TIMSS 2015

E-appendix to

Inside the post-primary classroom: Mathematics and science teaching in Second Year

June 2018

www.erc/timss

Introduction

This e-appendix provides supplementary statistical information (e.g., standard errors) for data presented in Chapters 3-7 of *Inside the post-primary classroom: Mathematics and science teaching in Second Year*[1] This information has been excluded from the main report in order to facilitate a clear presentation of findings. The main report can be found here: www.erc.ie/timss.

Tables in the e-appendix in which the title is preceded by an **A** are expansions of corresponding tables in the main report (e.g., Table A3.1 is an expansion of Table 3.1). The e-appendix document also contains additional tables that expand on information given only in text in the main report. In these cases, the table number is preceded by an **E** (e.g., Table E6.1). Finally, the e-appendix contains tabulated versions of figures from the main report (e.g., Figure 3.1 [tabulation])).

Tables and figures are presented in the order in which they appear, or are referenced, in the main report.

[1]See Clerkin, Perkins & Chubb (2018): http://www.erc.ie/studies/timss

Chapter 3: Characteristics of teachers

Figure 3.1 (tabulation): Percentage of students taught by female teachers for mathematics and science lessons

	Mathematics		Science	
	%	(S.E)	%	(S.E)
Australia	55	(3.2)	56	(3.6)
England	51	(4.0)	51	(2.9)
Hong Kong SAR	37	(4.7)	44	(4.9)
Ireland	62	(2.5)	66	(3.2)
New Zealand	55	(3.1)	51	(4.7)
Rep. of Korea	71	(3.1)	68	(3.6)
Russian Fed.	97	(1.4)	90	(1.2)
Singapore	62	(2.8)	61	(3.0)
Slovenia	83	(2.3)	81	(1.6)
United States	68	(2.6)	63	(2.9)
TIMSS	59	(0.5)	62	(0.5)

Table A3.1: Percentage of students taught by teachers of various ages

		Under 25	25-29	30-39	40-49	50-59	60 or more
Mathematics	IRL	4 (1.2)	18 (2.3)	38 (2.6)	24 (2.3)	14 (1.7)	2 (0.9)
	TIMSS	3 (0.2)	14 (0.4)	32 (0.5)	27 (0.5)	19 (0.4)	5 (0.3)
Science	IRL	3 (0.9)	17 (2.3)	30 (3.1)	32 (2.6)	17 (2.6)	2 (0.6)
	TIMSS	3 (0.2)	14 (0.4)	32 (0.5)	28 (0.5)	18 (0.4)	4 (0.2)

Table A3.2: Years of teaching experience (mean and median)

	Mathematics		Science	
	Mean	Median	Mean	Median
Australia	15.9 (0.7)	12.0 (2.4)	13.3 (0.5)	11.0 (0.0)
England	10.5 (0.7)	7.0 (3.4)	11.1 (0.7)	8.0 (0.0)
Hong Kong SAR	14.1 (0.8)	11.0 (0.0)	14.7 (0.7)	14.0 (0.0)
Ireland	14.5 (0.6)	12.0 (0.0)	15.4 (0.7)	13.0 (6.0)
New Zealand	17.2 (1.0)	14.0 (1.4)	15.1 (0.9)	12.0 (4.1)
Rep. of Korea	14.2 (0.6)	12.0 (0.0)	15.0 (0.9)	13.0 (0.0)
Russian Fed.	22.9 (0.7)	24.0 (3.8)	23.3 (0.6)	24.0 (1.7)
Singapore	8.8 (0.4)	6.0 (4.4)	8.4 (0.4)	6.0 (0.0)
Slovenia	21.3 (0.7)	21.0 (7.0)	22.0 (0.5)	23.0 (0.0)
United States	14.1 (0.6)	12.0 (0.0)	12.7 (0.5)	12.0 (0.0)
TIMSS	15.5 (0.1)	14.3 (0.5)	14.9 (0.1)	13.7 (0.4)

Table A3.3: Percentage of students, by mathematics teachers' major or main areas of study

	Major in maths and maths education	Major in maths but not in maths education	Major in maths education but not in mathematics	All other majors
Australia	46 (3.3)	18 (2.7)	14 (2.7)	22 (2.7)
England	44 (4.1)	37 (4.3)	4 (1.5)	15 (3.0)
Hong Kong SAR	42 (4.1)	25 (3.5)	9 (2.3)	23 (3.9)
Ireland	33 (3.0)	36 (2.6)	8 (1.6)	22 (2.5)
New Zealand	29 (2.9)	30 (3.1)	7 (1.6)	34 (3.7)
Rep. of Korea	18 (3.1)	30 (3.4)	49 (4.1)	3 (1.2)
Russian Fed.	58 (4.0)	41 (3.9)	0 (0.0)	1 (0.6)
Singapore	53 (2.6)	31 (2.4)	6 (1.1)	10 (1.5)
Slovenia	39 (3.2)	40 (3.3)	20 (2.7)	1 (0.5)
United States	35 (2.9)	12 (1.6)	22 (2.4)	31 (2.8)
TIMSS	36 (0.6)	36 (0.5)	13 (0.4)	13 (0.4)

Table A3.4: Percentage of students, by science teachers' major or main areas of study

	Major in science and science education	Major in science but not in science education	Major in science education but not in science	All other majors
Australia	63 (2.2)	21 (2.3)	8 (1.5)	8 (1.4)
England	47 (3.0)	49 (3.1)	1 (0.4)	3 (1.0)
Hong Kong SAR	42 (4.7)	37 (3.9)	12 (3.2)	10 (2.4)
Ireland	44 (3.4)	49 (3.5)	2 (1.2)	4 (1.0)
New Zealand	47 (4.0)	45 (3.5)	1 (0.4)	7 (1.7)
Rep. of Korea	42 (3.4)	51 (3.6)	7 (2.1)	0 (0.0)
Russian Fed.	50 (2.2)	48 (2.2)	1 (0.2)	1 (0.3)
Singapore	54 (2.8)	41 (2.8)	2 (0.8)	3 (1.0)
Slovenia	18 (1.7)	77 (1.7)	2 (0.6)	3 (0.7)
United States	35 (3.0)	26 (2.6)	18 (2.4)	21 (2.1)
TIMSS	32 (0.5)	47 (0.5)	11 (0.3)	7 (0.3)

Table E3.1: Percentage of students, by teachers' major or main area of study

		Maths	Biology	Physics	Chemistry	Earth Science	Education-Maths	Education-Science	Education-general	Other
Maths	IRL	69 (2.7)	14 (1.8)	13 (1.6)	14 (1.7)	7 (1.4)	41 (2.8)	14 (1.8)	32 (2.8)	49 (3.0)
	TIMSS	72 (0.5)	10 (0.3)	19 (0.4)	12 (0.4)	4 (0.2)	49 (0.6)	13 (0.4)	24 (0.5)	25 (0.5)
Science	IRL	40 (3.5)	67 (2.9)	24 (2.7)	50 (3.2)	8 (2.2)	15 (2.5)	46 (3.6)	35 (3.2)	21 (3.0)
	TIMSS	20 (0.4)	43 (0.5)	32 (0.5)	40 (0.5)	16 (0.4)	11 (0.3)	44 (0.5)	24 (0.5)	20 (0.4)

Chapter 4: Characteristics of mathematics and science classrooms

Table A4.1: Mean class size and mean number of students with difficulties understanding the (spoken) language of the test, mathematics classes

	Class size	N students with language difficulties
Australia	25.2 (0.2)	0.7 (0.1)
England	26.2 (0.4)	0.8 (0.2)
Hong Kong SAR	30.5 (0.4)	2.9 (0.5)
Ireland	24.3 (0.3)	1.0 (0.2)
New Zealand	25.3 (0.4)	1.0 (0.2)
Rep. of Korea	31.6 (0.7)	0.9 (0.2)
Russian Fed.	23.2 (0.4)	0.2 (0.04)
Singapore	35.8 (0.3)	1.0 (0.2)
Slovenia	16.7 (0.3)	0.8 (0.1)
United States	27.8 (0.8)	1.3 (0.2)
TIMSS	28.5 (0.1)	3.4 (0.1)

Figure 4.1 (tabulation): Variation in number of students taught by Second Year maths teachers, by DEIS status

	Less than 20 pupils	20-25 pupils	26-30 pupils	31 or more pupils
Non-DEIS	13 (1.6)	30 (2.8)	47 (3.3)	10 (2.3)
DEIS	40 (5.8)	29 (5.9)	30 (6.2)	1 (1.4)

Figure 4.2 (tabulation): Percentage of students in maths classes where no Second Year students or where >10% of Second Year students have difficulties understanding English, overall and by DEIS status

	No students in class has difficulties w/ English	>10% of students in class has difficulties w/ English
Non-DEIS	70 (3.1)	8 (1.8)
DEIS	66 (7.1)	15 (4.7)
Overall (national)	69 (2.8)	10 (1.8)

Table A4.2: Mean class size and mean number of students with difficulties understanding the (spoken) language of the test, science classes

	Class size	N students with language difficulties
Australia	25.4 (0.2)	1.3 (0.2)
England	25.8 (0.4)	1.0 (0.2)
Hong Kong SAR	31.5 (0.3)	3.6 (0.7)
Ireland	22.2 (0.2)	1.0 (0.3)
New Zealand	25.9 (0.3)	1.0 (0.2)
Rep. of Korea	34.0 (0.7)	0.9 (0.1)
Russian Fed.	23.2 (0.4)	0.2 (0.04)
Singapore	35.9 (0.3)	1.7 (0.3)
Slovenia	21.3 (0.3)	1.3 (0.1)
United States	28.5 (0.8)	2.1 (0.3)
TIMSS	28.7 (0.1)	3.6 (0.1)

Figure 4.3 (tabulation): Percentage of students in science classes where no Second Year students or where >10% of Second Year students have difficulties understanding English, by DEIS status

	No students in class has difficulties w/ English	>10% of students in class has difficulties w/ English
Non-DEIS	73 (3.6)	9 (2.1)
DEIS	58 (7.6)	14 (5.4)
Overall (national)	70 (3.3)	10 (2.0)

Chapter 5: Teaching of mathematics

Figure 5.1 (tabulation): Annual instructional hours devoted to mathematics lessons, reported by teachers

	Hours	S.E
Australia	139	(2.0)
England	126	(3.4)
Hong Kong SAR	139	(3.1)
Ireland	109	(0.8)
New Zealand	144	(2.5)
Rep. of Korea	114	(1.2)
Russian Federation	145	(3.1)
Singapore	129	(1.3)
Slovenia	114	(1.3)
United States	155	(3.9)
TIMSS	138	(0.5)

Table A5.1: Percentages of students whose **mathematics** teachers engaged in various teaching practices

		Every or almost every lesson	About half of lessons	Some lessons	Never
Relate the lesson to students' daily lives	IRL	28 (2.6)	32 (2.8)	40 (2.6)	<1 (0.1)
	TIMSS	36 (0.5)	30 (0.5)	34 (0.5)	<1 (0.1)
Ask students to explain their answers	IRL	60 (3.1)	26 (2.4)	14 (2.0)	0 (0.0)
	TIMSS	59 (0.5)	26 (0.5)	15 (0.4)	<1 (0.1)
Encourage classroom discussions among students	IRL	26 (2.6)	29 (2.8)	39 (2.9)	5 (1.0)
	TIMSS	39 (0.5)	28 (0.5)	31 (0.5)	2 (0.2)
Link new content to students' prior knowledge	IRL	70 (2.6)	24 (2.4)	6 (1.2)	0 (0.0)
	TIMSS	69 (0.5)	22 (0.5)	8 (0.3)	<1 (0.1)
Ask students to complete challenging exercises that require them to go beyond the instruction	IRL	18 (2.3)	43 (3.0)	35 (2.9)	3 (1.0)
	TIMSS	19 (0.4)	29 (0.5)	46 (0.6)	6 (0.3)
Ask students to decide their own problem solving procedures	IRL	16 (2.4)	36 (2.9)	42 (2.7)	7 (1.4)
	TIMSS	35 (0.5)	35 (0.6)	28 (0.5)	2 (0.1)
Encourage students to express their ideas in class	IRL	51 (2.8)	27 (2.6)	20 (2.1)	2 (0.5)
	TIMSS	59 (0.6)	26 (0.5)	14 (0.4)	<1 (0.1)

Table A5.2: Percentage of students experiencing various teaching practices in **mathematics** lessons

		Every or almost every lesson	About half the lessons	Some lessons	Never
Listen to me explain new mathematics content	IRL	62 (2.9)	29 (3.0)	9 (1.6)	0 (0.0)
	TIMSS	65 (0.5)	22 (0.5)	12 (0.4)	1 (0.1)
Listen to me explain how to solve problems	IRL	53 (3.0)	29 (2.9)	18 (2.4)	<1 (0.3)
	TIMSS	60 (0.6)	25 (0.5)	14 (0.4)	1 (0.1)
Memorise rules, procedures, and facts	IRL	14 (1.9)	22 (2.5)	57 (3.0)	8 (1.7)
	TIMSS	36 (0.5)	28 (0.5)	33 (0.5)	3 (0.2)
Work problems (individually or with peers) with my guidance	IRL	50 (3.1)	35 (3.0)	13 (1.8)	1 (0.7)
	TIMSS	52 (0.6)	34 (0.6)	14 (0.4)	<1 (0.1)
Work problems together in the whole class with direct guidance from me	IRL	39 (2.8)	40 (2.5)	20 (2.0)	2 (1.0)
	TIMSS	42 (0.6)	34 (0.6)	23 (0.5)	1 (0.1)
Work problems (individually or with peers) while I am occupied by other tasks	IRL	12 (1.6)	19 (2.3)	35 (2.6)	34 (2.7)
	TIMSS	15 (0.4)	19 (0.4)	34 (0.5)	33 (0.5)
Work on problems for which there is no immediately obvious method of solution	IRL	2 (0.6)	18 (2.5)	60 (3.1)	20 (2.2)
	TIMSS	9 (0.3)	22 (0.5)	55 (0.6)	14 (0.4)
Take a written test or quiz	IRL	3 (0.9)	9 (1.7)	86 (1.9)	2 (0.9)
	TIMSS	17 (0.4)	22 (0.5)	60 (0.5)	1 (0.1)
Work in mixed ability groups	IRL	15 (2.1)	25 (2.8)	44 (3.0)	17 (2.3)
	TIMSS	18 (0.4)	24 (0.5)	48 (0.6)	9 (0.3)
Work in same ability groups	IRL	9 (1.5)	16 (2.1)	51 (2.7)	24 (2.3)
	TIMSS	10 (0.3)	20 (0.5)	50 (0.6)	20 (0.5)

Table A5.3: Percentage of students, by mathematics teachers' emphasis on various forms of assessment

		Major Emphasis	Some emphasis	Little or no emphasis
Assessment of students' ongoing work	IRL	58 (2.7)	36 (2.7)	6 (1.5)
	TIMSS	72 (0.5)	27 (0.5)	1 (0.1)
Classroom tests (for example, teacher-made or textbook tests)	IRL	87 (2.2)	13 (2.1)	1 (0.7)
	TIMSS	75 (0.5)	24 (0.5)	1 (0.1)
National or regional achievement tests	IRL	13 (2.0)	33 (3.0)	54 (3.0)
	TIMSS	36 (0.5)	41 (0.6)	23 (0.5)

Table E5.1: Percentage of students, by teachers' reported coverage of mathematics topics

			Mostly taught before this year	Mostly taught this year	Not yet taught or just introduced
Number	Computing with whole numbers	IRL	95 (1.1)	4 (1.0)	<1 (0.3)
		TIMSS	87 (0.4)	12 (0.4)	1 (0.1)
	Comparing and ordering rational numbers	IRL	84 (2.2)	14 (2.1)	2 (0.7)
		TIMSS	68 (0.5)	30 (0.5)	3 (0.2)
	Computing with rational numbers	IRL	83 (2.5)	16 (2.4)	1 (0.8)
		TIMSS	67 (0.5)	31 (0.5)	2 (0.2)
	Concepts of irrational numbers	IRL	33 (2.8)	35 (3.2)	32 (2.6)
		TIMSS	24 (0.5)	44 (0.5)	32 (0.5)
	Problem solving involving percents or proportions	IRL	56 (2.9)	39 (2.8)	5 (1.4)
		TIMSS	56 (0.5)	39 (0.5)	5 (0.3)
Algebra	Simplifying and evaluating algebraic expressions	IRL	38 (2.3)	62 (2.3)	<1 (0.3)
		TIMSS	43 (0.5)	53 (0.5)	4 (0.2)
	Simple linear equations and inequalities	IRL	19 (2.3)	75 (2.6)	6 (1.3)
		TIMSS	29 (0.5)	57 (0.5)	13 (0.4)
	Simultaneous (two variables) equations	IRL	2 (0.8)	72 (2.7)	26 (2.6)
		TIMSS	9 (0.3)	36 (0.4)	55 (0.4)
	Numeric, algebraic, and geometric patterns or sequences	IRL	16 (2.6)	47 (3.3)	38 (3.4)
		TIMSS	32 (0.5)	40 (0.5)	28 (0.5)
	Representation of functions as ordered pairs, tables, graphs, words, or equations	IRL	3 (0.8)	46 (3.1)	52 (3.2)
		TIMSS	21 (0.4)	50 (0.6)	29 (0.5)
	Properties of functions	IRL	2 (0.9)	48 (3.0)	50 (2.9)
		TIMSS	10 (0.3)	37 (0.5)	53 (0.5)
Geometry	Geometric properties of angles and geometric shapes	IRL	35 (3.2)	42 (3.2)	23 (2.7)
		TIMSS	54 (0.5)	41 (0.5)	5 (0.2)
	Congruent figures and similar triangles	IRL	6 (1.3)	39 (3.2)	55 (3.1)
		TIMSS	25 (0.5)	45 (0.5)	30 (0.5)
	Relationship between three-dimensional shapes and their two-dimensional representations	IRL	5 (1.2)	36 (3.3)	59 (3.3)
		TIMSS	23 (0.5)	32 (0.5)	45 (0.5)
	Using appropriate measurement formulas for perimeters, circumferences, areas, surface areas, and volume	IRL	7 (1.3)	63 (2.9)	30 (2.9)
		TIMSS	37 (0.5)	52 (0.6)	11 (0.3)
	Points of the Cartesian plane	IRL	33 (2.8)	45 (3.3)	22 (2.6)
		TIMSS	50 (0.5)	35 (0.5)	15 (0.4)
	Translation, reflection, and rotation	IRL	12 (2.1)	25 (2.9)	63 (3.4)
		TIMSS	35 (0.5)	35 (0.5)	31 (0.4)
Data and chance	Characteristics of data sets	IRL	25 (2.5)	55 (3.5)	20 (2.9)
		TIMSS	35 (0.5)	36 (0.5)	29 (0.4)
	Interpreting data sets	IRL	16 (2.0)	52 (3.3)	32 (2.9)
		TIMSS	22 (0.5)	34 (0.5)	45 (0.6)
	Judging, predicting, and determining the chances of possible outcomes	IRL	30 (2.7)	45 (3.3)	24 (2.6)
		TIMSS	17 (0.4)	37 (0.5)	46 (0.5)

Figure 5.2 (tabulation): Coverage of mathematics topics by Second Year students, by content area

	Ireland	TIMSS
Number	92 (0.8)	92 (0.1)
Algebra	72 (1.5)	70 (0.2)
Geometry	58 (1.8)	77 (0.2)
Data and Chance	75 (2.3)	60 (0.4)

Table A5.4: Percentage of students who have access to a computer or tablet in lessons, and use of computers *at least monthly* for various activities in lessons

	% students	% students whose teachers have them use computers at least monthly for various activities			
	Yes	Explore maths principles & concepts	Practice skills & procedures	Look up ideas & information	Process & analyse data
Australia	62 (3.4)	51 (3.5)	52 (3.6)	48 (3.6)	44 (3.2)
England	29 (4.1)	17 (3.6)	23 (3.7)	17 (3.3)	13 (2.9)
Hong Kong SAR	21 (3.6)	13 (2.8)	12 (2.8)	13 (2.8)	12 (2.6)
Ireland	25 (2.8)	11 (1.9)	12 (2.0)	10 (1.7)	10 (1.8)
New Zealand	47 (3.5)	36 (3.3)	35 (3.3)	35 (3.3)	33 (3.5)
Rep. of Korea	39 (3.6)	25 (3.3)	22 (3.1)	24 (3.2)	19 (2.6)
Russian Fed.	47 (3.5)	36 (3.5)	41 (3.6)	42 (3.2)	34 (3.5)
Singapore	35 (2.5)	27 (2.2)	27 (2.3)	23 (2.0)	19 (2.0)
Slovenia	19 (2.5)	12 (2.2)	14 (2.1)	13 (1.9)	13 (1.9)
United States	39 (2.9)	27 (2.8)	31 (2.9)	29 (2.8)	26 (2.8)
TIMSS	32 (0.5)	21 (0.5)	23 (0.5)	22 (0.5)	19 (0.5)

Table A5.5: Percentage of students, by teachers' confidence with various aspects of mathematics teaching

		Very high	High	Medium	Low
Inspiring students to learn maths	IRL	33 (2.9)	47 (2.8)	20 (2.2)	1 (0.3)
	TIMSS	39 (0.5)	44 (0.6)	16 (0.4)	1 (0.1)
Providing challenging tasks for the highest achieving students	IRL	22 (2.4)	54 (2.8)	22 (2.4)	2 (0.8)
	TIMSS	28 (0.5)	46 (0.6)	24 (0.5)	2 (0.2)
Adapting my teaching to engaging students interest	IRL	28 (2.5)	54 (3.0)	17 (2.1)	1 (0.9)
	TIMSS	29 (0.5)	53 (0.6)	17 (0.4)	1 (0.1)
Helping students appreciate the value of learning maths	IRL	27 (2.4)	53 (2.7)	18 (2.0)	2 (0.8)
	TIMSS	34 (0.5)	49 (0.6)	15 (0.4)	1 (0.1)
Assessing student comprehension of maths	IRL	38 (2.8)	54 (2.8)	8 (1.7)	0 (0.0)
	TIMSS	30 (0.5)	54 (0.6)	15 (0.4)	1 (0.1)
Improving understanding of struggling students	IRL	29 (2.6)	52 (2.9)	17 (2.1)	1 (0.6)
	TIMSS	25 (0.5)	50 (0.6)	24 (0.5)	1 (0.1)
Making maths relevant to students	IRL	29 (2.4)	54 (2.9)	17 (2.1)	<1 (0.4)
	TIMSS	28 (0.5)	49 (0.6)	22 (0.5)	1 (0.1)
Developing students' higher-order thinking skills	IRL	20 (2.2)	54 (2.4)	23 (2.6)	3 (0.9)
	TIMSS	23 (0.5)	48 (0.6)	26 (0.5)	2 (0.2)
Showing students a variety of problem solving strategies	IRL	31 (2.8)	50 (3.0)	17 (2.0)	2 (0.8)
	TIMSS	38 (0.6)	49 (0.6)	12 (0.4)	1 (0.1)

Table E5.2: Percentage of students, by teachers' reported preparedness to teach mathematics topics

			Very well prepared	Somewhat prepared	Not well prepared
Number	Computing with whole numbers	IRL	83 (2.2)	2 (0.9)	0 (0.0)
		TIMSS	77 (0.5)	5 (0.3)	1 (0.1)
	Comparing and ordering rational numbers	IRL	83 (2.2)	3 (0.8)	0 (0.0)
		TIMSS	79 (0.5)	6 (0.3)	1 (0.1)
	Computing with rational numbers	IRL	85 (2.1)	3 (0.8)	0 (0.0)
		TIMSS	81 (0.4)	6 (0.3)	1 (0.1)
	Concepts of irrational numbers	IRL	77 (2.5)	10 (2.1)	1 (0.4)
		TIMSS	67 (0.5)	12 (0.4)	2 (0.2)
	Problem solving involving percents or proportions	IRL	88 (1.9)	5 (1.3)	<1 (0.2)
		TIMSS	80 (0.5)	8 (0.3)	1 (0.1)
Algebra	Simplifying and evaluating algebraic expressions	IRL	94 (1.4)	3 (1.1)	0 (0.0)
		TIMSS	86 (0.4)	5 (0.3)	1 (0.1)
	Simple linear equations and inequalities	IRL	95 (1.3)	3 (1.1)	0 (0.0)
		TIMSS	83 (0.4)	6 (0.3)	1 (0.1)
	Simultaneous (two variables) equations	IRL	93 (1.5)	3 (0.9)	<1 (0.03)
		TIMSS	63 (0.5)	7 (0.3)	1 (0.2)
	Numeric, algebraic, and geometric patterns or sequences	IRL	80 (2.3)	11 (1.8)	<1 (0.03)
		TIMSS	66 (0.5)	12 (0.4)	2 (0.2)
	Representation of functions as ordered pairs, tables, graphs, words, or equations	IRL	80 (2.2)	7 (1.5)	<1 (0.2)
		TIMSS	73 (0.5)	9 (0.3)	1 (0.1)
	Properties of functions	IRL	82 (2.2)	6 (1.5)	<1 (0.1)
		TIMSS	61 (0.5)	9 (0.3)	2 (0.2)
Geometry	Geometric properties of angles and geometric shapes	IRL	85 (2.1)	6 (1.4)	0 (0.0)
		TIMSS	84 (0.4)	7 (0.3)	1 (0.1)
	Congruent figures and similar triangles	IRL	80 (2.3)	7 (1.4)	1 (0.5)
		TIMSS	74 (0.5)	8 (0.3)	1 (0.1)
	Relationship between three-dimensional shapes and their two-dimensional representations	IRL	74 (2.7)	11 (1.9)	1 (0.5)
		TIMSS	57 (0.6)	12 (0.4)	2 (0.2)
	Using appropriate measurement formulas for perimeters, circumferences, areas, surface areas, and volume	IRL	90 (1.5)	3 (0.9)	<1 (0.1)
		TIMSS	83 (0.4)	7 (0.3)	1 (0.1)
	Points of the Cartesian plane	IRL	90 (1.6)	3 (1.1)	<1 (0.2)
		TIMSS	76 (0.5)	6 (0.3)	1 (0.2)
	Translation, reflection, and rotation	IRL	75 (2.5)	9 (1.7)	1 (0.3)
		TIMSS	64 (0.5)	10 (0.4)	2 (0.2)
Data and chance	Characteristics of data sets	IRL	87 (1.9)	4 (1.3)	<1 (0.2)
		TIMSS	71 (0.5)	7 (0.3)	1 (0.1)
	Interpreting data sets	IRL	79 (2.5)	12 (2.2)	<1 (0.2)
		TIMSS	59 (0.5)	14 (0.4)	2 (0.2)
	Judging, predicting, and determining the chances of possible outcomes	IRL	79 (2.5)	11 (1.9)	<1 (0.3)
		TIMSS	62 (0.5)	14 (0.4)	2 (0.2)

Table A5.6: Percentage of students, by teachers' participation in recent mathematics-related CPD in the two years prior to TIMSS

	None	Less than 6 hours	6-15 hours	16-35 hours	More than 35 hours
IRL	3 (1.0)	11 (1.9)	35 (2.7)	35 (2.7)	17 (2.0)
TIMSS	15 (0.4)	16 (0.4)	25 (0.5)	20 (0.5)	23 (0.5)

Table A5.7: Percentages of students, by teachers' participation in CPD related to specified aspects of mathematics teaching

	Content	Instruction	Curriculum	Integrating IT into maths lessons	Assessment	Improving critical thinking	Addressing individuals' needs
IRL	94 (1.2)	78 (2.6)	91 (1.7)	65 (2.9)	40 (2.6)	71 (2.5)	35 (2.7)
TIMSS	56 (0.6)	59 (0.6)	50 (0.5)	50 (0.6)	44 (0.6)	45 (0.6)	42 (0.6)

Table A5.8: Percentage of students, by teachers' engagement in various collaborative practices

		Very often	Often	Sometimes	Never or almost never
Discuss how to teach a particular topic	IRL	22 (2.1)	34 (2.7)	36 (2.7)	8 (1.7)
	TIMSS	26 (0.5)	39 (0.6)	32 (0.5)	3 (0.2)
Collaborate in planning or preparing instructional materials	IRL	22 (2.3)	29 (2.4)	38 (2.4)	11 (1.8)
	TIMSS	21 (0.5)	37 (0.6)	34 (0.6)	7 (0.3)
Share what I have learned about my teaching experiences	IRL	18 (2.3)	36 (3.0)	34 (2.5)	12 (2.3)
	TIMSS	24 (0.5)	42 (0.6)	31 (0.5)	4 (0.2)
Visit another classroom to learn more about teaching	IRL	2 (0.5)	3 (0.9)	23 (2.8)	72 (2.8)
	TIMSS	9 (0.3)	21 (0.5)	43 (0.6)	27 (0.4)
Work together to try out new ideas	IRL	9 (1.9)	19 (2.5)	51 (3.0)	22 (2.7)
	TIMSS	16 (0.4)	32 (0.5)	43 (0.6)	9 (0.3)
Work as a group to implement the curriculum	IRL	24 (2.3)	39 (2.9)	31 (2.5)	6 (1.4)
	TIMSS	21 (0.4)	36 (0.5)	34 (0.5)	9 (0.3)
Work with teachers from other grades to ensure continuity in learning	IRL	15 (2.0)	28 (2.5)	40 (3.0)	17 (2.2)
	TIMSS	15 (0.4)	32 (0.5)	38 (0.6)	15 (0.4)

Chapter 6: Teaching of science

Figure 6.1 (tabulation): Annual instructional time devoted to science lessons, reported by teachers

	Hours	S.E
Australia	126	(1.6)
England	97	(3.8)
Hong Kong SAR	102	(2.8)
Ireland	90	(0.9)
New Zealand	133	(2.5)
Rep. of Korea	94	(2.1)
Russian Federation	219	(2.9)
Singapore	106	(1.4)
Slovenia	221	(4.7)
United States	144	(2.4)
TIMSS	144	(0.7)

Table A6.1: Percentages of students whose science teachers engaged in various teaching practices

		Every or almost every lesson	About half of lessons	Some lessons	Never
Relate the lesson to students' daily lives	IRL	65 (3.4)	23 (2.8)	12 (2.1)	0 (0.0)
	TIMSS	59 (0.5)	26 (0.5)	15 (0.4)	<1 (0.02)
Ask students to explain their answers	IRL	59 (3.5)	32 (3.5)	9 (1.6)	0 (0.0)
	TIMSS	55 (0.5)	29 (0.5)	15 (0.4)	<1 (0.1)
Encourage classroom discussions among students	IRL	36 (3.5)	28 (3.1)	33 (3.5)	2 (1.0)
	TIMSS	40 (0.5)	29 (0.5)	30 (0.5)	1 (0.1)
Link new content to students' prior knowledge	IRL	73 (3.1)	22 (2.8)	4 (1.3)	0 (0.0)
	TIMSS	67 (0.5)	25 (0.5)	8 (0.3)	<1 (0.1)
Ask students to complete challenging exercises that require them to go beyond the instruction	IRL	15 (2.5)	41 (3.1)	42 (3.6)	2 (0.8)
	TIMSS	17 (0.4)	31 (0.5)	46 (0.5)	5 (0.2)
Ask students to decide their own problem solving procedures	IRL	13 (2.1)	30 (2.8)	47 (3.3)	9 (1.8)
	TIMSS	26 (0.4)	33 (0.5)	38 (0.5)	3 (0.2)
Encourage students to express their ideas in class	IRL	57 (3.2)	24 (2.6)	18 (2.8)	<1 (0.5)
	TIMSS	59 (0.5)	27 (0.5)	14 (0.4)	<1 (0.1)

Table A6.2: Percentage of students experiencing various teaching practices in science lessons

		Every or almost every lesson	About half the lessons	Some lessons	Never
Listen to me explain new science content	IRL	59 (3.3)	27 (3.2)	12 (2.3)	2 (1.1)
	TIMSS	60 (0.5)	26 (0.5)	13 (0.4)	1 (0.1)
Observe natural phenomena (e.g., the weather or a plant growing) and describe what they see	IRL	14 (2.2)	39 (3.3)	42 (3.4)	4 (1.3)
	TIMSS	26 (0.5)	37 (0.5)	35 (0.5)	2 (0.2)
Watch me demonstrate an experiment or investigation	IRL	10 (1.8)	31 (3.3)	56 (3.6)	3 (1.2)
	TIMSS	25 (0.4)	28 (0.5)	44 (0.5)	3 (0.2)
Design or plan experiments or investigations	IRL	7 (1.6)	33 (3.2)	50 (3.6)	10 (2.0)
	TIMSS	13 (0.4)	29 (0.5)	52 (0.5)	6 (0.3)
Conduct experiments or investigations	IRL	20 (2.6)	57 (3.1)	21 (3.0)	1 (0.7)
	TIMSS	15 (0.4)	35 (0.5)	47 (0.5)	2 (0.2)
Present data from experiments or investigations	IRL	12 (2.2)	47 (3.2)	37 (3.3)	3 (1.0)
	TIMSS	14 (0.4)	31 (0.5)	52 (0.5)	4 (0.2)
Interpret data from experiments or investigations	IRL	13 (2.2)	48 (3.4)	39 (3.7)	1 (0.5)
	TIMSS	16 (0.4)	34 (0.5)	47 (0.5)	3 (0.2)
Use evidence from experiments or investigations to support conclusions	IRL	15 (2.5)	53 (3.3)	30 (3.3)	1 (0.6)
	TIMSS	19 (0.4)	35 (0.5)	43 (0.5)	3 (0.2)
Read textbooks or other resource materials	IRL	23 (3.0)	19 (2.6)	47 (3.3)	11 (2.3)
	TIMSS	35 (0.5)	31 (0.5)	30 (0.5)	3 (0.2)
Have students memorise facts and principles	IRL	25 (3.5)	27 (3.2)	42 (4.2)	5 (1.4)
	TIMSS	30 (0.5)	30 (0.5)	35 (0.5)	5 (0.2)
Use scientific formulas and laws to solve routine problems	IRL	13 (2.4)	38 (3.7)	46 (3.7)	2 (0.8)
	TIMSS	25 (0.4)	34 (0.5)	37 (0.5)	4 (0.2)
Do field work outside the class	IRL	1 (0.8)	4 (1.4)	85 (2.0)	10 (1.7)
	TIMSS	4 (0.2)	11 (0.3)	59 (0.5)	26 (0.5)
Take a written test or quiz	IRL	5 (1.6)	19 (2.4)	74 (2.9)	1 (0.7)
	TIMSS	18 (0.4)	26 (0.5)	54 (0.5)	1 (0.1)
Work in mixed ability groups	IRL	27 (2.8)	28 (2.9)	42 (3.5)	3 (1.2)
	TIMSS	21 (0.4)	30 (0.5)	44 (0.5)	5 (0.2)
Work in same ability groups	IRL	5 (1.4)	7 (1.8)	46 (3.4)	42 (3.4)
	TIMSS	8 (0.3)	20 (0.4)	49 (0.6)	23 (0.5)

Table A6.3: Percentage of students and science achievement, by teachers' emphasis on active scientific methods

	About half the lessons or more		Less than half of the lessons	
	% students	**Mean score**	**% students**	**Mean score**
Australia	16 (2.4)	520 (7.0)	84 (2.4)	515 (3.0)
England	18 (1.9)	547 (6.1)	82 (1.9)	536 (5.2)
Hong Kong SAR	25 (3.6)	565 (6.6)	75 (3.6)	539 (5.0)
Ireland	20 (2.5)	540 (4.7)	80 (2.5)	535 (3.0)
New Zealand	10 (1.9)	516 (12.3)	90 (1.9)	516 (3.7)
Rep. of Korea	16 (2.7)	555 (3.3)	84 (2.7)	556 (2.4)
Russian Fed.	11 (1.5)	556 (8.7)	89 (1.5)	543 (4.3)
Singapore	8 (1.6)	617 (15.1)	92 (1.6)	595 (3.5)
Slovenia	14 (1.4)	553 (3.4)	86 (1.4)	551 (2.5)
United States	21 (2.5)	541 (6.1)	79 (2.5)	531 (3.5)
TIMSS	27 (0.5)	490 (1.3)	73 (0.5)	485 (0.7)

Table A6.4: Percentage of students, by science teachers' emphasis on various forms of assessment

		Major Emphasis	**Some emphasis**	**Little or no emphasis**
Assessment of students' ongoing work	IRL	44 (3.4)	50 (3.4)	7 (1.9)
	TIMSS	69 (0.5)	30 (0.5)	2 (0.2)
Classroom tests (e.g., teacher-made or textbook tests)	IRL	82 (3.0)	18 (3.0)	<1 (0.2)
	TIMSS	72 (0.5)	26 (0.5)	1 (0.1)
National or regional achievement tests	IRL	29 (3.5)	22 (2.8)	49 (3.2)
	TIMSS	35 (0.5)	39 (0.6)	27 (0.5)

Table E6.1: Percentage of students, by teachers' reported coverage of science topics

			Mostly taught before this year	Mostly taught this year	Not yet taught or just introduced
Biology	Differences among major taxonomic groups of organisms	IRL	69 (3.5)	9 (2.1)	22 (3.0)
		TIMSS	68 (0.5)	17 (0.4)	16 (0.4)
	Major organs and organ systems in humans and other organisms	IRL	31 (3.2)	67 (3.3)	2 (0.7)
		TIMSS	39 (0.5)	46 (0.5)	15 (0.4)
	Cells, their structure and functions, including respiration and photosynthesis as cellular processes	IRL	63 (3.2)	33 (3.1)	4 (1.4)
		TIMSS	55 (0.5)	32 (0.5)	13 (0.4)
	Life cycles, sexual reproduction, and heredity	IRL	7 (2.0)	52 (4.0)	41 (3.9)
		TIMSS	23 (0.5)	33 (0.5)	44 (0.5)
	Role of variation and adaptation in survival/extinction of species in a changing environment	IRL	5 (1.4)	22 (2.8)	73 (3.1)
		TIMSS	31 (0.5)	25 (0.5)	44 (0.6)
	Interdependence of populations of organisms in an ecosystem and factors affecting population size in an ecosystem	IRL	11 (2.1)	26 (2.9)	63 (3.3)
		TIMSS	46 (0.5)	23 (0.4)	31 (0.5)
	Human health and the importance of diet and exercise in maintaining health	IRL	28 (3.2)	38 (3.8)	34 (3.3)
		TIMSS	30 (0.5)	36 (0.5)	34 (0.5)
Chemistry	Classification, composition, and particulate structure of matter	IRL	62 (3.3)	35 (3.5)	4 (1.4)
		TIMSS	36 (0.5)	51 (0.5)	14 (0.4)
	Physical and chemical properties of matter	IRL	76 (3.1)	22 (3.0)	2 (0.7)
		TIMSS	45 (0.6)	43 (0.6)	11 (0.3)
	Mixtures and solutions	IRL	79 (3.1)	20 (3.1)	2 (0.7)
		TIMSS	48 (0.5)	37 (0.5)	15 (0.4)
	Properties and uses of common acids and bases	IRL	21 (3.0)	70 (3.1)	9 (2.2)
		TIMSS	25 (0.5)	43 (0.5)	32 (0.4)
	Chemical change	IRL	9 (1.7)	48 (3.5)	43 (3.6)
		TIMSS	22 (0.5)	46 (0.5)	32 (0.5)
	The role of electrons in chemical bonds	IRL	2 (0.7)	59 (4.1)	39 (4.1)
		TIMSS	13 (0.3)	34 (0.5)	53 (0.5)
Physics	Physical states and changes in matter	IRL	59 (3.7)	23 (2.7)	18 (3.0)
		TIMSS	51 (0.6)	31 (0.5)	17 (0.4)
	Energy forms, transformations, heat, and temperature	IRL	44 (3.3)	43 (3.4)	13 (2.5)
		TIMSS	41 (0.5)	40 (0.5)	19 (0.4)
	Basic properties/behaviours of light and sound	IRL	19 (3.0)	57 (3.5)	24 (2.9)
		TIMSS	20 (0.4)	42 (0.5)	38 (0.5)
	Electric circuits and properties and the uses of permanent magnets and electromagnets	IRL	1 (0.4)	16 (2.8)	83 (2.8)
		TIMSS	23 (0.4)	35 (0.5)	42 (0.5)
	Forces and motion	IRL	18 (2.7)	64 (3.5)	18 (2.8)
		TIMSS	34 (0.5)	40 (0.5)	26 (0.5)
Earth Science	Earth's structure and physical features	IRL	6 (1.6)	25 (3.1)	69 (3.3)
		TIMSS	47 (0.5)	23 (0.5)	31 (0.5)

	Earth's processes, cycles, and history	IRL	8 (1.8)	27 (2.9)	65 (3.0)
		TIMSS	40 (0.5)	26 (0.5)	33 (0.5)
	Earth's resources, their use and conservation	IRL	18 (2.6)	38 (3.5)	45 (3.3)
		TIMSS	38 (0.6)	31 (0.5)	31 (0.5)
	Earth in the solar system and the universe	IRL	6 (1.7)	10 (2.4)	84 (2.8)
		TIMSS	43 (0.5)	18 (0.4)	39 (0.5)

Figure 6.2 (tabulation): Coverage of science topics by Second Year students, by content area

	Ireland	**TIMSS**
Biology	66 (1.3)	73 (0.2)
Chemistry	84 (1.3)	76 (0.2)
Physics	69 (1.4)	72 (0.3)
Earth Science	34 (2.1)	68 (0.3)

Table A6.5: Percentage of students who have access to a computer or tablet in lessons, and use of computers *at least monthly* for various activities in lessons

	% students	% students whose teachers have them use computers at least monthly				
	Yes	**Practice skills & procedures**	**Look up ideas & information**	**Scientific procedures or experiments**	**Study natural phenomena through simulations**	**Process & analyse data**
Australia	66 (3.0)	53 (3.3)	65 (3.0)	47 (3.5)	49 (3.2)	55 (3.1)
England	48 (3.3)	23 (2.6)	44 (3.4)	18 (2.3)	24 (2.7)	28 (2.7)
Hong Kong SAR	21 (3.6)	12 (2.9)	17 (3.4)	12 (3.1)	15 (3.1)	14 (2.8)
Ireland	26 (3.1)	12 (2.5)	17 (2.8)	10 (2.2)	12 (2.1)	11 (2.4)
New Zealand	60 (4.0)	38 (4.3)	56 (4.4)	26 (3.3)	40 (4.6)	35 (4.0)
Rep. of Korea	50 (3.9)	25 (3.2)	30 (3.4)	28 (3.5)	28 (3.3)	26 (3.2)
Russian Fed.	64 (2.2)	54 (2.3)	60 (2.5)	46 (2.2)	40 (2.4)	50 (2.5)
Singapore	52 (2.3)	31 (2.2)	41 (2.2)	27 (1.8)	34 (2.2)	27 (1.9)
Slovenia	32 (2.6)	23 (2.4)	29 (2.5)	19 (2.3)	25 (2.5)	25 (2.5)
United States	51 (3.4)	40 (2.9)	49 (3.3)	41 (3.2)	40 (3.0)	41 (3.0)
TIMSS	42 (0.5)	30 (0.5)	37 (0.5)	28 (0.5)	29 (0.5)	29 (0.5)

Table A6.6: Percentage of students, by teachers' confidence with various aspects of science teaching

		Very high	**High**	**Medium**	**Low**
Inspiring students to learn science	IRL	42 (3.3)	51 (3.2)	8 (1.6)	0 (0.0)
	TIMSS	41 (0.5)	46 (0.5)	12 (0.3)	1 (0.1)
Providing challenging tasks for the highest achieving students	IRL	23 (2.9)	53 (3.1)	23 (2.8)	2 (0.7)
	TIMSS	22 (0.5)	46 (0.6)	28 (0.5)	3 (0.2)
Adapting my teaching to engage students' interest	IRL	31 (3.1)	63 (3.0)	6 (1.4)	0 (0.0)
	TIMSS	31 (0.5)	53 (0.5)	15 (0.4)	1 (0.1)
Helping students appreciate the value of learning science	IRL	36 (3.2)	52 (3.0)	12 (2.1)	0 (0.0)
	TIMSS	37 (0.5)	49 (0.6)	13 (0.4)	1 (0.1)
Assessing student comprehension of science	IRL	40 (3.1)	56 (3.1)	4 (1.0)	0 (0.0)
	TIMSS	28 (0.5)	55 (0.6)	16 (0.4)	1 (0.1)
Improving understanding of struggling students	IRL	24 (2.8)	57 (3.3)	19 (2.7)	<1 (0.3)
	TIMSS	21 (0.5)	52 (0.6)	25 (0.5)	2 (0.2)
Making science relevant to students	IRL	51 (3.8)	48 (3.7)	2 (0.7)	0 (0.0)
	TIMSS	36 (0.5)	51 (0.5)	13 (0.4)	<1 (0.1)
Developing students' higher-order thinking skills	IRL	28 (3.2)	55 (3.2)	17 (2.3)	1 (0.7)
	TIMSS	24 (0.5)	49 (0.6)	25 (0.5)	2 (0.2)
Explaining concepts or principles by doing science experiments	IRL	58 (3.1)	36 (3.1)	6 (1.6)	0 (0.0)
	TIMSS	35 (0.5)	45 (0.6)	18 (0.4)	2 (0.2)
Teaching science using inquiry methods	IRL	25 (3.0)	45 (3.5)	26 (3.1)	4 (1.3)
	TIMSS	23 (0.5)	45 (0.6)	28 (0.5)	4 (0.2)

Table E6.2: Percentage of students, by teachers' reported preparedness to teach science topics

			Very well prepared	Somewhat prepared	Not well prepared
Biology	Differences among major taxonomic groups of organisms	IRL	63 (3.5)	7 (1.3)	<1 (0.2)
		TIMSS	46 (0.6)	13 (0.4)	2 (0.1)
	Major organs and organ systems in humans and other organisms	IRL	92 (1.8)	4 (0.9)	<1 (0.03)
		TIMSS	62 (0.5)	12 (0.4)	2 (0.1)
	Cells, their structure and functions, including respiration and photosynthesis as cellular processes	IRL	86 (2.3)	5 (1.2)	<1 (0.03)
		TIMSS	61 (0.5)	9 (0.4)	1 (0.1)
	Life cycles, sexual reproduction, and heredity	IRL	81 (2.5)	7 (1.3)	<1 (0.3)
		TIMSS	53 (0.5)	11 (0.4)	2 (0.2)
	Role of variation and adaptation in survival/extinction of species in a changing environment	IRL	59 (2.9)	12 (2.3)	1 (0.4)
		TIMSS	44 (0.6)	15 (0.4)	3 (0.2)
	Interdependence of populations of organisms in an ecosystem and factors affecting population size in an ecosystem	IRL	76 (2.6)	7 (1.5)	<1 (0.3)
		TIMSS	52 (0.5)	11 (0.4)	2 (0.2)
	Human health and the importance of diet and exercise in maintaining health	IRL	77 (3.1)	8 (1.8)	<1 (0.3)
		TIMSS	54 (0.5)	12 (0.4)	2 (0.2)
Chemistry	Classification, composition, and particulate structure of matter	IRL	88 (1.8)	4 (1.2)	0 (0.0)
		TIMSS	69 (0.5)	10 (0.3)	2 (0.2)
	Physical and chemical properties of matter	IRL	79 (2.4)	4 (1.5)	0 (0.0)
		TIMSS	67 (0.5)	11 (0.4)	2 (0.1)
	Mixtures and solutions	IRL	81 (2.0)	4 (1.3)	0 (0.0)
		TIMSS	62 (0.5)	11 (0.4)	2 (0.1)
	Properties and uses of common acids and bases	IRL	88 (2.4)	5 (1.5)	1 (0.8)
		TIMSS	60 (0.5)	12 (0.4)	2 (0.2)
	Chemical change	IRL	70 (3.2)	13 (2.4)	<1 (0.3)
		TIMSS	60 (0.5)	14 (0.4)	2 (0.2)
	The role of electrons in chemical bonds	IRL	82 (2.6)	6 (1.4)	<1 (0.3)
		TIMSS	53 (0.5)	12 (0.4)	3 (0.2)
Physics	Physical states and changes in matter	IRL	70 (3.2)	10 (2.1)	1 (0.7)
		TIMSS	59 (0.5)	12 (0.4)	1 (0.1)
	Energy forms, transformations, heat, and temperature	IRL	81 (2.5)	9 (1.8)	<1 (0.5)
		TIMSS	63 (0.5)	12 (0.4)	1 (0.1)
	Basic properties/behaviours of light and sound	IRL	76 (2.7)	10 (1.9)	2 (1.0)
		TIMSS	56 (0.5)	16 (0.4)	3 (0.2)
	Electric circuits and properties and the uses of permanent magnets and electromagnets	IRL	57 (3.3)	20 (2.6)	3.8 (1.5)
		TIMSS	52 (0.6)	15 (0.4)	3 (0.2)
	Forces and motion	IRL	81 (2.7)	12 (2.4)	1 (0.6)
		TIMSS	57 (0.6)	15 (0.4)	2 (0.1)
Earth Science	Earth's structure and physical features	IRL	24 (3.1)	17 (2.2)	5 (1.4)
		TIMSS	44 (0.6)	15 (0.4)	3 (0.2)
	Earth's processes, cycles, and history	IRL	31 (3.6)	17 (2.3)	5 (1.3)
		TIMSS	43 (0.6)	18 (0.4)	3 (0.2)

	Earth's resources, their use and conservation	IRL	50 (3.6)	12 (2.4)	5 (1.8)
		TIMSS	52 (0.5)	14 (0.4)	2 (0.2)
	Earth in the solar system and the universe	IRL	22 (2.8)	15 (2.5)	6 (1.3)
		TIMSS	41 (0.5)	14 (0.4)	3 (0.2)

Table A6.7: Percentage of students, by teachers' participation in recent science-related CPD

	None	Less than 6 hours	6-15 hours	16-35 hours	More than 35 hours
IRL	5 (1.4)	12 (2.0)	27 (3.1)	26 (3.0)	31 (3.2)
TIMSS	22 (0.4)	18 (0.4)	25 (0.5)	17 (0.4)	17 (0.4)

Table A6.8: Percentages of students, by teachers' participation in CPD related to specified aspects of science teaching

	Content	Instruction	Curriculum	Integrating IT into science lessons	Assessment	Improving critical thinking	Addressing individuals' needs
Ireland	42 (3.4)	38 (3.1)	28 (2.8)	36 (3.7)	26 (2.9)	34 (3.1)	24 (2.9)
TIMSS	55 (0.5)	57 (0.5)	49 (0.5)	50 (0.5)	44 (0.5)	45 (0.5)	42 (0.5)

Table A6.9: Percentage of students, by teachers' engagement in various collaborative practices

		Very often	Often	Sometimes	Never or almost never
Discuss how to teach a particular topic	IRL	23 (2.3)	33 (3.0)	35 (3.2)	9 (2.0)
	TIMSS	25 (0.5)	40 (0.5)	32 (0.5)	4 (0.2)
Collaborate in planning or preparing instructional materials	IRL	20 (2.4)	28 (3.0)	44 (3.5)	7 (1.7)
	TIMSS	22 (0.5)	38 (0.5)	34 (0.5)	7 (0.3)
Share what I have learned about my teaching experiences	IRL	21 (2.7)	34 (3.2)	34 (3.5)	11 (2.6)
	TIMSS	23 (0.5)	43 (0.5)	30 (0.5)	4 (0.2)
Visit another classroom to learn more about teaching	IRL	4 (1.1)	4 (1.3)	21 (2.5)	71 (3.1)
	TIMSS	9 (0.3)	21 (0.4)	44 (0.5)	27 (0.4)
Work together to try out new ideas	IRL	9 (1.6)	23 (2.9)	51 (3.4)	18 (2.7)
	TIMSS	16 (0.4)	34 (0.5)	41 (0.5)	9 (0.3)
Work as a group to implement the curriculum	IRL	24 (2.7)	37 (3.0)	30 (3.0)	9 (2.2)
	TIMSS	21 (0.4)	36 (0.5)	34 (0.5)	10 (0.3)
Work with teachers from other grades to ensure continuity in learning	IRL	11 (2.0)	19 (2.1)	37 (3.2)	34 (3.0)
	TIMSS	15 (0.4)	31 (0.5)	37 (0.5)	17 (0.4)

Chapter 7:
Teachers' views of the working environment

Table A7.1: Percentage of students, by **mathematics** teachers' reports of issues limiting their ability to teach their class

		A lot	To some extent	Not at all
Disruptive students	IRL	12 (1.9)	34 (2.9)	54 (3.2)
	TIMSS	20 (0.5)	52 (0.6)	28 (0.5)
Uninterested students	IRL	14 (1.9)	64 (3.1)	22 (2.6)
	TIMSS	25 (0.5)	60 (0.6)	15 (0.4)
Students lacking prerequisite knowledge or skills	IRL	29 (2.8)	62 (2.8)	9 (1.6)
	TIMSS	33 (0.5)	57 (0.6)	11 (0.4)
Students with mental, emotional, or psychological impairments	IRL	4 (1.2)	43 (2.7)	53 (3.0)
	TIMSS	7 (0.3)	43 (0.6)	49 (0.6)
Students with physical disabilities	IRL	<1 (0.3)	7 (1.3)	93 (1.4)
	TIMSS	2 (0.2)	14 (0.4)	85 (0.4)
Students suffering from not enough sleep	IRL	7 (1.2)	59 (3.1)	34 (3.0)
	TIMSS	13 (0.4)	56 (0.6)	31 (0.5)
Students suffering from lack of basic nutrition	IRL	4 (1.3)	17 (2.3)	79 (2.5)
	TIMSS	8 (0.3)	35 (0.5)	57 (0.5)

Table E7.1: Percentage of students, by **science** teachers' reports of issues limiting their ability to teach their class

		A lot	To some extent	Not at all
Disruptive students	IRL	11 (2.2)	53 (3.4)	36 (3.1)
	TIMSS	21 (0.4)	54 (0.6)	25 (0.4)
Uninterested students	IRL	13 (2.3)	71 (3.0)	17 (2.2)
	TIMSS	23 (0.4)	62 (0.5)	15 (0.4)
Students lacking prerequisite knowledge or skills	IRL	11 (1.7)	69 (2.7)	20 (2.5)
	TIMSS	24 (0.5)	62 (0.5)	14 (0.4)
Students with mental, emotional, or psychological impairments	IRL	4 (1.4)	47 (3.6)	49 (3.6)
	TIMSS	7 (0.3)	44 (0.5)	49 (0.5)
Students with physical disabilities	IRL	<1 (0.3)	13 (2.4)	87 (2.4)
	TIMSS	2 (0.1)	15 (0.4)	84 (0.4)
Students suffering from not enough sleep	IRL	6 (1.6)	61 (3.5)	33 (3.2)
	TIMSS	13 (0.4)	57 (0.5)	30 (0.5)
Students suffering from lack of basic nutrition	IRL	1 (0.5)	22 (2.7)	77 (2.7)
	TIMSS	7 (0.3)	35 (0.5)	58 (0.5)

Table A7.2: Percentage of students, by **mathematics** teachers' reports of work-related challenges

		Agree a lot	Agree a little	Disagree a little	Disagree a lot
There are too many students in the classes	IRL	22 (2.6)	42 (2.9)	22 (2.4)	14 (2.1)
	TIMSS	30 (0.5)	35 (0.6)	21 (0.5)	14 (0.4)
I have too much material to cover in class	IRL	36 (2.9)	49 (2.9)	11 (1.9)	4 (1.3)
	TIMSS	28 (0.5)	43 (0.6)	23 (0.5)	6 (0.3)
I have too many teaching hours	IRL	13 (2.2)	32 (3.0)	35 (2.8)	20 (2.4)
	TIMSS	16 (0.4)	30 (0.5)	34 (0.6)	21 (0.5)
I need more time prepare for class	IRL	34 (2.7)	43 (2.9)	16 (2.0)	8 (1.6)
	TIMSS	23 (0.5)	42 (0.6)	24 (0.5)	10 (0.4)
I need more time to assist individual pupils	IRL	57 (3.0)	39 (3.0)	4 (0.9)	<1 (0.4)
	TIMSS	49 (0.6)	41 (0.6)	7 (0.3)	2 (0.2)
I feel too much pressure from parents	IRL	6 (1.3)	28 (2.6)	46 (2.8)	20 (2.2)
	TIMSS	5 (0.3)	21 (0.5)	45 (0.6)	29 (0.5)
I have difficulty keeping up with all the changes to the curriculum	IRL	8 (1.4)	42 (2.8)	33 (2.5)	18 (1.7)
	TIMSS	5 (0.3)	25 (0.5)	39 (0.6)	31 (0.5)
I have too many administrative tasks	IRL	23 (2.7)	38 (2.6)	25 (2.4)	13 (1.9)
	TIMSS	19 (0.4)	30 (0.5)	28 (0.5)	23 (0.5)

Table E7.2: Percentage of students, by **science** teachers' reports of work-related challenges

		Agree a lot	Agree a little	Disagree a little	Disagree a lot
There are too many students in the classes	IRL	16 (2.3)	42 (3.4)	21 (2.6)	21 (2.6)
	TIMSS	31 (0.5)	35 (0.5)	20 (0.4)	14 (0.4)
I have too much material to cover in class	IRL	21 (2.2)	45 (3.6)	26 (3.2)	8 (1.8)
	TIMSS	30 (0.5)	42 (0.6)	22 (0.5)	7 (0.3)
I have too many teaching hours	IRL	16 (2.3)	27 (2.9)	34 (3.1)	24 (2.8)
	TIMSS	15 (0.4)	29 (0.5)	34 (0.5)	21 (0.4)
I need more time prepare for class	IRL	33 (3.0)	48 (3.5)	13 (2.2)	7 (1.5)
	TIMSS	26 (0.5)	42 (0.5)	22 (0.5)	9 (0.3)
I need more time to assist individual pupils	IRL	53 (3.2)	42 (3.0)	4 (1.3)	1 (0.6)
	TIMSS	47 (0.5)	42 (0.5)	8 (0.3)	2 (0.2)
I feel too much pressure from parents	IRL	4 (1.0)	30 (3.0)	41 (3.1)	25 (2.9)
	TIMSS	5 (0.3)	20 (0.5)	46 (0.6)	30 (0.5)
I have difficulty keeping up with all the changes to the curriculum	IRL	6 (1.5)	31 (3.3)	37 (3.2)	26 (2.9)
	TIMSS	6 (0.3)	25 (0.5)	39 (0.5)	30 (0.5)
I have too many administrative tasks	IRL	23 (2.5)	38 (3.5)	28 (2.9)	10 (1.9)
	TIMSS	20 (0.4)	30 (0.5)	27 (0.5)	23 (0.4)

Table A7.3: Percentage of students and mean **mathematics** achievement, by teachers' reports of the safety of the school environment

	Very safe and orderly		Safe and orderly		Less than safe and orderly	
	%	Maths	%	Maths	%	Maths
Australia	60 (3.0)	523 (3.6)	33 (2.7)	492 (4.5)	7 (1.6)	445 (10.1)
England	50 (3.9)	527 (7.2)	44 (3.8)	514 (8.8)	6 (0.3)	461 (9.0)
Hong Kong SAR	56 (4.9)	606 (5.6)	43 (4.9)	580 (8.6)	1 (0.2)	--
Ireland	70 (2.7)	534 (3.1)	26 (2.4)	505 (6.4)	4 (1.3)	452 (25.9)
New Zealand	50 (3.6)	507 (5.0)	42 (3.5)	479 (4.3)	8 (1.4)	482 (19.7)
Rep. of Korea	27 (2.8)	613 (3.8)	64 (3.1)	604 (3.6)	8 (2.2)	598 (12.0)
Russian Fed.	57 (2.9)	545 (4.9)	42 (2.8)	528 (7.4)	2 (1.0)	--
Singapore	59 (2.3)	629 (4.7)	38 (2.2)	609 (5.5)	3 (0.9)	586 (20.0)
Slovenia	19 (2.4)	527 (6.9)	71 (2.7)	515 (2.1)	10 (1.7)	512 (5.3)
United States	46 (3.0)	538 (4.1)	41 (2.7)	507 (5.1)	13 (2.0)	482 (9.2)
TIMSS	46 (0.6)	493 (0.9)	46 (0.6)	474 (0.9)	8 (0.3)	453 (2.5)

Table E7.3: Percentage of students and mean **science** achievement, by teachers' reports of the safety of the school environment

	Very safe and orderly		Safe and orderly		Less than safe and orderly	
	%	Science	%	Science	%	Science
Australia	56 (3.2)	529 (3.3)	38 (3.3)	501 (4.2)	6 (1.5)	482 (13.1)
England	51 (3.0)	551 (6.2)	43 (3.0)	527 (6.6)	5 (1.1)	498 (15.4)
Hong Kong SAR	58 (4.5)	549 (4.5)	39 (4.4)	542 (8.4)	2 (1.2)	--
Ireland	64 (3.1)	544 (2.9)	32 (2.9)	514 (4.9)	4 (1.2)	475 (14.5)
New Zealand	53 (3.6)	536 (4.0)	40 (3.4)	498 (6.0)	7 (1.9)	455 (14.9)
Rep. of Korea	30 (3.7)	560 (2.8)	65 (4.0)	555 (2.8)	5 (1.7)	544 (4.8)
Russian Fed.	47 (2.6)	550 (4.9)	50 (2.6)	538 (5.2)	2 (0.5)	--
Singapore	64 (2.2)	606 (4.2)	33 (2.1)	582 (7.9)	3 (0.8)	571 (15.0)
Slovenia	20 (2.0)	557 (4.7)	71 (2.2)	551 (2.4)	9 (1.5)	542 (5.2)
United States	45 (2.9)	549 (4.5)	42 (2.6)	526 (4.4)	12 (1.9)	490 (9.1)
TIMSS	45 (0.5)	499 (0.9)	47 (0.5)	478 (0.9)	8 (0.3)	457 (2.4)

Table A7.4: Percentage of students and mean **mathematics** achievement, by teachers' reports of their schools' emphasis on academic success

	Very high emphasis		High emphasis		Medium emphasis	
	%	Maths	%	Maths	%	Maths
Australia	8 (1.8)	543 (10.5)	48 (3.1)	523 (4.2)	44 (2.9)	484 (4.0)
England	9 (2.4)	568 (15.2)	54 (4.0)	528 (6.6)	37 (3.5)	487 (7.7)
Hong Kong SAR	1 (0.8)	--	40 (3.9)	626 (5.6)	59 (3.9)	572 (5.8)
Ireland	12 (1.9)	538 (8.1)	61 (3.0)	535 (3.2)	27 (2.5)	490 (6.4)
New Zealand	4 (1.2)	531 (15.0)	59 (2.7)	500 (5.5)	37 (2.6)	478 (5.3)
Rep. of Korea	16 (2.8)	620 (5.7)	57 (3.8)	611 (3.6)	27 (3.2)	587 (4.7)
Russian Fed.	<1 (0.4)	--	35 (3.7)	552 (6.9)	64 (3.8)	529 (5.0)
Singapore	4 (1.1)	643 (22.9)	49 (2.8)	639 (4.9)	47 (2.6)	598 (5.4)
Slovenia	<1 (0.2)	--	42 (3.4)	519 (4.1)	58 (3.4)	514 (2.5)
United States	6 (1.2)	558 (11.2)	39 (2.9)	537 (4.8)	55 (3.0)	501 (4.0)
TIMSS	5 (0.2)	515 (3.6)	46 (0.5)	495 (0.9)	49 (0.5)	464 (0.8)

Table E7.4: Percentage of students and mean **science** achievement, by teachers' reports of their schools' emphasis on academic success

	Very high emphasis		High emphasis		Medium emphasis	
	%	Science	%	Science	%	Science
Australia	6 (1.4)	548 (10.9)	45 (3.1)	526 (4.5)	49 (3.2)	501 (3.3)
England	8 (1.3)	575 (12.0)	52 (2.7)	549 (5.9)	40 (2.7)	516 (6.8)
Hong Kong SAR	2 (1.4)	--	42 (4.1)	562 (5.6)	56 (4.3)	531 (4.6)
Ireland	11 (1.8)	546 (6.7)	63 (2.9)	541 (2.6)	26 (2.6)	504 (6.4)
New Zealand	4 (1.5)	541 (24.7)	53 (3.4)	533 (3.7)	43 (3.5)	491 (5.1)
Rep. of Korea	13 (2.7)	566 (6.1)	61 (3.8)	558 (2.8)	26 (3.5)	545 (3.2)
Russian Fed.	1 (0.3)	--	35 (2.5)	559 (4.0)	64 (2.5)	536 (4.9)
Singapore	4 (1.1)	629 (18.1)	53 (2.7)	621 (4.7)	43 (2.7)	564 (5.7)
Slovenia	1 (0.3)	--	41 (2.4)	556 (3.4)	58 (2.4)	548 (2.5)
United States	5 (1.2)	582 (7.9)	45 (3.1)	543 (4.9)	50 (3.2)	517 (4.3)
TIMSS	5 (0.2)	520 (3.5)	46 (0.5)	499 (0.9)	49 (0.5)	471 (0.8)

Table A7.5: Percentage of students, by **mathematics** teachers' satisfaction with various aspects of being a teacher

		Very often	Often	Sometimes	Never or almost never
I am content with my profession as a teacher	IRL	61 (3.1)	31 (2.7)	8 (1.5)	<1 (0.4)
	TIMSS	49 (0.6)	39 (0.6)	11 (0.4)	1 (0.1)
I am satisfied with being a teacher at this school	IRL	64 (2.8)	26 (2.5)	9 (1.5)	1 (0.4)
	TIMSS	47 (0.6)	38 (0.6)	13 (0.4)	2 (0.2)
I find my work full of meaning and purpose	IRL	51 (3.1)	37 (2.9)	11 (1.7)	1 (0.4)
	TIMSS	57 (0.6)	35 (0.6)	8 (0.3)	1 (0.1)
I am enthusiastic about my job	IRL	64 (2.7)	30 (2.5)	6 (1.4)	<1 (0.4)
	TIMSS	53 (0.6)	38 (0.6)	8 (0.3)	1 (0.1)
My work inspires me	IRL	48 (3.0)	37 (2.9)	13 (2.1)	2 (1.1)
	TIMSS	46 (0.6)	40 (0.6)	13 (0.4)	1 (0.1)
I am proud of the work I do	IRL	66 (2.8)	29 (2.6)	5 (1.2)	<1 (0.4)
	TIMSS	58 (0.6)	33 (0.6)	9 (0.3)	1 (0.1)
I am going to continue teaching for as long as I can	IRL	59 (2.9)	26 (2.7)	11 (1.4)	3 (0.9)
	TIMSS	50 (0.6)	32 (0.5)	13 (0.4)	5 (0.2)

Table E7.5: Percentage of students, by **science** teachers' satisfaction with various aspects of being a teacher

		Very often	Often	Sometimes	Never or almost never
I am content with my profession as a teacher	IRL	56 (3.2)	31 (2.8)	13 (2.3)	0 (0.0)
	TIMSS	48 (0.5)	38 (0.5)	13 (0.4)	1 (0.1)
I am satisfied with being a teacher at this school	IRL	54 (3.3)	36 (3.3)	10 (2.0)	0 (0.0)
	TIMSS	46 (0.6)	38 (0.5)	14 (0.4)	2 (0.2)
I find my work full of meaning and purpose	IRL	48 (3.4)	36 (3.3)	16 (2.4)	<1 (0.3)
	TIMSS	56 (0.5)	35 (0.5)	9 (0.3)	1 (0.1)
I am enthusiastic about my job	IRL	63 (3.3)	30 (2.8)	6 (1.7)	<1 (0.2)
	TIMSS	52 (0.5)	37 (0.5)	10 (0.3)	1 (0.1)
My work inspires me	IRL	45 (3.4)	39 (3.1)	14 (2.3)	1 (0.8)
	TIMSS	46 (0.5)	39 (0.5)	14 (0.4)	1 (0.1)
I am proud of the work I do	IRL	67 (3.2)	28 (2.9)	5 (1.5)	0 (0.0)
	TIMSS	57 (0.5)	33 (0.5)	9 (0.3)	1 (0.1)
I am going to continue teaching for as long as I can	IRL	57 (3.4)	24 (2.8)	15 (2.4)	3 (1.3)
	TIMSS	50 (0.5)	31 (0.5)	14 (0.4)	4 (0.2)

Table A7.6: Percentage of students and mean **mathematics** achievement, by teachers' overall career satisfaction

	Very satisfied		Satisfied		Less than satisfied	
	%	Maths	%	Maths	%	Maths
Australia	50 (3.6)	514 (4.2)	39 (3.4)	504 (5.6)	11 (2.1)	496 (8.1)
England	29 (4.0)	523 (9.2)	57 (4.5)	517 (7.4)	14 (2.7)	505 (14.2)
Hong Kong SAR	31 (4.0)	612 (8.6)	60 (3.8)	587 (6.7)	10 (2.1)	562 (17.2)
Ireland	58 (2.9)	532 (4.1)	36 (2.5)	514 (5.0)	6 (1.4)	498 (12.8)
New Zealand	43 (3.4)	494 (5.3)	47 (3.8)	497 (6.2)	10 (1.6)	472 (15.7)
Rep. of Korea	38 (3.1)	604 (4.2)	53 (3.7)	606 (4.2)	10 (2.0)	609 (8.0)
Russian Fed.	39 (3.6)	548 (5.6)	55 (3.5)	535 (5.9)	6 (1.6)	502 (12.6)
Singapore	31 (2.4)	631 (7.6)	56 (2.8)	616 (4.7)	14 (1.9)	612 (11.1)
Slovenia	40 (2.9)	517 (3.2)	55 (2.8)	516 (3.1)	5 (1.3)	521 (8.3)
United States	44 (2.9)	520 (4.7)	42 (2.9)	516 (4.9)	14 (1.9)	518 (7.1)
TIMSS	50 (0.6)	486 (0.8)	43 (0.6)	478 (1.0)	7 (0.3)	480 (2.4)

Table E7.6: Percentage of students and mean **science** achievement, by teachers' overall career satisfaction

	Very satisfied		Satisfied		Less than satisfied	
	%	Science	%	Science	%	Science
Australia	44 (3.0)	524 (4.3)	41 (2.8)	508 (3.9)	15 (2.4)	513 (5.9)
England	27 (2.3)	550 (7.3)	52 (2.5)	539 (5.8)	21 (2.5)	521 (7.7)
Hong Kong SAR	34 (4.1)	562 (7.1)	48 (5.0)	541 (5.4)	19 (3.7)	523 (10.0)
Ireland	55 (3.2)	539 (3.1)	37 (2.6)	521 (4.8)	8 (1.8)	532 (11.2)
New Zealand	40 (3.8)	520 (4.9)	47 (3.8)	511 (4.9)	13 (2.3)	514 (8.2)
Rep. of Korea	39 (3.6)	557 (3.0)	49 (3.9)	555 (3.0)	12 (2.4)	555 (7.3)
Russian Fed.	33 (2.3)	544 (5.1)	62 (2.3)	545 (4.6)	6 (1.0)	534 (7.2)
Singapore	33 (2.9)	604 (6.6)	54 (3.0)	594 (5.7)	13 (1.8)	590 (11.6)
Slovenia	42 (2.2)	551 (3.4)	51 (2.1)	551 (2.6)	8 (1.3)	553 (5.5)
United States	46 (3.0)	537 (5.5)	43 (2.7)	529 (4.1)	11 (1.7)	532 (8.8)
TIMSS	49 (0.5)	492 (0.8)	42 (0.5)	483 (1.0)	9 (0.3)	478 (2.2)

Figure 7.1 (tabulation): Percentage of students, by mathematics teachers' career satisfaction, by DEIS status

	Very satisfied	Satisfied or less than satisfied	S.E
Non-DEIS	62	38	(3.2)
DEIS	43	57	(7.0)
Overall (national)	58	42	(2.9)