

Exhibit 9.13: Teachers' Participation in Professional Development in Mathematics in the Past Two Years

Students' Results based on Teachers' Reports

Country	Percent of Students by Teachers' Participation in Professional Development*						
	Mathematics Content	Mathematics Pedagogy/ Instruction	Mathematics Curriculum	Integrating Technology into Mathematics Instruction	Improving Students' Critical Thinking or Problem Solving Skills	Mathematics Assessment	Addressing Individual Students' Needs
Albania	29 (3.6)	33 (3.3)	48 (4.0)	32 (4.0)	52 (3.9)	49 (4.0)	46 (3.9)
Armenia	46 (3.4)	48 (4.0)	55 (4.1)	48 (4.1)	40 (3.7)	44 (3.7)	47 (3.8)
Australia	56 (3.7)	54 (3.4)	53 (3.4)	30 (3.3)	55 (3.6)	43 (3.2)	52 (3.8)
Austria	50 (3.1)	41 (3.0)	16 (2.4)	13 (1.9)	34 (3.4)	22 (2.7)	51 (2.9)
Azerbaijan	49 (4.0)	39 (3.7)	61 (3.7)	33 (3.7)	43 (3.7)	57 (3.6)	39 (3.6)
Bahrain	51 (3.5)	68 (2.6)	45 (3.3)	72 (3.1)	69 (2.6)	52 (3.0)	61 (3.0)
Belgium (Flemish)	17 (2.7)	19 (2.9)	35 (3.8)	8 (1.9)	15 (3.0)	5 (1.7)	34 (3.5)
Bosnia and Herzegovina	15 (2.1)	10 (1.7)	19 (2.6)	12 (2.1)	20 (2.7)	15 (2.5)	21 (2.7)
Bulgaria	30 (3.3)	25 (3.1)	29 (3.9)	26 (3.5)	19 (3.1)	26 (3.4)	25 (3.5)
Canada	62 (2.1)	r 68 (1.8)	47 (2.8)	37 (3.0)	58 (2.1)	52 (2.9)	52 (2.1)
Chile	43 (4.3)	33 (4.3)	30 (3.9)	17 (3.4)	36 (4.4)	24 (3.8)	42 (3.6)
Chinese Taipei	53 (3.8)	46 (4.0)	59 (4.1)	41 (3.8)	45 (3.7)	44 (3.6)	54 (4.0)
Croatia	49 (3.4)	35 (4.0)	36 (3.1)	43 (3.3)	44 (3.4)	36 (3.4)	43 (3.6)
Cyprus	67 (3.8)	51 (4.5)	64 (3.8)	26 (3.0)	32 (3.7)	25 (2.5)	15 (2.6)
Czech Republic	32 (3.6)	43 (3.8)	14 (2.7)	31 (3.4)	47 (3.8)	28 (3.7)	51 (3.1)
Denmark	r 26 (3.5)	r 22 (3.2)	r 13 (2.7)	r 20 (3.1)	r 15 (2.9)	r 17 (2.7)	r 15 (3.2)
Finland	7 (1.9)	17 (2.6)	12 (2.0)	15 (2.3)	8 (2.0)	9 (1.9)	17 (2.6)
France	64 (3.5)	68 (3.5)	36 (3.7)	13 (2.4)	39 (3.2)	6 (1.6)	21 (2.6)
Georgia	48 (3.8)	57 (3.8)	59 (4.1)	57 (3.6)	50 (4.3)	46 (3.4)	48 (4.3)
Germany	37 (3.3)	28 (3.5)	27 (3.3)	8 (2.0)	20 (3.2)	18 (2.9)	29 (3.3)
Hong Kong SAR	72 (3.2)	72 (3.3)	72 (3.9)	77 (3.9)	58 (4.3)	40 (4.3)	56 (4.2)
Hungary	5 (1.4)	16 (2.4)	4 (1.4)	12 (2.0)	21 (2.4)	5 (1.3)	30 (3.2)
Iran, Islamic Rep. of	59 (3.7)	64 (3.6)	35 (3.8)	24 (3.5)	32 (3.0)	35 (3.8)	57 (3.8)
Ireland	36 (3.6)	33 (3.5)	23 (3.5)	23 (3.2)	34 (3.6)	19 (2.7)	31 (3.4)
Italy	33 (3.6)	47 (3.5)	30 (3.6)	33 (3.0)	27 (3.4)	25 (3.4)	42 (3.9)
Japan	55 (3.7)	58 (2.9)	23 (2.8)	11 (2.6)	29 (3.0)	21 (3.1)	33 (3.4)
Kazakhstan	54 (3.9)	60 (3.8)	63 (3.4)	62 (3.7)	69 (3.6)	65 (3.5)	58 (3.8)
Korea, Rep. of	30 (4.3)	28 (3.7)	39 (4.1)	15 (2.9)	38 (3.8)	38 (4.1)	49 (4.0)
Kosovo	24 (3.5)	20 (3.4)	15 (3.4)	16 (3.3)	39 (3.8)	31 (4.0)	24 (3.4)
Kuwait	78 (3.6)	75 (3.6)	74 (3.5)	70 (4.0)	66 (3.9)	67 (4.4)	69 (3.5)
Latvia	42 (3.7)	37 (3.5)	34 (3.7)	48 (3.7)	67 (3.6)	37 (3.4)	42 (3.6)
Lithuania	24 (3.0)	29 (3.5)	24 (3.6)	55 (3.5)	53 (3.6)	34 (3.7)	45 (4.2)
Malta	60 (0.4)	62 (0.4)	55 (0.5)	41 (0.4)	62 (0.4)	67 (0.4)	45 (0.4)
Montenegro	30 (2.4)	23 (1.9)	21 (2.2)	14 (1.9)	38 (2.4)	35 (2.7)	30 (2.5)
Morocco	30 (3.7)	35 (3.0)	33 (3.4)	18 (3.2)	32 (3.5)	48 (3.3)	37 (3.6)
Netherlands	r 39 (4.6)	r 34 (4.6)	r 24 (5.1)	r 4 (1.5)	r 26 (4.8)	r 22 (4.3)	r 46 (5.2)
New Zealand	59 (3.7)	61 (3.3)	50 (3.6)	26 (2.9)	58 (3.3)	36 (3.4)	46 (3.1)
North Macedonia	36 (4.3)	22 (3.6)	25 (3.7)	22 (3.8)	31 (4.4)	32 (4.3)	29 (4.3)
Northern Ireland	50 (4.2)	57 (3.9)	39 (4.2)	37 (4.2)	56 (4.2)	30 (4.2)	33 (4.2)
Norway (5)	r 23 (4.0)	r 25 (4.0)	r 8 (2.5)	r 18 (3.8)	r 19 (3.4)	r 12 (3.1)	r 14 (3.3)
Oman	66 (3.2)	65 (3.4)	64 (3.3)	42 (3.3)	56 (3.7)	73 (2.8)	50 (3.4)
Pakistan	72 (5.0)	63 (6.9)	63 (7.7)	42 (7.8)	79 (4.1)	75 (4.7)	75 (4.6)
Philippines	68 (3.5)	71 (3.9)	67 (3.7)	56 (4.2)	66 (3.8)	63 (3.8)	65 (3.7)
Poland	74 (3.5)	55 (3.6)	69 (3.7)	63 (3.6)	46 (4.0)	38 (4.2)	54 (3.6)
Portugal	41 (3.3)	37 (3.6)	30 (3.0)	25 (3.1)	33 (3.2)	14 (2.2)	37 (3.4)
Qatar	64 (3.7)	68 (3.0)	60 (3.2)	70 (3.5)	72 (3.3)	54 (3.0)	71 (2.9)
Russian Federation	37 (3.8)	43 (3.8)	50 (3.8)	55 (3.4)	51 (3.6)	55 (3.7)	51 (4.2)
Saudi Arabia	55 (3.7)	59 (3.9)	43 (3.7)	53 (3.4)	52 (4.1)	35 (3.5)	50 (4.1)
Serbia	42 (3.7)	30 (3.8)	29 (3.7)	27 (4.0)	44 (3.8)	29 (3.4)	47 (3.8)
Singapore	74 (2.4)	82 (2.6)	69 (2.4)	61 (2.3)	62 (2.7)	67 (2.6)	46 (2.6)
Slovak Republic	15 (2.4)	23 (2.7)	42 (2.6)	37 (3.0)	21 (2.4)	15 (2.3)	22 (2.7)
South Africa (5)	85 (2.1)	57 (3.9)	85 (2.7)	46 (3.9)	67 (3.2)	78 (2.9)	60 (3.3)
Spain	37 (3.1)	45 (3.1)	28 (3.4)	28 (3.3)	45 (3.5)	24 (2.8)	49 (3.7)
Sweden	22 (3.1)	23 (3.2)	23 (3.8)	29 (4.1)	17 (3.0)	24 (3.9)	33 (4.6)
Turkey (5)	22 (3.3)	27 (3.1)	32 (3.1)	32 (3.5)	17 (3.4)	15 (2.9)	14 (2.6)
United Arab Emirates	r 68 (1.5)	r 70 (1.3)	r 71 (1.8)	r 70 (1.3)	r 78 (1.2)	r 67 (1.3)	r 75 (1.6)
United States	66 (2.3)	65 (2.6)	70 (2.3)	47 (2.4)	59 (2.5)	48 (2.6)	56 (2.6)
England	x 66 (5.9)	x 63 (6.9)	x 57 (6.9)	x 17 (4.4)	x 63 (5.5)	x 47 (6.9)	x 42 (6.8)
International Average	46 (0.5)	45 (0.5)	41 (0.5)	35 (0.4)	44 (0.5)	37 (0.4)	43 (0.5)
Benchmarking Participants							
Ontario, Canada	r 81 (2.6)	r 81 (2.4)	r 66 (5.1)	r 49 (5.5)	r 76 (3.3)	r 61 (5.4)	r 68 (3.7)
Quebec, Canada	38 (4.0)	50 (4.5)	20 (3.3)	22 (4.0)	34 (4.4)	44 (4.2)	27 (3.9)
Moscow City, Russian Fed.	26 (3.6)	27 (3.9)	37 (4.1)	62 (4.2)	36 (4.4)	35 (4.4)	40 (4.0)
Madrid, Spain	39 (4.0)	44 (4.0)	23 (3.4)	33 (4.6)	41 (4.0)	22 (3.8)	50 (4.2)
Abu Dhabi, UAE	r 64 (2.2)	r 65 (2.1)	r 62 (2.5)	r 58 (2.7)	r 68 (2.3)	r 57 (2.4)	r 65 (2.5)
Dubai, UAE	r 69 (2.2)	r 69 (2.5)	r 73 (1.3)	r 77 (1.8)	r 84 (2.1)	r 69 (2.4)	r 81 (2.1)

* Teachers could indicate participating in more than one area of professional development.

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

Exhibit 9.14: Teachers' Participation in Professional Development in Science in the Past Two Years

Students' Results based on Teachers' Reports

Country	Percent of Students by Teachers' Participation in Professional Development*							
	Science Content	Science Pedagogy/ Instruction	Science Curriculum	Integrating Technology into Science Instruction	Improving Students' Critical Thinking or Inquiry Skills	Science Assessment	Addressing Individual Students' Needs	Integrating Science with Other Subjects
Albania	29 (3.9)	29 (3.9)	43 (3.7)	26 (3.9)	51 (3.9)	45 (3.8)	28 (3.6)	38 (4.3)
Armenia	35 (4.2)	39 (4.0)	r 44 (4.0)	41 (4.4)	r 43 (3.8)	r 40 (4.5)	r 43 (4.2)	r 57 (4.1)
Australia	35 (3.6)	31 (3.5)	35 (3.4)	34 (3.8)	43 (3.9)	18 (2.8)	30 (3.6)	30 (3.3)
Austria	40 (3.1)	19 (2.3)	15 (2.3)	9 (1.9)	24 (3.1)	6 (1.9)	15 (2.5)	14 (2.4)
Azerbaijan	25 (2.9)	16 (2.5)	38 (3.5)	30 (3.3)	36 (3.7)	38 (3.9)	39 (3.6)	45 (3.9)
Bahrain	42 (3.3)	69 (3.0)	47 (2.8)	80 (2.3)	78 (2.7)	61 (3.0)	57 (3.0)	70 (3.1)
Belgium (Flemish)	17 (3.0)	11 (2.5)	37 (3.4)	10 (2.3)	6 (1.8)	6 (1.9)	14 (2.7)	21 (3.4)
Bosnia and Herzegovina	13 (2.0)	12 (1.9)	16 (2.3)	10 (1.7)	17 (2.5)	12 (2.1)	16 (2.3)	12 (1.7)
Bulgaria	15 (2.4)	14 (2.8)	20 (2.8)	19 (2.8)	9 (2.2)	14 (2.7)	12 (2.7)	15 (2.7)
Canada	r 16 (1.7)	r 14 (1.8)	r 15 (1.5)	r 18 (1.7)	r 24 (2.4)	r 9 (1.7)	r 23 (2.2)	r 20 (2.0)
Chile	r 20 (3.5)	r 12 (2.8)	r 15 (3.2)	r 16 (3.2)	r 27 (4.4)	r 11 (3.0)	r 36 (4.8)	r 23 (3.9)
Chinese Taipei	61 (3.8)	41 (3.9)	61 (4.0)	53 (4.0)	44 (3.6)	29 (4.1)	50 (3.5)	45 (3.6)
Croatia	57 (3.6)	41 (3.6)	34 (3.4)	43 (4.1)	38 (3.4)	32 (3.2)	35 (3.4)	34 (3.0)
Cyprus	55 (5.1)	47 (4.7)	54 (4.9)	23 (4.2)	38 (4.1)	15 (3.5)	12 (3.3)	17 (3.6)
Czech Republic	22 (3.0)	14 (2.6)	6 (1.6)	14 (2.3)	26 (3.3)	10 (2.2)	35 (3.5)	20 (2.9)
Denmark	r 24 (3.8)	r 16 (3.3)	r 13 (3.2)	r 16 (3.9)	r 18 (3.5)	r 8 (2.3)	r 7 (2.2)	r 10 (2.8)
Finland	5 (1.6)	7 (2.0)	8 (1.6)	11 (2.1)	7 (1.9)	7 (1.7)	10 (1.8)	7 (1.8)
France	14 (2.4)	15 (2.5)	13 (2.8)	10 (2.5)	14 (2.5)	4 (1.4)	11 (2.3)	12 (2.7)
Georgia	41 (4.1)	48 (3.9)	48 (4.4)	50 (4.4)	55 (4.4)	42 (4.4)	49 (4.2)	44 (4.3)
Germany	33 (3.4)	22 (3.0)	21 (2.9)	13 (2.7)	14 (3.2)	12 (2.6)	19 (3.1)	13 (2.8)
Hong Kong SAR	53 (4.2)	47 (4.6)	54 (4.8)	66 (4.9)	61 (4.8)	34 (4.3)	48 (4.2)	58 (4.5)
Hungary	4 (1.4)	8 (1.9)	1 (0.7)	8 (2.5)	24 (2.6)	2 (1.1)	26 (3.4)	8 (1.8)
Iran, Islamic Rep. of	49 (3.6)	51 (3.2)	34 (3.1)	26 (2.9)	32 (3.5)	32 (3.7)	39 (3.7)	29 (3.0)
Ireland	25 (3.6)	22 (3.0)	21 (3.2)	22 (3.3)	29 (3.9)	12 (2.5)	19 (2.8)	28 (3.6)
Italy	13 (2.5)	18 (2.7)	18 (3.1)	19 (3.1)	22 (3.5)	18 (3.2)	28 (3.5)	20 (3.0)
Japan	40 (3.9)	37 (4.0)	18 (3.0)	11 (2.4)	12 (2.5)	13 (2.9)	14 (3.0)	4 (1.7)
Kazakhstan	51 (4.1)	56 (4.0)	54 (4.0)	57 (4.2)	66 (3.4)	61 (3.6)	63 (3.4)	56 (3.9)
Korea, Rep. of	31 (3.8)	35 (3.5)	46 (3.7)	27 (3.7)	32 (3.6)	33 (3.6)	33 (3.5)	35 (3.9)
Kosovo	16 (2.7)	16 (3.2)	10 (2.3)	9 (2.4)	28 (3.5)	24 (3.5)	18 (4.0)	19 (3.4)
Kuwait	78 (3.9)	80 (2.6)	82 (3.1)	75 (3.4)	78 (3.6)	76 (3.5)	70 (3.4)	71 (3.9)
Latvia	37 (3.9)	33 (3.7)	32 (3.8)	44 (3.9)	62 (4.0)	28 (3.5)	41 (4.3)	40 (3.7)
Lithuania	28 (3.7)	26 (3.2)	22 (3.4)	35 (3.5)	44 (3.9)	20 (2.7)	38 (3.8)	37 (3.9)
Malta	31 (0.4)	33 (0.4)	25 (0.4)	19 (0.3)	33 (0.4)	30 (0.4)	23 (0.3)	26 (0.4)
Montenegro	31 (2.2)	19 (1.8)	28 (2.4)	15 (1.9)	33 (2.3)	27 (1.8)	25 (2.2)	22 (2.5)
Morocco	24 (3.3)	33 (3.8)	30 (3.3)	23 (3.1)	28 (3.4)	39 (3.5)	38 (4.1)	25 (3.2)
Netherlands	r 8 (3.2)	r 9 (3.3)	r 8 (3.2)	r 16 (4.6)	r 24 (5.2)	r 8 (3.5)	r 17 (4.5)	r 15 (4.6)
New Zealand	29 (3.0)	30 (2.8)	28 (2.8)	20 (2.5)	34 (3.1)	13 (2.2)	21 (2.7)	25 (3.0)
North Macedonia	22 (3.5)	15 (3.0)	19 (3.5)	14 (2.8)	21 (3.2)	23 (3.7)	26 (3.6)	17 (2.9)
Northern Ireland	21 (3.3)	25 (3.5)	17 (3.6)	25 (3.7)	31 (4.3)	5 (2.1)	14 (3.2)	27 (3.8)
Norway (5)	s 11 (2.8)	s 8 (2.4)	s 5 (2.0)	s 8 (2.6)	s 7 (2.2)	s 5 (2.1)	s 9 (2.9)	s 9 (2.3)
Oman	63 (3.2)	59 (3.3)	55 (3.1)	37 (2.9)	50 (3.7)	65 (2.9)	49 (3.7)	50 (3.7)
Pakistan	r 66 (6.2)	r 72 (5.8)	r 73 (5.4)	r 56 (7.5)	r 75 (5.2)	r 70 (5.8)	r 72 (5.8)	r 54 (7.8)
Philippines	76 (3.6)	68 (3.6)	73 (3.6)	61 (4.4)	68 (3.7)	63 (4.0)	63 (4.0)	62 (3.8)
Poland	64 (4.0)	33 (4.0)	57 (4.3)	56 (3.8)	45 (3.9)	34 (3.9)	52 (4.3)	28 (3.8)
Portugal	24 (2.6)	26 (2.9)	15 (2.5)	15 (2.4)	24 (3.1)	9 (1.9)	24 (3.1)	17 (2.5)
Qatar	59 (4.1)	62 (3.2)	46 (4.0)	65 (3.4)	69 (3.3)	54 (3.2)	67 (3.2)	60 (3.7)
Russian Federation	33 (3.4)	36 (3.5)	48 (3.9)	50 (3.6)	46 (3.4)	48 (3.6)	47 (3.9)	50 (3.5)
Saudi Arabia	49 (3.6)	47 (3.6)	52 (3.8)	r 51 (3.6)	r 39 (4.5)	r 39 (4.5)	r 56 (4.0)	r 44 (4.4)
Serbia	28 (3.5)	17 (2.9)	21 (3.5)	26 (3.6)	35 (3.8)	19 (3.3)	36 (3.9)	34 (4.1)
Singapore	67 (2.7)	81 (2.1)	63 (2.6)	58 (2.5)	49 (2.6)	71 (2.6)	36 (2.7)	30 (2.6)
Slovak Republic	24 (3.1)	25 (3.2)	45 (3.7)	35 (2.7)	19 (2.6)	12 (2.4)	17 (2.7)	20 (2.8)
South Africa (5)	68 (3.8)	46 (4.5)	76 (3.2)	59 (3.5)	60 (4.6)	63 (4.1)	55 (4.2)	61 (3.8)
Spain	16 (2.5)	25 (3.2)	16 (2.5)	29 (3.3)	33 (3.1)	19 (2.7)	40 (3.1)	23 (3.5)
Sweden	17 (3.4)	13 (2.8)	10 (2.4)	19 (3.4)	10 (2.6)	15 (3.2)	19 (3.6)	17 (3.4)
Turkey (5)	28 (3.4)	28 (3.7)	36 (3.6)	31 (3.8)	20 (3.0)	25 (3.5)	19 (3.2)	20 (3.0)
United Arab Emirates	r 70 (2.1)	r 67 (2.1)	r 72 (2.3)	r 69 (2.2)	r 77 (1.8)	r 68 (2.3)	r 73 (2.1)	r 70 (2.1)
United States	40 (2.3)	34 (2.2)	43 (2.4)	29 (2.2)	37 (2.2)	21 (1.7)	29 (2.3)	26 (2.0)
England	y - -	y - -	y - -	y - -	y - -	y - -	y - -	y - -
International Average	35 (0.4)	33 (0.4)	34 (0.4)	32 (0.4)	36 (0.5)	28 (0.4)	33 (0.5)	31 (0.5)
Benchmarking Participants								
Ontario, Canada	r 10 (2.7)	r 9 (2.4)	r 19 (3.1)	r 21 (3.3)	r 35 (4.9)	r 9 (3.2)	r 34 (4.4)	r 23 (3.6)
Quebec, Canada	r 19 (3.4)	r 17 (3.6)	r 3 (1.6)	r 12 (3.0)	r 5 (1.7)	r 7 (2.4)	r 5 (1.6)	r 9 (2.8)
Moscow City, Russian Fed.	18 (3.2)	21 (3.4)	38 (4.3)	50 (4.5)	35 (4.5)	28 (3.7)	31 (4.2)	42 (4.3)
Madrid, Spain	22 (3.0)	28 (3.8)	19 (3.0)	34 (4.4)	36 (3.7)	15 (2.5)	45 (4.0)	22 (3.5)
Abu Dhabi, UAE	r 65 (2.7)	r 61 (2.6)	r 65 (2.5)	r 55 (2.7)	r 70 (2.5)	r 59 (2.4)	r 64 (2.4)	r 61 (2.3)
Dubai, UAE	r 71 (2.0)	r 67 (2.3)	r 74 (1.9)	r 78 (2.0)	r 82 (2.0)	r 75 (2.0)	r 81 (2.1)	r 75 (1.5)

* Teachers could indicate participating in more than one area of professional development.

() 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.

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

Exhibit 9.15: Teachers' Participation in Professional Development in Mathematics in the Past Two Years

Students' Results based on Teachers' Reports

Country	Percent of Students by Teachers' Participation in Professional Development*						
	Mathematics Content	Mathematics Pedagogy/ Instruction	Mathematics Curriculum	Integrating Technology into Mathematics Instruction	Improving Students' Critical Thinking or Problem Solving Skills	Mathematics Assessment	Addressing Individual Students' Needs
Australia	58 (3.0)	63 (3.2)	63 (2.9)	55 (3.0)	58 (3.7)	52 (3.0)	60 (3.2)
Bahrain	52 (3.3)	70 (2.8)	45 (3.0)	79 (2.8)	75 (3.1)	57 (3.8)	59 (3.3)
Chile	50 (4.5)	40 (4.3)	33 (4.0)	28 (3.6)	38 (3.7)	23 (3.3)	36 (3.8)
Chinese Taipei	80 (2.9)	67 (3.2)	77 (3.1)	63 (3.5)	45 (3.0)	52 (3.4)	49 (3.2)
Cyprus	s 68 (3.5)	s 56 (4.0)	s 73 (3.9)	s 38 (4.9)	s 36 (3.8)	s 48 (4.4)	s 38 (4.6)
Egypt	67 (3.9)	69 (3.7)	58 (4.0)	52 (4.1)	66 (4.3)	55 (4.0)	61 (4.3)
England	s 72 (5.6)	s 67 (5.2)	s 75 (5.0)	s 22 (5.4)	s 47 (5.6)	s 45 (5.9)	s 42 (5.9)
Finland	15 (2.3)	29 (2.9)	35 (3.2)	45 (3.4)	15 (2.1)	28 (2.7)	16 (2.4)
France	r 43 (4.3)	r 46 (4.2)	r 47 (4.4)	r 55 (4.5)	r 15 (3.3)	r 33 (4.2)	r 22 (3.3)
Georgia	69 (4.4)	83 (3.5)	69 (3.5)	71 (4.0)	76 (4.3)	68 (4.3)	67 (4.2)
Hong Kong SAR	60 (3.8)	63 (4.3)	54 (4.0)	66 (4.2)	36 (3.8)	35 (4.2)	45 (4.5)
Hungary	17 (3.0)	32 (3.3)	9 (2.4)	28 (3.3)	20 (2.9)	18 (2.9)	24 (3.1)
Iran, Islamic Rep. of	60 (3.1)	65 (3.6)	44 (3.9)	46 (3.1)	36 (3.6)	41 (3.8)	43 (3.4)
Ireland	83 (1.9)	72 (2.6)	86 (2.2)	38 (3.0)	55 (3.0)	48 (2.9)	32 (2.4)
Israel	68 (2.9)	69 (3.0)	48 (3.2)	59 (3.2)	46 (3.2)	42 (2.9)	43 (2.8)
Italy	35 (3.2)	60 (3.9)	35 (3.8)	58 (3.4)	28 (3.4)	32 (3.6)	55 (3.8)
Japan	67 (3.8)	71 (3.6)	35 (3.8)	18 (2.5)	40 (3.6)	28 (3.2)	28 (3.3)
Jordan	39 (3.7)	44 (4.0)	50 (4.2)	48 (3.6)	53 (4.2)	48 (4.6)	46 (4.1)
Kazakhstan	75 (3.3)	80 (3.1)	74 (3.7)	65 (3.9)	68 (3.6)	71 (3.5)	54 (4.2)
Korea, Rep. of	52 (3.8)	65 (3.5)	60 (3.4)	32 (3.6)	40 (3.8)	60 (3.6)	40 (3.6)
Kuwait	84 (2.8)	79 (3.8)	71 (5.1)	65 (4.3)	66 (4.1)	65 (4.6)	60 (4.2)
Lebanon	61 (4.2)	56 (3.9)	54 (4.5)	59 (4.0)	65 (4.1)	58 (3.8)	56 (3.9)
Lithuania	54 (4.1)	59 (3.7)	32 (4.0)	63 (3.6)	51 (3.8)	57 (4.5)	58 (4.1)
Malaysia	74 (2.5)	61 (3.3)	74 (2.8)	46 (3.3)	47 (3.2)	56 (3.7)	32 (3.1)
Morocco	49 (3.8)	48 (3.5)	40 (3.4)	40 (3.4)	43 (3.4)	62 (3.2)	42 (3.4)
New Zealand	61 (2.7)	66 (2.9)	54 (3.4)	58 (3.2)	54 (3.2)	40 (3.5)	51 (3.1)
Norway (9)	s 21 (3.7)	s 23 (3.6)	s 15 (2.6)	s 30 (4.1)	s 16 (3.5)	s 21 (4.0)	s 10 (2.5)
Oman	58 (3.6)	62 (3.4)	52 (3.8)	42 (3.5)	37 (3.5)	57 (3.8)	32 (3.6)
Portugal	57 (4.2)	58 (4.1)	43 (4.3)	61 (3.8)	18 (3.2)	26 (3.6)	30 (3.6)
Qatar	70 (3.5)	77 (3.2)	68 (3.9)	75 (3.9)	70 (3.4)	63 (3.7)	71 (3.6)
Romania	38 (3.2)	35 (3.8)	28 (2.8)	31 (3.8)	22 (3.3)	33 (3.1)	33 (3.1)
Russian Federation	68 (3.4)	74 (3.8)	70 (3.3)	69 (3.4)	47 (3.4)	56 (3.7)	51 (3.6)
Saudi Arabia	46 (3.8)	64 (4.0)	38 (4.1)	59 (3.6)	62 (4.1)	35 (3.8)	47 (4.0)
Singapore	60 (2.7)	82 (2.3)	62 (2.7)	57 (2.6)	57 (2.6)	60 (2.6)	43 (2.7)
South Africa (9)	84 (2.3)	58 (3.0)	74 (2.4)	46 (3.1)	56 (2.8)	70 (2.5)	50 (3.0)
Sweden	34 (3.3)	41 (4.0)	29 (3.2)	51 (3.8)	23 (3.2)	29 (3.7)	40 (3.5)
Turkey	26 (3.0)	27 (3.4)	33 (3.5)	34 (3.8)	22 (2.9)	24 (3.8)	19 (3.1)
United Arab Emirates	76 (1.7)	75 (1.6)	r 71 (2.0)	r 79 (1.3)	r 83 (1.1)	74 (1.4)	r 77 (1.4)
United States	74 (2.3)	73 (2.7)	77 (2.7)	67 (2.9)	60 (2.9)	56 (2.8)	61 (3.0)
International Average	57 (0.6)	60 (0.6)	53 (0.6)	51 (0.6)	46 (0.6)	47 (0.6)	44 (0.6)
Benchmarking Participants							
Ontario, Canada	71 (3.9)	83 (2.7)	56 (4.6)	55 (3.8)	75 (3.9)	60 (4.9)	62 (4.2)
Quebec, Canada	32 (3.9)	54 (4.6)	17 (3.3)	67 (4.1)	25 (3.6)	36 (4.0)	36 (4.5)
Moscow City, Russian Fed.	61 (3.5)	59 (3.6)	57 (3.8)	78 (3.8)	39 (3.9)	47 (4.1)	42 (3.8)
Gauteng, RSA (9)	90 (2.7)	64 (4.1)	79 (3.3)	60 (3.9)	61 (4.4)	77 (3.7)	52 (4.8)
Western Cape, RSA (9)	85 (2.8)	58 (4.4)	79 (3.2)	58 (4.5)	47 (4.1)	62 (4.3)	40 (4.2)
Abu Dhabi, UAE	r 76 (3.1)	r 74 (2.3)	r 73 (2.7)	r 77 (2.4)	r 78 (2.1)	r 71 (2.6)	r 71 (2.7)
Dubai, UAE	r 73 (2.0)	r 75 (1.9)	r 73 (3.2)	r 81 (1.6)	r 86 (1.6)	r 77 (2.1)	r 82 (1.9)

* Teachers could indicate participating in more than one area of professional development.

() 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 9.16: Teachers' Participation in Professional Development in Science in the Past Two Years

Students' Results based on Teachers' Reports

Country	Percent of Students by Teachers' Participation in Professional Development*						
	Science Content	Science Pedagogy/ Instruction	Science Curriculum	Integrating Technology into Science Instruction	Improving Students' Critical Thinking or Inquiry Skills	Science Assessment	Addressing Individual Students' Needs
Australia	r 50 (3.5)	r 54 (3.5)	r 62 (2.9)	r 49 (3.1)	r 55 (3.6)	r 44 (3.2)	r 66 (2.8)
Bahrain	39 (2.6)	59 (2.8)	36 (2.8)	78 (2.0)	69 (2.8)	58 (2.2)	60 (3.0)
Chile	34 (3.9)	34 (4.0)	23 (3.4)	21 (3.1)	31 (4.1)	22 (3.4)	26 (3.5)
Chinese Taipei	76 (3.5)	69 (3.6)	74 (3.6)	71 (3.3)	43 (3.3)	49 (3.4)	39 (3.4)
Cyprus	s 62 (1.8)	s 65 (1.6)	s 67 (2.1)	s 43 (1.7)	s 52 (2.2)	s 59 (2.0)	s 36 (2.0)
Egypt	71 (3.6)	76 (3.8)	59 (4.0)	57 (4.1)	52 (4.0)	49 (4.4)	43 (4.4)
England	s 72 (5.3)	s 56 (6.3)	s 72 (5.0)	s 23 (5.2)	s 35 (5.3)	s 60 (5.7)	s 50 (5.8)
Finland	20 (1.7)	27 (2.0)	32 (2.0)	38 (2.4)	10 (1.4)	25 (1.9)	17 (1.8)
France	r 47 (3.2)	r 57 (3.5)	r 60 (3.1)	r 47 (3.2)	r 22 (2.9)	r 37 (3.2)	r 34 (3.2)
Georgia	72 (2.2)	83 (2.1)	74 (2.2)	67 (2.9)	74 (2.7)	76 (2.1)	70 (2.4)
Hong Kong SAR	72 (4.0)	69 (4.1)	64 (3.9)	65 (4.0)	37 (4.6)	46 (4.1)	48 (4.4)
Hungary	17 (1.8)	26 (2.4)	7 (1.1)	21 (2.0)	19 (2.0)	10 (1.2)	25 (2.1)
Iran, Islamic Rep. of	63 (3.6)	65 (3.4)	42 (3.9)	44 (3.7)	42 (3.8)	47 (3.4)	49 (3.3)
Ireland	87 (2.1)	76 (2.9)	95 (1.5)	39 (3.1)	51 (3.7)	74 (3.1)	34 (3.5)
Israel	75 (3.0)	79 (2.9)	53 (4.0)	56 (3.7)	49 (3.6)	41 (4.2)	43 (3.6)
Italy	28 (3.5)	39 (4.0)	25 (3.6)	44 (3.5)	22 (3.0)	17 (2.7)	44 (3.8)
Japan	76 (3.3)	72 (3.6)	39 (3.7)	27 (3.3)	26 (3.9)	26 (3.9)	26 (3.7)
Jordan	43 (3.9)	62 (4.2)	46 (4.3)	52 (3.7)	57 (3.7)	39 (3.4)	44 (4.2)
Kazakhstan	76 (1.9)	78 (2.1)	75 (2.3)	67 (2.3)	67 (2.2)	72 (2.0)	58 (2.3)
Korea, Rep. of	60 (3.1)	69 (3.5)	54 (3.1)	41 (3.7)	46 (3.8)	55 (3.3)	37 (3.4)
Kuwait	87 (2.8)	82 (3.8)	79 (3.2)	71 (3.3)	78 (3.8)	66 (4.0)	63 (3.8)
Lebanon	65 (2.5)	60 (2.9)	64 (2.6)	52 (2.5)	58 (2.8)	63 (2.6)	53 (2.8)
Lithuania	60 (2.0)	48 (2.3)	41 (1.9)	58 (2.4)	56 (2.8)	51 (2.2)	53 (2.1)
Malaysia	69 (3.5)	62 (3.8)	73 (3.0)	47 (3.8)	46 (3.6)	65 (3.1)	29 (3.5)
Morocco	49 (2.3)	52 (2.5)	38 (2.1)	44 (2.4)	40 (2.2)	58 (2.5)	33 (2.0)
New Zealand	52 (3.3)	56 (3.6)	46 (4.3)	54 (3.7)	44 (3.3)	42 (3.5)	51 (3.9)
Norway (9)	s 11 (2.8)	s 11 (2.8)	s 7 (2.3)	s 5 (1.6)	s 8 (2.6)	s 11 (2.7)	s 9 (3.1)
Oman	56 (3.7)	65 (3.3)	57 (3.5)	48 (3.3)	42 (3.9)	52 (4.1)	37 (3.6)
Portugal	57 (3.3)	52 (3.1)	30 (2.8)	58 (3.1)	24 (2.4)	22 (2.6)	32 (3.0)
Qatar	62 (4.3)	83 (2.7)	53 (3.5)	78 (3.3)	78 (4.0)	65 (3.5)	67 (4.3)
Romania	37 (3.2)	36 (3.1)	26 (2.5)	38 (2.8)	29 (2.9)	30 (2.2)	34 (2.6)
Russian Federation	78 (1.9)	75 (1.5)	69 (1.9)	69 (1.9)	51 (2.5)	56 (1.9)	53 (2.0)
Saudi Arabia	53 (3.5)	67 (3.8)	41 (3.9)	65 (3.9)	62 (4.4)	33 (3.9)	51 (3.6)
Singapore	58 (3.1)	88 (1.9)	61 (2.7)	69 (2.9)	61 (2.7)	67 (2.3)	44 (2.5)
South Africa (9)	67 (3.3)	44 (2.7)	68 (2.9)	38 (3.2)	43 (3.0)	57 (3.2)	40 (3.3)
Sweden	32 (3.6)	24 (3.2)	20 (2.9)	33 (3.3)	15 (2.6)	28 (3.4)	45 (3.4)
Turkey	29 (3.3)	37 (3.7)	46 (3.5)	42 (3.9)	21 (3.6)	22 (3.0)	19 (3.2)
United Arab Emirates	r 72 (1.7)	r 75 (1.3)	r 72 (1.2)	r 79 (1.5)	r 83 (1.1)	r 69 (1.8)	r 79 (1.1)
United States	r 72 (2.2)	r 61 (2.6)	r 74 (2.4)	r 64 (2.9)	r 66 (2.8)	r 51 (2.9)	r 64 (2.8)
International Average	57 (0.5)	59 (0.5)	52 (0.5)	50 (0.5)	45 (0.5)	46 (0.5)	44 (0.5)
Benchmarking Participants							
Ontario, Canada	s 21 (4.7)	s 26 (4.2)	s 19 (3.8)	s 34 (5.7)	s 44 (5.3)	s 19 (4.5)	s 45 (5.6)
Moscow City, Russian Fed.	66 (2.1)	57 (2.2)	49 (2.3)	76 (2.0)	42 (2.2)	40 (2.5)	42 (2.4)
Gauteng, RSA (9)	78 (3.7)	50 (4.6)	73 (3.8)	51 (4.4)	50 (3.6)	65 (3.7)	44 (4.8)
Western Cape, RSA (9)	74 (3.4)	57 (3.6)	72 (3.3)	52 (4.4)	42 (4.3)	62 (3.6)	38 (4.3)
Abu Dhabi, UAE	r 72 (2.6)	r 75 (2.2)	r 72 (1.9)	r 77 (2.1)	r 79 (1.9)	r 64 (2.5)	r 72 (2.1)
Dubai, UAE	r 63 (2.6)	r 71 (1.6)	r 68 (2.3)	r 78 (2.5)	r 82 (2.0)	r 71 (2.6)	r 84 (1.1)
Quebec, Canada	y - -	y - -	y - -	y - -	y - -	y - -	y - -

* Teachers could indicate participating in more than one area of professional development.

() 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.

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

