

### Exhibit 9.17: Teachers' Needs for Future Professional Development in Mathematics

Students' Results based on Teachers' Reports

Country	Percent of Students by Teachers Indicating a Need for Future 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	53 (3.7)	65 (3.2)	57 (3.9)	78 (3.3)	60 (4.2)	52 (4.2)	59 (4.3)
Armenia	r 47 (3.9)	r 48 (4.5)	r 61 (4.4)	r 80 (3.7)	r 65 (4.4)	r 50 (4.2)	r 68 (4.1)
Australia	43 (3.7)	54 (3.7)	40 (3.5)	78 (2.8)	76 (3.1)	63 (3.2)	63 (3.8)
Austria	17 (2.4)	20 (2.8)	11 (1.9)	43 (3.2)	52 (3.0)	41 (3.0)	52 (3.1)
Azerbaijan	r 56 (3.7)	r 56 (4.3)	r 59 (4.2)	r 63 (3.9)	r 61 (3.8)	r 57 (3.8)	r 54 (4.1)
Bahrain	56 (3.5)	71 (2.9)	54 (3.3)	78 (3.2)	76 (2.9)	70 (3.3)	74 (2.8)
Belgium (Flemish)	14 (2.6)	27 (3.2)	29 (2.8)	66 (3.8)	52 (4.1)	20 (2.9)	46 (3.5)
Bosnia and Herzegovina	29 (3.1)	30 (3.0)	28 (2.8)	72 (3.5)	63 (3.4)	36 (3.4)	54 (3.6)
Bulgaria	21 (3.8)	28 (4.2)	12 (3.1)	65 (4.3)	69 (3.8)	25 (3.7)	50 (4.5)
Canada	r 32 (2.4)	r 50 (3.0)	r 32 (2.3)	r 75 (2.4)	r 64 (2.4)	r 50 (3.0)	r 56 (2.5)
Chile	61 (4.3)	66 (3.8)	63 (4.0)	85 (2.8)	83 (3.2)	77 (3.9)	78 (3.4)
Chinese Taipei	79 (3.2)	80 (3.1)	77 (3.1)	86 (2.8)	91 (2.2)	79 (3.2)	83 (3.1)
Croatia	63 (3.3)	59 (3.6)	58 (3.5)	90 (2.7)	87 (2.6)	77 (3.3)	83 (2.7)
Cyprus	33 (4.0)	46 (3.9)	33 (3.5)	76 (3.3)	65 (3.6)	50 (4.1)	67 (3.9)
Czech Republic	28 (3.7)	44 (3.5)	28 (3.3)	62 (3.4)	58 (3.5)	40 (3.5)	47 (3.7)
Denmark	r 27 (3.6)	r 31 (4.0)	r 19 (3.8)	r 49 (4.7)	r 56 (4.2)	r 31 (4.3)	r 44 (4.0)
Finland	22 (2.5)	54 (3.0)	24 (2.8)	70 (3.0)	65 (2.6)	44 (2.6)	56 (3.3)
France	25 (3.2)	56 (3.2)	20 (2.5)	76 (3.0)	63 (3.6)	40 (3.7)	68 (3.3)
Georgia	r 52 (4.5)	r 68 (4.7)	r 62 (5.0)	r 75 (4.0)	r 77 (3.6)	r 72 (4.0)	r 75 (3.7)
Germany	r 24 (3.5)	r 34 (3.9)	r 16 (3.2)	r 57 (4.5)	r 60 (3.8)	r 34 (3.7)	r 46 (3.7)
Hong Kong SAR	73 (4.5)	82 (4.5)	71 (4.3)	86 (3.4)	82 (4.4)	73 (4.4)	75 (3.6)
Hungary	20 (3.5)	47 (3.7)	18 (3.0)	56 (3.3)	65 (3.3)	36 (3.7)	53 (4.1)
Iran, Islamic Rep. of	66 (3.7)	63 (3.4)	51 (3.7)	81 (2.9)	71 (3.9)	58 (3.9)	63 (3.9)
Ireland	37 (3.8)	54 (3.7)	37 (3.9)	81 (3.1)	75 (3.5)	49 (3.9)	58 (3.8)
Italy	41 (3.7)	59 (3.6)	40 (3.7)	81 (2.7)	64 (3.7)	52 (3.9)	63 (3.6)
Japan	74 (3.2)	88 (2.3)	60 (3.6)	69 (3.7)	84 (2.8)	68 (3.0)	86 (2.2)
Kazakhstan	r 46 (4.0)	55 (3.9)	55 (4.0)	r 66 (3.8)	r 61 (3.8)	55 (3.4)	r 56 (3.8)
Korea, Rep. of	58 (4.3)	78 (2.8)	60 (4.4)	76 (3.2)	83 (3.0)	67 (4.0)	78 (3.4)
Kosovo	r 74 (5.3)	r 74 (5.0)	r 84 (3.0)	s 84 (3.6)	r 83 (3.6)	r 83 (3.6)	r 80 (3.5)
Kuwait	r 60 (4.0)	r 60 (4.0)	r 50 (4.2)	r 70 (4.0)	r 65 (4.1)	r 57 (5.1)	r 67 (3.9)
Latvia	44 (4.1)	47 (3.6)	35 (3.1)	73 (3.3)	58 (3.5)	49 (3.8)	59 (3.8)
Lithuania	47 (3.7)	51 (3.5)	45 (3.4)	73 (3.4)	67 (3.3)	51 (3.5)	59 (3.8)
Malta	51 (0.4)	64 (0.4)	55 (0.4)	82 (0.3)	78 (0.4)	64 (0.4)	73 (0.4)
Montenegro	50 (2.4)	49 (2.1)	57 (2.8)	81 (2.4)	66 (2.5)	50 (2.8)	63 (2.7)
Morocco	57 (4.0)	65 (3.8)	61 (3.9)	81 (3.3)	73 (3.2)	65 (3.3)	76 (3.3)
Netherlands	r 29 (4.4)	r 38 (5.6)	r 14 (3.8)	r 52 (5.1)	r 48 (6.2)	r 33 (5.5)	r 47 (6.0)
New Zealand	48 (3.3)	57 (3.0)	37 (2.8)	74 (2.8)	75 (2.6)	52 (3.0)	59 (3.0)
North Macedonia	42 (4.4)	43 (4.4)	43 (4.8)	63 (4.2)	54 (4.4)	42 (4.4)	55 (3.8)
Northern Ireland	33 (4.1)	41 (4.1)	33 (4.1)	71 (4.0)	67 (4.3)	46 (4.4)	54 (4.7)
Norway (5)	r 41 (4.8)	r 56 (4.7)	r 38 (4.6)	r 76 (3.6)	r 61 (4.6)	r 54 (4.5)	r 60 (4.8)
Oman	63 (3.2)	56 (3.4)	58 (3.6)	75 (3.2)	66 (3.4)	60 (3.7)	67 (4.2)
Pakistan	r 74 (7.2)	r 66 (7.2)	r 57 (7.7)	r 73 (5.6)	r 78 (5.2)	r 70 (7.9)	r 75 (7.2)
Philippines	93 (1.6)	92 (1.9)	89 (2.5)	96 (1.5)	96 (1.5)	92 (1.7)	93 (2.0)
Poland	32 (3.6)	40 (4.1)	20 (3.2)	53 (3.4)	63 (3.4)	32 (3.8)	49 (4.2)
Portugal	34 (3.0)	57 (3.5)	37 (3.0)	79 (2.8)	68 (3.2)	46 (3.4)	55 (3.3)
Qatar	44 (3.9)	53 (4.1)	48 (4.1)	63 (3.3)	63 (3.0)	50 (3.6)	58 (3.9)
Russian Federation	68 (3.3)	69 (3.5)	72 (2.9)	82 (3.3)	82 (3.0)	73 (3.5)	83 (2.6)
Saudi Arabia	r 31 (3.8)	r 37 (3.7)	r 27 (3.3)	r 61 (3.5)	r 47 (4.2)	r 38 (3.7)	r 53 (4.1)
Serbia	24 (3.3)	30 (3.5)	27 (3.5)	64 (4.0)	56 (4.2)	36 (4.0)	49 (3.6)
Singapore	44 (2.9)	64 (2.5)	45 (2.7)	75 (2.2)	79 (2.1)	63 (2.4)	75 (2.1)
Slovak Republic	30 (2.5)	45 (3.2)	31 (3.1)	62 (3.3)	68 (3.0)	40 (3.2)	56 (2.8)
South Africa (5)	70 (3.7)	78 (3.3)	68 (4.1)	83 (3.3)	84 (3.0)	73 (3.8)	83 (3.8)
Spain	39 (3.4)	65 (4.1)	31 (3.3)	79 (3.3)	70 (3.6)	56 (3.5)	69 (3.6)
Sweden	r 35 (4.0)	r 49 (4.3)	r 26 (3.4)	r 68 (4.1)	r 61 (4.5)	r 58 (4.5)	r 60 (4.6)
Turkey (5)	48 (4.0)	62 (3.7)	64 (3.5)	86 (2.8)	87 (2.8)	64 (3.7)	74 (3.4)
United Arab Emirates	r 50 (1.8)	r 56 (1.5)	r 52 (1.9)	r 66 (1.5)	r 66 (1.5)	r 55 (1.8)	r 59 (1.6)
United States	38 (2.5)	45 (2.3)	41 (2.6)	66 (2.5)	64 (2.6)	45 (3.0)	58 (2.6)
England	x 31 (6.7)	y - -	x 31 (6.4)	y - -	y - -	y - -	y - -
<b>International Average</b>	<b>45 (0.5)</b>	<b>55 (0.5)</b>	<b>44 (0.5)</b>	<b>72 (0.5)</b>	<b>69 (0.5)</b>	<b>54 (0.5)</b>	<b>64 (0.5)</b>
<b>Benchmarking Participants</b>							
Ontario, Canada	r 38 (4.2)	r 49 (5.9)	r 38 (4.0)	r 79 (3.7)	r 61 (4.4)	r 55 (5.6)	r 56 (4.6)
Quebec, Canada	15 (2.7)	45 (4.1)	12 (2.8)	72 (4.0)	56 (4.6)	34 (3.9)	48 (4.2)
Moscow City, Russian Fed.	59 (4.2)	66 (4.2)	73 (4.0)	85 (3.2)	90 (2.4)	75 (3.9)	85 (3.3)
Madrid, Spain	52 (4.8)	79 (3.6)	44 (4.6)	89 (2.6)	86 (3.0)	62 (3.9)	81 (3.7)
Abu Dhabi, UAE	r 44 (2.8)	r 52 (2.8)	r 47 (2.6)	r 64 (2.5)	r 66 (2.8)	r 53 (3.0)	r 60 (3.0)
Dubai, UAE	r 58 (2.2)	r 65 (2.4)	r 58 (2.3)	r 73 (2.4)	r 74 (2.2)	r 63 (2.5)	r 65 (2.4)

\* Teachers could indicate needing professional development in more than one area.

( ) 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.

### Exhibit 9.18: Teachers' Needs for Future Professional Development in Science

Students' Results based on Teachers' Reports

Country	Percent of Students by Teachers Indicating a Need for Future 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	55 (4.1)	60 (4.1)	59 (4.2)	75 (3.8)	66 (4.4)	53 (4.7)	63 (4.3)	67 (4.1)
Armenia	r 66 (3.9)	r 65 (3.7)	r 67 (4.1)	r 76 (3.9)	r 63 (4.4)	r 52 (4.3)	r 64 (4.8)	r 68 (4.5)
Australia	54 (3.9)	59 (3.7)	54 (3.7)	74 (3.3)	68 (4.0)	66 (4.3)	61 (4.4)	67 (3.7)
Austria	39 (2.8)	32 (2.8)	21 (2.1)	37 (3.7)	45 (3.4)	29 (3.0)	30 (2.8)	43 (3.6)
Azerbaijan	r 59 (4.0)	r 59 (3.8)	r 58 (3.7)	r 51 (3.8)	r 57 (4.5)	r 55 (3.7)	r 53 (3.9)	r 53 (4.1)
Bahrain	52 (3.4)	r 53 (3.3)	r 53 (3.5)	r 63 (3.3)	r 56 (3.6)	r 54 (3.2)	r 59 (3.1)	r 53 (3.7)
Belgium (Flemish)	25 (3.9)	28 (3.3)	25 (3.0)	55 (3.4)	36 (3.4)	32 (3.2)	36 (3.8)	50 (4.2)
Bosnia and Herzegovina	34 (3.3)	34 (3.0)	31 (3.0)	73 (3.6)	60 (3.5)	31 (3.1)	50 (3.5)	61 (3.9)
Bulgaria	24 (4.0)	26 (3.6)	12 (3.2)	65 (3.9)	65 (3.9)	32 (4.2)	44 (4.8)	47 (3.7)
Canada	r 50 (2.5)	r 56 (2.9)	r 41 (2.4)	r 70 (2.0)	r 62 (2.8)	r 50 (2.4)	r 48 (3.2)	r 62 (2.2)
Chile	r 70 (4.1)	r 70 (4.5)	r 62 (4.4)	r 81 (3.6)	r 82 (3.5)	r 72 (3.7)	r 70 (4.1)	r 77 (4.1)
Chinese Taipei	82 (3.2)	76 (3.6)	82 (3.1)	88 (2.6)	85 (2.9)	77 (3.2)	78 (3.2)	85 (2.9)
Croatia	71 (2.6)	61 (3.5)	58 (3.4)	88 (2.6)	85 (2.8)	79 (2.8)	80 (2.7)	79 (3.1)
Cyprus	45 (4.8)	50 (5.3)	40 (4.6)	77 (4.3)	60 (5.0)	64 (4.3)	67 (5.1)	62 (4.9)
Czech Republic	27 (3.6)	33 (3.8)	20 (3.3)	51 (3.7)	46 (3.2)	26 (3.3)	25 (2.9)	37 (3.5)
Denmark	r 44 (4.0)	r 37 (4.0)	r 22 (3.5)	r 37 (3.7)	r 46 (4.7)	r 30 (4.2)	r 31 (3.7)	r 36 (4.3)
Finland	32 (2.9)	46 (2.9)	29 (2.9)	61 (3.0)	53 (3.0)	40 (3.0)	45 (3.4)	51 (2.8)
France	46 (3.9)	65 (3.7)	35 (3.5)	74 (3.0)	56 (3.0)	40 (4.0)	50 (3.5)	63 (3.6)
Georgia	r 63 (4.7)	r 68 (4.9)	r 60 (5.1)	r 80 (3.8)	r 72 (4.0)	r 65 (4.4)	r 69 (4.0)	r 74 (3.9)
Germany	r 43 (3.9)	r 43 (3.5)	r 18 (3.0)	r 54 (4.1)	r 45 (4.2)	r 27 (3.7)	r 33 (4.2)	r 41 (3.5)
Hong Kong SAR	r 69 (4.0)	r 75 (4.5)	68 (3.9)	75 (4.0)	79 (4.1)	r 66 (4.0)	70 (4.1)	80 (3.8)
Hungary	28 (3.0)	39 (3.4)	17 (3.0)	42 (4.0)	54 (3.7)	25 (3.4)	47 (4.0)	37 (3.7)
Iran, Islamic Rep. of	58 (3.7)	60 (3.6)	50 (3.4)	74 (3.2)	68 (3.7)	54 (3.6)	60 (3.7)	69 (3.5)
Ireland	47 (3.7)	58 (3.9)	42 (3.7)	78 (3.1)	73 (3.6)	62 (4.1)	54 (3.6)	67 (3.3)
Italy	48 (4.2)	66 (3.7)	39 (3.9)	77 (3.1)	66 (3.8)	47 (4.1)	64 (4.1)	72 (3.8)
Japan	72 (3.7)	89 (2.8)	63 (3.9)	69 (4.1)	80 (3.4)	71 (3.7)	80 (3.0)	53 (4.1)
Kazakhstan	r 57 (3.9)	r 55 (4.1)	r 56 (4.3)	r 65 (4.2)	r 66 (4.2)	r 60 (4.2)	r 57 (4.4)	r 57 (4.1)
Korea, Rep. of	62 (3.8)	66 (3.9)	59 (4.1)	75 (3.7)	79 (3.2)	58 (4.4)	66 (3.7)	74 (3.4)
Kosovo	r 80 (3.7)	r 77 (4.2)	r 84 (4.0)	r 88 (3.0)	r 84 (3.5)	r 82 (3.7)	r 87 (2.9)	r 86 (3.3)
Kuwait	60 (4.5)	57 (4.6)	56 (4.6)	66 (3.8)	67 (3.9)	59 (4.5)	68 (4.3)	60 (4.4)
Latvia	46 (3.9)	45 (3.6)	38 (3.8)	65 (3.3)	54 (3.9)	54 (3.6)	45 (3.9)	66 (3.8)
Lithuania	49 (3.6)	51 (3.5)	44 (3.9)	73 (3.1)	57 (3.1)	56 (3.5)	54 (3.6)	55 (3.6)
Malta	69 (0.4)	72 (0.4)	74 (0.4)	86 (0.3)	81 (0.3)	79 (0.3)	73 (0.3)	74 (0.3)
Montenegro	59 (2.8)	56 (2.8)	59 (2.4)	81 (2.3)	66 (2.3)	50 (2.6)	65 (2.6)	63 (3.1)
Morocco	66 (3.7)	77 (3.4)	72 (3.8)	85 (2.4)	79 (3.3)	71 (3.9)	76 (3.3)	77 (3.6)
Netherlands	r 29 (4.1)	r 27 (4.3)	r 26 (3.4)	r 43 (3.7)	r 43 (3.9)	r 18 (2.6)	r 26 (4.6)	r 50 (4.8)
New Zealand	69 (2.8)	70 (2.9)	60 (3.3)	76 (2.7)	71 (2.5)	64 (2.9)	62 (2.8)	72 (2.6)
North Macedonia	45 (4.2)	47 (4.3)	43 (4.7)	60 (4.2)	64 (4.3)	48 (4.7)	52 (4.5)	53 (4.7)
Northern Ireland	62 (4.4)	63 (4.8)	61 (4.5)	r 74 (4.1)	r 66 (4.3)	59 (4.3)	r 55 (4.4)	64 (4.2)
Norway (5)	s 65 (4.3)	s 68 (4.5)	s 53 (4.9)	s 73 (4.5)	s 62 (5.1)	s 53 (4.7)	s 52 (5.5)	s 61 (4.6)
Oman	62 (3.0)	58 (3.7)	59 (3.3)	67 (3.3)	70 (3.3)	63 (3.3)	59 (3.5)	66 (4.0)
Pakistan	s 70 (8.7)	s 79 (5.2)	s 67 (8.8)	s 58 (8.3)	s 78 (5.5)	s 70 (9.0)	s 70 (8.7)	s 68 (9.0)
Philippines	s 81 (3.9)	s 77 (4.2)	s 78 (4.2)	s 76 (3.8)	s 78 (4.2)	s 77 (4.1)	s 78 (3.9)	s 75 (4.2)
Poland	25 (4.2)	23 (3.5)	17 (3.4)	47 (4.6)	46 (4.0)	r 29 (4.3)	r 35 (4.0)	33 (4.1)
Portugal	38 (3.4)	59 (3.2)	37 (3.5)	77 (2.9)	58 (3.2)	43 (3.6)	48 (3.1)	72 (2.7)
Qatar	50 (3.4)	54 (4.0)	48 (3.2)	64 (2.8)	64 (2.9)	54 (3.6)	60 (4.1)	58 (3.9)
Russian Federation	67 (4.2)	68 (3.8)	68 (3.8)	78 (3.2)	79 (3.3)	68 (3.6)	72 (3.4)	72 (3.9)
Saudi Arabia	63 (3.6)	55 (3.4)	42 (3.7)	42 (3.7)	r 40 (4.0)	r 56 (4.2)	r 38 (4.2)	r 44 (3.9)
Serbia	30 (3.5)	38 (4.0)	32 (2.8)	61 (3.9)	54 (4.4)	36 (3.3)	44 (3.5)	54 (4.3)
Singapore	53 (2.3)	71 (2.1)	56 (2.6)	78 (2.2)	81 (2.4)	68 (2.4)	70 (2.5)	66 (2.6)
Slovak Republic	46 (3.7)	46 (3.0)	31 (2.9)	55 (3.5)	61 (2.6)	35 (2.8)	46 (3.3)	43 (3.3)
South Africa (5)	78 (3.5)	75 (3.6)	74 (3.7)	78 (3.5)	81 (3.4)	74 (3.8)	79 (3.4)	79 (3.4)
Spain	48 (3.7)	72 (3.0)	42 (3.9)	82 (2.8)	68 (3.4)	55 (3.5)	63 (3.0)	73 (2.7)
Sweden	r 55 (4.7)	r 46 (4.7)	r 33 (4.3)	r 68 (4.5)	r 65 (4.5)	r 55 (4.9)	r 52 (4.6)	r 57 (4.5)
Turkey (5)	61 (3.8)	74 (3.3)	69 (3.8)	84 (2.6)	84 (2.9)	76 (3.3)	78 (3.6)	83 (3.0)
United Arab Emirates	r 48 (1.9)	r 54 (1.7)	r 49 (2.0)	r 64 (1.7)	r 62 (1.8)	r 51 (1.6)	r 55 (1.9)	r 57 (1.9)
United States	61 (2.5)	58 (2.2)	60 (2.6)	70 (2.5)	67 (2.6)	57 (2.7)	56 (2.4)	65 (2.5)
England	y - -	y - -	y - -	y - -	y - -	y - -	y - -	y - -
<b>International Average</b>	<b>54 (0.5)</b>	<b>57 (0.5)</b>	<b>49 (0.5)</b>	<b>68 (0.5)</b>	<b>65 (0.5)</b>	<b>54 (0.5)</b>	<b>57 (0.5)</b>	<b>62 (0.5)</b>
<b>Benchmarking Participants</b>								
Ontario, Canada	r 49 (4.7)	r 58 (5.9)	r 38 (4.3)	r 76 (2.9)	r 63 (5.4)	r 50 (4.6)	r 50 (6.3)	r 63 (4.3)
Quebec, Canada	r 52 (4.8)	r 59 (4.4)	r 39 (4.5)	r 66 (4.3)	r 57 (4.5)	r 53 (5.0)	r 45 (4.9)	r 61 (4.6)
Moscow City, Russian Fed.	61 (4.2)	61 (4.3)	65 (3.9)	84 (2.9)	82 (3.4)	72 (3.5)	79 (3.5)	85 (3.2)
Madrid, Spain	54 (4.9)	71 (4.0)	40 (4.8)	77 (3.4)	70 (3.9)	53 (4.1)	66 (4.5)	72 (3.5)
Abu Dhabi, UAE	r 49 (3.0)	r 53 (2.4)	r 49 (2.7)	r 67 (2.5)	r 60 (2.8)	r 51 (2.8)	r 55 (3.0)	r 55 (2.6)
Dubai, UAE	r 50 (3.4)	r 62 (3.4)	r 54 (2.9)	r 65 (3.3)	s 68 (3.4)	r 58 (3.4)	r 61 (3.5)	r 63 (3.7)

\* Teachers could indicate needing professional development in more than one area.

( ) 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 9.19: Teachers' Needs for Future Professional Development in Mathematics

Students' Results based on Teachers' Reports

Country	Percent of Students by Teacher Indicating a Need for Future 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 (3.3)	70 (2.9)	61 (3.7)	81 (2.7)	84 (2.2)	71 (3.1)	77 (3.2)
Bahrain	48 (3.8)	r 59 (4.0)	45 (4.1)	r 79 (3.4)	74 (3.7)	r 56 (3.4)	64 (3.5)
Chile	40 (3.8)	48 (3.7)	44 (3.8)	75 (3.5)	70 (3.7)	65 (3.5)	68 (3.7)
Chinese Taipei	76 (2.8)	80 (3.1)	76 (3.2)	87 (2.4)	82 (2.5)	73 (2.8)	79 (2.9)
Cyprus	s 24 (3.2)	s 41 (4.6)	s 21 (2.9)	s 67 (4.4)	s 68 (4.9)	s 44 (5.0)	s 61 (4.7)
Egypt	r 46 (4.4)	r 51 (4.5)	r 49 (4.9)	r 69 (4.1)	r 59 (4.3)	r 53 (4.7)	r 53 (4.7)
England	s 28 (5.2)	s 44 (6.2)	s 36 (5.4)	s 57 (6.0)	s 61 (6.4)	s 38 (5.3)	s 38 (5.4)
Finland	25 (2.9)	48 (3.4)	31 (2.5)	70 (3.2)	50 (3.0)	46 (2.8)	57 (3.1)
France	r 28 (3.6)	r 61 (4.3)	r 39 (4.0)	r 61 (4.3)	r 60 (4.3)	r 49 (4.2)	r 71 (3.7)
Georgia	r 44 (4.3)	r 68 (4.8)	r 48 (4.7)	r 82 (3.1)	r 72 (3.9)	r 60 (4.7)	r 65 (4.6)
Hong Kong SAR	r 60 (4.7)	r 76 (3.9)	r 60 (4.6)	r 73 (4.3)	r 80 (3.4)	r 54 (4.3)	r 77 (3.5)
Hungary	21 (2.4)	44 (3.7)	14 (2.0)	53 (3.8)	58 (3.8)	34 (3.6)	57 (3.6)
Iran, Islamic Rep. of	67 (3.6)	59 (3.8)	64 (3.7)	81 (3.5)	76 (3.4)	68 (3.5)	72 (3.6)
Ireland	54 (3.2)	61 (2.8)	67 (2.9)	79 (2.9)	84 (1.8)	66 (2.9)	71 (3.0)
Israel	47 (3.2)	51 (3.2)	43 (3.1)	74 (3.0)	68 (2.9)	52 (3.0)	56 (3.4)
Italy	24 (2.8)	60 (4.0)	37 (3.6)	65 (3.7)	60 (3.7)	38 (4.1)	60 (3.6)
Japan	80 (2.8)	86 (2.3)	64 (3.5)	75 (3.1)	86 (2.7)	72 (3.0)	79 (3.1)
Jordan	50 (4.5)	44 (3.8)	38 (3.9)	48 (4.1)	44 (3.7)	47 (4.4)	52 (4.0)
Kazakhstan	47 (4.2)	50 (4.2)	46 (3.6)	63 (4.2)	61 (4.2)	56 (4.4)	57 (3.8)
Korea, Rep. of	66 (4.1)	82 (3.3)	65 (3.7)	84 (2.7)	83 (2.6)	86 (2.5)	76 (3.3)
Kuwait	65 (3.9)	71 (3.7)	60 (3.8)	78 (3.6)	73 (4.1)	66 (3.6)	71 (3.1)
Lebanon	r 51 (4.1)	r 58 (3.8)	r 59 (3.9)	r 61 (4.0)	r 61 (4.0)	r 53 (4.1)	r 62 (4.9)
Lithuania	48 (4.2)	61 (3.9)	47 (4.0)	77 (3.0)	83 (2.8)	67 (4.1)	69 (4.2)
Malaysia	60 (3.4)	70 (3.3)	60 (3.4)	77 (3.1)	77 (3.3)	67 (3.2)	72 (3.1)
Morocco	50 (3.8)	70 (3.4)	55 (3.1)	82 (2.6)	73 (3.5)	63 (3.4)	73 (3.6)
New Zealand	r 53 (3.0)	r 63 (3.5)	r 54 (3.6)	72 (2.9)	80 (2.8)	60 (3.2)	71 (3.2)
Norway (9)	s 25 (4.1)	s 52 (4.7)	s 36 (4.1)	s 60 (4.1)	s 56 (4.5)	s 42 (4.4)	s 59 (4.5)
Oman	57 (3.8)	55 (4.0)	60 (3.6)	74 (3.5)	63 (3.9)	56 (4.5)	57 (4.2)
Portugal	25 (3.3)	50 (4.2)	39 (3.7)	60 (4.2)	65 (4.0)	50 (4.5)	67 (3.4)
Qatar	38 (4.8)	57 (5.0)	44 (4.1)	63 (4.2)	62 (4.6)	45 (4.8)	57 (5.1)
Romania	29 (3.0)	39 (3.6)	37 (3.4)	59 (3.6)	59 (4.0)	37 (3.8)	54 (3.8)
Russian Federation	68 (3.8)	73 (3.3)	75 (2.9)	77 (3.7)	79 (2.9)	73 (3.3)	79 (2.8)
Saudi Arabia	r 40 (4.1)	r 46 (3.8)	r 37 (4.0)	r 62 (4.0)	r 52 (4.5)	r 51 (4.4)	r 51 (4.2)
Singapore	49 (2.9)	69 (2.3)	58 (2.9)	78 (2.1)	82 (2.2)	69 (2.6)	68 (2.9)
South Africa (9)	77 (2.4)	81 (2.3)	71 (2.6)	88 (2.0)	89 (1.7)	77 (2.0)	86 (2.0)
Sweden	38 (3.7)	59 (4.3)	27 (3.3)	79 (2.9)	64 (3.3)	51 (3.8)	67 (3.5)
Turkey	42 (4.0)	61 (4.2)	61 (4.1)	81 (2.9)	81 (3.1)	61 (3.9)	67 (3.8)
United Arab Emirates	r 44 (2.0)	r 55 (1.9)	r 47 (1.9)	r 64 (2.2)	r 62 (1.6)	r 47 (1.8)	r 54 (1.7)
United States	36 (2.9)	49 (2.6)	43 (2.8)	72 (2.1)	71 (2.2)	50 (3.0)	63 (2.6)
<b>International Average</b>	<b>47 (0.6)</b>	<b>60 (0.6)</b>	<b>49 (0.6)</b>	<b>71 (0.6)</b>	<b>69 (0.6)</b>	<b>57 (0.6)</b>	<b>65 (0.6)</b>
<b>Benchmarking Participants</b>							
Ontario, Canada	39 (3.9)	55 (4.2)	35 (4.8)	70 (4.5)	70 (4.2)	60 (4.1)	55 (4.9)
Quebec, Canada	25 (4.4)	52 (4.8)	23 (4.1)	78 (4.0)	58 (5.1)	47 (5.0)	59 (4.9)
Moscow City, Russian Fed.	72 (3.2)	76 (3.3)	72 (3.4)	76 (3.3)	81 (2.9)	73 (3.2)	84 (2.5)
Gauteng, RSA (9)	r 60 (4.7)	r 72 (4.1)	r 63 (4.3)	r 83 (3.8)	r 88 (3.2)	r 68 (4.5)	r 82 (3.5)
Western Cape, RSA (9)	53 (3.9)	62 (3.8)	r 46 (4.2)	80 (3.5)	80 (3.5)	r 50 (4.4)	75 (3.9)
Abu Dhabi, UAE	r 49 (3.3)	r 57 (2.9)	r 53 (3.3)	r 71 (2.5)	r 66 (2.9)	r 51 (3.1)	r 60 (2.6)
Dubai, UAE	r 49 (3.1)	r 63 (2.8)	r 54 (3.0)	r 72 (2.5)	r 71 (2.3)	r 57 (3.0)	r 58 (3.0)

\* Teachers could indicate needing professional development in more than one area.

() 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 9.20: Teachers' Needs for Future Professional Development in Science

Students' Results based on Teachers' Reports

Country	Percent of Students by Teachers Indicating a Need for Future 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 52 (3.1)	r 65 (3.0)	r 51 (3.1)	r 77 (2.6)	r 81 (2.3)	r 59 (2.9)	r 71 (3.0)
Bahrain	52 (3.5)	53 (3.1)	48 (3.1)	61 (3.1)	62 (3.0)	58 (3.3)	56 (3.1)
Chile	44 (4.1)	54 (3.9)	53 (4.0)	83 (2.8)	68 (3.3)	67 (3.5)	80 (3.0)
Chinese Taipei	75 (3.1)	75 (3.0)	75 (3.0)	84 (2.6)	82 (3.0)	69 (3.7)	71 (3.6)
Cyprus	s 33 (1.6)	s 45 (2.2)	s 26 (2.1)	s 65 (2.5)	s 57 (1.6)	s 44 (2.8)	s 60 (2.6)
Egypt	r 47 (4.7)	r 49 (5.0)	r 49 (4.4)	r 64 (4.7)	r 60 (4.6)	r 54 (4.6)	r 64 (5.0)
England	s 34 (5.6)	s 44 (5.5)	s 35 (6.1)	s 55 (6.4)	s 56 (5.4)	s 44 (6.1)	s 41 (5.3)
Finland	32 (1.8)	51 (1.9)	34 (1.9)	69 (1.8)	56 (2.2)	54 (2.2)	63 (1.9)
France	r 58 (3.4)	r 65 (2.8)	r 53 (2.9)	r 67 (3.0)	r 62 (3.1)	r 56 (2.9)	r 70 (2.8)
Georgia	s 48 (3.1)	s 55 (3.2)	s 54 (3.1)	r 80 (2.4)	r 68 (2.8)	s 54 (2.9)	s 63 (3.2)
Hong Kong SAR	r 65 (4.2)	r 77 (3.4)	r 65 (4.3)	r 80 (4.0)	r 74 (3.8)	r 66 (4.6)	r 76 (3.9)
Hungary	29 (2.0)	47 (2.2)	26 (1.8)	54 (1.9)	59 (2.2)	40 (2.4)	51 (2.5)
Iran, Islamic Rep. of	69 (3.4)	63 (3.6)	60 (3.9)	80 (3.2)	77 (3.6)	62 (3.5)	68 (3.6)
Ireland	56 (3.6)	58 (3.1)	63 (3.8)	76 (2.9)	79 (2.6)	59 (3.1)	71 (3.6)
Israel	48 (4.0)	49 (4.4)	41 (3.9)	63 (3.6)	60 (4.1)	45 (3.6)	57 (3.8)
Italy	26 (3.3)	54 (3.5)	32 (3.5)	59 (3.6)	58 (3.8)	33 (3.4)	54 (3.6)
Japan	89 (2.6)	90 (2.5)	67 (3.7)	83 (2.9)	84 (3.0)	75 (3.7)	76 (3.5)
Jordan	47 (4.2)	48 (4.3)	42 (4.1)	62 (4.0)	50 (3.8)	52 (3.5)	49 (4.0)
Kazakhstan	46 (2.6)	54 (2.6)	48 (2.7)	62 (2.8)	62 (2.4)	57 (2.4)	63 (2.1)
Korea, Rep. of	68 (3.3)	86 (2.6)	70 (3.1)	83 (2.4)	85 (2.6)	77 (2.5)	78 (2.7)
Kuwait	62 (4.5)	58 (4.7)	55 (4.2)	79 (3.8)	68 (3.7)	63 (4.4)	70 (4.2)
Lebanon	56 (2.8)	r 65 (3.1)	r 57 (2.4)	r 74 (2.3)	r 69 (2.6)	r 58 (2.7)	r 65 (3.1)
Lithuania	58 (2.0)	64 (2.3)	59 (2.2)	74 (2.2)	73 (1.9)	68 (1.8)	69 (2.2)
Malaysia	56 (4.1)	67 (3.7)	58 (3.6)	80 (2.7)	79 (2.9)	68 (3.3)	71 (3.4)
Morocco	58 (2.5)	68 (2.2)	63 (2.4)	73 (2.5)	78 (2.4)	65 (2.5)	78 (2.4)
New Zealand	46 (4.1)	62 (3.6)	54 (3.9)	75 (3.2)	77 (3.6)	59 (3.3)	71 (3.7)
Norway (9)	s 46 (4.5)	s 53 (4.9)	s 35 (4.8)	s 51 (5.1)	s 55 (5.0)	s 45 (5.2)	s 52 (4.8)
Oman	70 (3.6)	64 (3.5)	62 (3.8)	80 (3.1)	66 (3.7)	55 (4.1)	65 (4.0)
Portugal	36 (2.9)	49 (2.8)	35 (2.8)	68 (2.6)	69 (3.2)	54 (2.6)	64 (3.1)
Qatar	38 (4.2)	41 (4.4)	37 (4.2)	48 (3.7)	51 (4.7)	45 (5.0)	49 (4.5)
Romania	36 (2.5)	48 (3.1)	45 (2.7)	54 (2.9)	56 (3.2)	46 (2.9)	59 (2.9)
Russian Federation	79 (1.6)	79 (1.9)	79 (1.4)	82 (1.7)	83 (1.3)	81 (1.4)	84 (1.4)
Saudi Arabia	r 48 (4.5)	r 50 (4.3)	r 48 (4.7)	r 64 (3.7)	r 57 (4.2)	r 54 (4.4)	r 55 (4.5)
Singapore	48 (2.7)	75 (2.7)	56 (2.7)	80 (2.0)	83 (2.2)	70 (2.3)	78 (2.4)
South Africa (9)	72 (2.7)	76 (2.4)	69 (2.5)	81 (2.2)	85 (2.0)	76 (2.6)	81 (2.5)
Sweden	51 (3.7)	58 (3.9)	33 (3.3)	69 (3.4)	66 (3.4)	51 (3.5)	61 (3.0)
Turkey	55 (3.6)	67 (3.8)	65 (3.3)	83 (3.0)	84 (3.0)	72 (3.0)	79 (2.8)
United Arab Emirates	r 43 (1.8)	r 49 (1.7)	r 49 (1.8)	r 62 (2.0)	r 62 (1.7)	r 50 (1.8)	r 59 (1.5)
United States	r 48 (3.0)	r 51 (3.3)	r 56 (3.0)	r 64 (3.1)	r 65 (2.9)	r 57 (3.1)	r 62 (2.9)
<b>International Average</b>	<b>52 (0.5)</b>	<b>60 (0.5)</b>	<b>51 (0.5)</b>	<b>70 (0.5)</b>	<b>68 (0.5)</b>	<b>58 (0.5)</b>	<b>66 (0.5)</b>
<b>Benchmarking Participants</b>							
Ontario, Canada	s 45 (6.3)	s 49 (5.8)	s 43 (6.0)	s 63 (5.9)	s 60 (6.0)	s 54 (5.8)	s 52 (5.7)
Moscow City, Russian Fed.	72 (2.3)	74 (2.0)	72 (2.0)	76 (2.0)	78 (1.8)	69 (2.4)	79 (1.9)
Gauteng, RSA (9)	59 (4.9)	r 64 (4.9)	r 58 (4.7)	79 (4.1)	80 (3.9)	67 (4.5)	74 (4.0)
Western Cape, RSA (9)	47 (4.5)	59 (4.2)	46 (4.8)	72 (3.9)	78 (3.5)	r 62 (4.1)	73 (4.1)
Abu Dhabi, UAE	r 44 (2.6)	r 51 (2.7)	r 49 (3.1)	r 62 (2.9)	r 67 (2.8)	r 53 (2.8)	r 65 (2.4)
Dubai, UAE	r 46 (3.1)	r 55 (1.6)	r 52 (2.6)	r 70 (2.8)	r 67 (2.0)	r 56 (2.7)	r 59 (3.0)
Quebec, Canada	y - -	y - -	y - -	y - -	y - -	y - -	y - -

\* Teachers could indicate needing professional development in more than one area.

() 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.

