507 (21.5) | 61 (3.6) | 457 (5.0) | 28 (3.6) | 441 (7.3) |
| Saudi Arabia | 10 (2.7) | 405 (16.2) | 57 (4.1) | 401 (5.4) | 33 (4.0) | 383 (8.2) |
| Lithuania | 10 (2.1) | 529 (13.6) | 61 (3.3) | 506 (3.9) | 30 (3.1) | 488 (4.8) |
| Ukraine | 8 (2.3) | 498 (9.3) | 49 (4.7) | 485 (6.3) | 43 (4.4) | 469 (6.6) |
| Bahrain | 8 (0.8) | 435 (8.5) | 55 (1.9) | 415 (3.6) | 37 (2.0) | 397 (4.4) |
| Syrian Arab Republic | 8 (2.2) | 395 (15.2) | 60 (4.3) | 382 (5.7) | 32 (4.2) | 369 (8.8) |
| Thailand | 7 (2.0) | 467 (22.7) | 63 (4.2) | 429 (6.4) | 30 (4.1) | 412 (5.7) |
| Armenia | 7 (1.6) | 476 (9.0) | 75 (3.4) | 466 (3.7) | 18 (3.2) | 461 (9.1) |
| Oman | 6 (1.0) | 372 (12.0) | 49 (3.6) | 379 (4.4) | 45 (3.6) | 351 (4.5) |
| Jordan | 6 (1.3) | 428 (14.9) | 48 (4.4) | 413 (6.1) | 46 (4.4) | 395 (6.1) |
| Tunisia | 5 (1.7) | 419 (7.0) | 54 (3.8) | 431 (4.3) | 40 (3.9) | 417 (3.8) |
| Georgia | 5 (1.5) | 425 (26.8) | 70 (3.4) | 437 (5.3) | 25 (3.1) | 412 (7.2) |
| Palestinian Nat'l Auth. | 5 (1.8) | 400 (14.3) | 43 (4.3) | 417 (5.7) | 53 (4.4) | 395 (5.7) |
| Iran, Islamic Rep. of | 5 (1.3) | 423 (20.5) | 50 (3.5) | 424 (6.6) | 45 (3.2) | 404 (5.4) |
| Indonesia | 5 (1.7) | 407 (12.4) | 58 (4.6) | 393 (5.4) | 38 (4.6) | 372 (8.0) |
| Turkey | 2 (1.0) | ~ ~ | 34 (3.2) | 476 (7.4) | 64 (3.2) | 437 (4.4) |
| International Avg. | 15 (0.4) | 490 (1.9) | 57 (0.6) | 471 (0.8) | 28 (0.5) | 443 (1.2) |

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 8.20: Instruction Limited by Students Lacking Prerequisite Knowledge or Skills (Continued)

| Country | Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills | | | | | |
|----------------------------------|--|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Not At All | | Some | | A Lot | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Ninth Grade Participants | | | | | | |
| Botswana | 11 (2.6) | 413 (9.2) | 43 (3.9) | 402 (3.6) | 46 (4.0) | 387 (3.6) |
| Honduras | r 9 (2.9) | 335 (18.0) | 54 (4.8) | 348 (7.0) | 36 (4.4) | 323 (5.5) |
| South Africa | 7 (1.4) | 365 (11.7) | 59 (3.4) | 347 (4.0) | 34 (3.0) | 361 (4.3) |
| Benchmarking Participants | | | | | | |
| Quebec, Canada | 21 (3.5) | 570 (5.0) | 46 (4.2) | 530 (3.5) | 34 (3.7) | 513 (5.2) |
| Dubai, UAE | 19 (2.4) | 503 (10.8) | 66 (3.5) | 476 (3.3) | 15 (2.6) | 445 (9.0) |
| Massachusetts, US | r 18 (5.1) | 592 (12.0) | 59 (6.3) | 564 (8.8) | 23 (5.2) | 533 (9.3) |
| Connecticut, US | r 18 (4.5) | 547 (16.6) | 60 (5.6) | 530 (7.4) | 22 (4.6) | 489 (14.4) |
| Ontario, Canada | 16 (2.3) | 526 (4.8) | 66 (3.5) | 513 (3.4) | 18 (2.7) | 503 (7.1) |
| North Carolina, US | r 15 (4.8) | 581 (22.8) | 55 (6.4) | 542 (9.6) | 30 (5.3) | 510 (8.1) |
| California, US | s 12 (4.6) | 536 (16.3) | 47 (6.8) | 509 (9.7) | 40 (6.1) | 458 (8.4) |
| Florida, US | r 12 (3.0) | 596 (7.9) | 48 (6.8) | 519 (9.4) | 40 (6.4) | 495 (11.3) |
| Alberta, Canada | 12 (2.5) | 528 (7.9) | 72 (3.3) | 503 (3.3) | 17 (2.5) | 497 (5.4) |
| Minnesota, US | r 12 (3.1) | 595 (10.3) | 63 (3.8) | 557 (6.8) | 25 (4.6) | 500 (10.9) |
| Abu Dhabi, UAE | 10 (2.3) | 466 (17.0) | 75 (3.5) | 452 (4.7) | 15 (2.8) | 427 (8.2) |
| Indiana, US | r 10 (3.5) | 593 (10.4) | 68 (5.6) | 514 (6.5) | 22 (4.5) | 492 (11.6) |
| Colorado, US | r 6 (2.5) | 562 (31.2) | 56 (5.4) | 540 (6.7) | 38 (5.1) | 475 (8.9) |
| Alabama, US | r 4 (2.8) | 551 (7.0) | 63 (5.5) | 479 (10.4) | 34 (5.8) | 435 (7.6) |

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

and instruction for groups of students, it is distressing that, according to their teachers, relatively few students at the eighth grade are receiving the full instructional benefit that could be provided.

Eighth grade students in classes where instruction was not limited had higher average mathematics achievement than did their counterparts in classes where instruction was limited to some extent (490 vs. 471). Also consistent with teachers' reports, average mathematics achievement was substantially lower (443) for the eighth grade students in classrooms where instruction was limited "a lot" because students lacked the prerequisite knowledge or skills. This pattern also was evidenced at the ninth grade and for the benchmarking participants.

Instruction Limited by Students Suffering from Lack of Nutrition or Sleep

The importance of a healthy breakfast is widely advertised, including the benefit of doing better in school. Unfortunately, some children in many countries around the world suffer from hunger, and a growing body of research, mostly in developing countries, is providing evidence that malnutrition has a negative impact on educational achievement. Similarly, a number of studies in a variety of countries have shown sleep duration and quality to be related to academic functioning at school. For example, a Dutch researcher found that chronic sleep reduction can affect school achievement directly and indirectly via motivation and engagement (Meijer, 2008).

Exhibit 8.21 presents teachers' reports at the fourth grade about the degree to which their mathematics instruction was limited by students' lack of nutrition or not having enough sleep. On average, internationally, 71 percent of the fourth grade students were in classrooms where instruction was "not at all" limited because students were lacking in basic nutrition. These fourth grade students had higher average mathematics achievement than their peers in classrooms where instruction was limited "some" or "a lot" due to lack of basic nutrition (498 vs. 472). It is of considerable concern that 29 percent of fourth grade students, on average, were reported to be suffering from lack of basic nutrition; and this percentage is much higher in some countries, including those that participated at the sixth grade.

Teachers reported that 53 percent of the fourth grade students, on average, were in classrooms where instruction was "not at all" limited by students suffering from not enough sleep. However, it is unfortunate that 47 percent, on average, were in classrooms where instruction was limited "some" or "a lot" by students suffering from lack of sleep. The achievement gap for sleep

deprivation was somewhat less than that related to lack of nutrition, but the fourth grade students suffering from some amount of sleep deprivation did have lower average mathematics achievement than their more alert counterparts (by 11 points on average). Again, there was considerable variation across countries in teachers' reports about the percentages of fourth grade students suffering from not enough sleep. According to their teachers, in a number of TIMSS 2011 countries and benchmarking participants, the majority of students were at least somewhat sleep deprived.

Exhibit 8.22 presents the eighth grade teachers' reports about the degree to which their instruction was limited by students' lack of nutrition or not having enough sleep. On average, internationally, 63 percent of the eighth grade students were in classrooms where instruction was "not at all" limited because students were lacking in basic nutrition. These eighth grade students had higher average mathematics achievement than their peers in classrooms where instruction was limited "some" or "a lot" due to lack of basic nutrition (477 vs. 449). More than one-third (37%) of the eighth grade students, on average, were reported to be suffering from lack of basic nutrition; and this percentage was much higher in some countries, including those that participated at the ninth grade.

Teachers reported that 43 percent of the eighth grade students, on average, were in classrooms where instruction was "not at all" limited by students suffering from not enough sleep. However, again, it is a matter of considerable concern that the majority of eighth grade students (57%), on average, were in classrooms where instruction was limited "some" or "a lot" by students suffering from lack of sleep. Similar to the results at the fourth grade, the achievement gap for sleep deprivation was somewhat less than that related to lack of nutrition, but the eighth grade students suffering from some amount of sleep deprivation did have lower average mathematics achievement than their counterparts (by 16 points). Again, there was considerable variation across countries in teachers' reports about the percentages of eighth grade students suffering from not enough sleep. According to their teachers, however, in a number of TIMSS 2011 countries and benchmarking participants, at least two-thirds of students were at least somewhat sleep deprived.

Exhibit 8.21: Instruction Limited by Students Suffering from Lack of Nutrition or Sleep

Reported by Teachers

| Country | Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition | | | | Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep | | | |
|-----------------------|--|---------------------|---------------------|---------------------|---|---------------------|---------------------|---------------------|
| | Not At All | | Some or A Lot | | Not At All | | Some or A Lot | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Armenia | 33 (3.9) | 462 (6.6) | 67 (3.9) | 448 (4.5) | 52 (4.6) | 458 (5.7) | 48 (4.6) | 444 (5.2) |
| Australia | r 73 (3.0) | 531 (3.7) | 27 (3.0) | 486 (6.7) | r 33 (3.5) | 539 (6.2) | 67 (3.5) | 509 (5.1) |
| Austria | -- | -- | -- | -- | 40 (3.5) | 518 (3.0) | 60 (3.5) | 501 (3.3) |
| Azerbaijan | 59 (3.2) | 475 (7.7) | 41 (3.2) | 452 (9.2) | 84 (2.9) | 466 (6.5) | 16 (2.9) | 458 (11.6) |
| Bahrain | 57 (4.4) | 448 (5.0) | 43 (4.4) | 421 (4.6) | 52 (4.8) | 441 (5.4) | 48 (4.8) | 431 (5.1) |
| Belgium (Flemish) | 95 (1.5) | 551 (2.0) | 5 (1.5) | 518 (8.0) | 62 (3.6) | 554 (2.5) | 38 (3.6) | 542 (3.1) |
| Chile | 58 (3.5) | 477 (3.5) | 42 (3.5) | 442 (5.2) | 37 (4.3) | 482 (5.5) | 63 (4.3) | 451 (4.6) |
| Chinese Taipei | 71 (3.7) | 593 (2.4) | 29 (3.7) | 587 (4.4) | 40 (4.0) | 587 (3.4) | 60 (4.0) | 594 (2.9) |
| Croatia | 83 (2.8) | 491 (2.1) | 17 (2.8) | 487 (6.5) | 44 (3.5) | 488 (2.9) | 56 (3.5) | 492 (2.7) |
| Czech Republic | 99 (0.9) | 510 (2.4) | 1 (0.9) | ~ ~ | 65 (3.6) | 512 (3.0) | 35 (3.6) | 507 (4.3) |
| Denmark | 86 (2.4) | 542 (2.7) | 14 (2.4) | 524 (6.0) | 53 (3.7) | 542 (3.6) | 47 (3.7) | 537 (3.6) |
| England | 78 (3.1) | 554 (4.3) | 22 (3.1) | 513 (6.5) | 36 (4.6) | 569 (5.1) | 64 (4.6) | 531 (4.9) |
| Finland | 91 (2.1) | 548 (2.3) | 9 (2.1) | 526 (8.4) | 40 (3.9) | 552 (3.9) | 60 (3.9) | 542 (2.5) |
| Georgia | 46 (3.9) | 464 (5.3) | 54 (3.9) | 441 (6.1) | 65 (4.1) | 450 (4.6) | 35 (4.1) | 451 (7.0) |
| Germany | 86 (2.7) | 532 (2.3) | 14 (2.7) | 507 (5.5) | 53 (3.5) | 537 (2.6) | 47 (3.5) | 519 (3.4) |
| Hong Kong SAR | 89 (2.5) | 607 (2.7) | 11 (2.5) | 560 (17.9) | 55 (4.4) | 611 (4.1) | 45 (4.4) | 591 (4.5) |
| Hungary | 77 (2.9) | 523 (3.6) | 23 (2.9) | 485 (9.3) | 51 (3.5) | 524 (5.0) | 49 (3.5) | 504 (5.8) |
| Iran, Islamic Rep. of | 30 (3.6) | 458 (6.9) | 70 (3.6) | 419 (4.1) | 41 (3.6) | 436 (5.5) | 59 (3.6) | 427 (4.6) |
| Ireland | 79 (3.0) | 533 (3.2) | 21 (3.0) | 509 (5.9) | 38 (3.6) | 541 (4.3) | 62 (3.6) | 519 (3.5) |
| Italy | 71 (3.4) | 508 (3.5) | 29 (3.4) | 511 (4.8) | 48 (4.5) | 508 (4.5) | 52 (4.5) | 511 (3.8) |
| Japan | 99 (0.6) | 586 (1.7) | 1 (0.6) | ~ ~ | 80 (3.0) | 586 (1.9) | 20 (3.0) | 583 (4.3) |
| Kazakhstan | 81 (3.2) | 502 (5.4) | 19 (3.2) | 503 (10.9) | 88 (2.9) | 499 (4.9) | 12 (2.9) | 521 (13.1) |
| Korea, Rep. of | 81 (3.3) | 607 (2.4) | 19 (3.3) | 596 (3.4) | 71 (3.5) | 606 (2.4) | 29 (3.5) | 602 (3.5) |
| Kuwait | 60 (4.0) | 346 (4.7) | 40 (4.0) | 336 (5.2) | 31 (3.5) | 349 (6.2) | 69 (3.5) | 338 (4.2) |
| Lithuania | 81 (2.9) | 536 (3.0) | 19 (2.9) | 520 (5.2) | 51 (3.0) | 540 (3.7) | 49 (3.0) | 528 (3.1) |
| Malta | 88 (0.1) | 500 (1.7) | 12 (0.1) | 468 (3.7) | 74 (0.1) | 500 (1.9) | 26 (0.1) | 484 (2.2) |
| Morocco | 21 (3.3) | 370 (11.2) | 79 (3.3) | 330 (6.1) | 39 (3.9) | 346 (6.6) | 61 (3.9) | 333 (6.2) |
| Netherlands | r 91 (2.6) | 541 (2.5) | 9 (2.6) | 523 (8.1) | r 54 (4.3) | 545 (2.3) | 46 (4.3) | 532 (3.1) |
| New Zealand | 63 (2.7) | 505 (3.0) | 37 (2.7) | 456 (3.7) | 31 (2.9) | 507 (5.3) | 69 (2.9) | 478 (3.0) |
| Northern Ireland | r 81 (2.9) | 571 (3.9) | 19 (2.9) | 532 (6.8) | r 41 (4.8) | 580 (4.4) | 59 (4.8) | 551 (5.0) |
| Norway | 80 (3.6) | 496 (3.0) | 20 (3.6) | 491 (7.3) | 64 (4.1) | 495 (3.4) | 36 (4.1) | 495 (4.9) |
| Oman | 41 (2.7) | 399 (4.3) | 59 (2.7) | 377 (3.9) | 44 (3.1) | 397 (4.0) | 56 (3.1) | 377 (4.2) |
| Poland | 88 (2.2) | 481 (2.3) | 12 (2.2) | 477 (4.8) | 62 (3.1) | 482 (2.8) | 38 (3.1) | 480 (3.4) |
| Portugal | 86 (2.8) | 533 (3.6) | 14 (2.8) | 531 (10.9) | 67 (4.0) | 534 (4.6) | 33 (4.0) | 528 (6.4) |
| Qatar | 67 (3.1) | 429 (5.6) | 33 (3.1) | 379 (7.8) | 47 (4.2) | 400 (7.0) | 53 (4.2) | 423 (5.5) |
| Romania | 50 (3.6) | 501 (6.8) | 50 (3.6) | 461 (8.4) | 62 (3.8) | 485 (5.9) | 38 (3.8) | 475 (10.0) |
| Russian Federation | 83 (2.6) | 547 (3.9) | 17 (2.6) | 517 (6.8) | 73 (2.7) | 545 (4.0) | 27 (2.7) | 534 (6.8) |
| Saudi Arabia | 51 (4.2) | 415 (8.1) | 49 (4.2) | 406 (8.0) | 32 (3.7) | 427 (10.7) | 68 (3.7) | 403 (5.2) |
| Serbia | 84 (2.8) | 517 (3.1) | 16 (2.8) | 518 (8.0) | 52 (4.0) | 516 (4.1) | 48 (4.0) | 519 (3.8) |
| Singapore | 83 (2.1) | 614 (3.3) | 17 (2.1) | 564 (9.5) | 55 (3.0) | 613 (4.2) | 45 (3.0) | 596 (5.0) |
| Slovak Republic | 96 (1.1) | 508 (3.8) | 4 (1.1) | 476 (18.8) | 79 (2.7) | 512 (3.6) | 21 (2.7) | 488 (9.7) |
| Slovenia | 88 (2.0) | 515 (2.2) | 12 (2.0) | 497 (5.2) | 48 (4.5) | 518 (2.8) | 52 (4.5) | 509 (2.9) |
| Spain | 89 (2.3) | 484 (3.1) | 11 (2.3) | 470 (7.0) | 62 (3.9) | 488 (3.7) | 38 (3.9) | 474 (4.4) |
| Sweden | r 97 (1.3) | 506 (2.6) | 3 (1.3) | 495 (9.3) | r 59 (3.8) | 509 (3.1) | 41 (3.8) | 500 (4.0) |
| Thailand | 70 (4.1) | 467 (5.2) | 30 (4.1) | 440 (9.1) | 68 (4.2) | 463 (5.4) | 32 (4.2) | 451 (8.9) |
| Tunisia | 47 (3.1) | 372 (5.7) | 53 (3.1) | 348 (5.4) | 61 (4.1) | 363 (4.9) | 39 (4.1) | 354 (6.4) |
| Turkey | 26 (2.8) | 492 (9.1) | 74 (2.8) | 461 (5.6) | 35 (3.0) | 472 (5.9) | 65 (3.0) | 468 (6.2) |
| United Arab Emirates | 62 (2.3) | 452 (2.8) | 38 (2.3) | 407 (3.4) | 49 (2.6) | 450 (4.1) | 51 (2.6) | 420 (3.8) |
| United States | r 61 (2.4) | 551 (2.6) | 39 (2.4) | 529 (3.0) | r 27 (2.4) | 555 (4.6) | 73 (2.4) | 537 (2.2) |
| Yemen | 21 (3.7) | 266 (16.8) | 79 (3.7) | 242 (6.4) | 54 (4.6) | 254 (8.6) | 46 (4.6) | 238 (7.6) |
| International Avg. | 71 (0.4) | 498 (0.7) | 29 (0.4) | 472 (1.1) | 53 (0.5) | 497 (0.7) | 47 (0.5) | 486 (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 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 8.21: Instruction Limited by Students Suffering from Lack of Nutrition or Sleep (Continued)

| Country | Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition | | | | Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep | | | |
|----------------------------------|--|---------------------|---------------------|---------------------|---|---------------------|---------------------|---------------------|
| | Not At All | | Some or A Lot | | Not At All | | Some or A Lot | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Sixth Grade Participants | | | | | | | | |
| Botswana | 53 (3.9) | 435 (6.7) | 47 (3.9) | 404 (4.6) | 37 (4.2) | 430 (6.4) | 63 (4.2) | 415 (5.1) |
| Honduras | 28 (4.0) | 430 (10.6) | 72 (4.0) | 384 (6.3) | 64 (4.3) | 404 (6.5) | 36 (4.3) | 383 (10.1) |
| Yemen | 17 (3.0) | 380 (12.8) | 83 (3.0) | 342 (6.1) | 54 (4.7) | 361 (7.2) | 46 (4.7) | 334 (8.9) |
| Benchmarking Participants | | | | | | | | |
| Alberta, Canada | r 59 (4.6) | 514 (3.2) | 41 (4.6) | 494 (4.1) | r 28 (4.4) | 525 (5.3) | 72 (4.4) | 499 (2.5) |
| Ontario, Canada | 63 (3.7) | 530 (3.5) | 37 (3.7) | 501 (4.4) | 27 (3.5) | 531 (4.9) | 73 (3.5) | 514 (3.5) |
| Quebec, Canada | 73 (3.5) | 537 (2.8) | 27 (3.5) | 520 (4.4) | 35 (3.8) | 542 (3.4) | 65 (3.8) | 528 (2.7) |
| Abu Dhabi, UAE | 62 (4.3) | 431 (6.2) | 38 (4.3) | 398 (7.6) | 47 (4.8) | 436 (7.5) | 53 (4.8) | 403 (6.6) |
| Dubai, UAE | r 78 (1.8) | 490 (3.1) | 22 (1.8) | 409 (7.2) | r 62 (3.1) | 484 (4.3) | 38 (3.1) | 452 (5.8) |
| Florida, US | r 66 (4.5) | 550 (5.2) | 34 (4.5) | 534 (5.8) | r 28 (4.0) | 556 (6.8) | 72 (4.0) | 541 (4.4) |
| North Carolina, US | 66 (5.6) | 559 (4.4) | 34 (5.6) | 544 (8.2) | 21 (3.2) | 560 (8.1) | 79 (3.2) | 553 (5.1) |

Exhibit 8.22: Instruction Limited by Students Suffering from Lack of Nutrition or Sleep

Reported by Teachers

| Country | Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition | | | | Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep | | | |
|-------------------------|--|---------------------|---------------------|---------------------|---|---------------------|---------------------|---------------------|
| | Not At All | | Some or A Lot | | Not At All | | Some or A Lot | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Armenia | 31 (3.2) | 472 (6.1) | 69 (3.2) | 463 (3.7) | 49 (3.6) | 469 (5.2) | 51 (3.6) | 463 (4.8) |
| Australia | r 75 (2.7) | 524 (6.6) | 25 (2.7) | 461 (5.1) | r 38 (3.6) | 533 (8.5) | 62 (3.6) | 493 (7.5) |
| Bahrain | 47 (3.1) | 437 (4.7) | 53 (3.1) | 386 (3.6) | 33 (2.6) | 439 (6.1) | 67 (2.6) | 396 (2.9) |
| Chile | 51 (4.2) | 440 (4.8) | 49 (4.2) | 395 (4.6) | 26 (3.4) | 441 (6.9) | 74 (3.4) | 409 (3.9) |
| Chinese Taipei | 78 (3.3) | 607 (3.5) | 22 (3.3) | 618 (10.3) | 24 (3.5) | 610 (8.6) | 76 (3.5) | 609 (4.1) |
| England | 86 (2.6) | 516 (5.9) | 14 (2.6) | 446 (10.1) | 44 (4.3) | 540 (8.0) | 56 (4.3) | 478 (7.1) |
| Finland | 84 (2.6) | 515 (2.9) | 16 (2.6) | 510 (5.7) | 19 (2.9) | 530 (4.0) | 81 (2.9) | 511 (2.7) |
| Georgia | 45 (3.8) | 442 (6.0) | 55 (3.8) | 422 (5.2) | 49 (3.8) | 426 (7.2) | 51 (3.8) | 435 (4.7) |
| Ghana | 39 (4.2) | 346 (7.8) | 61 (4.2) | 319 (5.4) | 33 (4.3) | 343 (7.6) | 67 (4.3) | 323 (5.5) |
| Hong Kong SAR | 84 (3.1) | 588 (4.4) | 16 (3.1) | 576 (13.9) | 27 (4.2) | 604 (10.2) | 73 (4.2) | 578 (5.1) |
| Hungary | 80 (2.5) | 511 (3.5) | 20 (2.5) | 477 (10.5) | 37 (3.4) | 513 (6.1) | 63 (3.4) | 499 (4.8) |
| Indonesia | 61 (4.5) | 394 (5.2) | 39 (4.5) | 373 (9.0) | 50 (4.6) | 391 (5.8) | 50 (4.6) | 380 (7.7) |
| Iran, Islamic Rep. of | 29 (3.5) | 448 (7.3) | 71 (3.5) | 402 (5.3) | 30 (3.6) | 410 (7.8) | 70 (3.6) | 417 (5.7) |
| Israel | 82 (2.2) | 530 (4.4) | 18 (2.2) | 475 (9.8) | 47 (3.2) | 541 (6.4) | 53 (3.2) | 502 (6.6) |
| Italy | 90 (2.4) | 501 (2.4) | 10 (2.4) | 483 (12.1) | 68 (3.9) | 500 (3.2) | 32 (3.9) | 497 (5.4) |
| Japan | 99 (0.7) | 570 (2.6) | 1 (0.7) | ~ ~ | 66 (4.1) | 571 (3.1) | 34 (4.1) | 566 (6.7) |
| Jordan | 27 (3.7) | 417 (7.9) | 73 (3.7) | 402 (4.5) | 40 (3.7) | 409 (7.0) | 60 (3.7) | 404 (5.4) |
| Kazakhstan | 79 (3.8) | 493 (4.6) | 21 (3.8) | 465 (9.8) | 82 (3.4) | 489 (4.1) | 18 (3.4) | 478 (12.1) |
| Korea, Rep. of | 72 (2.4) | 616 (3.5) | 28 (2.4) | 605 (4.8) | 37 (2.8) | 616 (6.0) | 63 (2.8) | 611 (3.6) |
| Lebanon | 66 (4.0) | 450 (4.9) | 34 (4.0) | 446 (7.1) | 53 (4.2) | 453 (5.2) | 47 (4.2) | 446 (6.1) |
| Lithuania | 84 (2.7) | 505 (3.2) | 16 (2.7) | 489 (6.0) | 52 (3.8) | 506 (4.0) | 48 (3.8) | 498 (4.0) |
| Macedonia, Rep. of | r 71 (4.7) | 431 (7.6) | 29 (4.7) | 413 (11.0) | r 47 (4.6) | 422 (10.2) | 53 (4.6) | 429 (7.8) |
| Malaysia | 62 (3.5) | 456 (5.8) | 38 (3.5) | 415 (8.5) | 54 (3.7) | 447 (8.2) | 46 (3.7) | 434 (7.9) |
| Morocco | 32 (3.2) | 392 (4.8) | 68 (3.2) | 361 (2.5) | 37 (3.0) | 376 (4.1) | 63 (3.0) | 369 (2.9) |
| New Zealand | 73 (3.3) | 499 (6.4) | 27 (3.3) | 461 (9.0) | 38 (3.9) | 500 (8.5) | 62 (3.9) | 482 (6.8) |
| Norway | 60 (4.1) | 480 (2.9) | 40 (4.1) | 467 (3.4) | 33 (4.0) | 487 (3.0) | 67 (4.0) | 469 (2.9) |
| Oman | 36 (3.1) | 382 (5.8) | 64 (3.1) | 357 (3.8) | 56 (3.6) | 375 (4.9) | 44 (3.6) | 354 (5.2) |
| Palestinian Nat'l Auth. | 19 (3.2) | 422 (6.7) | 81 (3.2) | 400 (4.0) | 18 (3.2) | 408 (8.1) | 82 (3.2) | 403 (4.1) |
| Qatar | 56 (3.4) | 431 (6.7) | 44 (3.4) | 382 (5.9) | 39 (4.2) | 426 (8.8) | 61 (4.2) | 398 (6.4) |
| Romania | 60 (3.9) | 468 (4.9) | 40 (3.9) | 443 (7.5) | 56 (3.6) | 465 (6.1) | 44 (3.6) | 449 (5.2) |
| Russian Federation | 81 (2.2) | 543 (4.5) | 19 (2.2) | 522 (7.1) | 68 (3.2) | 543 (4.8) | 32 (3.2) | 531 (5.3) |
| Saudi Arabia | 37 (4.1) | 403 (7.8) | 63 (4.1) | 391 (5.9) | 28 (3.4) | 400 (8.6) | 72 (3.4) | 393 (5.4) |
| Singapore | 87 (2.0) | 616 (3.6) | 13 (2.0) | 576 (12.1) | 31 (2.5) | 627 (6.4) | 69 (2.5) | 603 (4.5) |
| Slovenia | 93 (1.3) | 506 (2.4) | 7 (1.3) | 501 (9.0) | 52 (2.5) | 510 (3.0) | 48 (2.5) | 501 (3.2) |
| Sweden | r 93 (1.9) | 487 (2.2) | 7 (1.9) | 474 (8.1) | r 44 (3.9) | 498 (3.2) | 56 (3.9) | 477 (3.1) |
| Syrian Arab Republic | 48 (4.7) | 381 (7.1) | 52 (4.7) | 377 (5.8) | 48 (4.4) | 385 (6.9) | 52 (4.4) | 373 (5.8) |
| Thailand | 79 (3.4) | 434 (5.0) | 21 (3.4) | 401 (9.6) | 56 (4.4) | 430 (5.8) | 44 (4.4) | 422 (8.0) |
| Tunisia | 51 (3.8) | 437 (4.6) | 49 (3.8) | 412 (3.2) | 46 (4.1) | 425 (4.5) | 54 (4.1) | 425 (4.7) |
| Turkey | 38 (3.1) | 477 (8.4) | 62 (3.1) | 437 (4.3) | 35 (3.1) | 464 (7.4) | 65 (3.1) | 446 (4.8) |
| Ukraine | 83 (2.6) | 482 (4.5) | 17 (2.6) | 465 (9.1) | 74 (3.5) | 481 (4.4) | 26 (3.5) | 475 (7.1) |
| United Arab Emirates | 50 (2.6) | 472 (3.6) | 50 (2.6) | 439 (3.2) | 38 (2.6) | 474 (4.5) | 62 (2.6) | 444 (2.8) |
| United States | r 68 (2.6) | 523 (4.2) | 32 (2.6) | 487 (4.2) | r 22 (2.5) | 543 (6.9) | 78 (2.5) | 503 (3.3) |
| International Avg. | 63 (0.5) | 477 (0.8) | 37 (0.5) | 449 (1.2) | 43 (0.6) | 477 (1.0) | 57 (0.6) | 461 (0.9) |

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 8.22: Instruction Limited by Students Suffering from Lack of Nutrition or Sleep (Continued)

| Country | Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition | | | | Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep | | | |
|----------------------------------|--|---------------------|---------------------|---------------------|---|---------------------|---------------------|---------------------|
| | Not At All | | Some or A Lot | | Not At All | | Some or A Lot | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Ninth Grade Participants | | | | | | | | |
| Botswana | 55 (4.3) | 397 (3.2) | 45 (4.3) | 394 (4.6) | 34 (3.8) | 404 (4.5) | 66 (3.8) | 392 (3.3) |
| Honduras | r 26 (3.8) | 362 (12.6) | 74 (3.8) | 329 (4.5) | r 39 (4.8) | 328 (7.0) | 61 (4.8) | 343 (5.7) |
| South Africa | 37 (3.3) | 379 (6.7) | 63 (3.3) | 336 (3.9) | 41 (3.5) | 350 (5.7) | 59 (3.5) | 353 (4.0) |
| Benchmarking Participants | | | | | | | | |
| Alberta, Canada | 58 (4.3) | 512 (3.2) | 42 (4.3) | 495 (3.7) | 13 (2.6) | 519 (7.4) | 87 (2.6) | 503 (2.9) |
| Ontario, Canada | 63 (4.2) | 520 (3.4) | 37 (4.2) | 502 (4.1) | 22 (3.1) | 528 (5.6) | 78 (3.1) | 509 (3.0) |
| Quebec, Canada | 76 (3.0) | 539 (3.0) | 24 (3.0) | 513 (5.4) | 29 (3.7) | 543 (6.4) | 71 (3.7) | 529 (3.2) |
| Abu Dhabi, UAE | 43 (4.4) | 465 (8.1) | 57 (4.4) | 439 (5.0) | 31 (4.5) | 466 (11.4) | 69 (4.5) | 444 (4.7) |
| Dubai, UAE | 63 (3.0) | 498 (3.2) | 37 (3.0) | 440 (7.0) | 51 (2.6) | 494 (3.8) | 49 (2.6) | 458 (5.1) |
| Alabama, US | s 75 (6.4) | 472 (10.7) | 25 (6.4) | 451 (10.2) | r 23 (5.6) | 489 (19.7) | 77 (5.6) | 459 (7.4) |
| California, US | s 62 (5.9) | 502 (6.9) | 38 (5.9) | 475 (10.8) | s 26 (6.4) | 509 (10.3) | 74 (6.4) | 486 (8.8) |
| Colorado, US | r 59 (6.4) | 531 (9.4) | 41 (6.4) | 495 (11.6) | r 10 (3.3) | 541 (17.0) | 90 (3.3) | 514 (6.5) |
| Connecticut, US | r 75 (5.3) | 542 (8.0) | 25 (5.3) | 471 (13.2) | r 33 (5.7) | 545 (12.9) | 67 (5.7) | 514 (8.1) |
| Florida, US | r 69 (6.8) | 537 (8.3) | 31 (6.8) | 476 (8.8) | r 22 (5.4) | 548 (12.9) | 78 (5.4) | 510 (9.2) |
| Indiana, US | r 74 (4.6) | 524 (6.8) | 26 (4.6) | 498 (10.2) | r 26 (4.9) | 543 (10.0) | 74 (4.9) | 509 (6.6) |
| Massachusetts, US | r 83 (4.7) | 567 (6.8) | 17 (4.7) | 531 (12.6) | r 41 (7.7) | 580 (10.5) | 59 (7.7) | 547 (8.3) |
| Minnesota, US | r 65 (5.7) | 560 (5.8) | 35 (5.7) | 523 (11.2) | r 23 (3.6) | 554 (11.3) | 77 (3.6) | 546 (7.2) |
| North Carolina, US | r 80 (5.5) | 541 (8.8) | 20 (5.5) | 534 (17.7) | r 32 (6.2) | 565 (12.6) | 68 (6.2) | 526 (7.1) |

Exhibit 8.23: Instruction Limited by Disruptive or Uninterested Students

Reported by Teachers

| Country | Students in Classrooms Where Teachers Report Instruction Is Limited by Disruptive Students | | | | Students in Classrooms Where Teachers Report Instruction Is Limited by Uninterested Students | | | |
|-----------------------|--|---------------------|---------------------|---------------------|--|---------------------|---------------------|---------------------|
| | Some or Not At All | | A Lot | | Some or Not At All | | A Lot | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Armenia | 95 (1.6) | 453 (4.0) | 5 (1.6) | 442 (12.7) | 88 (2.8) | 454 (4.1) | 12 (2.8) | 442 (8.2) |
| Australia | r 86 (2.7) | 523 (4.0) | 14 (2.7) | 494 (6.2) | r 94 (1.7) | 521 (3.7) | 6 (1.7) | 487 (11.3) |
| Austria | 89 (2.3) | 510 (2.9) | 11 (2.3) | 496 (7.1) | 93 (2.2) | 510 (2.5) | 7 (2.2) | 491 (9.5) |
| Azerbaijan | 99 (0.7) | 464 (5.7) | 1 (0.7) | ~ ~ | 97 (1.0) | 465 (5.7) | 3 (1.0) | 435 (18.1) |
| Bahrain | 83 (3.8) | 437 (4.2) | 17 (3.8) | 432 (7.7) | 84 (3.4) | 440 (4.2) | 16 (3.4) | 420 (6.3) |
| Belgium (Flemish) | 92 (2.1) | 551 (2.0) | 8 (2.1) | 532 (8.0) | 97 (1.3) | 550 (1.9) | 3 (1.3) | 514 (10.5) |
| Chile | 72 (3.8) | 471 (2.6) | 28 (3.8) | 441 (6.6) | 82 (3.4) | 465 (3.0) | 18 (3.4) | 451 (8.5) |
| Chinese Taipei | 97 (1.6) | 592 (2.0) | 3 (1.6) | 560 (15.3) | 91 (2.3) | 593 (1.9) | 9 (2.3) | 573 (10.0) |
| Croatia | 93 (1.9) | 490 (1.9) | 7 (1.9) | 494 (8.0) | 95 (1.4) | 491 (1.9) | 5 (1.4) | 477 (6.4) |
| Czech Republic | 89 (2.4) | 511 (2.4) | 11 (2.4) | 505 (10.8) | 96 (1.5) | 512 (2.2) | 4 (1.5) | 474 (25.9) |
| Denmark | 93 (1.5) | 541 (2.4) | 7 (1.5) | 522 (16.2) | 95 (1.3) | 541 (2.4) | 5 (1.3) | 515 (25.4) |
| England | 93 (2.1) | 547 (3.9) | 7 (2.1) | 508 (10.0) | 95 (1.8) | 546 (3.9) | 5 (1.8) | 512 (12.2) |
| Finland | 90 (2.3) | 547 (2.2) | 10 (2.3) | 539 (7.9) | 97 (0.7) | 546 (2.3) | 3 (0.7) | 552 (17.0) |
| Georgia | 98 (1.1) | 452 (3.8) | 2 (1.1) | ~ ~ | 93 (1.8) | 452 (4.0) | 7 (1.8) | 436 (14.1) |
| Germany | 91 (2.0) | 530 (2.5) | 9 (2.0) | 511 (6.7) | 96 (1.2) | 528 (2.4) | 4 (1.2) | 526 (8.4) |
| Hong Kong SAR | 95 (1.9) | 603 (3.4) | 5 (1.9) | 579 (11.8) | 91 (2.3) | 605 (3.6) | 9 (2.3) | 572 (7.6) |
| Hungary | 90 (2.0) | 516 (3.8) | 10 (2.0) | 499 (11.9) | 94 (1.4) | 515 (3.7) | 6 (1.4) | 502 (16.0) |
| Iran, Islamic Rep. of | 88 (2.4) | 432 (3.9) | 12 (2.4) | 418 (11.4) | 81 (3.2) | 438 (4.1) | 19 (3.2) | 401 (8.4) |
| Ireland | 90 (2.5) | 529 (2.8) | 10 (2.5) | 517 (7.7) | 96 (1.6) | 528 (2.7) | 4 (1.6) | 517 (7.0) |
| Italy | 78 (3.1) | 510 (3.3) | 22 (3.1) | 505 (6.6) | 87 (2.8) | 510 (3.0) | 13 (2.8) | 500 (8.1) |
| Japan | 96 (1.7) | 585 (1.7) | 4 (1.7) | 597 (8.4) | 98 (1.1) | 585 (1.7) | 2 (1.1) | ~ ~ |
| Kazakhstan | 99 (0.7) | 502 (4.5) | 1 (0.7) | ~ ~ | 97 (1.4) | 502 (4.5) | 3 (1.4) | 505 (21.7) |
| Korea, Rep. of | 63 (3.8) | 606 (2.6) | 37 (3.8) | 602 (3.0) | 81 (3.5) | 606 (2.3) | 19 (3.5) | 601 (3.9) |
| Kuwait | 80 (3.2) | 345 (3.8) | 20 (3.2) | 327 (8.5) | 83 (3.0) | 343 (4.0) | 17 (3.0) | 334 (7.3) |
| Lithuania | 80 (2.5) | 533 (2.8) | 20 (2.5) | 535 (6.2) | 84 (2.7) | 535 (2.8) | 16 (2.7) | 524 (7.6) |
| Malta | 83 (0.1) | 498 (1.5) | 17 (0.1) | 486 (4.0) | 89 (0.1) | 498 (1.5) | 11 (0.1) | 481 (4.9) |
| Morocco | 75 (4.4) | 346 (5.1) | 25 (4.4) | 314 (7.6) | 62 (4.0) | 352 (5.7) | 38 (4.0) | 314 (6.5) |
| Netherlands | r 90 (2.8) | 539 (2.1) | 10 (2.8) | 535 (4.6) | r 98 (0.8) | 539 (2.1) | 2 (0.8) | ~ ~ |
| New Zealand | 89 (1.6) | 491 (2.7) | 11 (1.6) | 445 (6.0) | 97 (0.9) | 488 (2.6) | 3 (0.9) | 445 (14.9) |
| Northern Ireland | r 96 (1.7) | 564 (3.4) | 4 (1.7) | 539 (29.7) | r 98 (1.2) | 563 (3.5) | 2 (1.2) | ~ ~ |
| Norway | 92 (2.0) | 496 (2.9) | 8 (2.0) | 488 (12.4) | 97 (1.4) | 495 (2.8) | 3 (1.4) | 512 (38.0) |
| Oman | 75 (2.8) | 391 (3.2) | 25 (2.8) | 370 (5.4) | 73 (3.1) | 391 (3.2) | 27 (3.1) | 372 (5.3) |
| Poland | 85 (2.6) | 481 (2.4) | 15 (2.6) | 482 (6.3) | 93 (1.7) | 482 (2.2) | 7 (1.7) | 476 (8.6) |
| Portugal | 88 (2.4) | 533 (3.9) | 12 (2.4) | 530 (11.1) | 85 (2.9) | 533 (4.1) | 15 (2.9) | 531 (9.2) |
| Qatar | 76 (3.5) | 425 (4.8) | 24 (3.5) | 376 (9.0) | 77 (3.2) | 423 (4.4) | 23 (3.2) | 378 (8.7) |
| Romania | 98 (0.8) | 481 (6.0) | 2 (0.8) | ~ ~ | 93 (2.0) | 484 (6.1) | 7 (2.0) | 445 (21.7) |
| Russian Federation | 94 (1.8) | 542 (4.0) | 6 (1.8) | 540 (11.6) | 95 (1.8) | 543 (3.8) | 5 (1.8) | 521 (9.1) |
| Saudi Arabia | 91 (2.4) | 411 (4.6) | 9 (2.4) | 400 (30.7) | 79 (3.3) | 415 (6.1) | 21 (3.3) | 394 (12.1) |
| Serbia | 90 (2.2) | 517 (3.0) | 10 (2.2) | 519 (6.4) | 87 (2.6) | 516 (3.1) | 13 (2.6) | 520 (9.4) |
| Singapore | 87 (1.8) | 607 (3.4) | 13 (1.8) | 595 (8.3) | 90 (1.9) | 608 (3.1) | 10 (1.9) | 581 (12.8) |
| Slovak Republic | 95 (1.1) | 507 (4.0) | 5 (1.1) | 491 (10.9) | 93 (1.7) | 509 (3.4) | 7 (1.7) | 478 (15.8) |
| Slovenia | 66 (3.6) | 516 (2.7) | 34 (3.6) | 507 (3.1) | 84 (2.4) | 514 (2.5) | 16 (2.4) | 507 (3.1) |
| Spain | 87 (2.6) | 487 (2.9) | 13 (2.6) | 453 (9.5) | 83 (3.0) | 489 (2.9) | 17 (3.0) | 453 (7.6) |
| Sweden | r 91 (2.5) | 506 (2.6) | 9 (2.5) | 498 (11.8) | r 97 (1.4) | 506 (2.5) | 3 (1.4) | 487 (11.1) |
| Thailand | 94 (2.4) | 460 (5.3) | 6 (2.4) | 435 (14.7) | 89 (3.0) | 464 (4.3) | 11 (3.0) | 416 (16.8) |
| Tunisia | 73 (4.0) | 362 (4.7) | 27 (4.0) | 354 (6.5) | 73 (4.0) | 364 (4.6) | 27 (4.0) | 347 (8.7) |
| Turkey | 84 (2.4) | 470 (5.4) | 16 (2.4) | 466 (8.7) | 67 (3.1) | 483 (4.5) | 33 (3.1) | 441 (9.8) |
| United Arab Emirates | 87 (1.8) | 439 (2.6) | 13 (1.8) | 407 (7.0) | 90 (1.6) | 440 (2.4) | 10 (1.6) | 391 (7.9) |
| United States | r 85 (1.7) | 546 (2.3) | 15 (1.7) | 523 (5.1) | r 91 (1.0) | 544 (2.3) | 9 (1.0) | 518 (6.3) |
| Yemen | 84 (3.1) | 249 (6.9) | 16 (3.1) | 237 (11.5) | 69 (4.5) | 252 (7.5) | 31 (4.5) | 236 (10.6) |
| International Avg. | 87 (0.3) | 493 (0.5) | 13 (0.3) | 479 (1.6) | 89 (0.3) | 494 (0.5) | 11 (0.3) | 468 (1.9) |

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 8.23: Instruction Limited by Disruptive or Uninterested Students (Continued)

| Country | Students in Classrooms Where Teachers Report Instruction Is Limited by Disruptive Students | | | | Students in Classrooms Where Teachers Report Instruction Is Limited by Uninterested Students | | | | |
|----------------------------------|--|---------------------|---------------------|---------------------|--|---------------------|---------------------|---------------------|--|
| | Some or Not At All | | A Lot | | Some or Not At All | | A Lot | | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Sixth Grade Participants | | | | | | | | | |
| Botswana | 87 (2.7) | 421 (4.7) | 13 (2.7) | 420 (12.0) | 81 (3.5) | 426 (4.9) | 19 (3.5) | 400 (8.9) | |
| Honduras | 95 (1.3) | 396 (6.0) | 5 (1.3) | 395 (12.5) | 89 (2.6) | 397 (6.3) | 11 (2.6) | 391 (11.1) | |
| Yemen | 81 (3.5) | 343 (6.7) | 19 (3.5) | 368 (9.2) | 68 (3.6) | 352 (7.4) | 32 (3.6) | 339 (8.8) | |
| Benchmarking Participants | | | | | | | | | |
| Alberta, Canada | r 84 (3.1) | 510 (3.0) | 16 (3.1) | 486 (4.1) | r 94 (1.9) | 508 (2.8) | 6 (1.9) | 474 (7.8) | |
| Ontario, Canada | 81 (2.6) | 520 (3.5) | 19 (2.6) | 515 (4.9) | 93 (2.0) | 521 (3.1) | 7 (2.0) | 493 (8.7) | |
| Quebec, Canada | 77 (3.8) | 534 (2.7) | 23 (3.8) | 528 (4.7) | 90 (2.8) | 534 (2.6) | 10 (2.8) | 524 (5.7) | |
| Abu Dhabi, UAE | 86 (2.9) | 421 (5.5) | 14 (2.9) | 399 (12.0) | 90 (3.0) | 424 (5.1) | 10 (3.0) | 365 (9.5) | |
| Dubai, UAE | r 91 (1.6) | 476 (2.9) | 9 (1.6) | 439 (7.4) | r 95 (1.5) | 477 (2.7) | 5 (1.5) | 395 (13.8) | |
| Florida, US | r 89 (3.6) | 548 (3.8) | 11 (3.6) | 519 (13.8) | r 91 (2.5) | 546 (3.9) | 9 (2.5) | 526 (13.3) | |
| North Carolina, US | 85 (4.3) | 557 (4.0) | 15 (4.3) | 536 (10.7) | 84 (2.7) | 555 (4.8) | 16 (2.7) | 545 (8.2) | |

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

Exhibit 8.24: Instruction Limited by Disruptive or Uninterested Students

Reported by Teachers

| Country | Students in Classrooms Where Teachers Report Instruction Is Limited by Disruptive Students | | | | Students in Classrooms Where Teachers Report Instruction Is Limited by Uninterested Students | | | |
|-------------------------|--|---------------------|---------------------|---------------------|--|---------------------|---------------------|---------------------|
| | Some or Not At All | | A Lot | | Some or Not At All | | A Lot | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Armenia | 90 (2.4) | 467 (3.1) | 10 (2.4) | 468 (9.2) | 76 (3.1) | 471 (3.4) | 24 (3.1) | 450 (6.7) |
| Australia | r 82 (2.5) | 520 (6.2) | 18 (2.5) | 457 (10.6) | r 87 (2.4) | 518 (6.1) | 13 (2.4) | 441 (9.8) |
| Bahrain | 76 (2.8) | 420 (2.5) | 24 (2.8) | 377 (3.6) | 62 (3.2) | 424 (3.2) | 38 (3.2) | 387 (3.0) |
| Chile | 67 (3.7) | 427 (3.8) | 33 (3.7) | 401 (7.0) | 64 (3.9) | 430 (4.5) | 36 (3.9) | 396 (4.7) |
| Chinese Taipei | 74 (3.4) | 611 (3.9) | 26 (3.4) | 604 (7.5) | 52 (3.3) | 622 (3.9) | 48 (3.3) | 596 (5.7) |
| England | 83 (3.1) | 518 (6.1) | 17 (3.1) | 448 (12.8) | 88 (2.6) | 516 (6.0) | 12 (2.6) | 436 (13.1) |
| Finland | 85 (2.4) | 517 (2.6) | 15 (2.4) | 500 (6.3) | 82 (2.7) | 519 (2.7) | 18 (2.7) | 495 (5.0) |
| Georgia | 89 (2.0) | 431 (4.2) | 11 (2.0) | 428 (9.6) | 78 (2.8) | 437 (4.2) | 22 (2.8) | 405 (8.7) |
| Ghana | 95 (1.9) | 331 (4.4) | 5 (1.9) | 314 (13.8) | 93 (2.1) | 334 (4.4) | 7 (2.1) | 288 (9.8) |
| Hong Kong SAR | 95 (2.0) | 591 (3.7) | 5 (2.0) | 477 (28.3) | 86 (2.8) | 599 (4.0) | 14 (2.8) | 501 (13.5) |
| Hungary | 86 (2.1) | 508 (3.4) | 14 (2.1) | 482 (9.5) | 82 (2.5) | 510 (3.5) | 18 (2.5) | 478 (8.7) |
| Indonesia | 98 (1.3) | 385 (4.4) | 2 (1.3) | ~ ~ | 87 (3.3) | 388 (4.2) | 13 (3.3) | 373 (16.8) |
| Iran, Islamic Rep. of | 86 (2.4) | 415 (4.5) | 14 (2.4) | 414 (12.7) | 68 (3.1) | 418 (4.7) | 32 (3.1) | 407 (8.0) |
| Israel | 83 (2.2) | 529 (4.5) | 17 (2.2) | 476 (9.1) | 84 (2.2) | 529 (4.2) | 16 (2.2) | 469 (9.4) |
| Italy | 80 (3.2) | 504 (2.7) | 20 (3.2) | 480 (8.5) | 70 (3.7) | 507 (2.8) | 30 (3.7) | 481 (5.5) |
| Japan | 99 (0.7) | 570 (2.7) | 1 (0.0) | ~ ~ | 96 (1.7) | 571 (2.7) | 4 (1.7) | 544 (11.1) |
| Jordan | 76 (3.4) | 406 (4.0) | 24 (3.4) | 405 (8.8) | 64 (3.8) | 414 (4.8) | 36 (3.8) | 391 (6.6) |
| Kazakhstan | 96 (1.6) | 489 (4.2) | 4 (1.6) | 457 (26.0) | 94 (1.6) | 487 (4.3) | 6 (1.6) | 492 (14.1) |
| Korea, Rep. of | 60 (3.1) | 618 (4.1) | 40 (3.1) | 604 (4.5) | 71 (3.1) | 620 (3.7) | 29 (3.1) | 594 (5.1) |
| Lebanon | 90 (2.6) | 449 (3.9) | 10 (2.6) | 453 (12.6) | 85 (2.9) | 451 (4.1) | 15 (2.9) | 445 (13.0) |
| Lithuania | 76 (3.1) | 508 (3.1) | 24 (3.1) | 486 (4.6) | 77 (2.7) | 508 (3.3) | 23 (2.7) | 486 (4.9) |
| Macedonia, Rep. of | r 89 (2.5) | 430 (6.3) | 11 (2.5) | 393 (17.9) | r 80 (3.4) | 431 (6.9) | 20 (3.4) | 405 (14.0) |
| Malaysia | 96 (1.6) | 442 (5.6) | 4 (1.6) | 407 (17.4) | 84 (3.0) | 453 (5.6) | 16 (3.0) | 372 (9.3) |
| Morocco | 79 (2.6) | 374 (2.4) | 21 (2.6) | 362 (4.3) | 49 (3.1) | 383 (3.8) | 51 (3.1) | 360 (2.7) |
| New Zealand | 81 (2.4) | 495 (5.6) | 19 (2.4) | 460 (9.1) | 86 (1.8) | 493 (5.6) | 14 (1.8) | 462 (12.9) |
| Norway | 94 (2.0) | 476 (2.4) | 6 (2.0) | 461 (11.0) | 97 (1.9) | 476 (2.5) | 3 (1.9) | 448 (25.8) |
| Oman | 86 (2.5) | 370 (3.5) | 14 (2.5) | 340 (7.5) | 59 (3.2) | 376 (4.5) | 41 (3.2) | 351 (4.7) |
| Palestinian Nat'l Auth. | 61 (4.3) | 406 (5.0) | 39 (4.3) | 402 (6.0) | 55 (4.4) | 403 (4.5) | 45 (4.4) | 406 (6.5) |
| Qatar | 78 (2.7) | 420 (4.9) | 22 (2.7) | 368 (7.0) | 76 (2.8) | 425 (5.1) | 24 (2.8) | 359 (6.3) |
| Romania | 95 (1.7) | 457 (3.9) | 5 (1.7) | 430 (26.9) | 84 (3.0) | 464 (4.4) | 16 (3.0) | 425 (9.9) |
| Russian Federation | 86 (1.9) | 545 (3.7) | 14 (1.9) | 503 (7.9) | 81 (2.9) | 546 (3.5) | 19 (2.9) | 511 (7.1) |
| Saudi Arabia | 82 (3.1) | 401 (5.1) | 18 (3.1) | 370 (7.4) | 74 (3.4) | 400 (5.3) | 26 (3.4) | 383 (8.7) |
| Singapore | 88 (1.9) | 617 (3.7) | 12 (1.9) | 568 (13.0) | 87 (1.9) | 618 (3.6) | 13 (1.9) | 561 (14.2) |
| Slovenia | 78 (2.2) | 510 (2.2) | 22 (2.2) | 489 (4.9) | 80 (2.4) | 510 (2.0) | 20 (2.4) | 486 (4.9) |
| Sweden | r 91 (1.9) | 488 (2.3) | 9 (1.9) | 462 (6.0) | r 92 (1.7) | 488 (2.1) | 8 (1.7) | 459 (6.4) |
| Syrian Arab Republic | 73 (4.0) | 384 (4.7) | 27 (4.0) | 361 (9.4) | 61 (4.7) | 388 (5.5) | 39 (4.7) | 363 (8.2) |
| Thailand | 91 (2.3) | 428 (4.5) | 9 (2.3) | 417 (11.3) | 81 (3.0) | 429 (5.3) | 19 (3.0) | 415 (8.6) |
| Tunisia | 75 (3.1) | 425 (3.4) | 25 (3.1) | 425 (4.7) | 59 (4.0) | 429 (3.9) | 41 (4.0) | 419 (3.8) |
| Turkey | 66 (3.4) | 460 (4.9) | 34 (3.4) | 438 (6.8) | 44 (3.4) | 482 (6.8) | 56 (3.4) | 429 (5.1) |
| Ukraine | 77 (3.5) | 486 (4.6) | 23 (3.5) | 456 (8.2) | 66 (3.5) | 488 (5.4) | 34 (3.5) | 462 (5.8) |
| United Arab Emirates | 90 (1.5) | 459 (2.3) | 10 (1.5) | 424 (7.4) | 85 (1.9) | 461 (2.4) | 15 (1.9) | 423 (6.6) |
| United States | r 86 (1.8) | 518 (3.4) | 14 (1.8) | 472 (5.9) | r 81 (2.3) | 518 (3.6) | 19 (2.3) | 485 (5.5) |
| International Avg. | 83 (0.4) | 472 (0.6) | 17 (0.4) | 444 (1.8) | 76 (0.5) | 475 (0.7) | 24 (0.5) | 441 (1.5) |

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 8.24: Instruction Limited by Disruptive or Uninterested Students (Continued)

| Country | Students in Classrooms Where Teachers Report Instruction Is Limited by Disruptive Students | | | | Students in Classrooms Where Teachers Report Instruction Is Limited by Uninterested Students | | | | | |
|----------------------------------|--|---------------------|---------------------|---------------------|--|---------------------|---------------------|---------------------|----------|------------|
| | Some or Not At All | | A Lot | | Some or Not At All | | A Lot | | | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | | |
| Ninth Grade Participants | | | | | | | | | | |
| Botswana | | 71 (4.0) | 397 (2.7) | 29 (4.0) | 396 (6.4) | | 52 (4.8) | 403 (3.7) | 48 (4.8) | 390 (3.9) |
| Honduras | r | 77 (4.4) | 336 (5.5) | 23 (4.4) | 343 (9.3) | r | 69 (3.8) | 339 (6.1) | 31 (3.8) | 335 (6.5) |
| South Africa | | 79 (3.2) | 356 (3.6) | 21 (3.2) | 342 (6.0) | | 74 (3.9) | 358 (3.9) | 26 (3.9) | 337 (5.6) |
| Benchmarking Participants | | | | | | | | | | |
| Alberta, Canada | | 85 (3.0) | 507 (2.8) | 15 (3.0) | 491 (5.5) | | 91 (2.5) | 507 (2.7) | 9 (2.5) | 487 (6.8) |
| Ontario, Canada | | 90 (2.5) | 515 (2.7) | 10 (2.5) | 494 (6.7) | | 90 (2.2) | 514 (2.6) | 10 (2.2) | 508 (9.0) |
| Quebec, Canada | | 75 (3.2) | 539 (3.1) | 25 (3.2) | 515 (4.5) | | 79 (3.2) | 538 (2.8) | 21 (3.2) | 514 (4.4) |
| Abu Dhabi, UAE | | 89 (2.7) | 452 (4.0) | 11 (2.7) | 428 (14.3) | | 82 (3.7) | 453 (4.1) | 18 (3.7) | 435 (12.1) |
| Dubai, UAE | | 93 (1.4) | 481 (2.8) | 7 (1.4) | 424 (19.5) | | 92 (1.2) | 482 (2.7) | 8 (1.2) | 417 (9.1) |
| Alabama, US | r | 79 (4.2) | 478 (8.8) | 21 (4.2) | 424 (9.6) | r | 70 (5.4) | 474 (11.0) | 30 (5.4) | 450 (8.8) |
| California, US | s | 84 (3.7) | 501 (6.8) | 16 (3.7) | 443 (13.6) | s | 81 (4.4) | 502 (6.8) | 19 (4.4) | 449 (12.7) |
| Colorado, US | r | 84 (4.2) | 526 (7.1) | 16 (4.2) | 469 (19.7) | r | 82 (5.1) | 527 (6.6) | 18 (5.1) | 470 (18.0) |
| Connecticut, US | r | 84 (4.1) | 535 (6.3) | 16 (4.1) | 467 (12.4) | r | 86 (4.1) | 534 (6.3) | 14 (4.1) | 464 (12.5) |
| Florida, US | r | 85 (3.6) | 525 (7.8) | 15 (3.6) | 480 (10.7) | r | 82 (5.0) | 526 (8.7) | 18 (5.0) | 484 (11.5) |
| Indiana, US | r | 91 (2.9) | 519 (6.2) | 9 (2.9) | 501 (22.1) | r | 80 (5.1) | 521 (6.4) | 20 (5.1) | 501 (15.1) |
| Massachusetts, US | r | 92 (3.5) | 563 (6.7) | 8 (3.5) | 529 (25.7) | r | 89 (3.3) | 564 (6.8) | 11 (3.3) | 529 (15.8) |
| Minnesota, US | r | 80 (3.2) | 557 (6.1) | 20 (3.2) | 510 (15.2) | r | 85 (3.9) | 555 (5.7) | 15 (3.9) | 505 (18.5) |
| North Carolina, US | r | 91 (3.2) | 541 (7.9) | 9 (3.2) | 509 (15.5) | r | 75 (5.6) | 547 (9.8) | 25 (5.6) | 513 (11.2) |

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

Instruction Limited by Disruptive or Uninterested Students

The importance of classroom management and maintaining a positive and productive classroom environment is widely recognized as central to high-quality teaching (Bill & Melinda Gates Foundation, 2010). Yet, even the most experienced and effective teachers can encounter discipline problems.

Exhibit 8.23 presents teachers' reports about the extent to which their fourth grade classroom instruction in mathematics was limited by disruptive or uninterested students. As good news, internationally, on average, teachers reported their instruction was rarely limited by either disruptive or bored students, with 87 to 89 percent of the fourth grade students in classrooms with some or no problems. However, the 11 to 13 percent of students in classrooms with a lot of student behavior problems did have lower average mathematics achievement (from 14–26 points). Across the fourth grade, sixth grade, and benchmarking participants there was some variation in teachers' reports. In general, however, teachers reported that fourth grade students around the world appear relatively well behaved and attentive during their mathematics lessons.

Exhibit 8.24 presents teachers' reports about the extent to which their eighth grade classroom instruction in mathematics was limited by disruptive or uninterested students. Internationally, on average, teachers reported their instruction was limited "some or not at all" by disruptive students for 83 percent of the students and by bored students for 76 percent of the students. Although most eighth grade students were in mathematics classrooms with attentive students, the 17 to 24 percent of students in classrooms with "a lot" of student behavior problems had lower average mathematics achievement (from 28–34 points). Across the eighth grade, ninth grade, and benchmarking participants there was some variation in teachers' reports. Compared to the fourth grade, however, boredom appears to be an emerging problem in mathematics classes at the eighth grade. It is difficult to know whether students are bored because they cannot do the mathematics, or whether they just find mathematics boring.

Classroom Resources and Activities for Teaching Mathematics

Resources Teachers Use for Teaching Mathematics

Exhibit 8.25 contains teachers' reports about the classroom materials used for teaching mathematics at the fourth grade. On average, internationally, textbooks were used most often as the basis for mathematics instruction, for 75 percent of the fourth grade students, and workbooks or worksheets were used the next most often, for 46 percent of the students. Concrete objects to help students understand quantities or procedures (often called manipulables) were used as the basis of instruction for 37 percent of the fourth grade students, and relying on computer software was relatively rare, used for only 9 percent of the students, on average. Teachers reported that all of the materials TIMSS asked about were used to some extent as a supplementary resources for mathematics instruction at the fourth grade, with concrete objects or materials the most popular, used with 62 percent of the students, on average, followed by workbooks or worksheets used with 53 percent of the students. Teachers reported using computer software as a supplementary resource for 56 percent of the fourth grade students, on average.

As shown in Exhibit 8.26, textbooks also were the most frequent basis of mathematics instruction at the eighth grade, used with 77 percent of the students internationally, on average. However, in contrast to the fourth grade, workbooks or worksheets were much less frequently reported as a basis for instruction, used with approximately one-third of eighth grade students. As would be anticipated, concrete objects were less frequently used than at the fourth grade (23% of students on average). Computer software was not used with many students, on average, only 7 percent. All of the following materials except textbooks were popular as supplementary instructional resources at the eighth grade: workbooks or worksheets with 62 percent of students, concrete objects with 71 percent, and computer software with 55 percent.

Exhibit 8.25: Resources Teachers Use for Teaching Mathematics

Reported by Teachers

| Country | Percent of Students Whose Teachers Use | | | | | | | |
|-----------------------|--|-----------------|--------------------------|-----------------|--|-----------------|---|-----------------|
| | Textbooks | | Workbooks or Worksheets | | Concrete Objects or Materials that Help Students Understand Quantities or Procedures | | Computer Software for Mathematics Instruction | |
| | As Basis for Instruction | As a Supplement | As Basis for Instruction | As a Supplement | As Basis for Instruction | As a Supplement | As Basis for Instruction | As a Supplement |
| Armenia | 98 (0.9) | 2 (0.9) | 15 (2.9) | 78 (3.3) | 22 (2.7) | 78 (2.7) | 4 (1.7) | 47 (3.8) |
| Australia | r 25 (3.5) | 46 (3.8) | s 11 (1.9) | 87 (2.2) | r 56 (4.0) | 44 (4.0) | r 12 (2.4) | 77 (3.3) |
| Austria | 90 (2.2) | 9 (2.2) | 26 (2.6) | 73 (2.7) | 33 (3.3) | 67 (3.3) | 2 (1.1) | 59 (3.6) |
| Azerbaijan | 98 (0.9) | 2 (0.9) | 54 (3.4) | 46 (3.4) | 18 (2.9) | 80 (3.0) | 4 (1.5) | 37 (3.8) |
| Bahrain | 76 (5.0) | 23 (4.9) | 53 (3.8) | 47 (3.8) | 40 (5.3) | 57 (5.1) | 17 (3.3) | 61 (5.3) |
| Belgium (Flemish) | 39 (3.1) | 35 (3.6) | 93 (1.8) | 7 (1.8) | 29 (3.6) | 71 (3.6) | 2 (1.0) | 71 (3.6) |
| Chile | r 19 (3.5) | 81 (3.5) | r 40 (4.5) | 57 (4.5) | r 47 (4.0) | 53 (4.0) | r 5 (1.6) | 73 (4.0) |
| Chinese Taipei | 99 (0.7) | 1 (0.0) | 56 (4.2) | 44 (4.2) | 16 (2.8) | 82 (3.1) | 17 (3.4) | 62 (4.3) |
| Croatia | 88 (2.3) | 12 (2.3) | 37 (3.6) | 63 (3.6) | 14 (2.1) | 86 (2.1) | 1 (0.5) | 24 (2.9) |
| Czech Republic | 77 (3.4) | 19 (3.3) | 63 (3.7) | 35 (3.6) | 26 (3.7) | 73 (3.7) | 4 (1.3) | 64 (4.0) |
| Denmark | r 90 (2.6) | 10 (2.6) | r 50 (4.1) | 46 (4.0) | r 26 (3.8) | 74 (3.8) | r 9 (2.5) | 84 (3.0) |
| England | 10 (2.4) | 64 (4.0) | 11 (2.6) | 78 (3.8) | 39 (4.5) | 59 (4.3) | 24 (3.8) | 74 (3.7) |
| Finland | 95 (1.7) | 3 (1.2) | 37 (3.6) | 61 (3.7) | 15 (2.0) | 83 (2.2) | 5 (2.0) | 69 (3.6) |
| Georgia | 99 (0.6) | 1 (0.6) | 68 (3.6) | 32 (3.6) | 15 (2.5) | 85 (2.5) | 2 (1.1) | 36 (3.7) |
| Germany | 86 (2.3) | 11 (2.2) | 40 (3.5) | 59 (3.6) | 26 (3.2) | 74 (3.2) | 2 (0.9) | 58 (3.4) |
| Hong Kong SAR | 88 (2.8) | 11 (2.9) | 44 (3.9) | 56 (3.9) | 26 (3.7) | 74 (3.7) | 34 (4.5) | 61 (4.6) |
| Hungary | 88 (2.3) | 11 (2.2) | 69 (3.5) | 31 (3.5) | 43 (3.5) | 57 (3.5) | 4 (1.3) | 31 (3.7) |
| Iran, Islamic Rep. of | 91 (2.1) | 9 (2.1) | 13 (2.5) | 81 (2.8) | 45 (3.5) | 54 (3.5) | 2 (1.2) | 12 (2.5) |
| Ireland | 71 (3.5) | 29 (3.4) | 16 (3.2) | 82 (3.1) | 43 (3.7) | 56 (3.8) | 11 (2.2) | 68 (3.3) |
| Italy | 45 (3.0) | 54 (3.2) | 25 (3.5) | 74 (3.4) | 45 (3.4) | 54 (3.5) | 0 (0.4) | 43 (3.4) |
| Japan | 92 (2.2) | 8 (2.2) | 9 (2.4) | 84 (3.0) | 23 (3.4) | 77 (3.4) | 1 (0.9) | 35 (3.7) |
| Kazakhstan | 88 (2.9) | 12 (2.9) | 10 (2.4) | 90 (2.4) | 24 (3.7) | 76 (3.7) | 7 (1.9) | 75 (3.3) |
| Korea, Rep. of | 99 (1.0) | 1 (0.0) | 71 (3.4) | 28 (3.5) | 16 (3.0) | 81 (3.1) | 25 (3.7) | 63 (4.5) |
| Kuwait | 96 (1.5) | 3 (1.4) | 79 (3.2) | 21 (3.2) | 64 (3.6) | 35 (3.6) | 9 (2.4) | 65 (3.9) |
| Lithuania | 94 (1.8) | 6 (1.8) | 79 (3.1) | 21 (3.1) | 21 (2.9) | 79 (2.9) | 2 (1.1) | 65 (3.2) |
| Malta | 91 (0.1) | 9 (0.1) | 42 (0.1) | 58 (0.1) | 44 (0.1) | 56 (0.1) | 27 (0.1) | 45 (0.1) |
| Morocco | r 77 (3.0) | 23 (3.0) | r 75 (3.3) | 24 (3.2) | r 78 (3.1) | 21 (3.0) | r 6 (1.9) | 10 (2.1) |
| Netherlands | r 93 (2.2) | 4 (1.8) | r 62 (4.3) | 37 (4.5) | r 2 (1.1) | 96 (2.0) | r 3 (1.5) | 88 (3.0) |
| New Zealand | 7 (1.2) | 75 (2.4) | 8 (1.2) | 90 (1.4) | 68 (2.8) | 32 (2.8) | 9 (2.0) | 80 (2.6) |
| Northern Ireland | r 43 (4.5) | 56 (4.5) | r 24 (4.1) | 76 (4.1) | r 37 (3.9) | 63 (3.9) | r 13 (3.1) | 82 (3.3) |
| Norway | 97 (1.4) | 3 (1.4) | 34 (4.4) | 66 (4.4) | 34 (4.5) | 65 (4.5) | 14 (3.0) | 75 (4.1) |
| Oman | 49 (3.7) | 51 (3.7) | 61 (2.9) | 38 (2.9) | 55 (3.2) | 44 (3.3) | 5 (1.4) | 74 (2.6) |
| Poland | 78 (3.2) | 14 (2.6) | 66 (3.5) | 34 (3.5) | 48 (4.2) | 52 (4.2) | 0 (0.0) | 44 (4.0) |
| Portugal | 56 (4.9) | 40 (4.9) | 47 (5.1) | 53 (5.1) | 70 (4.0) | 30 (4.0) | 9 (4.6) | 62 (4.1) |
| Qatar | 70 (3.5) | 27 (3.6) | 56 (3.0) | 43 (3.0) | 54 (5.0) | 46 (5.0) | 29 (3.0) | 53 (3.6) |
| Romania | 90 (2.5) | 10 (2.5) | 40 (4.3) | 60 (4.3) | 48 (3.9) | 51 (4.0) | 5 (1.9) | 45 (4.0) |
| Russian Federation | 95 (1.7) | 5 (1.6) | 29 (3.9) | 66 (4.2) | 16 (3.3) | 81 (3.5) | 1 (0.7) | 46 (2.8) |
| Saudi Arabia | 93 (3.0) | 7 (3.0) | 62 (3.8) | 38 (3.8) | 57 (4.3) | 42 (4.3) | 30 (3.3) | 51 (4.0) |
| Serbia | 73 (3.1) | 27 (3.1) | 20 (3.5) | 78 (3.6) | 28 (3.2) | 72 (3.2) | 1 (0.7) | 25 (3.2) |
| Singapore | 70 (2.0) | 23 (1.5) | 71 (2.4) | 29 (2.4) | 34 (2.6) | 66 (2.5) | 16 (2.1) | 80 (2.2) |
| Slovak Republic | 85 (2.4) | 15 (2.4) | 64 (3.0) | 35 (3.0) | 10 (1.4) | 89 (1.5) | 1 (0.4) | 61 (3.5) |
| Slovenia | 76 (3.1) | 15 (2.7) | 79 (3.5) | 21 (3.5) | 49 (3.8) | 51 (3.8) | 2 (0.7) | 70 (3.7) |
| Spain | 77 (3.2) | 20 (2.8) | 40 (4.1) | 59 (4.0) | 20 (3.4) | 79 (3.5) | 2 (1.2) | 64 (3.5) |
| Sweden | r 89 (2.8) | 10 (2.6) | r 18 (3.2) | 77 (3.2) | r 25 (3.6) | 75 (3.6) | r 5 (2.0) | 61 (4.3) |
| Thailand | 81 (2.9) | 19 (2.9) | 53 (4.3) | 47 (4.4) | 37 (4.9) | 61 (4.7) | 4 (1.6) | 50 (4.1) |
| Tunisia | 44 (3.8) | 56 (3.8) | 68 (3.6) | 31 (3.6) | 83 (3.0) | 17 (3.0) | 5 (1.6) | 26 (3.6) |
| Turkey | 91 (1.7) | 9 (1.7) | 44 (3.1) | 56 (3.1) | 25 (2.8) | 73 (3.0) | 17 (2.8) | 60 (3.0) |
| United Arab Emirates | 80 (1.8) | 18 (1.7) | 50 (2.1) | 48 (2.1) | 55 (2.1) | 42 (2.1) | 18 (1.8) | 53 (2.6) |
| United States | r 45 (2.3) | 43 (2.1) | r 36 (3.0) | 61 (2.9) | r 43 (2.2) | 55 (2.1) | r 16 (1.4) | 68 (2.3) |
| Yemen | 85 (3.2) | 14 (3.1) | 61 (4.1) | 39 (4.1) | 34 (4.4) | 55 (4.6) | 3 (1.7) | 4 (2.0) |
| International Avg. | 75 (0.4) | 21 (0.4) | 46 (0.5) | 53 (0.5) | 37 (0.5) | 62 (0.5) | 9 (0.3) | 56 (0.5) |

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

(1) 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.

| Country | Percent of Students Whose Teachers Use | | | | | | | | | | | |
|----------------------------------|--|-----------------|--------------------------|-----------------|--|-----------------|---|-----------------|--------------------------|-----------------|----------|----------|
| | Textbooks | | Workbooks or Worksheets | | Concrete Objects or Materials that Help Students Understand Quantities or Procedures | | Computer Software for Mathematics Instruction | | | | | |
| | As Basis for Instruction | As a Supplement | As Basis for Instruction | As a Supplement | As Basis for Instruction | As a Supplement | As Basis for Instruction | As a Supplement | As Basis for Instruction | As a Supplement | | |
| Sixth Grade Participants | | | | | | | | | | | | |
| Botswana | 75 (4.3) | 25 (4.3) | r | 20 (3.7) | 41 (4.9) | 44 (4.5) | 53 (4.5) | r | 0 (0.0) | 7 (2.3) | | |
| Honduras | 88 (3.2) | 11 (3.1) | | 42 (4.5) | 54 (4.6) | 53 (4.4) | 45 (4.3) | | 5 (1.9) | 16 (3.3) | | |
| Yemen | 86 (3.2) | 12 (2.9) | | 53 (4.5) | 41 (4.5) | 39 (4.6) | 50 (4.6) | | 1 (0.9) | 5 (2.1) | | |
| Benchmarking Participants | | | | | | | | | | | | |
| Alberta, Canada | r | 36 (4.0) | 57 (4.0) | r | 20 (3.5) | 71 (4.0) | r | 60 (4.5) | 40 (4.5) | r | 9 (2.4) | 80 (3.7) |
| Ontario, Canada | | 49 (3.7) | 44 (3.9) | | 20 (2.8) | 78 (3.0) | | 55 (3.6) | 45 (3.6) | | 4 (1.0) | 65 (3.8) |
| Quebec, Canada | | 55 (4.6) | 35 (4.6) | | 48 (4.7) | 51 (4.5) | | 28 (4.1) | 71 (4.2) | | 3 (1.3) | 36 (4.2) |
| Abu Dhabi, UAE | | 82 (3.4) | 16 (3.0) | | 52 (4.0) | 46 (4.0) | | 57 (4.1) | 39 (4.0) | | 17 (2.8) | 54 (4.4) |
| Dubai, UAE | r | 61 (2.4) | 36 (2.5) | | 37 (4.0) | 61 (4.0) | | 53 (2.6) | 45 (2.9) | | 29 (3.7) | 56 (3.8) |
| Florida, US | r | 74 (4.6) | 23 (4.5) | r | 35 (4.6) | 59 (4.5) | r | 52 (5.4) | 47 (5.6) | r | 35 (4.7) | 59 (5.5) |
| North Carolina, US | r | 40 (7.8) | 51 (8.1) | | 16 (5.4) | 84 (5.4) | | 44 (6.4) | 56 (6.4) | | 25 (5.8) | 72 (6.2) |

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

Exhibit 8.26: Resources Teachers Use for Teaching Mathematics

Reported by Teachers

| Country | Percent of Students Whose Teachers Use | | | | | | | |
|-------------------------|--|-----------------|--------------------------|-----------------|--|-----------------|---|-----------------|
| | Textbooks | | Workbooks or Worksheets | | Concrete Objects or Materials that Help Students Understand Quantities or Procedures | | Computer Software for Mathematics Instruction | |
| | As Basis for Instruction | As a Supplement | As Basis for Instruction | As a Supplement | As Basis for Instruction | As a Supplement | As Basis for Instruction | As a Supplement |
| Armenia | 97 (1.4) | 2 (1.1) | 22 (2.9) | 76 (2.9) | 5 (1.8) | 95 (1.8) | 2 (1.0) | 73 (3.2) |
| Australia | r 56 (4.0) | 41 (3.9) | r 20 (3.5) | 77 (3.6) | r 13 (2.7) | 78 (3.4) | r 9 (2.5) | 78 (3.3) |
| Bahrain | 85 (2.1) | 15 (2.1) | 40 (3.7) | 60 (3.7) | 26 (3.4) | 66 (4.0) | 7 (1.8) | 66 (2.7) |
| Chile | 23 (3.2) | 75 (3.3) | 37 (4.0) | 61 (4.0) | 26 (3.7) | 68 (4.0) | 4 (1.6) | 68 (3.8) |
| Chinese Taipei | 92 (1.9) | 7 (1.9) | 48 (4.1) | 50 (4.1) | 6 (1.6) | 90 (2.3) | 1 (0.7) | 52 (4.0) |
| England | 29 (3.9) | 57 (4.4) | 21 (3.5) | 74 (4.2) | 8 (2.3) | 75 (3.5) | 21 (3.7) | 76 (3.9) |
| Finland | 88 (2.3) | 12 (2.3) | 26 (3.2) | 64 (3.5) | 9 (2.3) | 83 (2.8) | 1 (0.6) | 53 (3.6) |
| Georgia | 94 (1.8) | 6 (1.8) | 69 (3.5) | 30 (3.5) | 12 (2.6) | 87 (2.7) | 3 (1.3) | 58 (3.4) |
| Ghana | 56 (3.7) | 42 (3.7) | 27 (3.8) | 51 (4.3) | 50 (4.2) | 42 (4.4) | 1 (0.6) | 7 (2.2) |
| Hong Kong SAR | 88 (2.9) | 11 (2.7) | 34 (4.2) | 65 (4.3) | 8 (2.2) | 86 (2.9) | 3 (1.5) | 87 (3.0) |
| Hungary | 72 (3.2) | 28 (3.3) | 22 (2.9) | 61 (3.6) | 26 (3.2) | 73 (3.2) | 2 (1.1) | 44 (3.4) |
| Indonesia | 85 (3.6) | 14 (3.7) | 14 (2.6) | 82 (3.5) | 34 (4.5) | 62 (4.5) | 5 (2.3) | 36 (4.5) |
| Iran, Islamic Rep. of | 95 (1.5) | 5 (1.4) | 8 (1.5) | 82 (2.5) | 29 (3.3) | 59 (3.3) | 4 (1.3) | 24 (3.1) |
| Israel | 97 (1.0) | 3 (1.0) | 32 (2.8) | 66 (2.9) | 22 (3.0) | 59 (3.0) | 5 (1.9) | 35 (3.2) |
| Italy | 69 (3.3) | 31 (3.3) | 38 (4.0) | 62 (4.0) | 13 (2.5) | 84 (2.7) | 3 (1.4) | 47 (3.9) |
| Japan | 83 (2.8) | 15 (2.7) | 22 (3.4) | 75 (3.5) | 10 (2.1) | 80 (3.2) | 0 (0.0) | 27 (3.6) |
| Jordan | 91 (2.4) | 9 (2.4) | 42 (4.1) | 57 (4.1) | 30 (3.9) | 64 (4.1) | 7 (1.9) | 68 (3.3) |
| Kazakhstan | 85 (2.9) | 15 (2.9) | 13 (2.6) | 85 (2.5) | 24 (3.8) | 75 (3.7) | 8 (2.0) | 79 (2.9) |
| Korea, Rep. of | 97 (1.0) | 3 (1.0) | 68 (3.0) | 32 (3.0) | 17 (2.6) | 77 (2.9) | 14 (2.2) | 69 (2.7) |
| Lebanon | 73 (4.0) | 23 (3.9) | 43 (4.2) | 55 (4.2) | 20 (3.4) | 67 (4.0) | 10 (2.9) | 30 (3.8) |
| Lithuania | 98 (1.3) | 2 (1.3) | 10 (2.4) | 77 (3.1) | 10 (2.3) | 89 (2.4) | 4 (1.5) | 66 (3.6) |
| Macedonia, Rep. of | r 83 (3.5) | 17 (3.5) | r 28 (3.5) | 63 (3.6) | r 22 (3.7) | 74 (3.9) | r 7 (2.4) | 62 (4.1) |
| Malaysia | 83 (2.8) | 17 (2.8) | 20 (3.0) | 78 (3.2) | 19 (2.9) | 76 (3.2) | 6 (1.8) | 59 (3.7) |
| Morocco | 48 (3.2) | 51 (3.3) | 61 (3.5) | 34 (3.4) | 50 (4.0) | 39 (3.5) | 10 (1.5) | 17 (2.3) |
| New Zealand | 39 (3.8) | 53 (3.7) | 22 (3.9) | 77 (3.9) | 16 (2.7) | 74 (3.7) | 12 (2.2) | 57 (3.5) |
| Norway | 94 (1.9) | 6 (1.9) | 29 (3.9) | 68 (4.1) | 5 (1.7) | 89 (2.8) | s 5 (2.2) | 82 (4.4) |
| Oman | 55 (3.3) | 45 (3.3) | 43 (3.5) | 54 (3.5) | 39 (3.0) | 60 (3.1) | 3 (0.8) | 69 (2.9) |
| Palestinian Nat'l Auth. | 85 (2.8) | 15 (2.8) | 51 (4.0) | 49 (4.0) | 35 (3.9) | 64 (3.9) | 5 (1.9) | 57 (3.8) |
| Qatar | 68 (2.8) | 30 (2.6) | 53 (3.2) | 45 (3.0) | 42 (4.3) | 56 (4.3) | 34 (3.2) | 51 (3.7) |
| Romania | 67 (3.6) | 26 (3.2) | 45 (3.9) | 55 (3.9) | 49 (4.1) | 51 (4.1) | 7 (2.0) | 52 (4.3) |
| Russian Federation | 88 (2.1) | 12 (2.1) | 6 (1.8) | 86 (2.5) | 16 (2.6) | 82 (2.7) | 3 (1.2) | 67 (3.6) |
| Saudi Arabia | 91 (2.5) | 9 (2.5) | 51 (3.9) | 46 (3.9) | 33 (4.2) | 63 (4.1) | 22 (3.6) | 50 (4.0) |
| Singapore | 59 (2.5) | 38 (2.7) | 51 (2.7) | 48 (2.7) | 10 (1.8) | 85 (1.8) | 11 (1.5) | 82 (2.1) |
| Slovenia | 91 (1.7) | 9 (1.7) | 23 (2.8) | 70 (2.9) | 13 (1.9) | 85 (2.1) | 3 (1.3) | 73 (2.9) |
| Sweden | r 97 (1.4) | 3 (1.3) | r 6 (1.5) | 90 (1.6) | r 7 (2.0) | 91 (2.2) | r 4 (1.7) | 46 (3.5) |
| Syrian Arab Republic | 88 (2.7) | 12 (2.5) | 49 (4.8) | 46 (4.6) | 41 (4.3) | 49 (4.6) | 13 (3.0) | 26 (4.0) |
| Thailand | 79 (3.3) | 21 (3.3) | 47 (4.3) | 53 (4.3) | 16 (3.3) | 74 (3.6) | 5 (1.8) | 57 (3.8) |
| Tunisia | 77 (3.5) | 23 (3.5) | 75 (3.4) | 22 (3.4) | 39 (3.9) | 51 (4.3) | 1 (0.9) | 20 (3.1) |
| Turkey | 81 (2.5) | 17 (2.5) | 37 (3.3) | 61 (3.3) | 23 (2.8) | 72 (2.8) | 10 (2.1) | 54 (3.2) |
| Ukraine | 83 (3.3) | 17 (3.3) | 4 (1.7) | 85 (2.7) | 22 (3.6) | 77 (3.7) | 1 (0.5) | 53 (4.4) |
| United Arab Emirates | 87 (1.8) | 12 (1.8) | 38 (2.5) | 62 (2.5) | 42 (2.7) | 54 (2.5) | 20 (2.0) | 55 (2.4) |
| United States | r 48 (2.5) | 43 (2.7) | r 19 (2.2) | 77 (2.4) | r 17 (2.0) | 75 (2.2) | r 14 (1.7) | 62 (2.8) |
| International Avg. | 77 (0.4) | 21 (0.4) | 34 (0.5) | 62 (0.5) | 23 (0.5) | 71 (0.5) | 7 (0.3) | 55 (0.5) |

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.

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.

| Country | Percent of Students Whose Teachers Use | | | | | | | |
|----------------------------------|--|-----------------|--------------------------|-----------------|--|-----------------|---|-----------------|
| | Textbooks | | Workbooks or Worksheets | | Concrete Objects or Materials that Help Students Understand Quantities or Procedures | | Computer Software for Mathematics Instruction | |
| | As Basis for Instruction | As a Supplement | As Basis for Instruction | As a Supplement | As Basis for Instruction | As a Supplement | As Basis for Instruction | As a Supplement |
| Ninth Grade Participants | | | | | | | | |
| Botswana | 75 (3.8) | 25 (3.8) | 19 (3.3) | 61 (4.6) | 27 (3.8) | 68 (4.0) | 1 (0.7) | 20 (3.7) |
| Honduras | r 52 (4.6) | 40 (4.7) | r 30 (4.1) | 65 (4.3) | r 20 (3.9) | 62 (4.7) | r 4 (2.0) | 33 (4.8) |
| South Africa | 71 (3.5) | 27 (3.4) | 43 (3.7) | 51 (3.7) | 16 (3.0) | 71 (3.7) | 5 (1.7) | 19 (2.9) |
| Benchmarking Participants | | | | | | | | |
| Alberta, Canada | 59 (3.8) | 36 (3.5) | 15 (2.9) | 77 (3.7) | 26 (3.3) | 73 (3.3) | 11 (2.1) | 66 (3.9) |
| Ontario, Canada | 59 (3.6) | 38 (3.7) | 22 (3.6) | 77 (3.5) | 18 (3.0) | 80 (3.0) | 7 (1.7) | 67 (4.1) |
| Quebec, Canada | 45 (4.2) | 48 (4.2) | 54 (4.7) | 46 (4.7) | 17 (3.2) | 77 (3.5) | 6 (1.1) | 42 (4.3) |
| Abu Dhabi, UAE | 85 (3.5) | 15 (3.5) | 46 (4.4) | 53 (4.4) | 47 (4.2) | 49 (4.1) | 14 (3.1) | 56 (4.3) |
| Dubai, UAE | 81 (1.9) | 17 (1.9) | 29 (3.1) | 69 (3.0) | 36 (4.6) | 59 (4.7) | 25 (2.3) | 60 (3.3) |
| Alabama, US | r 59 (9.1) | 40 (9.0) | r 17 (4.2) | 79 (6.1) | r 16 (3.8) | 84 (3.8) | r 10 (3.7) | 74 (6.0) |
| California, US | s 57 (6.7) | 39 (6.6) | s 18 (5.2) | 73 (5.7) | s 18 (4.3) | 66 (5.6) | s 20 (6.2) | 47 (7.5) |
| Colorado, US | r 71 (6.2) | 24 (6.1) | r 8 (4.1) | 84 (4.5) | r 14 (4.3) | 79 (4.8) | r 9 (3.6) | 68 (5.7) |
| Connecticut, US | r 41 (6.1) | 53 (6.2) | r 21 (4.5) | 75 (5.0) | r 18 (4.1) | 77 (4.5) | r 14 (3.8) | 58 (5.2) |
| Florida, US | r 61 (6.6) | 33 (6.2) | r 19 (4.5) | 81 (4.5) | r 9 (3.6) | 90 (3.7) | r 23 (5.8) | 60 (6.8) |
| Indiana, US | r 54 (7.0) | 37 (6.0) | r 14 (4.5) | 84 (4.8) | r 12 (3.9) | 71 (5.8) | r 16 (4.5) | 57 (6.8) |
| Massachusetts, US | r 56 (5.9) | 38 (6.0) | r 12 (3.3) | 84 (4.1) | r 13 (4.0) | 81 (5.8) | r 9 (2.9) | 64 (6.1) |
| Minnesota, US | r 82 (5.4) | 16 (5.0) | r 10 (4.0) | 83 (5.4) | r 7 (2.8) | 78 (5.6) | r 13 (3.0) | 75 (4.6) |
| North Carolina, US | r 39 (7.5) | 52 (6.7) | r 17 (5.0) | 82 (5.2) | r 17 (5.6) | 67 (6.5) | r 13 (4.7) | 63 (6.8) |

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

Teacher Instructional Activities in Mathematics Class

There are a myriad of instructional approaches that can be used in teaching mathematics. However, effective instructional approaches often involve helping students improve their problem solving skills (a goal highlighted by the US National Council for Teachers of Mathematics (NCTM)). Also, collaborative problem solving activities have been found to be beneficial from several perspectives. For example, students in groups can discuss the merits of different proposed solutions and learn multiple strategies. Also, because they can help each other, students in groups can often handle challenging situations beyond the capabilities of individuals.

Exhibit 8.27 presents teachers' reports at the fourth grade about how much they use several common instructional approaches for teaching mathematics. The exhibit provides the percentage of fourth grade students asked to do the activity in "Every or Almost Every Lesson." Internationally, on average, the majority of fourth grade students (55%) are asked to work problems with teacher guidance (individually or in groups) in almost every mathematics lesson. It is relatively rare for teachers to ask students (16% on average) to work problems without teacher guidance (individually or in groups); more common is working problems as part of whole class instruction directed by the teacher, used with 45 percent of the students in almost every lesson. The two strategies queried were: asking students to memorize rules, procedures, and facts; and asking students to explain their answers. On average, internationally, 62 percent of the students were asked for explanations in almost every lesson, whereas fewer (37%) were asked to memorize. Looking across the countries at the fourth grade and sixth grade, as well as the benchmarking participants, there was considerable variation, in particular, for guided problem solving and memorization.

Exhibit 8.28 presents teachers reports about instructional approaches at the eighth grade. The use of the different configurations for problem solving activities corresponds closely to that reported at fourth grade. Internationally, on average, working problems with teacher guidance (individually or in groups) occurred in almost every lesson for 55 percent of students, working problems without teacher guidance (individually or in groups) for 14 percent of students, and working problems together as a whole class with direct teacher guidance for 48 percent of students. Regarding the strategies, internationally, 60 percent of the eighth grade students were asked for explanations and 45 percent to memorize, on average. At the eighth grade, teachers also reported on asking

students to apply facts, concepts, and procedures; and just about half of the students (49%) did application tasks in almost every lesson, on average. In general, the instructional approaches used at the ninth grade and by the benchmarking participants followed the international eighth grade pattern.

Computer Activities During Mathematics Lessons

According to the *TIMSS 2011 Encyclopedia*, countries are investing in technology as a way to enhance teaching and learning. Availability of computers and other technology in the mathematics classroom can facilitate successful implementation of the curriculum. For example, as described in Contextual Framework chapter of the *TIMSS 2011 Assessment Frameworks*, computers and the Internet provide students ways to explore concepts in-depth, trigger enthusiasm and motivation for learning, enable students to learn at their own pace, and provide students with access to vast information sources.

Besides giving students access to the Internet, computers can serve a number of other educational purposes. While initially limited to learning drills and practice, they are now used in a variety of ways including tutorials, simulations, games, and applications. New software enables students to pose their own problems and explore and discover mathematics and scientific properties on their own. Computer software for modeling and visualization of ideas can open a whole new world to students and help them connect these ideas to their language and symbol systems. A recent study summarizing 25 meta-analyses determined that computer use in the classroom has a significant positive effect on achievement at all grade levels and in all subjects (Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011).

Exhibit 8.29 contains teachers' reports about the prevalence and types of computer-based activities used as part of mathematics instruction at the fourth grade. The range of computer availability across countries was very large, from 5 percent of the students in Iran to 87 percent in New Zealand. Internationally, on average, less than half (42%) of the fourth grade students had computers available during their mathematics lessons. Interestingly, average mathematics achievement was equivalent between those fourth grade students with computers available and those without computers available.

Teachers reported that 26 to 27 percent of the fourth grade students, on average, were asked to use a computer at least monthly to explore mathematics principles and concepts and to look up ideas and information. Somewhat larger percentages, about one-third, were asked to use a computer at least

Reported by Teachers

| Country | Percent of Students Doing the Following Activities Every or Almost Every Lesson | | | | |
|-----------------------|---|--|--|---------------------------------------|-----------------------|
| | Work Problems (Individually or with Peers) with Teacher Guidance | Work Problems Together in the Whole Class with Direct Teacher Guidance | Work Problems (Individually or with Peers) While Teacher Occupied by Other Tasks | Memorize Rules, Procedures, and Facts | Explain Their Answers |
| Armenia | 49 (3.9) | 53 (3.4) | 6 (1.8) | 63 (3.6) | 70 (3.7) |
| Australia | r 46 (4.0) | r 40 (3.8) | s 22 (3.7) | r 13 (2.3) | r 61 (4.4) |
| Austria | 30 (3.5) | 22 (3.4) | 3 (1.0) | 1 (0.8) | 27 (3.3) |
| Azerbaijan | 57 (3.8) | 48 (3.7) | 20 (2.5) | 77 (3.0) | 71 (3.3) |
| Bahrain | 67 (4.0) | 54 (4.4) | 18 (4.1) | 56 (5.1) | 74 (4.1) |
| Belgium (Flemish) | 27 (3.3) | 17 (2.6) | 4 (1.0) | 3 (1.1) | 49 (3.7) |
| Chile | r 61 (4.4) | r 66 (4.0) | r 16 (3.4) | r 36 (4.7) | r 77 (3.9) |
| Chinese Taipei | 51 (4.0) | 55 (4.2) | 19 (3.3) | 42 (3.3) | 32 (3.9) |
| Croatia | 53 (2.9) | 54 (3.3) | 6 (1.5) | 49 (3.4) | 45 (3.7) |
| Czech Republic | 61 (3.5) | 37 (4.2) | 9 (2.8) | 3 (1.3) | 61 (3.4) |
| Denmark | r 62 (3.9) | r 23 (3.8) | r 8 (2.2) | r 7 (2.3) | r 41 (3.6) |
| England | 62 (4.1) | 37 (4.2) | 19 (3.3) | 23 (3.7) | 79 (3.6) |
| Finland | 73 (3.0) | 24 (3.2) | 10 (2.2) | 17 (2.9) | 36 (3.2) |
| Georgia | 61 (3.9) | 47 (4.0) | 11 (2.4) | 63 (3.4) | 77 (3.3) |
| Germany | 40 (3.5) | 20 (2.9) | 7 (1.9) | 6 (1.6) | 50 (3.3) |
| Hong Kong SAR | 32 (3.7) | 27 (4.0) | 8 (2.0) | 4 (1.7) | 34 (3.9) |
| Hungary | 65 (3.4) | 40 (3.7) | 13 (2.6) | 10 (2.0) | 87 (2.3) |
| Iran, Islamic Rep. of | 68 (3.9) | 55 (4.0) | 32 (4.0) | 55 (3.3) | 72 (2.7) |
| Ireland | 53 (3.8) | 53 (3.4) | 24 (3.3) | 30 (3.9) | 59 (3.9) |
| Italy | 24 (3.1) | 21 (3.3) | 4 (1.2) | 41 (3.9) | 57 (3.8) |
| Japan | 76 (3.3) | 74 (3.4) | 8 (2.2) | 42 (4.1) | 43 (3.3) |
| Kazakhstan | 69 (3.8) | 67 (3.5) | 42 (3.9) | 73 (4.0) | 78 (3.1) |
| Korea, Rep. of | 67 (3.8) | 72 (3.9) | 35 (3.6) | 38 (4.5) | 32 (3.9) |
| Kuwait | 29 (3.5) | 40 (3.4) | 8 (2.3) | 71 (3.5) | 74 (3.3) |
| Lithuania | 72 (2.7) | 53 (3.3) | 10 (2.0) | 44 (3.3) | 71 (3.4) |
| Malta | 47 (0.1) | 49 (0.1) | 13 (0.1) | 26 (0.1) | 68 (0.1) |
| Morocco | r 69 (3.6) | r 60 (4.1) | r 21 (3.6) | r 73 (3.3) | r 65 (3.9) |
| Netherlands | r 37 (4.5) | r 21 (3.5) | r 20 (3.7) | r 10 (2.7) | r 53 (4.6) |
| New Zealand | 59 (2.6) | 23 (2.2) | 35 (3.1) | 12 (1.8) | 69 (2.6) |
| Northern Ireland | r 58 (4.0) | r 39 (4.4) | r 15 (3.1) | r 23 (3.8) | r 64 (4.6) |
| Norway | 72 (4.6) | 33 (4.2) | 4 (1.0) | 9 (1.8) | 27 (3.9) |
| Oman | 69 (2.9) | 41 (3.1) | 8 (1.5) | 59 (3.1) | 68 (2.9) |
| Poland | 63 (3.5) | 69 (3.3) | 25 (3.5) | 48 (3.6) | 88 (2.1) |
| Portugal | 52 (4.7) | 43 (4.7) | 11 (2.5) | 42 (4.9) | 80 (3.3) |
| Qatar | 56 (5.2) | 53 (3.7) | 23 (4.4) | 60 (4.2) | 76 (3.8) |
| Romania | 78 (3.3) | 77 (3.0) | 13 (2.7) | 37 (3.0) | 84 (3.1) |
| Russian Federation | 59 (3.9) | 56 (4.0) | 35 (3.4) | 29 (3.3) | 89 (2.2) |
| Saudi Arabia | 56 (4.7) | 61 (3.9) | 21 (4.1) | 56 (4.4) | 65 (4.1) |
| Serbia | 63 (4.3) | 43 (4.2) | 2 (1.1) | 69 (4.1) | 75 (3.3) |
| Singapore | 36 (2.5) | 37 (2.6) | 15 (1.9) | 20 (2.2) | 48 (2.6) |
| Slovak Republic | 57 (3.3) | 49 (3.6) | 8 (2.3) | 11 (2.1) | 64 (3.5) |
| Slovenia | 37 (3.2) | 13 (2.3) | 11 (2.2) | 5 (1.4) | 64 (3.4) |
| Spain | 52 (3.9) | 44 (3.8) | 17 (3.1) | 34 (3.8) | 75 (3.3) |
| Sweden | r 48 (4.0) | r 26 (3.9) | r 8 (2.3) | r 13 (3.3) | r 40 (4.2) |
| Thailand | 55 (3.5) | 53 (4.6) | 30 (3.7) | 56 (4.4) | 55 (4.2) |
| Tunisia | 69 (3.6) | 50 (3.9) | 12 (2.5) | 72 (3.9) | 67 (4.2) |
| Turkey | 55 (3.5) | 50 (3.5) | 23 (2.9) | 63 (3.5) | 67 (3.4) |
| United Arab Emirates | 57 (2.0) | 49 (2.2) | 13 (1.5) | 49 (2.6) | 79 (1.6) |
| United States | r 76 (2.2) | r 79 (1.9) | r 32 (2.6) | r 31 (2.3) | r 75 (2.2) |
| Yemen | 34 (4.2) | 39 (4.2) | 7 (1.9) | 55 (4.2) | 38 (4.1) |
| International Avg. | 55 (0.5) | 45 (0.5) | 16 (0.4) | 37 (0.5) | 62 (0.5) |

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.

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 8.27: Teacher Instructional Activities in Mathematics Class (Continued)

| Country | Percent of Students Doing the Following Activities Every or Almost Every Lesson | | | | |
|----------------------------------|---|--|--|---------------------------------------|-----------------------|
| | Work Problems (Individually or with Peers) with Teacher Guidance | Work Problems Together in the Whole Class with Direct Teacher Guidance | Work Problems (Individually or with Peers) While Teacher Occupied by Other Tasks | Memorize Rules, Procedures, and Facts | Explain Their Answers |
| Sixth Grade Participants | | | | | |
| Botswana | 68 (4.2) | 64 (3.7) | 37 (4.2) | 59 (4.8) | r 71 (4.5) |
| Honduras | 61 (4.7) | 58 (4.5) | 35 (4.8) | 59 (4.5) | 77 (4.3) |
| Yemen | 30 (4.0) | 44 (4.1) | 7 (2.2) | 66 (4.1) | 45 (4.3) |
| Benchmarking Participants | | | | | |
| Alberta, Canada | r 49 (4.7) | r 39 (4.7) | r 14 (3.4) | r 4 (1.5) | r 60 (4.8) |
| Ontario, Canada | 47 (3.5) | 43 (3.5) | 14 (2.7) | 8 (1.9) | 62 (3.7) |
| Quebec, Canada | 37 (4.7) | 35 (4.9) | 14 (3.1) | 29 (3.9) | 49 (4.5) |
| Abu Dhabi, UAE | 58 (4.2) | 40 (4.4) | 13 (2.8) | 45 (4.7) | 80 (3.2) |
| Dubai, UAE | 61 (2.6) | r 52 (3.0) | r 18 (3.3) | 52 (2.8) | r 83 (2.4) |
| Florida, US | s 78 (4.9) | r 85 (3.9) | r 31 (4.9) | r 35 (4.3) | r 83 (3.6) |
| North Carolina, US | 80 (3.8) | 77 (5.1) | 23 (5.5) | 27 (5.3) | 94 (2.6) |

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

Reported by Teachers

| Country | Percent of Students Doing the Following Activities Every or Almost Every Lesson | | | | | |
|-------------------------|---|--|--|---------------------------------------|-----------------------|---------------------------------------|
| | Work Problems (Individually or with Peers) with Teacher Guidance | Work Problems Together in the Whole Class with Direct Teacher Guidance | Work Problems (Individually or with Peers) While Teacher Occupied by Other Tasks | Memorize Rules, Procedures, and Facts | Explain Their Answers | Apply Facts, Concepts, and Procedures |
| Armenia | 45 (3.8) | 37 (3.6) | 4 (1.5) | 73 (2.9) | 71 (3.6) | 71 (3.4) |
| Australia | r 64 (4.2) | r 43 (4.2) | r 25 (3.3) | r 32 (3.0) | r 46 (5.0) | r 60 (4.6) |
| Bahrain | 58 (2.8) | 50 (2.9) | 22 (2.2) | 70 (2.3) | 74 (2.7) | 61 (3.2) |
| Chile | 60 (3.9) | 59 (3.6) | 10 (2.5) | 33 (4.0) | 73 (3.8) | 60 (3.6) |
| Chinese Taipei | 36 (3.7) | 41 (3.6) | 9 (2.3) | 51 (4.0) | 20 (3.1) | 38 (4.5) |
| England | 69 (4.0) | 32 (4.2) | 9 (1.8) | 24 (3.9) | 66 (3.7) | 43 (4.8) |
| Finland | 83 (2.6) | 28 (2.6) | 6 (1.5) | 13 (2.5) | 36 (3.5) | 37 (3.5) |
| Georgia | 58 (3.7) | 31 (3.6) | 4 (1.5) | 80 (3.3) | 76 (3.0) | 28 (3.1) |
| Ghana | 69 (4.0) | 65 (4.4) | 26 (3.8) | 49 (3.9) | 68 (4.4) | 70 (3.6) |
| Hong Kong SAR | 55 (3.8) | 46 (4.3) | 11 (2.7) | 14 (3.2) | 27 (3.9) | 37 (4.3) |
| Hungary | 56 (3.8) | 43 (3.7) | 8 (2.0) | 16 (2.7) | 75 (3.0) | 33 (3.4) |
| Indonesia | 69 (4.8) | 74 (4.2) | 18 (3.3) | 74 (4.6) | 77 (3.7) | 56 (4.9) |
| Iran, Islamic Rep. of | 52 (3.8) | 45 (3.9) | 16 (2.1) | 38 (3.4) | 68 (3.2) | 48 (3.7) |
| Israel | 69 (3.0) | 61 (2.9) | 22 (2.3) | 33 (3.0) | 72 (2.7) | 54 (3.4) |
| Italy | 47 (3.8) | 43 (3.7) | 4 (1.4) | 57 (3.5) | 56 (3.9) | 32 (3.6) |
| Japan | 65 (3.5) | 49 (3.9) | 9 (2.1) | 48 (3.9) | 24 (3.6) | 24 (3.3) |
| Jordan | 41 (3.5) | 56 (3.8) | 11 (2.3) | 53 (3.9) | 66 (3.6) | 57 (3.2) |
| Kazakhstan | 57 (3.8) | 62 (4.1) | 30 (3.6) | 65 (3.8) | 75 (3.7) | 73 (4.0) |
| Korea, Rep. of | 67 (2.9) | 77 (2.7) | 45 (3.0) | 46 (3.1) | 21 (2.6) | 68 (2.9) |
| Lebanon | 48 (3.9) | 50 (4.1) | 15 (3.3) | 71 (3.8) | 75 (3.6) | 46 (4.7) |
| Lithuania | 65 (3.8) | 55 (3.3) | 6 (2.0) | 65 (2.8) | 65 (3.6) | 65 (3.3) |
| Macedonia, Rep. of | r 45 (4.7) | r 35 (3.9) | r 10 (2.6) | r 58 (4.7) | r 65 (4.4) | r 38 (4.3) |
| Malaysia | 49 (4.0) | 58 (3.5) | 25 (3.6) | 55 (3.9) | 64 (3.7) | 49 (3.8) |
| Morocco | 53 (3.8) | 50 (3.4) | 14 (2.4) | 54 (3.6) | 72 (2.9) | 54 (3.8) |
| New Zealand | 68 (3.9) | 39 (2.9) | 19 (2.5) | 19 (2.9) | 52 (3.4) | 50 (3.2) |
| Norway | 75 (3.7) | 25 (3.7) | 6 (1.9) | 12 (2.8) | 21 (3.4) | 19 (3.2) |
| Oman | 63 (2.7) | 58 (3.3) | 5 (1.4) | 66 (3.1) | 68 (2.7) | 48 (3.3) |
| Palestinian Nat'l Auth. | 57 (3.9) | 55 (4.1) | 13 (2.7) | 59 (3.9) | 79 (3.7) | 54 (4.5) |
| Qatar | 49 (4.4) | 51 (3.2) | 21 (3.0) | 41 (5.0) | 75 (3.4) | 45 (4.5) |
| Romania | 67 (3.9) | 67 (3.2) | 9 (2.1) | 59 (4.4) | 79 (2.9) | 46 (3.6) |
| Russian Federation | 47 (3.5) | 54 (3.7) | 13 (2.8) | 37 (3.1) | 70 (3.2) | 74 (2.7) |
| Saudi Arabia | 53 (3.8) | 57 (4.3) | 16 (3.1) | 43 (3.7) | 65 (4.1) | 54 (4.4) |
| Singapore | 41 (2.5) | 40 (2.4) | 8 (1.5) | 21 (2.1) | 30 (2.5) | 46 (2.6) |
| Slovenia | 37 (3.1) | 29 (2.5) | 4 (1.3) | 7 (1.4) | 46 (2.6) | 41 (2.7) |
| Sweden | r 34 (3.5) | r 18 (2.7) | r 10 (2.0) | r 16 (2.8) | r 51 (3.5) | r 27 (3.1) |
| Syrian Arab Republic | 21 (3.9) | 35 (4.0) | 7 (2.2) | 60 (4.6) | 70 (4.1) | 30 (3.9) |
| Thailand | 54 (4.0) | 51 (4.6) | 21 (3.5) | 53 (3.7) | 57 (4.6) | 26 (3.8) |
| Tunisia | 51 (4.3) | 52 (3.9) | 9 (2.2) | 49 (3.9) | 71 (3.5) | 51 (4.0) |
| Turkey | 52 (3.6) | 41 (3.3) | 16 (2.2) | 75 (2.9) | 71 (2.9) | 38 (2.9) |
| Ukraine | 45 (4.6) | 55 (4.4) | 8 (2.1) | 38 (4.3) | 60 (4.0) | 78 (3.5) |
| United Arab Emirates | 53 (2.4) | 47 (2.3) | 15 (1.7) | 44 (2.6) | 75 (2.0) | 59 (2.2) |
| United States | r 75 (2.6) | r 67 (2.6) | r 26 (2.5) | r 23 (2.7) | r 64 (2.6) | r 65 (2.6) |
| International Avg. | 55 (0.6) | 48 (0.6) | 14 (0.4) | 45 (0.5) | 60 (0.5) | 49 (0.6) |

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. 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 8.28: Teacher Instructional Activities in Mathematics Class (Continued)

| Country | Percent of Students Doing the Following Activities Every or Almost Every Lesson | | | | | |
|----------------------------------|---|--|--|---------------------------------------|-----------------------|---------------------------------------|
| | Work Problems (Individually or with Peers) with Teacher Guidance | Work Problems Together in the Whole Class with Direct Teacher Guidance | Work Problems (Individually or with Peers) While Teacher Occupied by Other Tasks | Memorize Rules, Procedures, and Facts | Explain Their Answers | Apply Facts, Concepts, and Procedures |
| Ninth Grade Participants | | | | | | |
| Botswana | 63 (4.1) | 45 (3.6) | 14 (3.0) | 39 (4.5) | 57 (4.2) | 48 (4.8) |
| Honduras | r 63 (4.3) | r 63 (4.3) | r 9 (2.5) | r 52 (4.4) | r 81 (3.4) | r 47 (4.7) |
| South Africa | 53 (4.1) | 56 (3.6) | 16 (3.1) | 45 (4.0) | 68 (3.6) | 62 (3.9) |
| Benchmarking Participants | | | | | | |
| Alberta, Canada | 62 (3.9) | 52 (4.4) | 23 (3.6) | 10 (2.5) | 58 (3.5) | 46 (4.4) |
| Ontario, Canada | 49 (3.7) | 45 (4.0) | 17 (2.8) | 10 (2.3) | 64 (3.9) | 43 (3.7) |
| Quebec, Canada | 56 (4.3) | 54 (4.5) | 18 (3.2) | 34 (4.0) | 45 (3.9) | 40 (3.7) |
| Abu Dhabi, UAE | 55 (4.2) | 48 (4.3) | 17 (3.1) | 49 (3.6) | 76 (3.0) | 62 (3.8) |
| Dubai, UAE | 55 (4.6) | 44 (2.9) | 18 (2.8) | 43 (4.5) | 73 (3.9) | 61 (3.6) |
| Alabama, US | s 83 (4.9) | s 81 (5.5) | s 25 (6.6) | s 16 (4.7) | s 69 (5.7) | s 75 (5.4) |
| California, US | s 70 (6.6) | s 77 (5.1) | s 13 (4.2) | s 36 (7.3) | s 63 (5.4) | s 65 (7.6) |
| Colorado, US | r 80 (4.3) | r 60 (6.7) | r 27 (6.0) | r 16 (5.5) | r 67 (6.0) | r 56 (7.0) |
| Connecticut, US | r 68 (6.2) | r 62 (5.6) | r 13 (3.9) | r 10 (2.9) | r 68 (5.2) | r 51 (6.3) |
| Florida, US | r 79 (4.2) | s 73 (5.5) | s 23 (5.6) | r 27 (5.5) | s 72 (6.7) | s 70 (6.4) |
| Indiana, US | r 78 (5.0) | r 71 (3.8) | r 31 (5.4) | r 26 (5.3) | r 38 (5.3) | r 59 (7.1) |
| Massachusetts, US | r 64 (5.2) | r 47 (6.2) | r 16 (5.6) | r 12 (4.6) | r 63 (6.5) | r 52 (5.3) |
| Minnesota, US | r 76 (4.9) | r 69 (5.6) | r 32 (5.0) | r 7 (3.5) | r 60 (6.6) | r 56 (6.2) |
| North Carolina, US | r 78 (5.8) | r 70 (5.6) | r 16 (4.0) | r 20 (4.7) | r 70 (5.7) | r 72 (5.8) |

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

monthly to practice skills and procedures. The range in computer availability across the benchmarking participants reflected the fourth grade results across countries. However, the students participating at the sixth grade had less access to computers for mathematics instruction than did the fourth grade TIMSS students, on average.

At the eighth grade, reports about computer availability and use were similar to those at the fourth grade (see Exhibit 8.30). Internationally, on average, about one-third of students had computers available during their mathematics lessons, ranging from 5 percent in Tunisia to 76 percent in Norway. Students with computers available during their lessons had slightly higher mathematics achievement than students without computers available. Approximately, 21 to 24 percent of the eighth grade students were asked to do the following on at least a monthly basis: explore mathematics principles and concepts, look up ideas and information, process and analyze data, and practice skills and procedures. As would be anticipated, computer use varied considerably across countries at the eighth grade, as well as for the benchmarking participants. Countries participating at the ninth grade had less computer availability, including South Africa, Botswana, and Honduras.

Mathematics Homework

Homework is a way to extend instruction and assess student progress. TIMSS has consistently shown that the amount of homework assigned for mathematics and science varies both within and across countries. In some situations, homework is assigned typically to students who need it the most to keep up with their classmates. In other situations, students receive homework for practice or as an enrichment exercise. Because of the different approaches and policies associated with assigning homework, it generally shows mixed results in relation to average student achievement.

The eighth grade students in TIMSS were asked how often their teacher gives homework in mathematics and how much time they usually spend on it when it is given. Weekly time on mathematics homework was estimated by multiplying the frequency of assignment by the amount of time spent. Exhibit 8.31 presents the results, with countries ordered by the percentage of students reporting they spent 3 hours or more per week. The range was from a high of 44 percent of students in Romania to 1 percent in England. It should be mentioned that although students in several of the high-performing East Asian countries report relatively small amounts of homework, many of them attend special tutoring schools. On average, internationally, only 15 percent of

the eighth grade students reported doing as much as 3 hours of mathematics homework per week. In fact, almost half (48%) reported doing 45 minutes or less of weekly mathematics homework. Thirty-eight percent reported doing more than 45 minutes but less than 3 hours, and these students had the highest average mathematics achievement. The ninth grade and benchmarking participants had comparably smaller percentages of students reporting 3 hours or more of mathematics homework per week, although the percentages reporting less than 3 hours of weekly homework were more similar to the international averages at eighth grade.

Mathematics Classroom Assessment

Teachers have a number of informal and formal ways to evaluate student learning. Informal assessments during instruction help teachers identify the needs of particular individuals, gauge the pace of instruction, and signal the need to adapt or reteach. Formal tests typically are used to make important decisions about the students, such as grades or marks.

Exhibit 8.32 presents teachers' reports about how often they give eighth grade students mathematics tests or examinations. Internationally, on average, eighth grade students are tested regularly in mathematics—45 percent at least every two weeks and 40 percent about monthly. Only 15 percent were tested less often, approximately a few times a year, on average. Teachers in the high-performing countries of Chinese Taipei and the Russian Federation tested almost all of the eighth grade students (97–98%) at least every two weeks, although students in other high-performing countries were tested less often.

The exhibit also contains teachers' reports about the types of questions they included in their tests and examinations. Most frequently, the test questions involved applications of mathematical procedures. This type of question was used always or almost always for 77 percent of the students, on average, across the countries, and at least sometimes for the remaining 23 percent of the students. Test questions involving searching for patterns and relationships were used always or almost always for 31 percent of the students, on average, sometimes for 64 percent of the students, and rarely for 5 percent of the students. Test questions that required students to provide explanations or justifications for their answers were used almost always for 37 percent of students and sometimes for 56 percent, with only 8 percent almost never. However, across the eighth grade, ninth grade, and benchmarking participants, there was considerable variation in testing practices.

Reported by Teachers

| Country | Computers Available for Mathematics Lessons | | | Percent of Students Whose Teachers Have Them Use Computers At Least Monthly | | |
|-----------------------|---|---------------------|-----------|---|----------------------------------|-----------------------------------|
| | Percent of Students | Average Achievement | | To Explore Mathematics Principles and Concepts | To Look Up Ideas and Information | To Practice Skills and Procedures |
| | Yes | Yes | No | | | |
| New Zealand | 87 (2.0) | 487 (2.9) | 481 (6.5) | 73 (2.6) | 63 (2.9) | 84 (2.4) |
| Netherlands | r 83 (3.3) | 540 (2.1) | 532 (5.2) | r 57 (5.2) | r 46 (4.9) | r 82 (3.4) |
| Australia | r 79 (2.8) | 521 (4.1) | 517 (7.3) | r 60 (3.3) | r 56 (3.5) | r 70 (3.3) |
| Norway | 77 (3.6) | 495 (3.1) | 494 (6.1) | 40 (4.6) | 35 (4.3) | 68 (4.0) |
| Northern Ireland | r 76 (3.9) | 561 (4.3) | 570 (6.4) | r 66 (4.4) | r 62 (4.4) | r 74 (4.0) |
| England | 71 (4.2) | 545 (3.9) | 542 (8.0) | 55 (4.4) | 41 (4.4) | 60 (4.3) |
| Denmark | r 70 (3.4) | 541 (3.0) | 537 (5.0) | r 38 (3.9) | r 40 (4.1) | r 63 (3.8) |
| Malta | 69 (0.1) | 488 (1.4) | 515 (2.9) | 56 (0.1) | 44 (0.1) | 59 (0.1) |
| Kazakhstan | 66 (3.5) | 499 (6.0) | 507 (7.9) | 56 (3.7) | 59 (3.6) | 61 (3.6) |
| Singapore | 65 (2.6) | 607 (4.4) | 603 (4.4) | 54 (2.4) | 46 (2.7) | 54 (2.3) |
| United States | r 63 (2.2) | 541 (2.3) | 544 (3.7) | r 43 (2.6) | r 37 (2.5) | r 53 (2.3) |
| Austria | 62 (3.5) | 510 (2.7) | 506 (4.6) | 23 (3.1) | 24 (2.5) | 48 (3.3) |
| Chile | r 60 (3.8) | 461 (4.2) | 458 (5.7) | r 42 (4.2) | r 47 (4.3) | r 51 (4.0) |
| Sweden | r 60 (5.0) | 508 (3.0) | 501 (4.6) | r 21 (3.6) | r 18 (3.3) | r 53 (5.1) |
| Finland | 59 (3.1) | 549 (2.5) | 542 (3.6) | 23 (2.9) | 20 (3.2) | 50 (3.5) |
| Japan | 58 (3.5) | 585 (2.4) | 587 (2.6) | 5 (1.9) | 9 (2.1) | 10 (1.9) |
| Germany | 58 (3.1) | 529 (2.9) | 527 (3.4) | 29 (3.2) | 27 (2.8) | 46 (3.1) |
| Ireland | 55 (3.2) | 528 (4.1) | 527 (3.5) | 42 (3.3) | 33 (3.8) | 43 (3.5) |
| Belgium (Flemish) | 52 (4.6) | 551 (2.8) | 547 (2.9) | 19 (3.2) | 26 (3.5) | 49 (4.5) |
| Czech Republic | 50 (4.4) | 509 (4.2) | 512 (2.5) | 21 (3.3) | 27 (3.8) | 43 (4.0) |
| Lithuania | 44 (3.6) | 538 (4.6) | 530 (3.1) | 34 (3.7) | 36 (3.7) | 39 (3.5) |
| Portugal | 43 (5.3) | 539 (7.1) | 528 (4.4) | 32 (4.2) | 37 (5.4) | 33 (4.4) |
| Chinese Taipei | 41 (3.6) | 591 (3.1) | 591 (2.9) | 27 (3.8) | 27 (3.8) | 30 (3.6) |
| Qatar | 40 (5.5) | 399 (9.7) | 420 (5.3) | 29 (5.2) | 33 (5.4) | 33 (5.5) |
| Hong Kong SAR | 39 (4.6) | 601 (6.5) | 602 (5.2) | 25 (4.3) | 22 (4.0) | 25 (3.7) |
| Slovak Republic | 38 (3.3) | 518 (3.8) | 499 (4.9) | 28 (2.9) | 32 (3.1) | 35 (3.3) |
| Spain | 36 (3.6) | 490 (4.6) | 478 (3.5) | 18 (3.4) | 20 (3.3) | 27 (3.3) |
| Turkey | 36 (3.4) | 498 (5.4) | 453 (6.0) | 33 (3.4) | 33 (3.6) | 33 (3.5) |
| Hungary | 34 (3.6) | 509 (7.6) | 517 (4.7) | 14 (2.6) | 17 (2.9) | 25 (3.5) |
| Slovenia | 31 (3.6) | 512 (3.9) | 514 (2.8) | 13 (2.2) | 21 (2.7) | 25 (3.0) |
| Korea, Rep. of | 31 (3.7) | 606 (3.3) | 604 (2.5) | 14 (3.0) | 19 (3.1) | 13 (3.0) |
| Russian Federation | 31 (3.3) | 546 (7.0) | 540 (4.0) | 24 (2.8) | 23 (2.7) | 27 (2.7) |
| Azerbaijan | 30 (3.7) | 467 (10.8) | 461 (7.4) | 20 (3.3) | 22 (3.5) | 21 (3.4) |
| United Arab Emirates | 29 (2.0) | 438 (5.1) | 435 (2.8) | 24 (1.9) | 25 (1.9) | 25 (1.9) |
| Bahrain | 27 (3.2) | 433 (6.5) | 437 (4.4) | 22 (3.0) | 24 (3.2) | 22 (3.0) |
| Italy | 25 (2.9) | 515 (4.9) | 507 (3.1) | 19 (2.8) | 19 (2.7) | 23 (2.9) |
| Armenia | 24 (3.4) | 458 (8.0) | 450 (4.2) | 11 (2.4) | 14 (2.6) | 14 (2.6) |
| Romania | 24 (3.4) | 486 (12.1) | 480 (6.6) | 18 (3.4) | 19 (3.4) | 21 (3.6) |
| Kuwait | 21 (3.0) | 341 (8.9) | 342 (3.7) | 15 (3.1) | 16 (2.9) | 17 (3.0) |
| Saudi Arabia | 21 (3.5) | 402 (10.0) | 411 (6.3) | 18 (3.2) | 19 (3.3) | 19 (3.3) |
| Georgia | 19 (3.1) | 463 (8.9) | 448 (4.6) | 14 (2.6) | 14 (2.9) | 14 (2.6) |
| Yemen | 19 (3.4) | 226 (14.5) | 253 (7.3) | 6 (2.1) | 7 (2.2) | 7 (2.4) |
| Poland | 16 (2.8) | 474 (5.2) | 482 (2.4) | 7 (1.9) | 11 (2.5) | 15 (2.6) |
| Oman | 15 (1.9) | 378 (8.4) | 387 (3.1) | 10 (1.8) | 12 (1.8) | 12 (2.0) |
| Thailand | 13 (2.7) | 444 (11.2) | 460 (5.6) | 7 (2.0) | 9 (2.3) | 11 (2.3) |
| Serbia | 12 (2.7) | 507 (10.3) | 518 (3.4) | 7 (2.0) | 9 (2.3) | 8 (2.2) |
| Croatia | 10 (1.9) | 495 (7.3) | 489 (1.9) | 5 (1.3) | 7 (1.6) | 6 (1.4) |
| Morocco | r 8 (1.8) | 328 (17.2) | 338 (4.9) | r 5 (1.6) | r 3 (1.1) | r 3 (1.1) |
| Tunisia | 7 (2.0) | 346 (12.5) | 361 (4.2) | 3 (1.3) | 5 (1.7) | 5 (1.5) |
| Iran, Islamic Rep. of | 5 (1.4) | 453 (21.4) | 429 (3.7) | 4 (1.3) | 3 (1.1) | 3 (1.3) |
| International Avg. | 42 (0.5) | 491 (1.1) | 490 (0.7) | 27 (0.4) | 26 (0.5) | 34 (0.5) |

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

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

Exhibit 8.29: Computer Activities During Mathematics Lessons (Continued)

| Country | Computers Available for Mathematics Lessons | | | Percent of Students Whose Teachers Have Them Use Computers At Least Monthly | | |
|----------------------------------|---|---------------------|------------|---|----------------------------------|-----------------------------------|
| | Percent of Students | Average Achievement | | To Explore Mathematics Principles and Concepts | To Look Up Ideas and Information | To Practice Skills and Procedures |
| | Yes | Yes | No | | | |
| Sixth Grade Participants | | | | | | |
| Yemen | 12 (3.0) | 339 (14.2) | 352 (6.0) | 4 (1.8) | 4 (1.8) | 4 (1.8) |
| Botswana | 6 (2.1) | 465 (16.6) | 416 (4.5) | r 3 (1.2) | 3 (1.5) | r 3 (1.2) |
| Honduras | 4 (1.6) | 407 (12.8) | 396 (6.4) | 2 (1.3) | 2 (1.3) | 2 (1.3) |
| Benchmarking Participants | | | | | | |
| Florida, US | r 81 (4.1) | 544 (4.0) | 551 (10.8) | r 64 (4.2) | r 57 (5.7) | r 78 (4.4) |
| North Carolina, US | 78 (4.6) | 553 (5.4) | 555 (10.0) | r 68 (5.9) | 58 (5.9) | 75 (5.5) |
| Alberta, Canada | r 60 (4.5) | 508 (3.5) | 505 (3.8) | r 42 (4.5) | r 35 (4.3) | r 52 (5.0) |
| Ontario, Canada | 44 (3.6) | 521 (4.0) | 517 (3.9) | 32 (3.3) | 28 (3.5) | 37 (3.5) |
| Dubai, UAE | 38 (2.6) | 482 (5.4) | 466 (4.2) | r 34 (2.4) | r 33 (2.3) | r 35 (2.3) |
| Quebec, Canada | 30 (3.8) | 534 (5.5) | 531 (2.4) | 16 (2.8) | 13 (2.7) | 19 (3.3) |
| Abu Dhabi, UAE | 26 (3.6) | 418 (11.3) | 420 (5.3) | 22 (3.6) | 24 (3.5) | 23 (3.5) |

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

Exhibit 8.30: Computer Activities During Mathematics Lessons

Reported by Teachers

| Country | Computers Available for Mathematics Lessons | | | Percent of Students Whose Teachers Have Them Use Computers At Least Monthly | | | |
|-------------------------|---|---------------------|-----------|---|----------------------------------|-----------------------------|-----------------------------------|
| | Percent of Students | Average Achievement | | To Explore Mathematics Principles and Concepts | To Look Up Ideas and Information | To Process and Analyze Data | To Practice Skills and Procedures |
| | Yes | Yes | No | | | | |
| Norway | 76 (3.5) | 476 (2.9) | 474 (4.5) | 34 (3.7) | 32 (4.0) | 58 (3.8) | 53 (4.3) |
| Kazakhstan | 74 (3.4) | 487 (5.0) | 490 (8.6) | 65 (3.8) | 71 (3.6) | 68 (3.6) | 71 (3.7) |
| Australia | r 64 (4.5) | 510 (7.3) | 506 (7.3) | r 49 (4.0) | r 34 (4.1) | r 40 (3.8) | r 53 (4.1) |
| Macedonia, Rep. of | r 60 (4.3) | 427 (9.2) | 416 (9.6) | r 48 (4.8) | r 46 (4.6) | r 46 (4.7) | s 43 (4.8) |
| Japan | 58 (4.2) | 572 (4.4) | 569 (4.2) | 3 (1.4) | 5 (1.6) | 6 (1.9) | 1 (0.8) |
| Singapore | 56 (2.4) | 614 (5.1) | 606 (6.4) | 38 (2.6) | 26 (2.4) | 24 (2.2) | 34 (2.4) |
| Korea, Rep. of | 56 (3.1) | 617 (4.3) | 607 (4.5) | 32 (3.0) | 30 (3.1) | 25 (3.0) | 28 (3.0) |
| Jordan | 53 (4.0) | 407 (6.1) | 406 (5.9) | 44 (4.1) | 48 (4.3) | 41 (4.1) | 47 (4.1) |
| England | 51 (4.3) | 510 (8.5) | 501 (7.5) | 34 (4.4) | 27 (3.9) | 24 (4.0) | 38 (4.1) |
| Chile | 48 (3.9) | 422 (4.7) | 413 (4.8) | 30 (3.7) | 33 (3.9) | 28 (3.6) | 33 (3.7) |
| Qatar | 45 (4.3) | 405 (9.3) | 416 (6.0) | 37 (4.0) | 40 (4.2) | 37 (4.1) | 40 (4.2) |
| Russian Federation | 44 (3.5) | 545 (4.5) | 535 (5.5) | 36 (3.6) | 40 (3.4) | 29 (3.4) | 40 (3.3) |
| United States | r 44 (2.5) | 504 (4.6) | 518 (4.8) | r 25 (2.3) | r 20 (2.3) | r 21 (2.4) | r 27 (2.4) |
| Georgia | 44 (3.6) | 427 (7.4) | 429 (5.2) | 29 (3.9) | 37 (3.7) | 34 (3.8) | 29 (3.7) |
| Finland | 43 (3.8) | 518 (3.4) | 511 (3.0) | 12 (2.5) | 15 (2.3) | 14 (3.0) | 27 (3.4) |
| Lithuania | 43 (3.4) | 501 (4.0) | 505 (3.9) | 23 (2.8) | 31 (3.2) | 30 (3.0) | 30 (3.0) |
| Hungary | 42 (3.4) | 496 (5.8) | 511 (3.6) | 18 (3.0) | 28 (3.3) | 18 (2.9) | 24 (3.0) |
| Ukraine | 42 (4.1) | 481 (5.9) | 479 (5.4) | 32 (4.1) | 32 (4.5) | 27 (4.1) | 34 (4.3) |
| Sweden | r 40 (3.7) | 483 (3.4) | 488 (2.9) | r 16 (2.8) | r 15 (2.5) | r 15 (2.7) | r 26 (3.3) |
| Israel | 34 (3.4) | 526 (7.8) | 516 (5.3) | 20 (2.8) | 22 (2.8) | 21 (3.0) | 23 (3.0) |
| Turkey | 32 (3.1) | 458 (10.6) | 450 (3.8) | 24 (2.6) | 26 (2.7) | 22 (2.6) | 21 (2.7) |
| Italy | 31 (3.9) | 501 (5.2) | 496 (3.2) | 18 (2.8) | 24 (3.6) | 20 (3.1) | 23 (3.4) |
| Slovenia | 31 (2.5) | 503 (3.8) | 506 (2.9) | 17 (2.3) | 17 (2.2) | 13 (1.8) | 22 (2.5) |
| New Zealand | 29 (3.4) | 482 (7.3) | 491 (6.6) | 17 (2.9) | 16 (3.0) | 16 (2.7) | 18 (3.1) |
| United Arab Emirates | 29 (2.1) | 447 (4.1) | 459 (3.0) | 25 (2.0) | 25 (1.8) | 21 (1.8) | 26 (1.9) |
| Romania | 29 (4.0) | 469 (10.4) | 455 (5.3) | 25 (3.9) | 24 (3.9) | 22 (3.8) | 25 (3.9) |
| Armenia | 29 (3.7) | 473 (7.2) | 464 (4.0) | 22 (3.1) | 25 (3.5) | 24 (3.3) | 23 (3.3) |
| Bahrain | 28 (2.8) | 397 (3.3) | 418 (3.0) | 21 (2.6) | 27 (2.7) | 24 (3.0) | 25 (2.7) |
| Palestinian Nat'l Auth. | 27 (3.8) | 409 (9.6) | 402 (4.0) | 19 (3.2) | 25 (3.6) | 18 (3.3) | 21 (3.3) |
| Hong Kong SAR | 24 (4.3) | 587 (12.4) | 585 (4.7) | 14 (3.4) | 15 (3.4) | 14 (3.4) | 10 (2.8) |
| Chinese Taipei | 23 (3.4) | 611 (6.6) | 609 (4.3) | 8 (2.1) | 6 (1.7) | 5 (1.5) | 4 (1.6) |
| Syrian Arab Republic | 22 (3.3) | 386 (10.3) | 377 (4.7) | 12 (3.0) | 12 (2.9) | 13 (2.9) | 14 (3.1) |
| Iran, Islamic Rep. of | 22 (2.9) | 460 (9.7) | 402 (4.0) | 13 (2.2) | 12 (2.2) | 11 (2.7) | 11 (2.0) |
| Thailand | 22 (3.6) | 426 (11.8) | 427 (5.0) | 14 (2.8) | 20 (3.6) | 12 (2.5) | 19 (3.5) |
| Oman | 21 (2.7) | 359 (8.4) | 369 (3.4) | 14 (2.6) | 18 (2.6) | 12 (2.2) | 16 (2.7) |
| Saudi Arabia | 21 (3.1) | 408 (10.8) | 393 (5.1) | 15 (3.3) | 18 (3.3) | 15 (2.8) | 17 (2.8) |
| Indonesia | 20 (4.1) | 375 (6.6) | 388 (5.5) | 5 (2.2) | 7 (2.7) | 5 (2.2) | 6 (2.3) |
| Ghana | 15 (3.1) | 331 (11.1) | 331 (4.9) | 6 (2.1) | 6 (2.1) | 6 (2.2) | 6 (2.1) |
| Lebanon | 9 (2.3) | 478 (15.3) | 446 (3.7) | 6 (1.9) | 8 (2.2) | 7 (2.0) | 8 (2.4) |
| Morocco | 7 (1.4) | 383 (10.4) | 369 (2.3) | 3 (0.9) | 3 (0.8) | 2 (0.8) | 3 (0.9) |
| Malaysia | 6 (1.8) | 434 (27.9) | 442 (5.5) | 5 (1.8) | 5 (1.8) | 4 (1.6) | 4 (1.6) |
| Tunisia | 5 (1.5) | 418 (14.4) | 426 (3.0) | 2 (0.9) | 2 (0.9) | 2 (0.9) | 2 (0.9) |
| International Avg. | 36 (0.5) | 470 (1.4) | 467 (0.8) | 22 (0.5) | 23 (0.5) | 21 (0.5) | 24 (0.5) |

(1) 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 8.30: Computer Activities During Mathematics Lessons (Continued)

| Country | Computers Available for Mathematics Lessons | | | Percent of Students Whose Teachers Have Them Use Computers At Least Monthly | | | | |
|----------------------------------|---|---------------------|------------|---|----------------------------------|-----------------------------|-----------------------------------|--|
| | Percent of Students | Average Achievement | | To Explore Mathematics Principles and Concepts | To Look Up Ideas and Information | To Process and Analyze Data | To Practice Skills and Procedures | |
| | Yes | Yes | No | | | | | |
| Ninth Grade Participants | | | | | | | | |
| South Africa | 20 (2.7) | 363 (9.1) | 349 (3.6) | 7 (1.7) | 8 (1.8) | 7 (1.7) | 6 (1.7) | |
| Botswana | 13 (3.1) | 393 (5.3) | 398 (2.9) | 5 (2.0) | 7 (2.3) | 3 (1.4) | 6 (2.2) | |
| Honduras | r 8 (3.1) | 340 (17.6) | 336 (4.9) | r 2 (1.5) | r 7 (3.0) | r 2 (1.2) | r 5 (2.4) | |
| Benchmarking Participants | | | | | | | | |
| Florida, US | r 64 (6.3) | 508 (9.2) | 537 (11.7) | s 37 (6.2) | s 32 (6.7) | s 34 (6.3) | s 40 (6.6) | |
| Alabama, US | r 61 (8.4) | 463 (10.7) | 473 (12.3) | r 38 (7.8) | r 26 (6.3) | r 27 (6.7) | r 39 (8.1) | |
| Alberta, Canada | 54 (3.9) | 503 (3.6) | 508 (3.4) | 36 (3.8) | 33 (3.7) | 31 (4.0) | 32 (4.0) | |
| Ontario, Canada | 52 (3.8) | 510 (3.7) | 516 (3.8) | 37 (3.8) | 35 (3.3) | 36 (3.8) | 37 (4.1) | |
| North Carolina, US | r 50 (6.8) | 545 (12.5) | 531 (8.2) | r 30 (7.0) | r 24 (6.2) | r 29 (6.4) | r 36 (7.2) | |
| Indiana, US | r 47 (7.2) | 516 (8.3) | 518 (7.7) | r 19 (5.5) | r 14 (4.5) | r 14 (4.1) | r 27 (6.4) | |
| Colorado, US | r 45 (6.8) | 524 (12.3) | 515 (8.8) | r 29 (5.9) | r 23 (5.5) | r 27 (5.5) | r 32 (6.6) | |
| Massachusetts, US | r 36 (7.6) | 564 (14.9) | 559 (7.2) | r 17 (3.9) | r 16 (4.9) | r 19 (5.6) | r 17 (5.0) | |
| Connecticut, US | r 35 (4.6) | 511 (8.7) | 531 (8.2) | r 18 (4.4) | r 15 (3.8) | r 15 (4.1) | r 22 (4.4) | |
| California, US | s 35 (7.0) | 486 (12.5) | 498 (7.0) | s 19 (7.4) | s 19 (6.8) | s 17 (7.1) | s 18 (7.3) | |
| Dubai, UAE | 34 (2.4) | 474 (7.3) | 476 (2.9) | 30 (2.3) | 30 (2.3) | 27 (2.3) | 31 (2.3) | |
| Minnesota, US | r 30 (5.9) | 537 (14.6) | 549 (6.1) | r 19 (4.8) | r 13 (4.7) | r 15 (5.4) | r 22 (6.2) | |
| Abu Dhabi, UAE | 25 (3.7) | 442 (8.1) | 452 (4.9) | 21 (3.4) | 20 (3.4) | 16 (3.0) | 21 (3.6) | |
| Quebec, Canada | 22 (3.4) | 538 (6.0) | 532 (3.0) | 12 (2.9) | 12 (2.8) | 9 (2.4) | 13 (3.1) | |

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

Exhibit 8.31: Weekly Time Students Spend on Mathematics Homework

Reported by Students

| Country | 3 Hours or More | | More than 45 Minutes but Less than 3 Hours | | 45 Minutes or Less | |
|-------------------------|---------------------|---------------------|--|---------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Romania | 44 (1.8) | 492 (4.4) | 31 (1.1) | 463 (4.7) | 25 (1.4) | 411 (4.4) |
| Russian Federation | 36 (1.1) | 531 (4.3) | 50 (1.4) | 546 (3.7) | 14 (0.8) | 540 (5.3) |
| Kazakhstan | 34 (1.2) | 486 (5.1) | 45 (1.1) | 495 (4.2) | 21 (1.0) | 481 (5.3) |
| Georgia | 31 (1.5) | 454 (5.4) | 39 (1.0) | 455 (4.2) | 30 (1.4) | 405 (5.0) |
| Ukraine | 26 (1.3) | 477 (5.4) | 53 (1.1) | 489 (3.7) | 21 (1.1) | 468 (5.9) |
| Italy | 25 (1.1) | 484 (3.6) | 54 (1.1) | 506 (2.7) | 21 (1.1) | 497 (3.8) |
| Armenia | 24 (1.1) | 481 (4.9) | 42 (1.0) | 476 (3.0) | 34 (1.2) | 456 (4.1) |
| Thailand | 22 (1.3) | 445 (8.3) | 52 (1.1) | 430 (4.2) | 26 (1.2) | 411 (4.7) |
| Tunisia | 21 (1.1) | 420 (3.6) | 43 (0.9) | 431 (3.2) | 37 (1.3) | 424 (3.5) |
| Malaysia | 20 (1.0) | 441 (5.4) | 46 (1.0) | 447 (6.3) | 34 (1.1) | 432 (6.4) |
| Lebanon | 19 (1.2) | 447 (5.2) | 36 (1.2) | 456 (4.7) | 45 (1.7) | 447 (4.5) |
| Morocco | 18 (0.6) | 388 (3.4) | 34 (0.6) | 389 (2.8) | 48 (1.0) | 363 (2.8) |
| Hong Kong SAR | 17 (1.5) | 607 (4.7) | 45 (1.4) | 599 (4.2) | 38 (2.1) | 564 (5.8) |
| Chinese Taipei | 17 (1.0) | 621 (6.9) | 45 (1.0) | 626 (3.5) | 38 (1.4) | 589 (3.8) |
| Israel | 17 (0.8) | 544 (5.4) | 42 (0.8) | 527 (4.3) | 41 (1.2) | 501 (5.2) |
| Slovenia | 16 (1.1) | 498 (3.8) | 45 (1.0) | 508 (2.3) | 38 (1.3) | 505 (3.3) |
| Macedonia, Rep. of | 16 (1.0) | 432 (7.4) | 40 (1.2) | 450 (5.1) | 44 (1.5) | 416 (6.4) |
| Singapore | 16 (0.7) | 628 (4.8) | 57 (0.9) | 622 (3.1) | 27 (1.2) | 584 (5.7) |
| Lithuania | 16 (0.9) | 490 (4.4) | 44 (1.0) | 508 (2.8) | 40 (1.4) | 506 (3.3) |
| Syrian Arab Republic | 16 (0.7) | 385 (5.3) | 37 (1.1) | 400 (4.4) | 47 (1.3) | 368 (5.4) |
| United States | 15 (1.0) | 535 (4.1) | 42 (0.9) | 519 (3.0) | 43 (1.3) | 496 (2.7) |
| Indonesia | 13 (0.8) | 401 (5.1) | 45 (1.1) | 404 (4.3) | 42 (1.4) | 371 (5.7) |
| Palestinian Nat'l Auth. | 13 (0.8) | 383 (6.1) | 30 (1.2) | 409 (4.0) | 57 (1.4) | 412 (4.0) |
| Ghana | 12 (0.8) | 328 (5.2) | 41 (1.2) | 348 (5.0) | 46 (1.4) | 324 (4.6) |
| Bahrain | 12 (0.8) | 383 (7.6) | 31 (1.0) | 427 (3.7) | 57 (1.4) | 410 (2.7) |
| Jordan | 12 (0.6) | 405 (5.3) | 36 (0.9) | 419 (3.8) | 52 (1.2) | 409 (3.9) |
| Iran, Islamic Rep. of | 11 (0.6) | 422 (9.4) | 48 (0.9) | 426 (5.0) | 41 (1.0) | 402 (4.2) |
| Hungary | 10 (0.8) | 492 (7.2) | 36 (0.9) | 511 (3.6) | 54 (1.3) | 507 (4.0) |
| Qatar | 9 (0.9) | 430 (10.1) | 31 (0.7) | 443 (4.6) | 60 (1.1) | 392 (3.4) |
| United Arab Emirates | 9 (0.5) | 455 (5.3) | 31 (0.7) | 469 (2.7) | 60 (1.0) | 452 (2.0) |
| Norway | 9 (0.8) | 460 (4.9) | 51 (1.3) | 479 (2.4) | 40 (1.7) | 476 (3.3) |
| Turkey | 8 (0.5) | 440 (5.8) | 40 (1.1) | 459 (4.2) | 52 (1.2) | 456 (4.8) |
| Australia | 7 (0.7) | 535 (13.6) | 35 (1.5) | 529 (5.8) | 59 (1.6) | 491 (5.2) |
| Oman | 6 (0.4) | 349 (6.9) | 20 (0.7) | 372 (4.1) | 74 (0.9) | 373 (2.8) |
| Saudi Arabia | 5 (0.5) | 356 (7.9) | 18 (0.7) | 391 (5.6) | 77 (1.0) | 398 (4.9) |
| New Zealand | 4 (0.7) | 508 (8.8) | 27 (1.7) | 518 (5.9) | 69 (2.2) | 482 (5.1) |
| Chile | 4 (0.4) | 403 (7.0) | 28 (1.0) | 417 (3.2) | 68 (1.2) | 419 (2.8) |
| Japan | 3 (0.4) | 586 (15.2) | 20 (1.6) | 567 (3.9) | 77 (1.8) | 571 (2.9) |
| Korea, Rep. of | 2 (0.4) | ~ ~ | 20 (1.1) | 611 (4.7) | 78 (1.4) | 615 (3.0) |
| Sweden | 2 (0.3) | ~ ~ | 23 (1.3) | 484 (3.1) | 75 (1.4) | 491 (1.9) |
| Finland | 2 (0.2) | ~ ~ | 23 (1.0) | 508 (3.5) | 76 (1.1) | 518 (2.6) |
| England | 1 (0.2) | ~ ~ | 25 (1.4) | 536 (6.7) | 74 (1.5) | 500 (5.5) |
| International Avg. | 15 (0.1) | 464 (1.1) | 38 (0.2) | 478 (0.6) | 48 (0.2) | 460 (0.7) |

() 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.

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

Exhibit 8.31: Weekly Time Students Spend on Mathematics Homework (Continued)

| Country | 3 Hours or More | | More than 45 Minutes but Less than 3 Hours | | 45 Minutes or Less | |
|----------------------------------|---------------------|---------------------|--|---------------------|---------------------|---------------------|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Ninth Grade Participants | | | | | | |
| South Africa | 26 (0.7) | 354 (3.6) | 43 (0.7) | 370 (2.7) | 31 (0.9) | 337 (2.9) |
| Botswana | 21 (0.9) | 394 (3.2) | 43 (0.9) | 414 (3.2) | 36 (1.2) | 384 (3.1) |
| Honduras | -- | -- | -- | -- | -- | -- |
| Benchmarking Participants | | | | | | |
| California, US | 27 (2.4) | 519 (7.4) | 43 (2.0) | 499 (5.4) | 31 (2.3) | 466 (6.8) |
| Massachusetts, US | 24 (2.6) | 578 (7.7) | 49 (1.9) | 563 (5.1) | 27 (2.8) | 544 (6.8) |
| Minnesota, US | 21 (1.9) | 556 (5.0) | 49 (1.4) | 554 (5.8) | 30 (2.1) | 528 (5.0) |
| North Carolina, US | 19 (2.9) | 587 (8.3) | 43 (2.4) | 546 (7.9) | 38 (3.3) | 506 (7.4) |
| Indiana, US | 19 (2.2) | 551 (7.6) | 46 (1.5) | 529 (4.6) | 36 (2.2) | 501 (5.9) |
| Connecticut, US | 17 (2.0) | 558 (9.4) | 47 (1.5) | 529 (4.8) | 35 (2.1) | 492 (5.4) |
| Quebec, Canada | 16 (1.1) | 524 (3.8) | 48 (1.3) | 539 (2.7) | 35 (1.9) | 530 (3.1) |
| Colorado, US | 14 (1.3) | 545 (8.2) | 43 (2.2) | 526 (5.1) | 43 (2.5) | 503 (7.1) |
| Florida, US | 14 (1.9) | 543 (7.6) | 41 (2.5) | 528 (7.8) | 45 (3.3) | 497 (7.1) |
| Ontario, Canada | 13 (1.1) | 511 (5.3) | 43 (1.5) | 512 (3.1) | 44 (1.8) | 512 (3.2) |
| Dubai, UAE | 11 (0.7) | 478 (5.6) | 38 (1.1) | 492 (3.3) | 51 (1.4) | 470 (2.5) |
| Alberta, Canada | 10 (0.9) | 499 (5.2) | 37 (1.5) | 503 (3.4) | 53 (1.9) | 510 (3.2) |
| Abu Dhabi, UAE | 9 (0.7) | 449 (8.1) | 29 (1.4) | 459 (6.2) | 62 (1.9) | 446 (3.7) |
| Alabama, US | 9 (1.7) | 511 (13.0) | 33 (2.1) | 480 (7.3) | 58 (3.1) | 456 (5.2) |

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

A. How often does your teacher give you homework in mathematics?

- 1) Every day
- 2) 3 or 4 times a week
- 3) 1 or 2 times a week
- 4) Less than once a week
- 5) Never

B. When your teacher gives you mathematics homework, about how many minutes do you usually spend on your homework?

- 1) My teacher never gives me homework
- 2) 1-15 minutes
- 3) 16-30 minutes
- 4) 31-60 minutes
- 5) 61-90 minutes
- 6) More than 90 minutes

The weekly time spent on mathematics homework was calculated by multiplying how often students were given homework weekly by the minutes they spent on that homework.

The values for Part A were: Every day = 5; 3 or 4 times a week = 3.5; 1 or 2 times a week = 1.5; Less than once a week = 0.5; and Never = 0.

The values for Part B were: My teacher never gives me homework = 0; 1-15 minutes = 8; 16-30 minutes = 23; 31-60 minutes = 45; 61-90 minutes = 75; and More than 90 minutes = 105.

Exhibit 8.32: Classroom Assessment

Reported by Teachers

| Country | Percentage of Students Whose Teachers Give Mathematics Tests or Examinations | | | Percentage of Students Whose Teachers Give Test Questions | | | | | | | | |
|-------------------------|--|--------------------|----------------------------|---|-----------|-----------------------|--|-----------|-----------------------|--|-----------|-----------------------|
| | Every 2 Weeks or More | About Once a Month | A Few Times a Year or Less | Involving Application of Mathematical Procedures | | | Involving Searching for Patterns and Relationships | | | Requiring Explanations or Justifications | | |
| | | | | Always or Almost Always | Sometimes | Never or Almost Never | Always or Almost Always | Sometimes | Never or Almost Never | Always or Almost Always | Sometimes | Never or Almost Never |
| Armenia | 40 (3.0) | 41 (3.2) | 19 (2.9) | 59 (3.4) | 40 (3.4) | 0 (0.0) | 20 (2.7) | 74 (3.1) | 6 (1.9) | 55 (3.9) | 44 (3.9) | 1 (0.9) |
| Australia | r 16 (2.7) | 66 (4.2) | 18 (3.4) | r 84 (2.8) | 16 (2.8) | 0 (0.1) | s 30 (4.6) | 66 (4.4) | 3 (1.5) | r 37 (4.3) | 52 (3.9) | 11 (2.7) |
| Bahrain | 80 (2.9) | 18 (2.8) | 1 (0.7) | 69 (3.3) | 31 (3.3) | 0 (0.0) | 23 (2.4) | 74 (2.6) | 3 (0.9) | 27 (3.3) | 71 (3.4) | 2 (0.8) |
| Chile | 68 (4.0) | 31 (3.9) | 1 (1.0) | 92 (2.0) | 7 (2.0) | 0 (0.4) | 36 (4.1) | 57 (4.2) | 8 (2.3) | 48 (4.0) | 47 (3.8) | 6 (2.3) |
| Chinese Taipei | 98 (1.3) | 2 (1.1) | 1 (0.6) | 57 (4.0) | 42 (3.9) | 1 (0.7) | 46 (4.2) | 53 (4.1) | 1 (0.7) | 20 (3.4) | 74 (3.6) | 6 (1.6) |
| England | 9 (2.2) | 31 (3.2) | 60 (4.0) | 71 (4.0) | 28 (3.8) | 1 (1.0) | 38 (4.3) | 59 (4.3) | 3 (1.1) | 45 (3.4) | 51 (4.4) | 4 (1.5) |
| Finland | 1 (0.6) | 44 (3.7) | 55 (3.7) | 82 (2.7) | 17 (2.7) | 1 (0.4) | 35 (3.4) | 59 (3.6) | 5 (1.6) | 45 (3.7) | 49 (3.8) | 6 (1.5) |
| Georgia | 46 (3.6) | 47 (3.5) | 7 (1.7) | 93 (2.0) | 7 (2.0) | 0 (0.0) | 20 (2.8) | 78 (3.0) | 2 (1.1) | 47 (3.8) | 50 (3.9) | 3 (0.8) |
| Ghana | 70 (4.0) | 29 (3.9) | 1 (0.9) | 73 (4.3) | 27 (4.3) | 0 (0.0) | 25 (3.7) | 73 (3.8) | 2 (1.2) | 32 (4.0) | 66 (4.2) | 2 (1.2) |
| Hong Kong SAR | 56 (4.6) | 39 (4.5) | 5 (2.0) | 66 (4.7) | 34 (4.7) | 0 (0.0) | 19 (3.3) | 68 (4.1) | 13 (3.0) | 19 (3.5) | 74 (3.7) | 7 (2.3) |
| Hungary | 69 (3.4) | 29 (3.3) | 1 (0.9) | 90 (1.8) | 10 (1.8) | 0 (0.0) | 56 (3.1) | 43 (3.1) | 1 (0.3) | 6 (1.5) | 72 (3.1) | 22 (3.0) |
| Indonesia | 38 (4.5) | 54 (4.5) | 8 (2.3) | 65 (4.7) | 35 (4.7) | 0 (0.0) | 34 (4.1) | 60 (4.6) | 6 (2.1) | 38 (4.6) | 55 (4.3) | 7 (2.3) |
| Iran, Islamic Rep. of | 35 (3.1) | 51 (3.0) | 14 (2.5) | 61 (3.3) | 38 (3.3) | 1 (0.4) | 27 (2.9) | 64 (3.1) | 9 (1.8) | 23 (2.6) | 66 (2.9) | 11 (2.2) |
| Israel | 20 (2.2) | 54 (2.9) | 26 (2.8) | 76 (2.6) | 24 (2.6) | 0 (0.2) | 39 (3.0) | 56 (2.8) | 5 (1.2) | 66 (2.8) | 30 (2.8) | 4 (1.3) |
| Italy | 32 (3.5) | 65 (3.6) | 4 (1.6) | 90 (2.4) | 9 (2.4) | 0 (0.0) | 27 (3.5) | 64 (3.4) | 9 (2.7) | 40 (3.8) | 53 (4.0) | 7 (2.0) |
| Japan | 15 (2.8) | 44 (3.9) | 41 (4.1) | 66 (3.7) | 33 (3.8) | 1 (0.9) | 35 (3.9) | 55 (4.2) | 10 (2.2) | 30 (4.0) | 68 (4.1) | 2 (1.0) |
| Jordan | 48 (3.6) | 49 (3.6) | 3 (1.0) | 76 (3.5) | 23 (3.4) | 1 (0.6) | 26 (3.3) | 69 (3.7) | 5 (2.0) | 33 (3.8) | 60 (3.6) | 8 (2.1) |
| Kazakhstan | 85 (2.8) | 10 (2.2) | 5 (1.8) | 82 (3.5) | 18 (3.5) | 0 (0.0) | 56 (3.8) | 42 (3.8) | 3 (1.5) | 51 (4.6) | 47 (4.5) | 2 (1.0) |
| Korea, Rep. of | 46 (2.7) | 42 (2.7) | 12 (2.1) | 71 (2.6) | 29 (2.6) | 1 (0.5) | 43 (3.5) | 54 (3.7) | 2 (1.0) | 24 (2.6) | 67 (2.7) | 8 (1.8) |
| Lebanon | 81 (3.0) | 19 (3.0) | 0 (0.0) | 82 (3.3) | 18 (3.3) | 0 (0.0) | 41 (4.1) | 55 (4.2) | 5 (1.8) | 70 (3.8) | 30 (3.8) | 0 (0.0) |
| Lithuania | 76 (3.1) | 24 (3.1) | 0 (0.0) | 89 (1.9) | 11 (1.9) | 0 (0.0) | 34 (3.6) | 64 (3.6) | 1 (0.6) | 45 (3.9) | 52 (3.9) | 3 (1.0) |
| Macedonia, Rep. of | r 25 (3.7) | 43 (3.8) | 32 (3.7) | s 78 (3.8) | 22 (3.8) | 0 (0.0) | s 49 (4.4) | 48 (4.7) | 3 (1.2) | s 39 (4.5) | 54 (4.7) | 7 (2.5) |
| Malaysia | 10 (1.7) | 43 (3.3) | 47 (3.5) | 58 (3.8) | 42 (3.8) | 0 (0.0) | 26 (3.6) | 71 (3.7) | 2 (1.2) | 11 (2.6) | 71 (3.4) | 18 (3.0) |
| Morocco | 18 (2.7) | 77 (2.9) | 6 (1.7) | 85 (2.7) | 14 (2.6) | 1 (0.8) | 25 (2.6) | 68 (2.7) | 7 (1.5) | 42 (3.4) | 52 (3.0) | 6 (1.7) |
| New Zealand | 17 (3.1) | 65 (4.0) | 18 (3.0) | 71 (3.5) | 28 (3.5) | 1 (0.4) | 30 (3.7) | 68 (3.8) | 3 (0.7) | 33 (4.0) | 59 (4.7) | 8 (2.1) |
| Norway | 7 (2.2) | 75 (3.5) | 18 (3.0) | 71 (3.8) | 28 (3.8) | 0 (0.4) | 12 (2.8) | 82 (3.2) | 5 (1.6) | 32 (3.8) | 65 (3.6) | 3 (1.5) |
| Oman | 23 (2.5) | 61 (3.3) | 16 (2.6) | 80 (2.5) | 20 (2.5) | 0 (0.0) | 16 (2.4) | 77 (2.7) | 7 (1.4) | 13 (1.8) | 67 (2.7) | 20 (2.3) |
| Palestinian Nat'l Auth. | 63 (3.2) | 37 (3.2) | 0 (0.0) | 74 (3.6) | 25 (3.5) | 1 (0.0) | 20 (3.4) | 71 (3.6) | 9 (2.3) | 22 (3.5) | 67 (3.7) | 10 (2.7) |
| Qatar | 84 (2.5) | 14 (2.2) | 2 (1.2) | 84 (2.7) | 15 (2.6) | 1 (0.7) | 30 (2.5) | 67 (2.7) | 3 (1.1) | 36 (4.2) | 62 (4.3) | 2 (0.9) |
| Romania | 63 (4.0) | 36 (3.9) | 1 (0.9) | 89 (2.5) | 11 (2.5) | 0 (0.4) | 44 (4.1) | 53 (4.2) | 3 (1.2) | 75 (3.1) | 24 (3.1) | 1 (0.9) |
| Russian Federation | 97 (1.3) | 3 (1.2) | 0 (0.0) | 74 (3.1) | 26 (3.0) | 1 (0.6) | 33 (3.6) | 64 (3.5) | 3 (1.1) | 48 (4.1) | 50 (4.1) | 2 (1.0) |
| Saudi Arabia | 65 (4.0) | 32 (4.0) | 2 (1.2) | 72 (3.5) | 26 (3.4) | 1 (1.0) | 39 (4.2) | 57 (4.2) | 4 (1.7) | 25 (3.6) | 66 (4.0) | 10 (2.6) |
| Singapore | 39 (2.4) | 51 (2.6) | 10 (1.4) | 76 (2.1) | 24 (2.1) | 0 (0.0) | 16 (1.7) | 76 (2.3) | 8 (1.7) | 10 (1.5) | 67 (2.9) | 23 (2.3) |
| Slovenia | 2 (0.6) | 10 (1.8) | 88 (1.9) | 91 (1.8) | 9 (1.8) | 0 (0.0) | 23 (2.9) | 69 (2.9) | 8 (1.3) | 16 (2.3) | 60 (2.6) | 25 (2.5) |
| Sweden | r 0 (0.4) | 36 (3.5) | 64 (3.5) | r 81 (2.9) | 18 (2.7) | 1 (0.9) | r 19 (2.6) | 76 (2.9) | 5 (1.4) | r 80 (3.0) | 20 (3.1) | 0 (0.3) |
| Syrian Arab Republic | 25 (4.0) | 50 (4.4) | 25 (4.1) | 64 (4.1) | 36 (4.1) | 0 (0.0) | 29 (3.9) | 65 (4.2) | 6 (2.1) | 27 (4.1) | 60 (4.4) | 14 (3.3) |
| Thailand | 55 (4.1) | 39 (3.9) | 6 (1.8) | 55 (4.3) | 44 (4.4) | 1 (0.8) | 32 (4.1) | 67 (4.1) | 1 (0.0) | 45 (3.7) | 52 (3.8) | 3 (1.1) |
| Tunisia | 3 (1.1) | 84 (2.7) | 13 (2.5) | 90 (2.4) | 10 (2.4) | 0 (0.0) | 25 (3.1) | 66 (3.0) | 9 (2.1) | 43 (3.5) | 56 (3.6) | 1 (0.7) |
| Turkey | 24 (2.8) | 70 (3.1) | 6 (1.5) | 91 (2.0) | 9 (2.0) | 0 (0.4) | 41 (3.4) | 58 (3.3) | 1 (0.8) | 18 (2.8) | 62 (3.2) | 20 (2.2) |
| Ukraine | 88 (3.0) | 11 (2.9) | 1 (0.0) | 77 (3.7) | 21 (3.5) | 2 (1.1) | 39 (4.4) | 59 (4.4) | 2 (1.5) | 72 (3.9) | 27 (4.0) | 1 (0.0) |
| United Arab Emirates | 73 (1.8) | 25 (1.8) | 3 (0.4) | 78 (2.1) | 21 (2.1) | 1 (0.2) | 28 (2.4) | 67 (2.4) | 5 (1.4) | 29 (2.3) | 64 (2.3) | 7 (1.4) |
| United States | r 77 (2.2) | 22 (2.2) | 1 (0.5) | r 83 (1.7) | 17 (1.6) | 0 (0.4) | r 32 (2.4) | 62 (2.4) | 7 (1.3) | r 35 (2.4) | 53 (2.6) | 12 (1.8) |
| International Avg. | 45 (0.5) | 40 (0.5) | 15 (0.3) | 77 (0.5) | 23 (0.5) | 0 (0.1) | 31 (0.5) | 64 (0.6) | 5 (0.2) | 37 (0.5) | 56 (0.6) | 8 (0.3) |

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. 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 8.32: Classroom Assessment (Continued)

| Country | Percentage of Students Whose Teachers Give Mathematics Tests or Examinations | | | Percentage of Students Whose Teachers Give Test Questions | | | | | | | | |
|----------------------------------|--|--------------------|----------------------------|---|-----------|-----------------------|--|-----------|-----------------------|--|-----------|-----------------------|
| | | | | Involving Application of Mathematical Procedures | | | Involving Searching for Patterns and Relationships | | | Requiring Explanations or Justifications | | |
| | Every 2 Weeks or More | About Once a Month | A Few Times a Year or Less | Always or Almost Always | Sometimes | Never or Almost Never | Always or Almost Always | Sometimes | Never or Almost Never | Always or Almost Always | Sometimes | Never or Almost Never |
| Ninth Grade Participants | | | | | | | | | | | | |
| Botswana | 16 (3.1) | 84 (3.2) | 1 (0.0) | 83 (3.6) | 16 (3.6) | 1 (0.0) | 42 (4.1) | 57 (4.3) | 1 (1.1) | 24 (3.6) | 70 (3.9) | 6 (2.2) |
| Honduras | 65 (4.3) | 31 (4.5) | 3 (1.5) | r 74 (3.9) | 24 (4.4) | 2 (1.5) | r 19 (3.9) | 69 (4.4) | 11 (2.4) | r 33 (4.7) | 58 (5.4) | 9 (3.1) |
| South Africa | 31 (3.8) | 61 (3.9) | 8 (2.1) | 76 (3.3) | 23 (3.3) | 1 (0.9) | 33 (3.9) | 67 (3.9) | 0 (0.0) | 31 (2.8) | 66 (3.0) | 3 (1.1) |
| Benchmarking Participants | | | | | | | | | | | | |
| Alberta, Canada | 72 (3.6) | 26 (3.4) | 2 (1.2) | 77 (3.4) | 23 (3.4) | 0 (0.0) | 38 (3.8) | 60 (3.7) | 2 (1.1) | 52 (3.8) | 43 (4.1) | 5 (1.6) |
| Ontario, Canada | 74 (3.7) | 24 (3.7) | 2 (1.0) | 85 (2.6) | 15 (2.6) | 0 (0.0) | 35 (3.8) | 64 (3.9) | 1 (0.6) | 66 (3.5) | 32 (3.3) | 2 (1.6) |
| Quebec, Canada | 71 (3.6) | 29 (3.7) | 0 (0.1) | 93 (2.0) | 6 (1.8) | 1 (0.9) | 19 (3.0) | 64 (3.7) | 17 (2.9) | 45 (4.4) | 51 (4.6) | 4 (1.9) |
| Abu Dhabi, UAE | 82 (2.8) | 17 (2.7) | 1 (0.6) | 82 (3.5) | 18 (3.4) | 1 (0.0) | 32 (4.3) | 63 (4.3) | 5 (3.0) | 29 (4.3) | 63 (4.5) | 8 (2.8) |
| Dubai, UAE | 62 (3.8) | 31 (3.8) | 7 (0.7) | 79 (2.7) | 20 (2.7) | 1 (0.0) | 23 (1.9) | 69 (3.2) | 8 (2.7) | 39 (3.6) | 56 (3.9) | 5 (1.4) |
| Alabama, US | r 95 (3.7) | 5 (3.7) | 0 (0.0) | r 85 (4.1) | 15 (4.1) | 0 (0.0) | r 12 (4.2) | 77 (5.6) | 11 (3.8) | r 36 (6.6) | 55 (7.0) | 9 (3.9) |
| California, US | s 80 (5.5) | 18 (5.2) | 2 (0.2) | s 82 (4.0) | 15 (4.5) | 3 (0.2) | s 25 (5.1) | 56 (7.0) | 19 (5.5) | s 32 (5.5) | 42 (6.5) | 26 (4.8) |
| Colorado, US | r 81 (5.2) | 19 (5.2) | 0 (0.0) | r 79 (4.4) | 21 (4.4) | 0 (0.0) | r 36 (5.7) | 60 (5.6) | 4 (2.7) | r 54 (6.1) | 44 (6.1) | 2 (0.2) |
| Connecticut, US | r 74 (5.6) | 26 (5.6) | 0 (0.0) | r 88 (3.8) | 12 (3.8) | 0 (0.0) | r 20 (5.1) | 76 (5.2) | 4 (1.6) | r 52 (6.2) | 44 (6.0) | 3 (1.8) |
| Florida, US | s 77 (5.0) | 21 (4.9) | 2 (1.4) | s 86 (4.4) | 14 (4.4) | 0 (0.0) | s 33 (6.9) | 58 (6.9) | 9 (4.6) | s 38 (6.7) | 54 (7.0) | 9 (3.6) |
| Indiana, US | r 73 (4.8) | 26 (4.7) | 1 (0.0) | r 75 (6.4) | 25 (6.4) | 0 (0.0) | r 18 (4.9) | 69 (5.8) | 13 (5.1) | r 25 (5.3) | 66 (6.4) | 9 (4.4) |
| Massachusetts, US | r 79 (5.3) | 21 (5.3) | 0 (0.0) | r 88 (3.4) | 12 (3.4) | 0 (0.0) | r 40 (7.3) | 58 (7.7) | 1 (1.5) | r 63 (6.2) | 35 (6.1) | 2 (0.1) |
| Minnesota, US | r 81 (4.7) | 19 (4.7) | 0 (0.0) | r 84 (4.6) | 16 (4.6) | 0 (0.0) | r 32 (6.2) | 68 (6.2) | 1 (0.0) | r 35 (6.5) | 63 (6.5) | 1 (1.2) |
| North Carolina, US | r 88 (4.0) | 12 (4.0) | 0 (0.0) | s 90 (4.5) | 10 (4.5) | 0 (0.0) | r 34 (6.4) | 65 (6.6) | 1 (0.9) | r 33 (6.4) | 56 (6.7) | 11 (4.7) |

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

