

Technology in Instruction

Computer Access for Instruction

Information about students' access to computers as part of their mathematics and science lessons is provided in Exhibits 14.1 (fourth grade mathematics), 14.2 (fourth grade science), 14.3 (eighth grade mathematics), and 14.4 (eighth grade science). Each exhibit presents teachers' reports on whether computers are available for students to use during lessons as well as the types of access they have: whether each student in the class has a computer, the class has computers that students can share, and/or the school has computers that the class can sometimes share (teachers could indicate more than one type of access to computers). Average student achievement is also reported for each category. Countries are ordered by the percent of students having access to computers.

In fourth grade, computers are available for students to use during mathematics lessons for 39 percent of students, on average (Exhibit 14.1), and during science lessons for 45 percent of students, on average (Exhibit 14.2). Availability of computers during mathematics and science lessons was similar for eighth grade students: 37 percent had mathematics teachers who said computers were available (Exhibit 14.3) and 48 percent had science teachers who said computers were available (Exhibit 14.4). There was wide variation across countries in computer availability, with 80 percent or more of students having access in some countries and as few as 5 or 6 percent in others. Having computers available for instruction was associated with higher achievement, on average, in both mathematics and science and at both grades. Of course, access to computers is likely associated with access to other resources that are associated with higher achievement. There was also quite a bit of variation across countries in the types of access to computers, though the most frequent type of access was that the school has computers that the class can sometimes use (28–29% of students in mathematics lessons and 36–39% of students in science lessons).

Exhibit 14.1: Access to Computers for Mathematics Lessons
Students' Results based on Teachers' Reports

Country	Computers Available for Students to Use During Mathematics Lessons				Percent of Students by Computer Access*		
	Yes		No		Each Student has a Computer	The Class has Computers that Students can Share	The School has Computers that the Class can Sometimes Use
	Percent of Students	Average Achievement	Percent of Students	Average Achievement			
Malta	95 (0.2)	508 (1.4)	5 (0.2)	518 (5.0)	63 (0.4)	16 (0.3)	34 (0.4)
New Zealand	92 (1.8)	487 (2.9)	8 (1.8)	491 (12.6)	33 (3.3)	67 (3.3)	39 (3.2)
Denmark	r 87 (3.1)	523 (2.3)	13 (3.1)	533 (7.2)	r 63 (4.7)	r 8 (2.4)	r 34 (4.7)
Sweden	85 (2.4)	522 (2.8)	15 (2.4)	519 (10.8)	50 (4.3)	19 (3.1)	34 (4.1)
Hong Kong SAR	81 (4.6)	602 (3.9)	19 (4.6)	599 (12.2)	38 (4.3)	23 (3.8)	67 (4.8)
Norway (5)	r 76 (3.8)	546 (2.6)	24 (3.8)	539 (5.7)	r 39 (4.2)	r 29 (4.2)	r 50 (4.6)
United States	76 (2.5)	536 (2.9)	24 (2.5)	534 (5.8)	51 (3.0)	36 (2.1)	41 (2.1)
Australia	71 (3.5)	521 (3.9)	29 (3.5)	511 (7.0)	32 (3.2)	39 (3.8)	44 (4.0)
Netherlands	r 71 (5.1)	534 (2.8)	29 (5.1)	542 (4.5)	r 35 (4.7)	r 46 (5.9)	r 34 (4.8)
Georgia	70 (3.8)	481 (4.5)	30 (3.8)	483 (6.5)	s 75 (4.0)	s 38 (4.8)	s 90 (2.8)
Northern Ireland	69 (4.0)	564 (4.3)	31 (4.0)	568 (5.9)	3 (1.2)	48 (4.3)	58 (4.2)
Finland	65 (3.6)	531 (2.9)	35 (3.6)	535 (3.3)	15 (2.5)	17 (2.4)	57 (3.5)
Kazakhstan	61 (3.5)	511 (3.1)	39 (3.5)	514 (4.9)	10 (2.2)	17 (2.9)	52 (3.6)
Japan	59 (3.9)	591 (2.4)	41 (3.9)	595 (5.8)	5 (1.6)	19 (2.7)	57 (3.9)
Belgium (Flemish)	52 (3.9)	531 (2.8)	48 (3.9)	536 (2.7)	3 (1.2)	34 (4.0)	43 (3.7)
Canada	51 (2.9)	506 (3.0)	49 (2.9)	520 (4.2)	13 (2.1)	32 (2.7)	r 43 (2.8)
Lithuania	51 (3.8)	541 (4.5)	49 (3.8)	541 (3.9)	8 (2.0)	16 (3.1)	48 (3.9)
Germany	48 (3.7)	519 (3.9)	52 (3.7)	523 (3.4)	0 (0.3)	32 (3.6)	37 (3.4)
North Macedonia	47 (4.5)	472 (7.7)	53 (4.5)	471 (7.3)	14 (2.9)	26 (4.3)	29 (4.5)
Singapore	46 (2.6)	626 (5.4)	54 (2.6)	625 (4.7)	18 (1.9)	18 (2.0)	44 (2.5)
United Arab Emirates	r 45 (1.8)	512 (2.5)	55 (1.8)	457 (3.0)	r 23 (1.6)	r 25 (1.8)	r 39 (1.8)
Austria	44 (3.3)	549 (3.1)	56 (3.3)	532 (4.4)	1 (0.4)	39 (3.2)	21 (2.7)
Ireland	43 (4.0)	548 (4.7)	57 (4.0)	548 (2.8)	5 (2.0)	19 (2.9)	36 (4.1)
Russian Federation	42 (3.5)	568 (4.5)	58 (3.5)	566 (4.1)	7 (1.7)	28 (3.3)	41 (3.5)
Qatar	37 (3.5)	449 (7.5)	63 (3.5)	450 (5.0)	18 (2.8)	11 (2.3)	33 (3.3)
Chile	34 (3.9)	441 (5.4)	66 (3.9)	442 (4.0)	16 (3.2)	16 (2.9)	33 (3.8)
Korea, Rep. of	34 (3.8)	595 (4.2)	66 (3.8)	602 (2.7)	6 (2.1)	6 (2.1)	32 (3.8)
Latvia	34 (3.1)	539 (5.0)	66 (3.1)	550 (3.0)	6 (2.0)	10 (2.5)	32 (3.3)
Spain	33 (2.6)	503 (3.7)	67 (2.6)	501 (3.4)	7 (1.4)	11 (2.1)	31 (2.6)
Bahrain	32 (2.9)	489 (4.1)	68 (2.9)	475 (3.1)	6 (1.6)	9 (1.8)	28 (2.8)
Saudi Arabia	31 (3.3)	411 (6.4)	69 (3.3)	393 (4.8)	4 (1.3)	9 (2.0)	26 (3.2)
Hungary	31 (3.6)	522 (5.3)	69 (3.6)	525 (4.1)	2 (1.0)	7 (1.8)	29 (3.5)
Cyprus	30 (2.5)	538 (4.1)	70 (2.5)	532 (3.3)	0 (0.2)	14 (2.2)	26 (2.8)
Poland	29 (3.4)	514 (4.6)	71 (3.4)	522 (3.0)	6 (1.8)	4 (1.4)	27 (3.2)
Czech Republic	29 (3.4)	540 (5.6)	71 (3.4)	530 (3.0)	7 (1.9)	12 (2.2)	28 (3.4)
Iran, Islamic Rep. of	25 (2.8)	463 (9.7)	75 (2.8)	436 (4.5)	2 (1.0)	3 (1.4)	18 (2.6)
Kuwait	24 (3.3)	391 (11.5)	76 (3.3)	381 (5.4)	6 (2.0)	5 (1.8)	19 (3.1)
Chinese Taipei	23 (3.4)	600 (3.9)	77 (3.4)	599 (2.1)	3 (1.4)	14 (2.6)	16 (2.7)
Italy	23 (3.3)	515 (4.8)	77 (3.3)	515 (2.7)	2 (1.0)	14 (2.5)	20 (3.1)
Philippines	23 (3.3)	315 (13.2)	77 (3.3)	290 (6.9)	0 (0.2)	12 (2.3)	22 (3.2)
France	21 (3.4)	471 (6.0)	79 (3.4)	489 (3.2)	1 (0.7)	10 (2.2)	16 (3.2)
Bulgaria	19 (3.1)	516 (7.9)	81 (3.1)	515 (5.3)	2 (0.9)	8 (2.4)	18 (3.2)
Azerbaijan	18 (2.9)	508 (6.5)	82 (2.9)	517 (3.0)	4 (1.4)	6 (1.7)	15 (2.6)
Oman	17 (2.3)	437 (6.8)	83 (2.3)	429 (4.5)	3 (1.0)	4 (1.3)	14 (2.5)
Turkey (5)	16 (3.1)	533 (10.2)	84 (3.1)	521 (5.1)	2 (1.3)	8 (2.3)	13 (2.8)
Armenia	14 (2.9)	505 (6.5)	86 (2.9)	497 (2.8)	3 (1.3)	3 (1.2)	13 (2.8)
Slovak Republic	14 (2.1)	523 (8.9)	86 (2.1)	508 (3.6)	3 (1.0)	5 (1.0)	11 (2.0)
Serbia	13 (2.6)	512 (8.9)	87 (2.6)	507 (3.4)	0 (0.3)	9 (2.2)	10 (2.5)
Bosnia and Herzegovina	13 (2.2)	477 (6.3)	87 (2.2)	448 (2.5)	4 (1.3)	7 (1.8)	10 (2.3)
Portugal	13 (2.0)	524 (6.1)	87 (2.0)	526 (2.9)	2 (0.9)	7 (1.4)	12 (2.0)
Montenegro	11 (1.1)	455 (5.7)	89 (1.1)	453 (2.2)	1 (0.0)	6 (0.7)	10 (1.1)
Albania	9 (2.7)	530 (17.2)	91 (2.7)	491 (3.5)	2 (1.2)	8 (2.6)	8 (2.6)
South Africa (5)	8 (1.6)	430 (15.2)	92 (1.6)	368 (3.8)	1 (0.5)	2 (0.7)	6 (1.5)
Kosovo	6 (2.0)	451 (7.9)	94 (2.0)	443 (3.3)	s 0 (0.0)	s 7 (3.1)	s 9 (3.2)
Croatia	6 (2.0)	503 (11.4)	94 (2.0)	509 (2.3)	1 (0.8)	4 (1.7)	6 (2.0)
Pakistan	6 (1.4)	303 (54.2)	94 (1.4)	329 (12.8)	2 (1.5)	3 (0.6)	4 (1.0)
Morocco	5 (1.9)	430 (28.6)	95 (1.9)	379 (4.8)	0 (0.3)	2 (1.2)	4 (1.6)
England	x 32 (4.4)	566 (5.6)	68 (4.4)	554 (6.5)	x 7 (2.3)	x 20 (4.4)	x 24 (4.9)
International Average	39 (0.4)	506 (1.4)	61 (0.4)	500 (0.7)	13 (0.3)	17 (0.4)	29 (0.4)
Benchmarking Participants							
Dubai, UAE	r 78 (1.3)	555 (2.4)	22 (1.3)	514 (5.1)	r 50 (2.3)	r 40 (1.8)	r 65 (1.8)
Ontario, Canada	r 59 (5.5)	509 (4.9)	41 (5.5)	518 (10.5)	r 13 (4.1)	r 42 (5.5)	r 49 (5.3)
Moscow City, Russian Fed.	53 (4.5)	600 (2.9)	47 (4.5)	585 (3.1)	10 (2.4)	27 (3.6)	49 (4.6)
Madrid, Spain	39 (4.5)	516 (4.4)	61 (4.5)	519 (2.5)	10 (2.8)	9 (2.8)	33 (4.6)
Abu Dhabi, UAE	r 33 (2.4)	476 (5.4)	67 (2.4)	426 (3.9)	r 15 (1.5)	r 18 (2.5)	r 28 (2.4)
Quebec, Canada	32 (4.1)	528 (3.7)	68 (4.1)	535 (2.8)	8 (2.1)	17 (3.7)	28 (4.2)

* Teachers could indicate the class having more than one type of computer access.
 () 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.
 An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

Exhibit 14.2: Access to Computers for Science Lessons

Students' Results based on Teachers' Reports

Country	Computers Available for Students to Use During Science Lessons				Percent of Students by Computer Access*						
	Yes		No		Each Student has a Computer	The Class has Computers that Students can Share	The School has Computers that the Class can Sometimes Use				
	Percent of Students	Average Achievement	Percent of Students	Average Achievement							
Denmark	r	93 (2.4)	522 (2.8)	7 (2.4)	519 (5.8)	r	63 (4.4)	r	8 (2.4)	r	48 (4.6)
New Zealand		91 (1.5)	503 (2.5)	9 (1.5)	500 (8.3)		30 (3.3)		69 (3.0)		41 (2.8)
Belgium (Flemish)		90 (2.2)	502 (2.3)	10 (2.2)	500 (6.3)		8 (1.7)		58 (4.0)		76 (3.0)
Sweden		89 (2.2)	540 (3.4)	11 (2.2)	534 (11.9)	r	54 (4.5)	r	26 (3.6)		35 (4.5)
Malta		87 (0.3)	497 (1.3)	13 (0.3)	491 (3.4)		62 (0.4)		19 (0.3)		32 (0.4)
Finland		83 (2.5)	554 (2.8)	17 (2.5)	557 (4.8)		18 (2.7)		25 (2.7)		76 (2.8)
Georgia		82 (3.3)	450 (4.6)	18 (3.3)	471 (8.6)	r	76 (3.6)	r	34 (4.2)	r	90 (2.6)
Northern Ireland		80 (3.5)	518 (2.8)	20 (3.5)	518 (5.9)		7 (2.1)		60 (4.4)		71 (4.2)
United States		79 (2.6)	541 (3.1)	21 (2.6)	534 (6.3)		53 (3.0)		38 (2.5)		42 (2.5)
Australia		78 (2.8)	535 (3.1)	22 (2.8)	529 (6.5)		33 (3.4)		41 (3.7)		49 (4.3)
Norway (5)	s	75 (4.2)	537 (3.3)	25 (4.2)	547 (5.1)	s	43 (5.0)	s	31 (4.9)	s	42 (5.0)
Netherlands	r	72 (4.8)	519 (4.0)	28 (4.8)	515 (4.4)	r	34 (5.3)	r	49 (5.7)	r	40 (5.6)
North Macedonia		71 (4.2)	422 (7.3)	29 (4.2)	436 (11.5)		19 (3.4)		43 (4.5)		44 (4.4)
Japan		70 (3.7)	560 (2.2)	30 (3.7)	565 (2.9)		10 (2.1)		24 (3.7)		66 (4.1)
Hong Kong SAR		70 (4.4)	533 (4.5)	30 (4.4)	532 (8.4)		45 (5.0)		28 (4.4)		59 (4.6)
Canada	r	64 (3.0)	524 (2.3)	36 (3.0)	525 (4.1)	r	16 (2.0)	r	40 (3.1)	r	52 (3.1)
Kazakhstan		63 (4.1)	488 (4.6)	37 (4.1)	499 (6.2)		16 (2.8)		24 (3.5)		52 (4.4)
Singapore		60 (2.6)	594 (4.4)	40 (2.6)	595 (4.6)		25 (2.4)		29 (2.2)		57 (2.8)
Germany		59 (3.8)	519 (3.1)	41 (3.8)	518 (4.5)		2 (1.1)		39 (3.8)		50 (3.9)
Lithuania		51 (3.6)	537 (4.2)	49 (3.6)	537 (4.0)		8 (2.0)		19 (2.9)		46 (3.8)
Chinese Taipei		50 (3.9)	557 (2.4)	50 (3.9)	559 (2.6)		6 (1.7)		26 (3.4)		39 (3.8)
Qatar		50 (4.3)	447 (5.6)	50 (4.3)	453 (7.0)		19 (3.4)		23 (3.2)		46 (4.0)
Korea, Rep. of		49 (3.8)	587 (3.6)	51 (3.8)	588 (2.3)		15 (2.6)		12 (2.8)		45 (4.0)
United Arab Emirates	r	48 (1.9)	507 (3.1)	52 (1.9)	445 (3.8)	r	25 (1.8)	r	30 (1.4)	r	42 (1.7)
Russian Federation		47 (3.7)	569 (3.9)	53 (3.7)	566 (4.0)		7 (1.6)		30 (3.7)		44 (3.9)
Spain		47 (2.9)	513 (3.0)	53 (2.9)	509 (3.3)		8 (1.7)		16 (2.2)		43 (2.9)
Latvia		45 (3.1)	535 (4.4)	55 (3.1)	547 (2.6)		5 (1.8)		17 (3.1)		42 (3.1)
Ireland		45 (3.8)	526 (5.6)	55 (3.8)	530 (3.5)		7 (2.2)		20 (3.2)		36 (3.8)
Austria		45 (3.2)	525 (3.5)	55 (3.2)	520 (3.6)		1 (0.7)		41 (3.0)		26 (3.3)
Kuwait		42 (4.0)	398 (10.6)	58 (4.0)	389 (8.3)		8 (2.1)		13 (2.7)		36 (3.6)
Cyprus		40 (4.7)	515 (5.0)	60 (4.7)	511 (3.8)		0 (0.5)		18 (3.7)		36 (4.8)
Chile	r	40 (3.6)	468 (4.6)	60 (3.6)	468 (4.2)	r	19 (3.2)	r	25 (4.0)	r	40 (3.6)
Bahrain		40 (2.9)	511 (4.8)	60 (2.9)	480 (4.7)		7 (1.5)		10 (2.0)		36 (2.7)
Saudi Arabia		37 (3.3)	413 (6.5)	63 (3.3)	394 (5.9)		3 (0.7)		16 (2.9)		31 (3.3)
Hungary		34 (3.3)	522 (4.8)	66 (3.3)	533 (3.7)		5 (1.5)		9 (2.1)		32 (3.2)
Italy		32 (3.4)	507 (4.6)	68 (3.4)	511 (3.6)		2 (0.9)		18 (2.8)		27 (3.2)
Slovak Republic		30 (3.3)	526 (7.1)	70 (3.3)	518 (4.1)		8 (1.8)		10 (1.8)		25 (3.1)
Iran, Islamic Rep. of		29 (3.2)	461 (8.1)	71 (3.2)	432 (5.1)		1 (0.7)		7 (2.0)		23 (3.2)
Philippines		29 (3.4)	255 (13.5)	71 (3.4)	245 (9.4)	x	3 (2.3)	x	32 (5.0)	x	55 (5.9)
Czech Republic		29 (3.0)	537 (4.7)	71 (3.0)	532 (3.0)		6 (1.8)		13 (2.1)		26 (2.8)
Oman		28 (3.2)	445 (9.3)	72 (3.2)	431 (4.8)		4 (1.2)		10 (2.0)		23 (2.9)
Armenia		25 (3.4)	476 (6.9)	75 (3.4)	464 (3.9)		9 (2.3)		6 (2.1)		23 (3.2)
France		23 (3.7)	482 (4.9)	77 (3.7)	490 (3.5)		0 (0.4)		12 (2.4)		19 (3.5)
Bulgaria		23 (3.3)	515 (12.2)	77 (3.3)	523 (6.2)		0 (0.3)		9 (2.5)		22 (3.3)
Poland		20 (2.9)	522 (5.7)	80 (2.9)	534 (2.8)		2 (1.2)		5 (1.8)		18 (2.7)
Turkey (5)		20 (3.2)	539 (6.0)	80 (3.2)	523 (5.4)		2 (0.9)		15 (2.9)		16 (3.0)
Serbia		19 (3.1)	520 (7.6)	81 (3.1)	516 (4.0)		0 (0.0)		13 (2.7)		16 (3.3)
Bosnia and Herzegovina		18 (2.4)	472 (6.0)	82 (2.4)	456 (3.0)		5 (1.4)		10 (2.1)		16 (2.6)
Portugal		18 (2.3)	507 (4.5)	82 (2.3)	503 (2.8)		3 (1.1)		10 (2.0)		18 (2.2)
Montenegro		18 (1.4)	442 (6.3)	82 (1.4)	456 (2.6)		1 (0.0)		10 (1.2)		15 (1.1)
Azerbaijan		17 (2.2)	433 (6.3)	83 (2.2)	425 (3.9)		5 (1.7)		9 (1.6)		13 (1.9)
Kosovo		12 (3.1)	416 (7.1)	88 (3.1)	413 (4.1)	s	0 (0.0)	s	10 (3.6)	s	17 (5.3)
Croatia		11 (2.4)	518 (8.6)	89 (2.4)	524 (2.2)		3 (1.2)		6 (2.5)		11 (2.3)
Albania		11 (2.6)	523 (12.2)	89 (2.6)	485 (3.9)		2 (1.2)		8 (2.3)		9 (2.5)
Morocco		11 (2.3)	412 (21.0)	89 (2.3)	370 (6.6)		0 (0.4)		4 (1.5)		8 (2.1)
Pakistan	r	8 (2.4)	297 (27.3)	92 (2.4)	292 (17.0)	r	0 (0.2)	r	4 (1.5)	r	4 (1.7)
South Africa (5)		7 (1.6)	422 (18.5)	93 (1.6)	319 (5.0)		1 (0.6)		2 (0.7)		6 (1.5)
England	x	36 (4.9)	550 (7.0)	64 (4.9)	533 (5.9)	x	4 (2.0)	x	24 (5.1)	x	27 (5.2)
International Average		45 (0.4)	496 (1.0)	55 (0.4)	490 (0.8)		14 (0.3)		22 (0.4)		36 (0.5)
Benchmarking Participants											
Dubai, UAE	r	80 (0.9)	554 (3.0)	20 (0.9)	531 (5.5)	r	47 (2.0)	r	50 (2.8)	r	69 (1.7)
Ontario, Canada	r	75 (5.9)	525 (3.7)	25 (5.9)	533 (11.9)	r	15 (4.3)	r	52 (6.0)	r	61 (6.2)
Moscow City, Russian Fed.		60 (4.3)	600 (2.7)	40 (4.3)	587 (3.4)		12 (2.6)		31 (3.6)		58 (4.5)
Madrid, Spain		53 (4.4)	524 (2.4)	47 (4.4)	521 (3.5)		16 (3.1)		13 (3.2)		49 (4.2)
Abu Dhabi, UAE	r	40 (2.3)	449 (6.0)	60 (2.3)	395 (5.9)	r	16 (1.9)	r	21 (2.3)	r	34 (2.6)
Quebec, Canada		38 (4.4)	522 (4.1)	62 (4.4)	523 (2.6)		10 (2.1)		20 (3.9)		32 (4.4)

* Teachers could indicate the class having more than one type of computer access.

() 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.

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

Exhibit 14.3: Access to Computers for Mathematics Lessons

Students' Results based on Teachers' Reports

Country	Computers Available for Students to Use During Mathematics Lessons				Percent of Students by Computer Access*		
	Yes		No		Each Student has a Computer	The Class has Computers that Students can Share	The School has Computers that the Class can Sometimes Use
	Percent of Students	Average Achievement	Percent of Students	Average Achievement			
Sweden	89 (2.6)	502 (2.7)	11 (2.6)	515 (8.2)	80 (3.1)	2 (1.1)	15 (3.0)
Norway (9)	s 82 (3.5)	506 (3.3)	18 (3.5)	501 (5.1)	s 73 (3.9)	s 13 (3.6)	s 20 (3.6)
New Zealand	81 (3.5)	488 (3.8)	19 (3.5)	460 (12.3)	61 (4.3)	24 (3.2)	55 (4.2)
Australia	76 (2.9)	529 (4.9)	24 (2.9)	488 (8.2)	62 (2.9)	10 (2.1)	40 (3.3)
United States	72 (2.8)	510 (4.7)	28 (2.8)	533 (9.2)	58 (3.0)	27 (2.2)	35 (2.4)
United Arab Emirates	r 56 (1.7)	480 (3.1)	44 (1.7)	468 (4.3)	r 32 (1.4)	r 24 (1.4)	r 43 (1.8)
Finland	55 (3.1)	508 (3.5)	45 (3.1)	510 (2.9)	24 (3.0)	13 (1.8)	47 (3.2)
Japan	54 (3.8)	595 (4.9)	46 (3.8)	594 (2.9)	8 (2.0)	19 (3.0)	52 (4.0)
Kazakhstan	46 (3.7)	484 (5.4)	54 (3.7)	490 (5.3)	15 (2.9)	30 (3.5)	36 (3.8)
Jordan	44 (3.6)	429 (6.5)	56 (3.6)	414 (6.1)	9 (2.7)	10 (1.8)	43 (3.7)
Chile	43 (4.1)	440 (5.0)	57 (4.1)	441 (4.9)	23 (3.6)	19 (3.2)	41 (4.1)
Hungary	42 (3.6)	514 (6.6)	58 (3.6)	515 (5.6)	6 (1.6)	7 (1.6)	39 (3.7)
Georgia	41 (4.0)	467 (7.2)	59 (4.0)	459 (5.5)	x 25 (6.4)	y - -	x 84 (5.1)
Lithuania	41 (3.9)	514 (4.9)	59 (3.9)	526 (4.3)	10 (2.0)	12 (2.4)	40 (3.9)
Egypt	39 (4.3)	424 (8.7)	61 (4.3)	407 (6.7)	2 (1.1)	11 (2.8)	38 (4.3)
Qatar	38 (3.3)	440 (8.8)	62 (3.3)	446 (4.6)	17 (2.3)	8 (2.3)	33 (3.3)
Hong Kong SAR	37 (4.0)	584 (7.9)	63 (4.0)	572 (6.5)	22 (3.4)	7 (2.1)	29 (4.0)
Singapore	35 (2.7)	615 (8.1)	65 (2.7)	616 (5.0)	19 (1.7)	11 (1.5)	30 (2.7)
Chinese Taipei	35 (3.4)	608 (5.4)	65 (3.4)	615 (3.2)	2 (1.0)	26 (3.1)	26 (3.1)
Romania	33 (3.7)	488 (8.9)	67 (3.7)	476 (5.4)	r 8 (2.1)	r 7 (2.2)	r 31 (3.8)
Bahrain	33 (2.7)	481 (3.8)	67 (2.7)	481 (2.5)	5 (0.7)	8 (1.6)	32 (2.8)
Israel	33 (3.2)	516 (10.7)	67 (3.2)	521 (6.0)	9 (2.2)	7 (1.3)	30 (3.0)
Russian Federation	31 (3.5)	558 (7.0)	69 (3.5)	537 (6.1)	7 (1.9)	16 (3.1)	30 (3.4)
Ireland	31 (3.2)	521 (5.5)	69 (3.2)	526 (3.1)	14 (2.3)	3 (1.2)	22 (2.6)
Korea, Rep. of	29 (3.5)	607 (4.6)	71 (3.5)	607 (3.6)	3 (1.1)	14 (2.6)	22 (3.2)
Saudi Arabia	29 (3.5)	401 (4.8)	71 (3.5)	389 (3.0)	5 (1.6)	14 (3.1)	23 (3.0)
Kuwait	28 (3.5)	426 (10.0)	72 (3.5)	392 (4.8)	6 (1.2)	5 (1.8)	25 (3.8)
Iran, Islamic Rep. of	25 (3.2)	465 (8.9)	75 (3.2)	440 (4.0)	0 (0.1)	3 (1.2)	22 (3.3)
England	s 24 (4.8)	521 (15.8)	76 (4.8)	522 (9.9)	s 13 (3.9)	s 4 (2.1)	s 17 (4.3)
Italy	23 (3.4)	484 (5.3)	77 (3.4)	502 (3.2)	r 6 (1.8)	r 15 (2.8)	r 24 (3.6)
France	r 19 (3.6)	483 (5.7)	81 (3.6)	482 (3.1)	r 6 (2.0)	r 5 (2.1)	r 16 (3.5)
Lebanon	16 (3.4)	447 (10.4)	84 (3.4)	426 (3.4)	2 (1.0)	6 (2.1)	14 (3.3)
Turkey	15 (2.8)	512 (12.1)	85 (2.8)	493 (4.9)	1 (0.9)	9 (2.3)	12 (2.5)
Oman	13 (2.6)	434 (10.1)	87 (2.6)	407 (3.2)	2 (0.7)	4 (1.3)	12 (2.5)
Malaysia	13 (2.1)	477 (9.8)	87 (2.1)	458 (3.7)	4 (1.3)	5 (1.5)	12 (2.2)
South Africa (9)	9 (1.3)	417 (11.5)	91 (1.3)	388 (2.8)	2 (0.4)	1 (0.4)	4 (0.7)
Portugal	9 (2.5)	503 (14.0)	91 (2.5)	500 (3.3)	3 (1.5)	1 (1.0)	8 (2.4)
Cyprus	s 9 (1.9)	517 (8.6)	91 (1.9)	504 (2.5)	s 0 (0.0)	s 2 (0.6)	s 6 (1.4)
Morocco	5 (1.6)	416 (15.5)	95 (1.6)	386 (2.4)	0 (0.0)	1 (0.7)	4 (1.3)
International Average	37 (0.5)	495 (1.3)	63 (0.5)	487 (0.9)	17 (0.4)	11 (0.4)	28 (0.5)
Benchmarking Participants							
Dubai, UAE	74 (2.3)	548 (3.2)	26 (2.3)	507 (6.8)	36 (2.8)	35 (2.2)	62 (3.1)
Ontario, Canada	70 (4.5)	539 (5.7)	30 (4.5)	516 (5.0)	r 21 (4.6)	r 50 (5.3)	r 57 (5.3)
Abu Dhabi, UAE	r 59 (1.8)	421 (5.0)	41 (1.8)	454 (4.6)	r 48 (1.9)	r 21 (2.5)	r 38 (2.5)
Moscow City, Russian Fed.	37 (4.1)	587 (7.0)	63 (4.1)	568 (4.8)	7 (2.2)	11 (2.5)	35 (4.0)
Quebec, Canada	29 (4.3)	557 (7.2)	71 (4.3)	537 (4.7)	14 (2.6)	6 (2.5)	17 (3.7)
Western Cape, RSA (9)	23 (3.6)	462 (14.2)	77 (3.6)	434 (5.7)	5 (1.6)	2 (1.0)	16 (3.8)
Gauteng, RSA (9)	15 (3.2)	434 (14.8)	85 (3.2)	418 (4.0)	5 (1.5)	1 (0.5)	7 (2.2)

* Teachers could indicate the class having more than one type of computer access.

() 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.

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from <http://timss2019.org/download>

Exhibit 14.4: Access to Computers for Science Lessons

Students' Results based on Teachers' Reports

Country	Computers Available for Students to Use During Science Lessons				Percent of Students by Computer Access*		
	Yes		No		Each Student has a Computer	The Class has Computers that Students can Share	The School has Computers that the Class can Sometimes Use
	Percent of Students	Average Achievement	Percent of Students	Average Achievement			
Sweden	96 (1.7)	521 (3.1)	4 (1.7)	528 (31.8)	87 (2.8)	4 (1.2)	19 (3.0)
New Zealand	90 (2.6)	506 (4.2)	10 (2.6)	464 (22.8)	55 (4.1)	24 (3.5)	67 (4.1)
Australia	r 87 (1.6)	537 (3.8)	13 (1.6)	505 (10.6)	r 67 (2.8)	r 18 (2.4)	r 51 (2.7)
Norway (9)	s 85 (3.3)	497 (3.9)	15 (3.3)	500 (7.9)	s 77 (3.8)	s 16 (3.6)	s 21 (3.9)
United States	r 82 (2.3)	530 (4.2)	18 (2.3)	511 (14.3)	r 58 (2.9)	r 35 (3.1)	r 50 (2.9)
Finland	78 (1.9)	542 (3.3)	22 (1.9)	545 (4.9)	27 (3.0)	18 (1.8)	70 (2.3)
Japan	67 (3.8)	568 (2.8)	33 (3.8)	572 (3.9)	17 (3.2)	29 (3.5)	62 (4.0)
Chile	65 (3.9)	468 (4.2)	35 (3.9)	454 (5.7)	40 (4.0)	39 (3.8)	63 (3.8)
Kazakhstan	64 (2.9)	477 (4.2)	36 (2.9)	480 (5.7)	19 (2.2)	37 (2.8)	56 (3.0)
United Arab Emirates	r 59 (1.4)	483 (2.8)	41 (1.4)	462 (4.2)	r 39 (1.3)	r 27 (1.6)	r 47 (1.6)
Egypt	58 (3.7)	399 (7.8)	42 (3.7)	379 (8.0)	3 (1.4)	14 (2.9)	56 (3.6)
Hong Kong SAR	57 (4.0)	512 (7.5)	43 (4.0)	494 (8.9)	30 (3.8)	20 (3.6)	45 (4.3)
Singapore	56 (2.2)	605 (6.0)	44 (2.2)	611 (5.8)	29 (1.9)	21 (2.1)	53 (2.4)
Israel	56 (4.3)	510 (5.8)	44 (4.3)	519 (6.4)	10 (2.5)	22 (3.1)	53 (4.1)
Iran, Islamic Rep. of	54 (3.8)	465 (5.4)	46 (3.8)	431 (5.8)	2 (1.2)	6 (1.9)	49 (3.8)
Jordan	54 (3.6)	468 (5.1)	46 (3.6)	434 (7.8)	13 (2.6)	11 (2.1)	50 (3.8)
Chinese Taipei	54 (3.6)	572 (2.6)	46 (3.6)	576 (3.7)	5 (1.4)	37 (3.5)	40 (3.6)
Lithuania	53 (2.3)	529 (3.6)	47 (2.3)	538 (2.9)	16 (1.7)	20 (1.7)	48 (2.1)
Qatar	50 (4.5)	477 (5.7)	50 (4.5)	472 (7.5)	24 (2.7)	19 (2.7)	46 (4.1)
Georgia	49 (2.4)	445 (4.4)	51 (2.4)	449 (4.2)	x 26 (3.5)	x 27 (3.4)	s 87 (2.2)
Korea, Rep. of	49 (4.2)	560 (3.3)	51 (4.2)	561 (2.6)	7 (1.9)	27 (3.1)	39 (4.1)
Kuwait	48 (4.6)	457 (7.4)	52 (4.6)	432 (6.9)	8 (2.3)	10 (2.6)	42 (4.8)
Hungary	46 (2.6)	529 (3.5)	54 (2.6)	528 (3.7)	3 (0.7)	10 (1.4)	43 (2.7)
Russian Federation	46 (2.5)	548 (4.2)	54 (2.5)	539 (5.8)	8 (1.5)	28 (2.2)	44 (2.5)
Ireland	45 (3.7)	527 (3.9)	55 (3.7)	528 (4.3)	17 (2.7)	10 (2.0)	33 (3.2)
Bahrain	44 (2.8)	483 (3.8)	56 (2.8)	488 (3.5)	6 (1.1)	11 (2.5)	39 (2.7)
Romania	40 (2.9)	481 (5.7)	60 (2.9)	464 (4.9)	r 12 (2.0)	r 12 (2.2)	r 41 (3.3)
Italy	36 (3.8)	493 (4.7)	64 (3.8)	506 (3.3)	6 (1.8)	25 (3.6)	32 (3.7)
France	r 35 (3.5)	487 (4.4)	65 (3.5)	489 (3.9)	r 4 (1.5)	r 19 (2.6)	r 31 (3.2)
England	s 32 (4.8)	524 (14.2)	68 (4.8)	522 (8.2)	s 14 (3.6)	s 7 (2.9)	s 29 (5.1)
Saudi Arabia	30 (3.8)	441 (6.9)	70 (3.8)	428 (3.4)	5 (1.6)	11 (2.3)	26 (3.3)
Malaysia	20 (3.3)	452 (10.9)	80 (3.3)	462 (4.5)	4 (1.3)	7 (1.7)	17 (3.0)
Lebanon	19 (2.6)	409 (11.4)	81 (2.6)	370 (5.2)	1 (0.7)	6 (1.9)	14 (2.3)
Oman	18 (2.4)	475 (8.2)	82 (2.4)	453 (3.2)	3 (1.0)	8 (1.6)	16 (2.3)
Turkey	18 (3.2)	536 (11.2)	82 (3.2)	511 (4.8)	3 (1.5)	10 (2.5)	14 (2.9)
Portugal	17 (3.1)	536 (5.4)	83 (3.1)	516 (3.0)	3 (1.2)	8 (1.9)	17 (3.0)
Morocco	15 (1.9)	411 (7.3)	85 (1.9)	391 (3.2)	0 (0.0)	5 (1.1)	12 (1.7)
South Africa (9)	10 (1.8)	404 (16.9)	90 (1.8)	366 (3.2)	3 (0.9)	2 (0.8)	6 (1.4)
Cyprus	s 7 (1.0)	494 (6.7)	93 (1.0)	486 (2.5)	s 1 (0.0)	s 3 (0.6)	s 4 (0.8)
International Average	48 (0.5)	496 (1.1)	52 (0.5)	486 (1.4)	19 (0.4)	17 (0.4)	39 (0.5)
Benchmarking Participants							
Ontario, Canada	s 88 (3.4)	522 (5.0)	12 (3.4)	516 (9.4)	s 29 (4.9)	s 66 (5.6)	s 72 (5.4)
Dubai, UAE	r 81 (1.4)	565 (2.6)	19 (1.4)	494 (8.1)	r 52 (1.7)	r 38 (1.9)	r 65 (2.6)
Abu Dhabi, UAE	r 62 (2.5)	397 (6.2)	38 (2.5)	451 (7.8)	r 50 (1.6)	r 22 (2.5)	r 44 (2.7)
Moscow City, Russian Fed.	40 (2.6)	571 (3.7)	60 (2.6)	563 (3.2)	9 (1.6)	17 (1.9)	37 (2.5)
Western Cape, RSA (9)	21 (3.5)	472 (17.8)	79 (3.5)	432 (6.6)	8 (2.1)	5 (1.9)	17 (3.2)
Gauteng, RSA (9)	8 (1.9)	517 (18.8)	92 (1.9)	415 (4.6)	5 (1.9)	0 (0.0)	3 (0.5)
Quebec, Canada	y - -	- -	- -	- -	y - -	y - -	y - -

* Teachers could indicate the class having more than one type of computer access.

() 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.

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

Downloaded from <http://timss2019.org/download>

Technology to Support Learning

Exhibits 14.5, 14.6, 14.7, and 14.8 presents teachers' reports on the frequency they do activities on computers to support learning during mathematics and science lessons, together with average achievement by frequency. Across both grades and subjects, 5 to 9 percent of students on average are in classes in which their teacher reported doing computer activities to support learning "every day or almost every day," 10 to 14 percent had teachers who reported "once or twice a week," 13 to 21 percent "once or twice a month," and 56 to 68 percent "never or almost never."

Teachers reported doing computer activities more frequently in science lessons than in mathematics lessons. Although 60 percent of fourth grade students (Exhibit 14.6) and 56 percent of eighth grade students (Exhibit 14.8) had science teachers who said they "never or almost never" did computer activities to support learning, 67 percent of fourth grade students (Exhibit 14.5) and 68 percent of eighth grade students (Exhibit 14.7) had mathematics teachers who reported "never or almost never" doing computer activities to support learning. Though few students are in classes where computers are used on a frequent basis, there was a substantial range across countries. For example, in fourth grade mathematics, on average only 7 percent of students' mathematics teachers said they use computers to support learning "every day or almost every day," on average, but more than 25 percent did so in Denmark, the Netherlands, New Zealand, and the United States.

Students in classes where teachers "never or almost never" used computers to support learning had the lowest achievement, on average. At both the fourth and the eighth grades, there was a 10-point difference in average mathematics achievement as well as average science achievement between students in the two lowest categories. Beyond that, the relationship with achievement varied across grades and subjects. In fourth grade mathematics (Exhibit 14.5) and eighth grade science (Exhibit 14.8), students with teachers who did computer activities "every day or almost every day" had the highest average achievement compared to students in the other three categories (515 vs. 509, 510, and 500 for fourth grade mathematics; 509 vs. 495, 497, and 487 for eighth grade science), while in fourth grade science (Exhibit 14.6), average achievement was similar for students in the "every day or almost every day," "once or twice a week," and "once or twice a month" categories (498, 498, and 500, respectively). In eighth grade mathematics (Exhibit 14.7), students in the two highest frequency categories had the same average achievement (505), which was higher than for students in the "once or twice a month" (497) and "never or almost never" (487) categories.

Exhibit 14.5: Teachers Do Computer Activities to Support Learning in Mathematics Lessons

Students' Results based on Teachers' Reports

Country	Every or Almost Every Day		Once or Twice a Week		Once or Twice a Month		Never or Almost Never	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Albania	1 (0.6)	~ ~	1 (0.7)	~ ~	7 (2.5)	532 (21.0)	91 (2.6)	491 (3.5)
Armenia	1 (0.9)	~ ~	5 (2.0)	494 (14.1)	5 (1.7)	519 (7.9)	89 (2.6)	497 (2.7)
Australia	14 (2.2)	528 (8.0)	37 (3.3)	518 (5.3)	11 (2.4)	531 (13.5)	38 (3.8)	511 (5.5)
Austria	1 (0.8)	~ ~	10 (2.0)	549 (6.2)	10 (1.8)	552 (5.1)	78 (2.6)	536 (2.4)
Azerbaijan	2 (0.8)	~ ~	10 (2.5)	515 (8.1)	3 (1.3)	485 (18.9)	85 (2.8)	517 (3.0)
Bahrain	7 (1.7)	498 (8.2)	8 (1.7)	495 (8.4)	13 (2.1)	486 (6.3)	71 (2.7)	475 (3.0)
Belgium (Flemish)	3 (1.3)	536 (23.2)	10 (2.1)	535 (5.2)	17 (3.0)	527 (4.3)	71 (3.8)	535 (2.2)
Bosnia and Herzegovina	1 (0.5)	~ ~	2 (0.8)	~ ~	9 (2.0)	484 (6.7)	88 (2.1)	448 (2.5)
Bulgaria	3 (1.5)	528 (14.1)	5 (1.6)	520 (18.5)	8 (2.6)	514 (15.3)	83 (2.7)	514 (5.1)
Canada	6 (1.0)	503 (6.2)	24 (2.0)	503 (3.9)	19 (2.5)	511 (6.1)	52 (3.0)	519 (4.0)
Chile	0 (0.0)	~ ~	7 (2.3)	446 (14.0)	18 (3.1)	429 (7.3)	76 (3.6)	443 (3.3)
Chinese Taipei	5 (1.5)	611 (8.5)	10 (2.4)	604 (5.8)	7 (2.0)	588 (8.3)	78 (3.3)	599 (2.1)
Croatia	0 (0.0)	~ ~	1 (0.7)	~ ~	5 (1.8)	501 (14.3)	94 (2.0)	509 (2.3)
Cyprus	12 (1.8)	540 (5.7)	10 (2.1)	536 (7.4)	7 (1.5)	539 (9.0)	71 (2.5)	532 (3.2)
Czech Republic	2 (1.3)	~ ~	9 (2.0)	543 (9.1)	16 (2.4)	540 (7.0)	73 (3.3)	531 (2.9)
Denmark	r 26 (3.6)	522 (4.5)	39 (4.0)	522 (3.7)	21 (3.3)	528 (6.0)	14 (3.2)	532 (6.5)
Finland	3 (0.8)	529 (10.2)	19 (2.5)	523 (5.4)	36 (3.4)	536 (3.6)	43 (3.8)	534 (3.7)
France	1 (0.4)	~ ~	5 (2.1)	488 (8.2)	3 (1.2)	437 (15.4)	91 (2.4)	487 (3.2)
Georgia	s 7 (1.6)	491 (33.1)	44 (4.3)	475 (6.5)	46 (4.3)	485 (4.7)	3 (1.2)	466 (23.2)
Germany	1 (0.7)	~ ~	7 (2.1)	508 (7.2)	17 (2.6)	518 (6.6)	75 (3.3)	524 (2.9)
Hong Kong SAR	12 (3.2)	587 (10.5)	15 (3.3)	597 (10.6)	42 (4.2)	609 (4.6)	30 (4.8)	600 (8.5)
Hungary	7 (1.7)	524 (8.8)	10 (2.1)	517 (9.1)	10 (2.6)	520 (8.8)	72 (3.4)	526 (3.9)
Iran, Islamic Rep. of	6 (1.8)	486 (18.1)	9 (2.2)	440 (16.6)	7 (1.8)	460 (11.0)	78 (2.9)	438 (4.5)
Ireland	3 (1.2)	519 (18.3)	15 (3.1)	543 (7.4)	15 (2.9)	559 (6.9)	66 (3.5)	548 (2.6)
Italy	7 (1.8)	504 (6.5)	8 (2.0)	519 (9.1)	8 (2.0)	519 (9.4)	78 (3.2)	515 (2.7)
Japan	10 (2.4)	582 (5.9)	9 (2.0)	593 (4.3)	10 (2.1)	589 (4.4)	71 (3.4)	595 (2.1)
Kazakhstan	9 (2.1)	508 (7.3)	23 (3.3)	508 (5.1)	13 (2.6)	504 (5.5)	55 (4.0)	516 (4.2)
Korea, Rep. of	0 (0.0)	~ ~	0 (0.4)	~ ~	10 (2.5)	590 (7.0)	90 (2.6)	600 (2.4)
Kosovo	s 0 (0.0)	~ ~	5 (2.2)	438 (15.5)	7 (3.3)	455 (8.1)	88 (3.8)	443 (4.6)
Kuwait	6 (1.6)	401 (24.2)	9 (2.5)	377 (20.5)	7 (1.9)	402 (20.5)	78 (3.5)	381 (5.5)
Latvia	1 (0.8)	~ ~	4 (1.6)	535 (14.1)	16 (2.8)	543 (5.4)	78 (3.3)	548 (3.1)
Lithuania	3 (1.2)	543 (14.4)	20 (3.2)	546 (9.6)	26 (3.6)	536 (5.8)	52 (3.8)	542 (3.6)
Malta	20 (0.3)	500 (2.1)	43 (0.4)	509 (1.8)	21 (0.4)	515 (3.0)	16 (0.3)	515 (3.3)
Montenegro	1 (0.0)	~ ~	2 (0.1)	~ ~	7 (1.1)	466 (6.4)	90 (1.1)	453 (2.2)
Morocco	1 (0.8)	~ ~	1 (0.6)	~ ~	3 (1.5)	408 (40.1)	95 (1.8)	379 (4.8)
Netherlands	r 43 (5.0)	536 (3.9)	19 (4.2)	533 (4.7)	2 (1.0)	~ ~	37 (4.4)	539 (4.4)
New Zealand	32 (3.5)	481 (5.5)	40 (3.2)	492 (5.2)	10 (1.9)	489 (7.9)	18 (2.3)	486 (5.9)
North Macedonia	1 (0.6)	~ ~	24 (3.9)	468 (10.9)	21 (3.8)	476 (11.2)	53 (4.5)	471 (7.2)
Northern Ireland	12 (2.9)	566 (11.9)	19 (3.0)	565 (6.7)	31 (3.8)	563 (6.0)	38 (3.9)	567 (5.2)
Norway (5)	r 9 (2.8)	548 (8.9)	40 (4.5)	545 (3.0)	23 (4.1)	550 (6.2)	29 (4.2)	538 (5.2)
Oman	2 (0.7)	~ ~	9 (2.0)	441 (12.3)	5 (1.5)	459 (20.1)	85 (2.4)	430 (4.5)
Pakistan	1 (0.9)	~ ~	2 (1.5)	~ ~	1 (0.5)	~ ~	96 (1.0)	329 (12.7)
Philippines	3 (1.4)	321 (32.5)	9 (1.9)	284 (20.8)	11 (2.6)	341 (16.3)	77 (3.3)	290 (6.9)
Poland	1 (0.8)	~ ~	5 (1.5)	513 (12.0)	17 (2.7)	511 (5.9)	76 (3.2)	523 (3.0)
Portugal	1 (0.5)	~ ~	5 (1.0)	527 (10.9)	4 (1.3)	523 (12.3)	90 (1.6)	526 (2.8)
Qatar	7 (2.1)	457 (16.6)	12 (2.3)	455 (8.6)	14 (2.4)	431 (13.9)	66 (3.5)	451 (4.7)
Russian Federation	3 (1.5)	545 (16.3)	12 (2.2)	574 (10.3)	24 (3.1)	567 (4.9)	61 (3.5)	567 (3.9)
Saudi Arabia	14 (3.0)	409 (8.9)	11 (2.0)	420 (11.3)	5 (1.6)	398 (23.3)	70 (3.3)	393 (4.7)
Serbia	4 (1.6)	522 (12.2)	4 (1.6)	517 (20.3)	4 (1.5)	496 (9.8)	88 (2.4)	507 (3.4)
Singapore	0 (0.3)	~ ~	11 (1.7)	626 (10.8)	30 (2.4)	629 (7.2)	59 (2.6)	623 (4.4)
Slovak Republic	3 (1.3)	534 (20.6)	5 (1.3)	518 (12.9)	5 (1.4)	524 (11.6)	87 (1.9)	507 (3.6)
South Africa (5)	0 (0.0)	~ ~	4 (1.0)	449 (26.5)	2 (0.6)	~ ~	95 (1.1)	370 (3.6)
Spain	3 (0.7)	504 (12.6)	13 (2.6)	502 (6.3)	13 (2.2)	500 (7.3)	71 (2.9)	502 (3.2)
Sweden	6 (1.9)	515 (10.5)	45 (4.5)	521 (3.8)	27 (3.9)	522 (6.6)	22 (3.0)	522 (8.5)
Turkey (5)	5 (2.0)	531 (17.9)	6 (1.9)	516 (15.9)	2 (1.1)	~ ~	86 (2.8)	521 (4.9)
United Arab Emirates	r 15 (1.1)	509 (5.2)	24 (1.7)	508 (4.1)	6 (0.7)	531 (8.1)	55 (1.8)	458 (3.0)
United States	36 (2.5)	537 (4.4)	27 (2.4)	531 (4.7)	9 (1.3)	537 (7.6)	28 (2.6)	536 (5.3)
England	x 5 (1.5)	587 (10.0)	10 (3.4)	578 (17.0)	13 (4.0)	557 (6.0)	72 (4.3)	553 (6.2)
International Average	7 (0.2)	515 (2.4)	14 (0.3)	509 (1.6)	13 (0.3)	510 (1.6)	67 (0.4)	500 (0.7)
Benchmarking Participants								
Ontario, Canada	r 6 (1.8)	509 (8.6)	23 (3.5)	505 (6.7)	25 (5.1)	514 (9.5)	47 (5.7)	516 (9.6)
Quebec, Canada	3 (1.3)	526 (13.0)	15 (3.2)	531 (4.3)	14 (3.4)	525 (6.6)	68 (4.1)	535 (2.8)
Moscow City, Russian Fed.	1 (1.3)	~ ~	21 (3.1)	605 (5.1)	26 (4.1)	597 (4.1)	52 (4.5)	585 (2.8)
Madrid, Spain	7 (2.0)	518 (6.2)	9 (2.4)	511 (6.6)	17 (3.3)	518 (8.4)	68 (4.2)	520 (2.5)
Abu Dhabi, UAE	r 13 (2.0)	490 (11.5)	14 (1.9)	468 (9.6)	5 (1.3)	468 (20.0)	68 (2.4)	426 (3.9)
Dubai, UAE	r 23 (2.2)	542 (6.5)	38 (2.4)	561 (3.1)	15 (2.3)	561 (6.8)	24 (1.5)	516 (5.1)

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

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

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from <http://timss2019.org/download>

Exhibit 14.6: Teachers Do Computer Activities to Support Learning in Science Lessons

Students' Results based on Teachers' Reports

Country	Every or Almost Every Day		Once or Twice a Week		Once or Twice a Month		Never or Almost Never	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Albania	1 (0.6)	~ ~	3 (1.2)	491 (13.8)	6 (2.1)	522 (20.5)	91 (2.4)	486 (3.9)
Armenia	4 (1.8)	468 (26.8)	8 (2.3)	488 (9.6)	10 (2.2)	465 (10.6)	78 (3.2)	465 (3.9)
Australia	7 (1.4)	547 (6.5)	28 (3.9)	532 (5.5)	30 (3.9)	531 (5.5)	35 (3.1)	534 (5.0)
Austria	1 (0.4)	~ ~	11 (2.0)	527 (7.1)	22 (2.4)	523 (5.3)	66 (3.1)	521 (3.3)
Azerbaijan	2 (0.9)	~ ~	9 (1.9)	420 (9.2)	5 (1.3)	454 (8.4)	84 (2.2)	425 (3.8)
Bahrain	17 (2.5)	511 (10.1)	8 (1.9)	511 (11.4)	11 (2.0)	514 (9.0)	64 (2.9)	481 (4.5)
Belgium (Flemish)	4 (1.7)	501 (14.8)	12 (2.8)	511 (5.2)	50 (3.3)	500 (3.2)	33 (3.9)	501 (3.5)
Bosnia and Herzegovina	2 (1.0)	~ ~	3 (1.0)	479 (12.9)	12 (2.2)	471 (8.0)	84 (2.6)	456 (2.9)
Bulgaria	5 (1.7)	546 (15.1)	4 (1.6)	554 (32.6)	14 (3.1)	495 (15.4)	78 (3.3)	523 (6.0)
Canada	r 5 (1.2)	526 (9.8)	18 (2.1)	521 (3.8)	32 (2.4)	524 (3.3)	45 (2.6)	526 (2.9)
Chile	r 4 (1.7)	477 (15.8)	7 (2.5)	451 (6.2)	24 (3.0)	464 (5.8)	65 (3.2)	471 (3.9)
Chinese Taipei	15 (2.8)	555 (4.4)	20 (3.2)	552 (4.3)	12 (2.2)	565 (6.3)	53 (4.0)	560 (2.3)
Croatia	2 (1.1)	~ ~	2 (1.1)	~ ~	6 (1.5)	518 (11.6)	90 (2.4)	524 (2.2)
Cyprus	11 (2.5)	511 (7.5)	9 (2.5)	516 (11.2)	18 (3.9)	519 (7.6)	62 (4.5)	510 (3.8)
Czech Republic	2 (1.0)	~ ~	4 (1.2)	514 (9.6)	21 (2.8)	544 (5.5)	73 (2.9)	532 (3.0)
Denmark	r 28 (3.8)	510 (4.5)	31 (3.9)	521 (3.8)	30 (4.1)	534 (4.4)	10 (2.3)	522 (5.7)
Finland	4 (1.2)	544 (8.7)	19 (2.7)	554 (4.3)	51 (3.3)	557 (3.2)	25 (2.8)	552 (5.0)
France	0 (0.3)	~ ~	0 (0.3)	~ ~	9 (2.8)	490 (8.2)	90 (2.8)	488 (3.2)
Georgia	r 6 (2.0)	458 (23.8)	35 (4.5)	449 (7.1)	56 (4.9)	453 (4.8)	4 (2.0)	437 (15.5)
Germany	1 (0.5)	~ ~	7 (1.9)	522 (8.1)	33 (3.5)	522 (4.7)	60 (3.7)	516 (3.4)
Hong Kong SAR	10 (2.6)	534 (11.3)	16 (3.3)	540 (8.7)	39 (4.0)	529 (4.5)	36 (4.1)	532 (6.5)
Hungary	5 (1.6)	516 (17.6)	15 (2.4)	522 (7.3)	10 (2.2)	520 (10.5)	70 (3.1)	533 (3.5)
Iran, Islamic Rep. of	5 (1.7)	484 (13.7)	13 (2.5)	452 (16.2)	9 (1.7)	455 (6.9)	72 (3.1)	434 (4.9)
Ireland	1 (0.8)	~ ~	8 (2.0)	510 (12.8)	21 (3.0)	532 (7.4)	69 (3.5)	530 (3.0)
Italy	6 (1.9)	511 (9.8)	11 (2.1)	503 (6.5)	11 (2.3)	500 (6.1)	73 (3.6)	512 (3.4)
Japan	8 (2.1)	548 (5.2)	10 (2.6)	564 (6.2)	29 (3.7)	562 (3.3)	53 (4.2)	563 (2.5)
Kazakhstan	8 (1.7)	507 (15.4)	25 (3.3)	486 (8.8)	16 (2.8)	481 (7.6)	51 (4.3)	496 (5.3)
Korea, Rep. of	2 (1.1)	~ ~	3 (1.5)	568 (16.7)	28 (3.6)	586 (4.2)	66 (3.3)	589 (2.2)
Kosovo	s 1 (0.8)	~ ~	14 (5.2)	411 (10.5)	5 (1.9)	424 (14.3)	80 (5.5)	413 (5.8)
Kuwait	18 (2.9)	390 (14.3)	12 (2.8)	418 (19.9)	12 (2.8)	390 (17.6)	59 (4.0)	389 (8.3)
Latvia	4 (1.8)	517 (19.3)	7 (2.2)	540 (11.3)	25 (3.1)	536 (6.1)	64 (3.1)	546 (2.4)
Lithuania	6 (1.9)	535 (7.9)	19 (2.8)	538 (8.0)	21 (3.3)	540 (6.5)	53 (3.6)	536 (3.9)
Malta	11 (0.2)	490 (3.2)	30 (0.4)	489 (2.5)	29 (0.4)	496 (2.5)	29 (0.4)	503 (2.4)
Montenegro	1 (0.6)	~ ~	3 (1.1)	431 (18.4)	11 (1.0)	432 (10.1)	84 (1.1)	456 (2.6)
Morocco	1 (0.8)	~ ~	1 (0.5)	~ ~	5 (1.9)	427 (29.4)	93 (2.0)	370 (6.6)
Netherlands	r 9 (2.2)	513 (11.1)	19 (2.7)	521 (8.3)	28 (5.1)	517 (6.9)	44 (5.1)	518 (3.3)
New Zealand	13 (2.4)	502 (8.0)	27 (2.6)	502 (6.4)	34 (2.9)	504 (4.7)	27 (2.9)	501 (4.5)
North Macedonia	4 (1.6)	415 (15.6)	25 (4.1)	405 (14.4)	33 (4.1)	442 (9.4)	37 (4.4)	427 (9.7)
Northern Ireland	5 (1.6)	514 (13.3)	14 (3.1)	529 (7.9)	42 (3.9)	520 (3.6)	40 (4.4)	513 (4.1)
Norway (5)	s 9 (2.9)	534 (10.6)	23 (3.7)	546 (5.0)	36 (4.6)	528 (4.8)	32 (4.6)	548 (4.3)
Oman	3 (0.7)	461 (20.4)	12 (2.3)	445 (14.6)	8 (1.8)	429 (15.1)	77 (2.8)	430 (4.6)
Pakistan	r 0 (0.3)	~ ~	5 (1.9)	310 (33.7)	1 (1.0)	~ ~	94 (2.2)	292 (17.0)
Poland	2 (1.0)	~ ~	5 (1.8)	527 (8.0)	6 (1.6)	510 (7.8)	86 (2.4)	533 (2.8)
Portugal	2 (0.8)	~ ~	7 (1.4)	503 (6.3)	9 (1.9)	512 (6.8)	82 (2.2)	503 (2.8)
Qatar	12 (2.2)	438 (15.9)	16 (2.6)	444 (8.9)	16 (2.2)	436 (11.4)	55 (3.9)	458 (6.7)
Russian Federation	2 (0.9)	~ ~	13 (2.9)	584 (8.2)	27 (3.7)	563 (4.3)	59 (3.8)	567 (3.7)
Saudi Arabia	16 (2.9)	417 (11.5)	13 (2.5)	420 (10.6)	6 (1.9)	390 (30.3)	65 (3.4)	394 (5.9)
Serbia	4 (1.5)	533 (14.0)	8 (2.0)	523 (10.8)	7 (2.2)	509 (11.4)	81 (3.1)	516 (3.9)
Singapore	1 (0.5)	~ ~	9 (1.3)	592 (13.0)	40 (2.8)	595 (5.8)	50 (2.7)	595 (4.1)
Slovak Republic	1 (0.6)	~ ~	8 (1.9)	526 (12.2)	20 (2.9)	528 (8.9)	70 (3.3)	518 (4.0)
South Africa (5)	0 (0.2)	~ ~	2 (0.7)	~ ~	2 (1.2)	~ ~	95 (1.3)	320 (5.2)
Spain	3 (1.1)	498 (17.7)	18 (2.3)	510 (4.6)	21 (2.9)	514 (4.4)	58 (3.0)	510 (3.0)
Sweden	7 (2.4)	512 (15.2)	33 (4.5)	540 (5.0)	37 (4.6)	543 (4.8)	23 (3.9)	540 (7.1)
Turkey (5)	12 (2.6)	544 (7.4)	5 (1.6)	526 (10.8)	3 (1.4)	539 (18.9)	80 (3.2)	523 (5.4)
United Arab Emirates	r 18 (1.2)	508 (6.4)	24 (1.6)	508 (5.0)	5 (0.6)	504 (12.4)	54 (1.9)	446 (3.9)
United States	14 (1.5)	532 (6.8)	30 (2.2)	546 (4.3)	24 (2.4)	543 (5.4)	33 (2.6)	533 (4.8)
England	x 5 (1.9)	566 (13.5)	10 (3.0)	556 (17.5)	18 (4.5)	543 (11.2)	68 (4.8)	533 (5.7)
Philippines	x 12 (3.8)	253 (34.6)	28 (5.8)	253 (20.2)	19 (4.7)	256 (25.7)	41 (6.2)	251 (14.9)
International Average	6 (0.2)	498 (2.3)	13 (0.3)	498 (1.6)	20 (0.4)	500 (1.5)	60 (0.4)	490 (0.7)
Benchmarking Participants								
Ontario, Canada	r 6 (2.3)	529 (15.9)	28 (4.4)	522 (5.0)	33 (4.3)	524 (5.7)	32 (4.3)	535 (7.4)
Quebec, Canada	2 (0.5)	~ ~	4 (1.5)	504 (11.2)	22 (3.7)	522 (4.9)	72 (3.9)	524 (2.7)
Moscow City, Russian Fed.	2 (1.5)	~ ~	10 (2.6)	602 (7.3)	42 (4.4)	600 (3.4)	45 (4.4)	588 (3.0)
Madrid, Spain	6 (1.7)	518 (7.8)	11 (2.9)	518 (5.5)	23 (3.3)	527 (3.4)	60 (4.5)	522 (3.0)
Abu Dhabi, UAE	r 14 (2.3)	461 (15.3)	18 (2.5)	442 (9.9)	6 (0.8)	444 (18.6)	62 (2.4)	398 (6.0)
Dubai, UAE	r 30 (2.3)	549 (6.5)	41 (2.3)	555 (3.5)	8 (1.4)	576 (8.0)	22 (1.1)	531 (5.3)

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

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

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

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

Downloaded from <http://timss2019.org/download>

Exhibit 14.7: Teachers Do Computer Activities to Support Learning in Mathematics Lessons

Students' Results based on Teachers' Reports

Country	Every or Almost Every Day		Once or Twice a Week		Once or Twice a Month		Never or Almost Never	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Australia	25 (3.1)	520 (7.2)	27 (3.8)	525 (8.1)	18 (2.6)	535 (10.2)	30 (3.2)	502 (8.7)
Bahrain	13 (1.8)	488 (6.4)	10 (1.9)	484 (7.8)	9 (1.1)	473 (5.3)	68 (2.8)	481 (2.5)
Chile	1 (0.7)	~ ~	5 (1.8)	444 (13.7)	23 (3.6)	441 (6.6)	71 (3.9)	441 (4.2)
Chinese Taipei	5 (1.6)	583 (8.3)	3 (1.0)	603 (17.1)	15 (2.6)	600 (8.5)	77 (3.0)	617 (2.8)
Cyprus s	3 (1.0)	487 (9.5)	3 (0.7)	556 (7.2)	1 (0.1)	~ ~	93 (1.3)	504 (2.5)
Egypt	2 (1.0)	~ ~	19 (3.5)	433 (10.8)	16 (3.4)	416 (14.5)	62 (4.3)	407 (6.6)
England s	6 (2.9)	555 (22.7)	7 (2.9)	509 (26.3)	7 (2.5)	490 (31.5)	80 (4.7)	523 (9.5)
Finland	2 (1.0)	~ ~	9 (1.8)	513 (7.3)	33 (2.8)	506 (4.4)	55 (3.1)	510 (3.0)
France r	0 (0.0)	~ ~	3 (1.6)	457 (24.9)	12 (3.1)	490 (9.8)	85 (3.2)	482 (3.0)
Hong Kong SAR	4 (1.4)	646 (23.6)	5 (2.1)	610 (16.5)	21 (3.5)	574 (11.7)	70 (3.9)	571 (5.8)
Hungary	1 (0.5)	~ ~	13 (2.7)	530 (11.9)	21 (2.6)	507 (8.3)	65 (3.4)	513 (4.7)
Iran, Islamic Rep. of	6 (2.0)	490 (15.0)	7 (1.9)	444 (11.4)	10 (2.2)	472 (15.9)	77 (3.1)	440 (3.9)
Ireland	4 (1.5)	516 (6.4)	5 (1.3)	514 (18.7)	12 (1.8)	530 (7.0)	79 (2.6)	525 (3.0)
Israel	0 (0.2)	~ ~	6 (1.5)	464 (26.9)	20 (2.6)	519 (11.9)	74 (2.9)	525 (5.3)
Italy r	3 (1.3)	471 (10.6)	9 (2.3)	486 (7.3)	12 (2.2)	489 (10.0)	76 (3.7)	500 (3.3)
Japan	5 (1.6)	565 (8.5)	4 (1.5)	602 (9.0)	8 (2.6)	600 (11.0)	83 (2.8)	595 (2.9)
Jordan	3 (1.4)	461 (36.6)	6 (1.8)	448 (16.3)	30 (3.7)	428 (8.3)	61 (3.8)	412 (5.7)
Kazakhstan	6 (1.8)	486 (12.2)	22 (3.0)	482 (8.6)	16 (2.9)	478 (11.3)	56 (3.8)	491 (5.2)
Korea, Rep. of	3 (1.4)	594 (8.7)	3 (1.2)	596 (13.8)	10 (2.2)	614 (11.2)	84 (2.7)	607 (3.0)
Kuwait	7 (2.0)	392 (12.3)	12 (3.7)	452 (15.5)	7 (2.2)	418 (21.0)	74 (3.7)	392 (4.9)
Lebanon	1 (0.7)	~ ~	5 (1.8)	438 (26.5)	7 (2.4)	457 (13.3)	88 (3.0)	426 (3.1)
Lithuania	0 (0.2)	~ ~	8 (1.9)	503 (7.4)	23 (3.4)	510 (6.9)	69 (3.6)	527 (4.2)
Malaysia	1 (0.6)	~ ~	2 (1.0)	~ ~	7 (1.6)	494 (11.9)	90 (2.1)	456 (3.7)
Morocco	0 (0.4)	~ ~	1 (0.8)	~ ~	2 (1.2)	~ ~	96 (1.4)	386 (2.4)
New Zealand	21 (4.3)	500 (8.6)	41 (3.9)	481 (5.7)	16 (2.3)	495 (5.5)	22 (3.7)	461 (10.7)
Norway (9) s	5 (1.5)	513 (11.7)	30 (3.9)	515 (5.2)	38 (3.9)	495 (4.9)	26 (4.2)	506 (4.5)
Oman	2 (1.1)	~ ~	2 (0.7)	~ ~	6 (1.9)	404 (11.4)	90 (2.3)	408 (3.1)
Portugal	2 (1.1)	~ ~	2 (1.2)	~ ~	4 (1.7)	473 (17.6)	93 (2.4)	500 (3.3)
Qatar	6 (1.9)	480 (27.6)	7 (1.5)	445 (15.2)	22 (3.4)	424 (12.2)	65 (3.4)	446 (4.5)
Romania r	1 (0.7)	~ ~	3 (1.2)	557 (42.3)	21 (3.4)	490 (10.1)	75 (3.3)	478 (5.1)
Russian Federation	1 (0.8)	~ ~	6 (1.8)	563 (11.8)	16 (3.1)	548 (9.1)	77 (3.5)	541 (5.5)
Saudi Arabia	8 (2.3)	413 (9.0)	11 (2.2)	408 (7.3)	6 (2.0)	374 (11.1)	75 (3.4)	390 (2.9)
Singapore	0 (0.0)	~ ~	7 (1.0)	604 (18.3)	21 (2.3)	616 (9.9)	72 (2.3)	617 (4.7)
South Africa (9)	1 (0.4)	~ ~	2 (0.5)	~ ~	2 (0.5)	~ ~	96 (0.8)	388 (2.6)
Sweden	7 (2.4)	481 (10.2)	17 (3.0)	507 (6.7)	43 (4.2)	507 (4.8)	33 (3.8)	503 (4.2)
Turkey	5 (1.8)	522 (18.4)	7 (2.0)	496 (18.0)	2 (1.2)	~ ~	86 (2.8)	493 (4.9)
United Arab Emirates r	23 (1.0)	440 (5.6)	25 (1.6)	501 (4.8)	7 (0.9)	538 (7.4)	45 (1.7)	468 (4.3)
United States	19 (2.2)	505 (9.0)	30 (2.6)	511 (6.5)	17 (2.0)	514 (8.0)	33 (2.7)	529 (8.7)
Georgia x	0 (0.4)	~ ~	18 (4.5)	486 (17.9)	64 (5.6)	463 (9.0)	17 (3.6)	450 (15.7)
International Average	5 (0.3)	505 (3.2)	10 (0.4)	505 (2.8)	16 (0.4)	497 (2.0)	68 (0.5)	487 (0.9)
Benchmarking Participants								
Ontario, Canada r	12 (3.8)	559 (23.1)	26 (3.8)	518 (6.2)	20 (4.1)	545 (7.2)	42 (4.5)	527 (5.4)
Quebec, Canada	2 (1.1)	~ ~	10 (2.9)	574 (13.7)	12 (2.9)	560 (9.8)	76 (3.6)	535 (4.6)
Moscow City, Russian Fed.	2 (1.3)	~ ~	5 (1.9)	582 (15.4)	13 (2.7)	584 (12.0)	80 (3.5)	573 (4.5)
Gauteng, RSA (9)	1 (0.7)	~ ~	4 (1.6)	467 (34.1)	2 (1.3)	~ ~	93 (2.2)	417 (3.6)
Western Cape, RSA (9)	2 (1.0)	~ ~	5 (2.9)	409 (29.5)	7 (2.2)	459 (22.4)	86 (2.9)	438 (5.4)
Abu Dhabi, UAE r	41 (2.0)	399 (7.9)	14 (1.8)	460 (11.9)	4 (1.1)	483 (10.2)	42 (1.9)	456 (4.6)
Dubai, UAE	17 (1.8)	533 (9.8)	42 (2.7)	550 (4.7)	15 (1.7)	562 (6.9)	26 (2.3)	507 (6.8)

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

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

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

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from <http://timss2019.org/download>

Exhibit 14.8: Teachers Do Computer Activities to Support Learning in Science Lessons

Students' Results based on Teachers' Reports

Country	Every or Almost Every Day		Once or Twice a Week		Once or Twice a Month		Never or Almost Never		
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Australia	r	30 (2.9)	547 (6.1)	40 (2.9)	540 (4.9)	17 (2.7)	511 (9.4)	14 (1.6)	507 (10.9)
Bahrain		17 (2.3)	479 (6.9)	11 (1.9)	455 (7.4)	12 (2.5)	503 (14.6)	60 (2.6)	489 (3.5)
Chile		1 (0.4)	~ ~	6 (1.9)	448 (16.7)	42 (3.8)	466 (4.9)	51 (3.9)	462 (4.6)
Chinese Taipei		12 (2.2)	565 (7.8)	13 (2.2)	579 (6.1)	20 (3.2)	576 (4.4)	55 (3.6)	574 (3.2)
Cyprus	s	2 (0.4)	~ ~	1 (0.3)	~ ~	4 (0.8)	505 (10.9)	93 (1.0)	486 (2.5)
Egypt		3 (1.3)	363 (17.9)	20 (3.4)	409 (13.4)	30 (3.7)	397 (11.3)	47 (3.7)	380 (7.3)
England	s	3 (2.3)	560 (16.9)	3 (2.0)	532 (52.2)	18 (4.7)	515 (24.8)	75 (4.0)	523 (7.8)
Finland		11 (1.7)	545 (7.6)	15 (1.6)	539 (6.9)	45 (2.5)	542 (3.8)	29 (2.1)	545 (4.0)
France	r	1 (0.5)	~ ~	2 (1.0)	~ ~	17 (2.6)	489 (5.6)	80 (3.0)	488 (3.2)
Georgia	s	4 (1.2)	477 (11.2)	17 (2.1)	450 (8.7)	62 (3.1)	441 (4.8)	16 (2.3)	440 (6.8)
Hong Kong SAR		9 (2.1)	536 (12.8)	11 (3.1)	477 (23.4)	31 (4.2)	519 (12.9)	49 (4.1)	497 (8.3)
Hungary		9 (1.5)	528 (7.9)	12 (1.5)	531 (5.6)	18 (1.7)	528 (5.3)	61 (2.5)	529 (3.7)
Iran, Islamic Rep. of		6 (2.0)	474 (12.0)	10 (2.3)	483 (14.3)	33 (3.6)	460 (6.7)	51 (3.7)	433 (5.6)
Ireland		5 (1.3)	529 (8.9)	10 (2.1)	525 (10.5)	20 (2.6)	528 (4.9)	65 (3.4)	528 (3.7)
Israel		4 (1.6)	498 (30.2)	18 (2.8)	490 (9.9)	33 (3.7)	524 (7.2)	45 (4.2)	518 (6.4)
Italy		7 (2.2)	497 (11.3)	8 (1.8)	481 (12.9)	17 (2.9)	495 (5.8)	68 (3.7)	506 (3.1)
Japan		10 (2.5)	565 (4.4)	8 (2.0)	570 (5.4)	21 (3.6)	565 (5.4)	61 (4.2)	572 (3.1)
Jordan		3 (1.2)	521 (24.6)	14 (2.5)	471 (9.9)	32 (3.1)	464 (6.9)	51 (3.4)	435 (7.4)
Kazakhstan		8 (1.5)	481 (9.1)	33 (2.4)	467 (6.0)	20 (2.2)	490 (6.3)	39 (2.9)	480 (5.2)
Korea, Rep. of		12 (2.5)	570 (8.0)	10 (2.1)	564 (8.1)	16 (2.5)	550 (4.5)	62 (3.8)	561 (2.3)
Kuwait		23 (3.4)	453 (10.1)	16 (4.5)	453 (14.1)	8 (2.5)	479 (16.6)	53 (4.6)	432 (6.9)
Lebanon		2 (1.3)	~ ~	5 (1.4)	389 (29.9)	11 (2.0)	417 (14.4)	83 (2.6)	369 (5.1)
Lithuania		6 (1.1)	535 (8.7)	6 (0.9)	525 (8.6)	30 (2.2)	526 (3.6)	58 (2.2)	537 (2.9)
Malaysia		2 (0.9)	~ ~	4 (1.7)	409 (22.1)	12 (2.6)	457 (12.2)	82 (3.2)	462 (4.3)
Morocco		5 (1.1)	416 (13.6)	4 (1.2)	411 (15.2)	5 (1.1)	400 (14.7)	86 (1.9)	391 (3.2)
New Zealand		26 (3.3)	516 (7.4)	41 (3.8)	505 (5.5)	20 (3.5)	492 (12.8)	13 (3.0)	475 (18.4)
Norway (9)	s	12 (3.3)	493 (9.6)	28 (4.3)	499 (5.5)	41 (4.2)	497 (5.5)	19 (3.6)	499 (6.4)
Oman		3 (1.1)	496 (25.9)	8 (1.5)	468 (14.8)	6 (1.8)	471 (11.3)	84 (2.2)	453 (3.2)
Portugal		3 (1.1)	530 (11.9)	3 (1.1)	530 (11.5)	8 (1.9)	541 (7.3)	86 (2.8)	517 (2.8)
Qatar		13 (2.8)	508 (15.0)	11 (2.2)	454 (10.0)	23 (2.9)	471 (7.9)	53 (4.2)	473 (7.3)
Romania		3 (0.6)	483 (10.8)	8 (1.4)	501 (11.2)	32 (3.4)	477 (6.2)	57 (3.4)	470 (5.1)
Russian Federation		1 (0.3)	~ ~	10 (1.3)	544 (6.4)	27 (2.2)	548 (4.6)	63 (2.6)	540 (5.3)
Saudi Arabia		11 (2.6)	460 (9.6)	12 (2.6)	428 (12.2)	5 (1.8)	428 (12.8)	71 (3.8)	428 (3.4)
Singapore		3 (0.7)	618 (16.7)	7 (1.1)	618 (14.8)	32 (2.2)	606 (7.7)	58 (2.1)	606 (5.1)
South Africa (9)		1 (0.5)	~ ~	1 (0.4)	~ ~	4 (1.1)	418 (28.1)	94 (1.2)	366 (3.3)
Sweden		29 (3.2)	517 (5.8)	28 (3.2)	517 (5.5)	30 (3.2)	527 (5.8)	13 (2.5)	525 (11.9)
Turkey		9 (2.5)	544 (17.7)	7 (2.1)	523 (18.2)	1 (0.7)	~ ~	82 (3.2)	511 (4.8)
United Arab Emirates	r	28 (1.0)	460 (5.2)	24 (1.3)	493 (6.7)	7 (1.1)	537 (10.4)	41 (1.4)	463 (4.2)
United States	r	25 (2.7)	526 (7.2)	41 (3.2)	530 (6.3)	14 (1.8)	539 (10.5)	20 (2.4)	509 (13.8)
International Average		9 (0.3)	509 (2.4)	13 (0.4)	495 (2.5)	21 (0.4)	497 (1.7)	56 (0.5)	487 (1.0)
Benchmarking Participants									
Ontario, Canada	s	17 (4.7)	543 (15.5)	33 (4.7)	511 (8.1)	32 (5.3)	521 (6.0)	18 (4.4)	519 (6.5)
Moscow City, Russian Fed.		2 (0.7)	~ ~	6 (1.3)	563 (6.8)	19 (1.9)	574 (5.1)	73 (2.2)	565 (3.1)
Gauteng, RSA (9)		2 (1.2)	~ ~	0 (0.5)	~ ~	3 (1.1)	537 (37.1)	94 (1.7)	417 (4.6)
Western Cape, RSA (9)		1 (0.9)	~ ~	6 (2.0)	514 (37.7)	8 (2.3)	475 (30.6)	84 (3.1)	430 (6.2)
Abu Dhabi, UAE	r	38 (2.2)	371 (8.0)	18 (1.8)	422 (13.5)	5 (1.1)	501 (19.9)	39 (2.5)	451 (7.7)
Dubai, UAE	r	32 (1.5)	585 (4.1)	37 (2.2)	547 (4.8)	11 (1.2)	565 (4.5)	19 (1.4)	497 (7.9)
Quebec, Canada	y	~ ~	~ ~	~ ~	~ ~	~ ~	~ ~	~ ~	~ ~

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

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

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

A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from <http://timss2019.org/download>

Tests Delivered on Digital Devices

Exhibits 14.9, 14.10, 14.11, and 14.12 present teachers' reports on the frequency with which students take mathematics and science tests on computers or tablets. On average, 61 to 69 percent of fourth and eighth grade students "never" take mathematics and science tests on computers or tablets according to their teachers, 14 to 21 percent do so "once or twice a year," and 17 to 20 percent do so "once a month or more." At the fourth grade, taking tests on digital devices was slightly less common in science compared to mathematics, with 69 percent of students "never" taking them and just 14 percent taking them "once a month or more," compared to 64 percent and 18 percent in mathematics, respectively. There is tremendous variation across countries, however, with a number of countries at both grades having 90 percent or more of students "never" taking mathematics and science tests on digital devices, and some countries having about half or more of students doing so "once a month or more."

The relationship between the frequency of taking tests on digital devices and average achievement varied across grades and subjects. At the eighth grade (Exhibits 14.11 and 14.12), although taking mathematics tests on computers "once a month or more" was associated with lower average achievement than "once or twice a year" and "never" (482 vs. 494 and 491, respectively), average achievement was similar across the three categories for taking science tests (492, 496, and 491, respectively). Average achievement was also similar across the three categories at the fourth grade (Exhibits 14.9 and 14.10), for both mathematics tests (502, 504, and 501, respectively) and science tests (489, 491, and 491, respectively).

Exhibit 14.9: Students Take Mathematics Tests on Computers or Tablets

Students' Results based on Teachers' Reports

Country	Once a Month or More		Once or Twice a Year		Never	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Albania	6 (2.1)	515 (12.1)	11 (2.5)	513 (10.8)	83 (3.3)	490 (3.6)
Armenia	16 (2.8)	501 (7.3)	16 (3.2)	500 (6.3)	68 (3.5)	498 (3.3)
Australia	21 (2.6)	528 (8.0)	56 (4.0)	521 (4.2)	23 (3.0)	503 (7.2)
Austria	4 (1.4)	553 (16.3)	2 (0.8)	~ ~	94 (1.7)	539 (2.0)
Azerbaijan	28 (3.5)	513 (4.3)	6 (1.8)	509 (9.0)	66 (3.8)	518 (3.5)
Bahrain	10 (2.0)	500 (5.8)	28 (2.9)	484 (5.2)	63 (3.2)	476 (3.2)
Belgium (Flemish)	4 (1.2)	532 (9.3)	11 (2.6)	543 (4.9)	85 (2.9)	532 (2.2)
Bosnia and Herzegovina	5 (1.5)	464 (12.0)	4 (1.6)	480 (8.0)	91 (2.0)	450 (2.5)
Bulgaria	16 (3.0)	517 (9.2)	9 (2.5)	512 (12.0)	75 (3.3)	515 (5.7)
Canada	13 (1.5)	500 (7.5)	9 (1.1)	508 (7.2)	79 (1.9)	515 (2.3)
Chile	11 (2.7)	437 (8.5)	22 (3.5)	426 (7.0)	67 (4.0)	446 (3.5)
Chinese Taipei	13 (2.6)	599 (5.0)	11 (2.1)	589 (9.8)	75 (3.0)	601 (2.1)
Croatia	7 (1.9)	498 (9.7)	5 (1.4)	506 (6.3)	88 (2.4)	510 (2.4)
Cyprus	13 (2.6)	530 (7.2)	8 (1.8)	548 (8.8)	78 (3.0)	533 (2.9)
Czech Republic	17 (2.7)	529 (7.2)	26 (3.3)	542 (4.4)	57 (3.9)	529 (3.7)
Denmark	18 (3.2)	524 (5.8)	64 (4.4)	526 (2.7)	18 (3.4)	518 (6.2)
Finland	14 (2.2)	538 (5.5)	26 (3.1)	531 (4.4)	60 (3.3)	531 (2.5)
France	2 (0.9)	~ ~	4 (1.2)	483 (11.3)	94 (1.5)	486 (3.3)
Georgia	55 (3.7)	475 (5.5)	19 (2.8)	489 (5.9)	26 (3.5)	491 (7.4)
Germany	8 (2.2)	522 (11.1)	4 (1.4)	506 (11.4)	88 (2.5)	521 (2.4)
Hong Kong SAR	30 (4.5)	601 (6.1)	25 (3.6)	593 (5.9)	45 (4.9)	607 (6.4)
Hungary	3 (1.1)	530 (7.1)	20 (3.2)	517 (7.3)	78 (3.3)	526 (3.8)
Iran, Islamic Rep. of	14 (2.0)	446 (9.8)	10 (2.4)	447 (14.2)	76 (2.8)	442 (5.0)
Ireland	8 (2.5)	554 (6.6)	10 (2.8)	546 (12.9)	82 (3.5)	548 (2.5)
Italy	21 (3.1)	516 (4.6)	18 (3.2)	506 (6.3)	61 (3.6)	517 (3.0)
Japan	3 (1.1)	586 (14.8)	5 (1.9)	589 (7.5)	92 (2.2)	593 (1.9)
Kazakhstan	48 (4.1)	510 (4.2)	15 (2.7)	497 (6.9)	37 (3.9)	520 (5.7)
Korea, Rep. of	2 (0.9)	~ ~	6 (1.8)	592 (11.3)	93 (2.1)	600 (2.4)
Kosovo	19 (3.1)	444 (7.9)	12 (3.0)	437 (10.3)	69 (3.8)	445 (3.7)
Kuwait	25 (3.4)	379 (9.0)	13 (2.6)	385 (12.4)	62 (3.8)	385 (7.6)
Latvia	22 (3.2)	551 (6.0)	30 (3.7)	540 (5.5)	47 (3.5)	549 (3.5)
Lithuania	19 (2.8)	537 (8.3)	29 (3.3)	535 (5.5)	52 (3.7)	546 (4.3)
Malta	50 (0.4)	505 (1.9)	21 (0.3)	497 (2.7)	30 (0.4)	525 (2.5)
Montenegro	5 (0.6)	446 (9.2)	6 (1.1)	464 (4.9)	90 (1.2)	452 (2.1)
Morocco	3 (1.4)	419 (41.7)	1 (0.8)	~ ~	96 (1.6)	381 (4.4)
Netherlands	30 (4.8)	539 (3.4)	2 (1.3)	~ ~	68 (4.8)	535 (3.3)
New Zealand	14 (2.4)	496 (9.4)	45 (4.0)	494 (5.6)	41 (4.0)	478 (6.1)
North Macedonia	22 (3.4)	465 (9.6)	23 (3.6)	451 (13.0)	55 (4.3)	483 (6.9)
Northern Ireland	8 (2.4)	567 (8.0)	70 (3.9)	564 (3.7)	23 (3.6)	568 (6.3)
Norway (5)	8 (1.7)	534 (11.1)	74 (3.7)	546 (2.6)	18 (3.5)	540 (8.0)
Oman	8 (2.0)	447 (20.5)	17 (2.6)	444 (12.3)	74 (2.9)	425 (3.7)
Pakistan	24 (4.9)	306 (18.0)	5 (3.1)	277 (12.5)	71 (5.8)	340 (15.5)
Philippines	15 (2.8)	314 (13.8)	6 (2.0)	294 (21.1)	79 (2.9)	293 (7.9)
Poland	9 (2.0)	510 (8.7)	20 (3.0)	518 (6.6)	71 (3.6)	522 (3.1)
Portugal	6 (1.5)	539 (7.9)	3 (0.9)	527 (11.4)	91 (1.8)	525 (2.8)
Qatar	43 (4.2)	427 (5.1)	19 (3.2)	464 (10.7)	38 (3.5)	469 (6.7)
Russian Federation	35 (3.7)	569 (5.4)	25 (3.0)	561 (4.7)	40 (4.1)	569 (5.5)
Saudi Arabia	38 (3.3)	421 (7.1)	9 (2.1)	394 (15.4)	53 (3.5)	381 (6.6)
Serbia	6 (1.9)	515 (13.5)	5 (1.9)	508 (10.0)	89 (2.1)	507 (3.4)
Singapore	14 (1.5)	625 (8.7)	31 (2.5)	626 (6.5)	54 (2.4)	625 (5.5)
Slovak Republic	15 (2.0)	515 (9.6)	27 (2.8)	510 (5.7)	58 (2.9)	508 (4.2)
South Africa (5)	10 (1.9)	372 (14.3)	2 (0.8)	~ ~	88 (2.0)	373 (4.2)
Spain	12 (2.4)	498 (8.2)	10 (1.7)	512 (6.5)	78 (2.8)	501 (2.7)
Sweden	20 (3.5)	521 (5.5)	9 (2.3)	517 (7.2)	71 (4.2)	522 (4.0)
Turkey (5)	4 (1.7)	572 (11.9)	4 (1.7)	547 (14.9)	92 (2.1)	520 (4.8)
United Arab Emirates	45 (1.9)	499 (2.6)	35 (2.1)	474 (3.4)	20 (1.6)	456 (5.5)
United States	50 (2.7)	530 (3.5)	38 (2.8)	539 (3.9)	12 (1.6)	549 (9.0)
England	11 (3.9)	545 (5.5)	27 (5.2)	564 (11.5)	62 (5.6)	559 (6.1)
International Average	17 (0.4)	502 (1.4)	18 (0.4)	504 (1.2)	64 (0.4)	501 (0.7)
Benchmarking Participants						
Ontario, Canada	14 (2.9)	494 (10.4)	8 (1.6)	521 (11.9)	78 (3.3)	514 (2.7)
Quebec, Canada	10 (2.6)	533 (5.8)	5 (2.1)	527 (9.1)	85 (3.2)	533 (2.4)
Moscow City, Russian Fed.	49 (4.2)	594 (3.1)	29 (4.1)	594 (4.3)	22 (3.2)	589 (4.3)
Madrid, Spain	13 (3.1)	519 (5.9)	5 (2.6)	527 (7.4)	82 (3.9)	517 (2.6)
Abu Dhabi, UAE	38 (2.7)	461 (4.9)	40 (2.7)	429 (4.7)	23 (2.4)	436 (10.3)
Dubai, UAE	67 (1.6)	547 (2.8)	30 (1.7)	548 (3.1)	4 (0.9)	532 (12.6)

() 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 "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

Exhibit 14.10: Students Take Science Tests on Computers or Tablets

Students' Results based on Teachers' Reports

Country	Once a Month or More		Once or Twice a Year		Never	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Albania	3 (1.6)	503 (9.6)	12 (2.6)	512 (10.6)	85 (3.0)	486 (4.0)
Armenia	16 (2.9)	483 (8.6)	17 (3.0)	461 (7.0)	67 (3.8)	464 (4.3)
Australia	7 (2.3)	545 (12.5)	21 (3.0)	540 (6.9)	73 (3.8)	531 (3.1)
Austria	4 (1.3)	524 (13.3)	3 (0.8)	530 (11.7)	93 (1.6)	522 (2.8)
Azerbaijan	31 (3.0)	424 (5.4)	7 (2.0)	408 (15.7)	62 (3.6)	432 (4.4)
Bahrain	18 (2.0)	494 (8.2)	25 (2.5)	493 (7.2)	58 (2.7)	490 (4.4)
Belgium (Flemish)	11 (2.4)	501 (6.1)	12 (2.6)	512 (5.1)	77 (3.3)	500 (2.5)
Bosnia and Herzegovina	5 (1.2)	450 (12.4)	6 (1.7)	485 (6.8)	89 (2.1)	457 (3.1)
Bulgaria	27 (3.3)	535 (8.0)	11 (2.7)	513 (15.7)	62 (3.7)	516 (7.7)
Canada	r 11 (1.5)	520 (4.3)	10 (1.5)	536 (5.3)	79 (2.1)	524 (2.3)
Chile	r 13 (3.2)	469 (6.5)	19 (3.6)	462 (8.5)	69 (4.1)	469 (3.8)
Chinese Taipei	17 (2.8)	555 (3.6)	11 (2.4)	560 (7.0)	72 (3.6)	558 (2.2)
Croatia	14 (2.8)	518 (6.1)	5 (1.3)	520 (6.9)	81 (3.2)	525 (2.3)
Cyprus	10 (2.9)	520 (11.0)	13 (2.7)	494 (7.3)	77 (3.6)	514 (3.3)
Czech Republic	10 (2.2)	531 (7.6)	19 (2.6)	536 (5.8)	71 (3.1)	533 (2.9)
Denmark	r 11 (2.7)	521 (7.8)	25 (3.7)	518 (5.7)	64 (4.3)	523 (3.2)
Finland	21 (2.4)	550 (5.8)	35 (3.3)	560 (3.0)	45 (3.3)	553 (3.2)
France	1 (0.5)	~ ~	5 (2.1)	478 (14.9)	94 (2.1)	489 (3.2)
Georgia	56 (3.9)	453 (6.0)	21 (3.4)	451 (6.8)	23 (2.9)	463 (7.3)
Germany	6 (1.9)	518 (7.2)	9 (2.3)	530 (8.1)	86 (2.7)	517 (2.6)
Hong Kong SAR	31 (4.2)	529 (6.2)	26 (3.1)	527 (5.7)	43 (4.7)	538 (5.3)
Hungary	3 (1.3)	483 (27.1)	17 (2.8)	507 (6.1)	80 (2.9)	534 (3.3)
Iran, Islamic Rep. of	18 (2.7)	452 (8.1)	9 (2.3)	448 (14.6)	73 (3.4)	437 (5.3)
Ireland	2 (0.9)	~ ~	5 (1.6)	521 (19.1)	93 (1.8)	528 (2.8)
Italy	25 (3.0)	506 (5.3)	19 (3.2)	510 (4.8)	56 (3.5)	511 (3.9)
Japan	3 (1.5)	576 (13.8)	2 (1.2)	~ ~	94 (1.9)	561 (1.8)
Kazakhstan	58 (4.1)	490 (4.3)	10 (2.5)	488 (9.9)	32 (3.7)	501 (6.9)
Korea, Rep. of	9 (2.3)	584 (8.2)	9 (2.3)	585 (7.3)	82 (3.2)	588 (2.1)
Kosovo	16 (2.8)	411 (9.7)	13 (2.8)	407 (10.3)	71 (3.6)	413 (4.5)
Kuwait	34 (3.9)	385 (12.2)	17 (3.4)	414 (11.5)	49 (4.0)	387 (9.1)
Latvia	10 (2.4)	531 (8.6)	35 (3.4)	538 (5.6)	55 (3.2)	546 (2.8)
Lithuania	23 (2.6)	527 (7.1)	27 (3.6)	537 (5.9)	50 (3.4)	542 (4.1)
Malta	22 (0.3)	480 (2.8)	24 (0.4)	488 (2.3)	54 (0.4)	505 (1.8)
Montenegro	9 (1.6)	450 (8.4)	4 (0.2)	460 (12.7)	88 (1.6)	452 (2.7)
Morocco	2 (1.0)	~ ~	2 (1.3)	~ ~	96 (1.7)	373 (5.5)
Netherlands	r 16 (4.5)	516 (5.6)	4 (1.7)	483 (15.6)	80 (4.7)	520 (3.5)
New Zealand	2 (0.8)	~ ~	14 (2.5)	504 (7.7)	85 (2.6)	503 (2.8)
North Macedonia	28 (3.8)	422 (11.3)	20 (3.9)	410 (14.7)	52 (4.8)	435 (7.7)
Northern Ireland	0 (0.0)	~ ~	1 (0.8)	~ ~	99 (0.8)	519 (2.5)
Norway (5)	s 9 (2.9)	528 (12.7)	27 (3.7)	535 (5.5)	64 (4.4)	543 (3.3)
Oman	7 (1.8)	430 (12.5)	15 (2.3)	462 (17.3)	78 (2.8)	431 (4.3)
Pakistan	r 21 (8.1)	256 (29.3)	3 (1.9)	234 (28.7)	76 (8.2)	306 (17.2)
Philippines	20 (2.8)	244 (14.1)	8 (2.4)	217 (17.2)	71 (3.2)	253 (10.1)
Poland	5 (1.5)	556 (8.7)	20 (3.4)	524 (5.4)	76 (3.7)	532 (3.0)
Portugal	5 (1.4)	518 (7.4)	4 (1.1)	497 (8.0)	91 (1.8)	504 (2.7)
Qatar	45 (3.3)	428 (5.2)	11 (2.5)	443 (11.6)	44 (3.0)	474 (8.0)
Russian Federation	34 (3.3)	566 (4.6)	26 (3.5)	572 (5.0)	40 (4.4)	566 (4.9)
Saudi Arabia	37 (3.4)	418 (6.6)	9 (2.0)	394 (14.1)	54 (3.5)	394 (6.7)
Serbia	15 (2.5)	518 (8.2)	8 (2.4)	521 (7.3)	78 (3.2)	516 (3.8)
Singapore	9 (1.3)	573 (12.0)	27 (2.1)	597 (5.6)	64 (2.3)	596 (4.5)
Slovak Republic	17 (2.6)	514 (7.8)	24 (2.8)	530 (5.4)	60 (3.4)	519 (5.1)
South Africa (5)	8 (1.8)	345 (30.2)	0 (0.2)	~ ~	92 (1.8)	324 (5.6)
Spain	19 (3.0)	503 (7.8)	9 (1.8)	510 (6.0)	73 (3.2)	513 (2.5)
Sweden	19 (3.7)	535 (7.3)	19 (3.8)	535 (7.1)	63 (4.3)	542 (4.1)
Turkey (5)	6 (2.0)	498 (18.4)	4 (1.5)	538 (23.6)	90 (2.6)	528 (4.8)
United Arab Emirates	r 43 (2.1)	500 (3.8)	34 (1.8)	468 (4.5)	24 (2.3)	434 (5.0)
United States	22 (1.8)	540 (4.9)	18 (1.9)	546 (4.4)	61 (2.2)	536 (3.8)
England	y - -	- -	- -	- -	- -	- -
International Average	17 (0.4)	489 (1.5)	14 (0.3)	491 (1.5)	69 (0.4)	491 (0.7)
Benchmarking Participants						
Ontario, Canada	r 8 (2.0)	520 (7.5)	9 (2.5)	537 (11.6)	83 (3.2)	527 (4.2)
Quebec, Canada	r 14 (2.9)	516 (6.2)	7 (2.0)	523 (8.1)	79 (3.5)	524 (2.8)
Moscow City, Russian Fed.	45 (4.0)	594 (3.6)	29 (3.6)	598 (3.0)	25 (3.7)	590 (3.7)
Madrid, Spain	14 (3.3)	532 (3.3)	7 (2.0)	530 (4.5)	78 (3.6)	520 (2.4)
Abu Dhabi, UAE	r 37 (2.5)	451 (7.1)	34 (2.5)	402 (9.2)	29 (2.4)	391 (7.8)
Dubai, UAE	r 60 (2.4)	553 (3.4)	32 (2.4)	547 (3.8)	7 (1.1)	518 (7.8)

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

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

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

A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

Downloaded from <http://timss2019.org/download>

Exhibit 14.11: Students Take Mathematics Tests on Computers or Tablets

Students' Results based on Teachers' Reports

Country	Once a Month or More		Once or Twice a Year		Never	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Australia	25 (3.0)	515 (8.6)	32 (2.8)	518 (5.8)	43 (3.1)	522 (6.8)
Bahrain	19 (2.4)	489 (5.4)	27 (2.7)	478 (3.6)	53 (2.4)	481 (2.8)
Chile	11 (2.7)	434 (9.4)	29 (3.9)	434 (6.3)	60 (4.3)	444 (4.7)
Chinese Taipei	7 (1.6)	579 (10.2)	25 (3.3)	607 (6.1)	68 (3.6)	617 (3.3)
Cyprus ^s	6 (2.3)	531 (11.1)	1 (0.6)	~ ~	94 (2.2)	503 (2.2)
Egypt	24 (3.7)	438 (10.1)	7 (2.2)	404 (20.3)	69 (3.6)	406 (6.0)
England ^s	11 (3.9)	501 (17.7)	18 (3.9)	521 (11.0)	71 (5.4)	523 (10.4)
Finland	15 (2.2)	506 (6.1)	31 (3.0)	510 (4.4)	55 (3.2)	509 (3.3)
France ^r	22 (3.8)	479 (4.8)	47 (4.3)	481 (4.3)	30 (4.4)	487 (6.3)
Georgia	29 (3.3)	479 (8.9)	27 (3.4)	449 (7.1)	44 (3.8)	460 (6.9)
Hong Kong SAR	11 (2.6)	551 (17.3)	24 (4.0)	576 (12.5)	65 (4.3)	582 (6.4)
Hungary	11 (2.1)	518 (12.2)	21 (3.1)	497 (10.3)	67 (3.4)	520 (4.6)
Iran, Islamic Rep. of	7 (2.1)	454 (21.2)	18 (2.9)	453 (13.4)	75 (3.2)	444 (4.0)
Ireland	7 (1.5)	511 (9.4)	9 (1.7)	531 (5.4)	84 (2.3)	525 (3.0)
Israel	15 (2.1)	479 (13.7)	14 (2.3)	523 (15.9)	70 (3.1)	527 (5.5)
Italy	23 (3.3)	486 (6.2)	28 (2.8)	496 (4.9)	49 (3.8)	504 (3.6)
Japan	2 (0.9)	~ ~	1 (0.8)	~ ~	97 (1.2)	595 (2.8)
Jordan	10 (2.5)	401 (17.9)	20 (3.6)	426 (11.9)	70 (4.0)	420 (4.8)
Kazakhstan	71 (3.9)	482 (4.5)	9 (2.2)	517 (12.9)	20 (3.4)	480 (9.5)
Korea, Rep. of	1 (0.7)	~ ~	5 (1.5)	605 (13.3)	94 (1.7)	607 (3.0)
Kuwait	25 (3.4)	405 (8.8)	27 (3.7)	407 (8.1)	47 (3.8)	399 (7.7)
Lebanon	11 (2.3)	431 (15.0)	13 (2.9)	425 (10.6)	76 (3.4)	429 (3.7)
Lithuania	23 (4.1)	525 (9.7)	43 (4.4)	517 (4.8)	35 (4.2)	524 (5.5)
Malaysia	24 (3.1)	466 (7.9)	39 (3.4)	453 (6.0)	38 (3.3)	465 (7.4)
Morocco	2 (1.0)	~ ~	2 (0.9)	~ ~	96 (1.2)	387 (2.7)
New Zealand	25 (3.8)	477 (6.2)	43 (4.3)	477 (6.9)	32 (3.8)	494 (6.0)
Norway (9) ^s	15 (3.3)	517 (4.5)	66 (4.3)	504 (3.9)	19 (3.6)	500 (5.0)
Oman	9 (2.0)	409 (11.9)	10 (2.0)	439 (10.3)	82 (2.4)	408 (3.1)
Portugal	2 (1.1)	~ ~	4 (1.5)	501 (18.2)	95 (1.9)	500 (3.3)
Qatar	39 (4.6)	417 (7.2)	19 (3.7)	452 (13.3)	42 (4.4)	465 (9.5)
Romania	6 (1.9)	500 (25.9)	10 (2.5)	477 (17.0)	84 (3.3)	477 (4.7)
Russian Federation	25 (2.7)	551 (7.4)	28 (3.8)	557 (7.8)	47 (3.6)	531 (7.7)
Saudi Arabia	42 (3.9)	400 (4.0)	5 (1.7)	403 (13.8)	53 (3.9)	391 (3.5)
Singapore	11 (1.6)	595 (15.2)	36 (2.7)	617 (6.8)	53 (2.6)	620 (5.0)
South Africa (9)	8 (1.3)	409 (10.5)	2 (1.0)	~ ~	90 (1.7)	388 (2.5)
Sweden	13 (2.6)	493 (7.9)	13 (2.5)	502 (5.6)	74 (3.3)	506 (3.1)
Turkey	2 (0.9)	~ ~	4 (1.5)	521 (42.8)	95 (1.7)	496 (5.1)
United Arab Emirates ^r	54 (1.8)	462 (3.4)	28 (1.9)	495 (5.6)	18 (1.8)	481 (5.1)
United States	49 (2.6)	502 (5.6)	34 (2.4)	529 (7.0)	17 (2.2)	533 (9.9)
International Average	18 (0.4)	482 (2.0)	21 (0.5)	494 (2.1)	61 (0.5)	491 (0.9)
Benchmarking Participants						
Ontario, Canada	15 (3.4)	528 (11.3)	19 (4.2)	545 (14.8)	66 (5.0)	530 (4.5)
Quebec, Canada	14 (3.0)	560 (7.1)	15 (3.6)	559 (11.7)	71 (4.3)	536 (5.3)
Moscow City, Russian Fed.	19 (3.2)	574 (9.2)	35 (4.1)	581 (6.3)	46 (4.1)	572 (6.7)
Gauteng, RSA (9)	14 (2.8)	427 (10.2)	2 (1.1)	~ ~	84 (2.9)	420 (3.6)
Western Cape, RSA (9)	3 (1.3)	503 (37.0)	4 (1.3)	458 (24.4)	93 (1.7)	438 (5.1)
Abu Dhabi, UAE ^r	60 (2.6)	426 (5.5)	25 (2.4)	445 (7.9)	15 (1.8)	451 (8.3)
Dubai, UAE	56 (1.7)	525 (3.9)	34 (2.0)	553 (6.6)	10 (1.9)	554 (14.7)

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

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

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

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

Downloaded from <http://timss2019.org/download>

Exhibit 14.12: Students Take Science Tests on Computers or Tablets

Students' Results based on Teachers' Reports

Country	Once a Month or More		Once or Twice a Year		Never		
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Australia	r	16 (2.8)	539 (11.5)	32 (3.0)	534 (6.5)	53 (3.3)	530 (5.0)
Bahrain		29 (2.6)	471 (4.6)	31 (2.6)	485 (4.8)	41 (2.5)	498 (4.7)
Chile		11 (2.5)	452 (8.3)	25 (3.0)	473 (5.9)	63 (3.3)	461 (3.8)
Chinese Taipei		10 (2.0)	555 (5.6)	10 (2.4)	571 (8.7)	80 (3.0)	577 (2.4)
Cyprus	s	3 (0.7)	483 (7.1)	8 (0.6)	502 (6.8)	89 (0.9)	485 (2.6)
Egypt		23 (3.8)	402 (12.7)	5 (2.1)	437 (17.0)	72 (4.1)	384 (6.0)
England	s	5 (2.6)	546 (22.5)	13 (3.5)	487 (13.8)	82 (4.3)	527 (7.4)
Finland		24 (1.9)	546 (5.1)	41 (1.9)	538 (3.4)	35 (2.1)	546 (4.1)
France	r	10 (1.8)	495 (6.5)	35 (3.1)	491 (4.2)	55 (3.1)	486 (3.7)
Georgia		34 (2.2)	446 (5.4)	30 (2.3)	444 (4.5)	37 (2.6)	449 (4.9)
Hong Kong SAR		14 (2.8)	486 (15.6)	25 (4.2)	510 (13.9)	61 (4.8)	506 (7.1)
Hungary		7 (1.1)	514 (9.0)	16 (1.8)	528 (7.2)	77 (2.0)	531 (3.1)
Iran, Islamic Rep. of		18 (2.5)	476 (12.2)	13 (2.3)	453 (10.5)	69 (3.4)	442 (3.7)
Ireland		10 (1.8)	520 (5.8)	12 (2.4)	516 (8.4)	78 (2.7)	530 (3.0)
Israel		17 (2.8)	500 (11.0)	35 (3.4)	521 (7.5)	48 (2.9)	513 (6.0)
Italy		16 (2.9)	493 (7.6)	18 (3.0)	489 (7.7)	66 (3.9)	506 (2.7)
Japan		4 (1.5)	568 (3.8)	4 (1.7)	564 (6.1)	92 (2.3)	570 (2.3)
Jordan		13 (2.4)	462 (12.8)	18 (2.9)	464 (8.7)	70 (3.7)	447 (6.1)
Kazakhstan		81 (2.4)	469 (3.8)	6 (1.3)	478 (6.3)	13 (2.2)	488 (8.1)
Korea, Rep. of		7 (1.6)	552 (7.8)	10 (1.9)	558 (6.6)	83 (2.3)	562 (2.2)
Kuwait		38 (3.8)	452 (7.4)	24 (4.1)	435 (10.1)	38 (3.7)	442 (9.4)
Lebanon		16 (2.1)	379 (10.1)	11 (2.0)	381 (18.8)	73 (2.5)	376 (5.3)
Lithuania		21 (1.8)	525 (4.3)	46 (2.6)	535 (3.6)	33 (2.5)	536 (3.5)
Malaysia		25 (2.8)	463 (7.6)	35 (3.4)	453 (8.5)	40 (3.8)	464 (7.2)
Morocco		1 (0.5)	~	3 (1.1)	417 (13.1)	96 (1.2)	393 (2.9)
New Zealand		22 (3.1)	503 (7.1)	28 (3.4)	503 (7.5)	50 (4.0)	500 (7.0)
Norway (9)	s	8 (2.5)	499 (9.0)	59 (5.3)	498 (4.3)	33 (5.0)	496 (6.9)
Oman		7 (1.4)	447 (18.4)	7 (1.8)	463 (13.2)	87 (2.3)	458 (3.1)
Portugal		3 (1.1)	507 (13.2)	5 (1.3)	529 (9.1)	92 (1.8)	519 (2.8)
Qatar		46 (3.3)	461 (5.8)	12 (2.5)	461 (15.5)	41 (3.0)	493 (7.6)
Romania		6 (1.3)	469 (12.0)	24 (3.1)	481 (9.0)	70 (2.9)	468 (4.5)
Russian Federation		32 (1.9)	546 (4.9)	21 (2.3)	542 (5.9)	47 (2.7)	541 (5.2)
Saudi Arabia		41 (4.0)	439 (5.0)	7 (2.0)	419 (13.5)	52 (4.1)	428 (4.4)
Singapore		5 (1.1)	596 (21.4)	21 (2.2)	601 (8.7)	74 (2.4)	610 (4.7)
South Africa (9)		7 (1.7)	381 (19.1)	2 (0.7)	~	90 (1.8)	370 (3.5)
Sweden		26 (3.5)	519 (6.5)	22 (2.5)	526 (6.1)	52 (3.9)	521 (5.6)
Turkey		5 (1.8)	555 (28.1)	6 (1.8)	531 (24.7)	90 (2.5)	512 (4.0)
United Arab Emirates	r	52 (1.7)	469 (3.9)	25 (1.7)	478 (6.0)	23 (1.5)	486 (5.5)
United States	r	52 (3.0)	524 (4.8)	18 (2.1)	551 (8.3)	30 (2.5)	516 (11.1)
International Average		20 (0.4)	492 (1.8)	20 (0.4)	496 (1.6)	61 (0.5)	491 (0.9)
Benchmarking Participants							
Ontario, Canada	s	23 (4.8)	514 (6.0)	18 (4.1)	504 (10.1)	59 (5.2)	530 (6.1)
Moscow City, Russian Fed.		27 (2.1)	563 (4.1)	22 (1.8)	571 (4.5)	51 (2.2)	566 (3.3)
Gauteng, RSA (9)		4 (1.6)	512 (23.7)	4 (2.0)	451 (57.9)	93 (2.5)	417 (4.7)
Western Cape, RSA (9)		7 (3.0)	430 (34.0)	7 (2.1)	511 (34.7)	86 (3.4)	435 (6.2)
Abu Dhabi, UAE	r	59 (2.3)	399 (5.9)	20 (1.8)	419 (9.9)	21 (1.8)	469 (8.8)
Dubai, UAE	r	55 (3.3)	558 (4.2)	29 (3.4)	541 (7.2)	16 (2.0)	555 (8.2)
Quebec, Canada	y	-	-	-	-	-	-

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

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

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

A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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