

PIRLS and TIMSS 2011 in Northern Ireland: reading, mathematics and science



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PIRLS and TIMSS 2011 in Northern Ireland: introduction

Report outline

This report summarises Year 6 (Y6) pupils' attainment in the PIRLS and TIMSS surveys of 2011 in Northern Ireland and explores the context of that attainment.

PIRLS is an international comparison study of reading at ages 9-10 and TIMSS is a parallel study of mathematics and science at ages 9-10 (and ages 13-14, although Northern Ireland participated only at the younger age range). PIRLS has a five-yearly cycle and TIMSS a four-yearly cycle. 2011 was the first year in which the cycles of the two studies coincided, allowing the opportunity to assess the same pupils at ages 9-10 in all three subject domains. Northern Ireland took part in PIRLS and TIMSS for the first time in the 2011 cycle.

What PIRLS assesses at ages 9-10

PIRLS identifies and assesses two purposes for reading: reading for literary experience and reading to acquire and use information. Within each of the two reading purposes, the PIRLS items measure four comprehension processes:

- Focus on and retrieve explicitly stated information
- Make straightforward inferences
- Interpret and integrate ideas and information
- Examine and evaluate content, language and textual elements.

What TIMSS assesses at ages 9-10

TIMSS assesses content domains (mathematics and science) and cognitive domains (knowing, applying and reasoning) in both subjects. The content domains assessed at ages 9-10 are:

- Mathematics – Number, Geometric Shapes and Measures, Data Display
- Science – Life Science, Physical Science, Earth Science.

In science, the area of study related to the classification and properties of materials is included in the Physical Science content domain.

Countries with which Northern Ireland will mainly be compared in this report

The report compares performance in Northern Ireland with that of the five PISA countries which outperformed Northern Ireland in all three subject domains in the most recent PISA cycle, PISA 2009, as well as with England and the Republic of Ireland. PISA is an international comparison study of reading, mathematics and scientific literacy at age 15.

Of the 45 countries participating in PIRLS and 50 countries in TIMSS at ages 9-10, therefore, the main comparator countries are:

- Australia
- Finland
- Hong Kong
- New Zealand
- Singapore
- England
- Republic of Ireland.

These will be referenced throughout the report as applicable.

1. Attainment in PIRLS and TIMSS 2011 in Northern Ireland

Chapter outline

This chapter summarises pupils' attainment in reading, mathematics and science in Year 6 (Y6) at ages 9-10 in 2011. In each section, the relevant tables of data are presented, accompanied by discussion of the outcomes. Findings for reading are discussed first, followed by findings for mathematics and then science. Outcomes for Northern Ireland are compared with those of other relevant nations.

Key findings

- In PIRLS, Northern Ireland is outperformed by only four of the 45 participating countries. The mean score for reading is not significantly¹ different from that of a further four countries, and is significantly higher than all other countries participating in PIRLS 2011.
- Pupils in Northern Ireland performed very well in TIMSS 2011 mathematics, significantly outperforming 44 of the 50 participating countries and being significantly outperformed by only five countries.
- The average score for science is lower than for mathematics, although still above the TIMSS science international average. Northern Ireland is outperformed by 17 countries in science and is in a band of 10 countries scoring similarly.
- Pupils in Northern Ireland performed comparatively better on PIRLS reading and TIMSS mathematics than on PISA reading and PISA mathematics. Their scores on TIMSS and PISA science were more similar.²

1.1 Summary of attainment, PIRLS and TIMSS 2011

Tables 1.1 to 1.3 below summarise Northern Ireland's attainment in each subject in turn, taking account of the significance of any apparent differences in attainment. The tables for reading, mathematics and science are presented consecutively and then discussed in turn.

1 Throughout this report, the term 'significant' refers to statistical significance.

2 Although scores on PIRLS, TIMSS and PISA all have a mean of 500 scale points, they cannot be compared directly as they are derived from different assessments representing different constructs. However, Northern Ireland's scale score on each survey can be compared directly with the international mean scale score for each survey. The comparisons summarised here, therefore, relate to Northern Ireland's distance from the international mean score in each case.

Interpreting the data: performance groups

The PIRLS and TIMSS achievement scales have a centre point of 500 and a standard deviation of 100. The scales are 'standardised' in this way to facilitate comparisons between countries and over time. The summaries below compare the average performance in Northern Ireland in the scale for each subject with that of the other participating countries (45 countries in total took part in PIRLS and 50 in TIMSS). The summaries indicate whether average scores, which may appear similar, are statistically significantly different from each other.

Countries participating in PIRLS and TIMSS follow guidelines and strict sampling targets to provide samples that are nationally representative. In addition to the participating countries shown in these tables, PIRLS and TIMSS include 'benchmarking participants'. These are regional entities which follow the same guidelines and targets to provide samples that are representative at regional level. Their results are not reported here but are included in the PIRLS and TIMSS international reports.

Table 1.1 PIRLS 2011 performance groups: reading at ages 9-10

HIGHER performance compared with Northern Ireland Participants performing at a significantly higher level than Northern Ireland	SIMILAR performance compared with Northern Ireland Participants performing at a similar level to Northern Ireland (not significantly different statistically)	LOWER performance compared with Northern Ireland Participants performing at a significantly lower level than Northern Ireland
4 countries (with their scale scores)	4 other countries (with their scale scores)	36 countries <i>including...</i> (with their scale scores)
Hong Kong 571	Northern Ireland 558	Rep. of Ireland 552
Russian Federation 568	United States 556	England 552
Finland 568	Denmark 554	New Zealand 531
Singapore 567	Croatia 553	Australia 527
	Chinese Taipei 553	

Source: Exhibit 1.3, international PIRLS report

Table 1.2 TIMSS 2011 performance groups: mathematics at ages 9-10

HIGHER performance compared with Northern Ireland Participants performing at a significantly higher level than Northern Ireland	SIMILAR performance compared with Northern Ireland Participants performing at a similar level to Northern Ireland (not significantly different statistically)	LOWER performance compared with Northern Ireland Participants performing at a significantly lower level than Northern Ireland
5 countries (with their scale scores)	0 other countries	44 countries <i>including...</i> (with their scale scores)
Singapore 606 Korea 605 Hong Kong 602 Chinese Taipei 591 Japan 585	Northern Ireland 562	Finland 545 England 542 Rep. of Ireland 527 Australia 516 New Zealand 486

Source: Exhibit 1.3, international mathematics report

Table 1.3 TIMSS 2011 performance groups: science at ages 9-10

HIGHER performance compared with Northern Ireland Participants performing at a significantly higher level than Northern Ireland	SIMILAR performance compared with Northern Ireland Participants performing at a similar level to Northern Ireland (not significantly different statistically)	LOWER performance compared with Northern Ireland Participants performing at a significantly lower level than Northern Ireland
17 countries (with their scale scores)	9 other countries	23 countries <i>including...</i> (with their scale scores)
Korea 587 Singapore 583 Finland 570 Japan 559 Russian Federation 552 Chinese Taipei 552 United States 544 Czech Republic 536 Hong Kong 535 Hungary 534 Sweden 533 Slovak Republic 532 Austria 532 Netherlands 531 England 529 Denmark 528 Germany 528	Italy 524 Portugal 522 Slovenia 520 Northern Ireland 517 Rep. of Ireland 516 Croatia 516 Australia 516 Serbia 516 Lithuania 515 Romania 505	New Zealand 497

Source: Exhibit 1.3, international science report

1.1.1 Reading attainment, PIRLS 2011

The PIRLS 2011 average scale score for Y6 pupils in Northern Ireland was 558, significantly above the centre point of the international scale (500) and ranking fifth among the participating nations.³

The four countries that outperformed Northern Ireland include three of the countries that also ranked higher in PISA 2009: Hong Kong, Finland and Singapore. Northern Ireland did significantly better than all other English-speaking participants including the four comparator countries of the Republic of Ireland, England, New Zealand and Australia.

1.1.2 Mathematics attainment: TIMSS 2011

The TIMSS 2011 score for Y6 pupils in Northern Ireland was 562, well above the centre point of the international scale (500) and ranking sixth among participating nations.

Table 1.2 shows that pupils in Northern Ireland did well at mathematics at ages 9-10. They were significantly outperformed by only five of the 50 participating countries (all Asian Pacific Rim countries) and they significantly outperformed the remaining 44 participating countries.

1.1.3 Science attainment: TIMSS 2011

The TIMSS 2011 score for Y6 pupils in Northern Ireland was 517, above the centre point of the international scale (500) and ranking 21st among participating nations.⁴

Although Northern Ireland's average scale score was significantly above the international average, its pupils did less well comparatively in science than in mathematics at ages 9-10. Whereas only five countries outperformed Northern Ireland in TIMSS mathematics, 17 did so in science.

Although the curriculum in Northern Ireland⁵ does not include science as a discrete subject, it is covered as part of 'The World Around Us'.⁶ A comparison was made between the key stage 2 curriculum in Northern Ireland and the TIMSS Assessment Framework for science. It showed that all of the TIMSS science topics are in the Northern Ireland curriculum and almost two thirds of Northern Ireland's pupils had been taught these topics before or during the TIMSS assessment (a similar proportion to the average internationally).⁷

3 Rankings should be treated with caution as some apparent differences in attainment may not be significant. See 'Interpreting the data: international rankings' in section 1.2 for more information.

4 As noted earlier, rankings should be treated with caution: in absolute terms, Northern Ireland is ranked 21st, but the countries ranked 18th to 20th have achievement scores that are not significantly different from that of Northern Ireland (see Table 1.3).

5 See CCEA (2007) *The Northern Ireland Curriculum: KS1 and 2*.

6 See the TIMSS 2011 encyclopaedia (Mullis *et al*, 2012a).

7 See chapter 8 of this report for more information.

1.2 Attainment rankings: PIRLS and TIMSS 2011

Tables 1.4 to 1.6 below show the full rankings for each subject in turn, indicating Northern Ireland's ranking in terms of international attainment in the subject concerned. The tables are presented consecutively and then discussed in turn.

Interpreting the data: international rankings

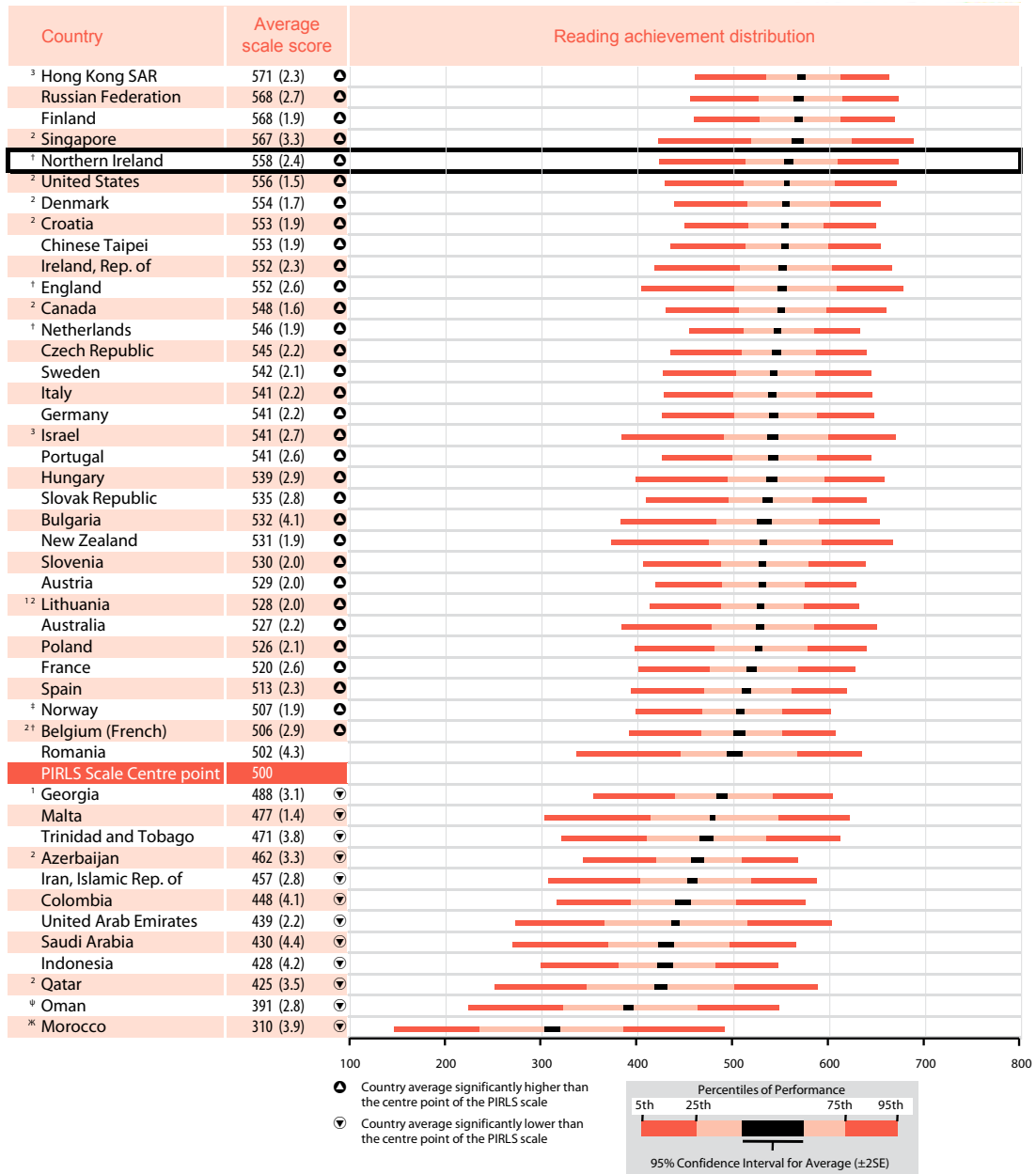
The mean scores on the PIRLS and TIMSS achievement scales (with 95 per cent confidence intervals) are shown graphically as the darkened areas on the achievement distributions, and listed (together with their standard errors) in the 'Average Scale Score' column of the tables. Arrows beside the scores indicate whether the average achievement in that country is significantly higher (upward arrow) or lower (downward arrow) than the scale mean of 500. The standard error refers to uncertainty in estimates resulting from random fluctuations in samples. The smaller the standard error, the better the score is as an estimate of the population's score. The distribution of attainment is discussed further in Chapter 3.

It is important to bear in mind that small differences may or may not be statistically significant, depending on the size of the standard error for each country. Tables 1.1 to 1.3 identified whether any given difference between Northern Ireland's scores and those of other countries is, or is not, statistically significant. More information can be found in chapter 1 of the international reports.

Interpreting the data: participation notes

Northern Ireland met the sampling guidelines for participation rates only after replacement schools were included. Since the replacement schools are matched to the originally sampled schools, this results in a sample that is nationally representative of pupils in the target age group.

Table 1.4 Mean scores and distribution of reading achievement at ages 9-10, PIRLS 2011



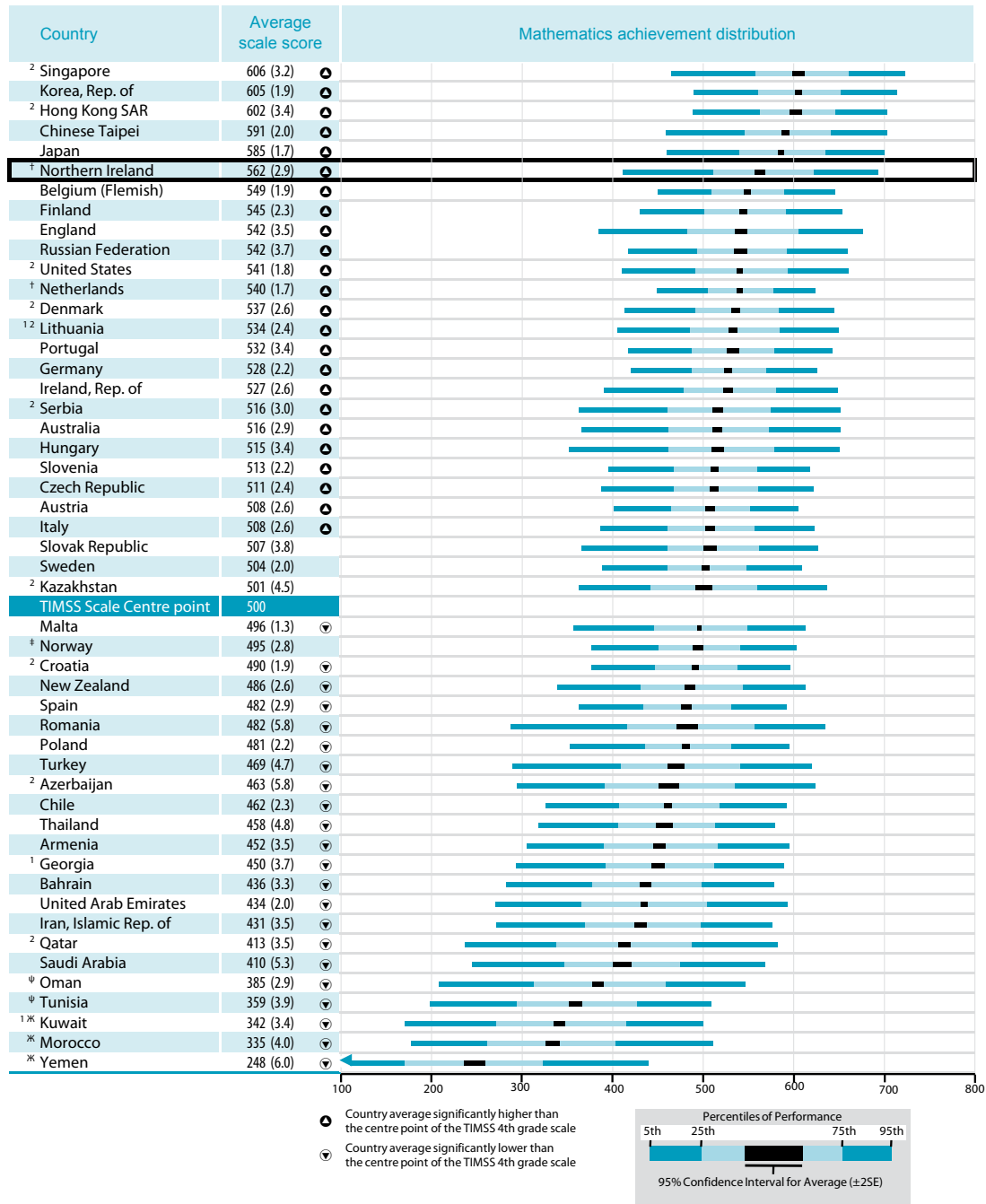
⌘ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

⌘ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds See Appendix C.2 in international report for target population coverage notes 1, 2, and 3. See Appendix C.5 for sampling guidelines and sampling participation notes † and ‡.

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

Source: Exhibit 1.1, international PIRLS report

Table 1.5 Mean scores and distribution of mathematics achievement at ages 9-10, TIMSS 2011



* Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

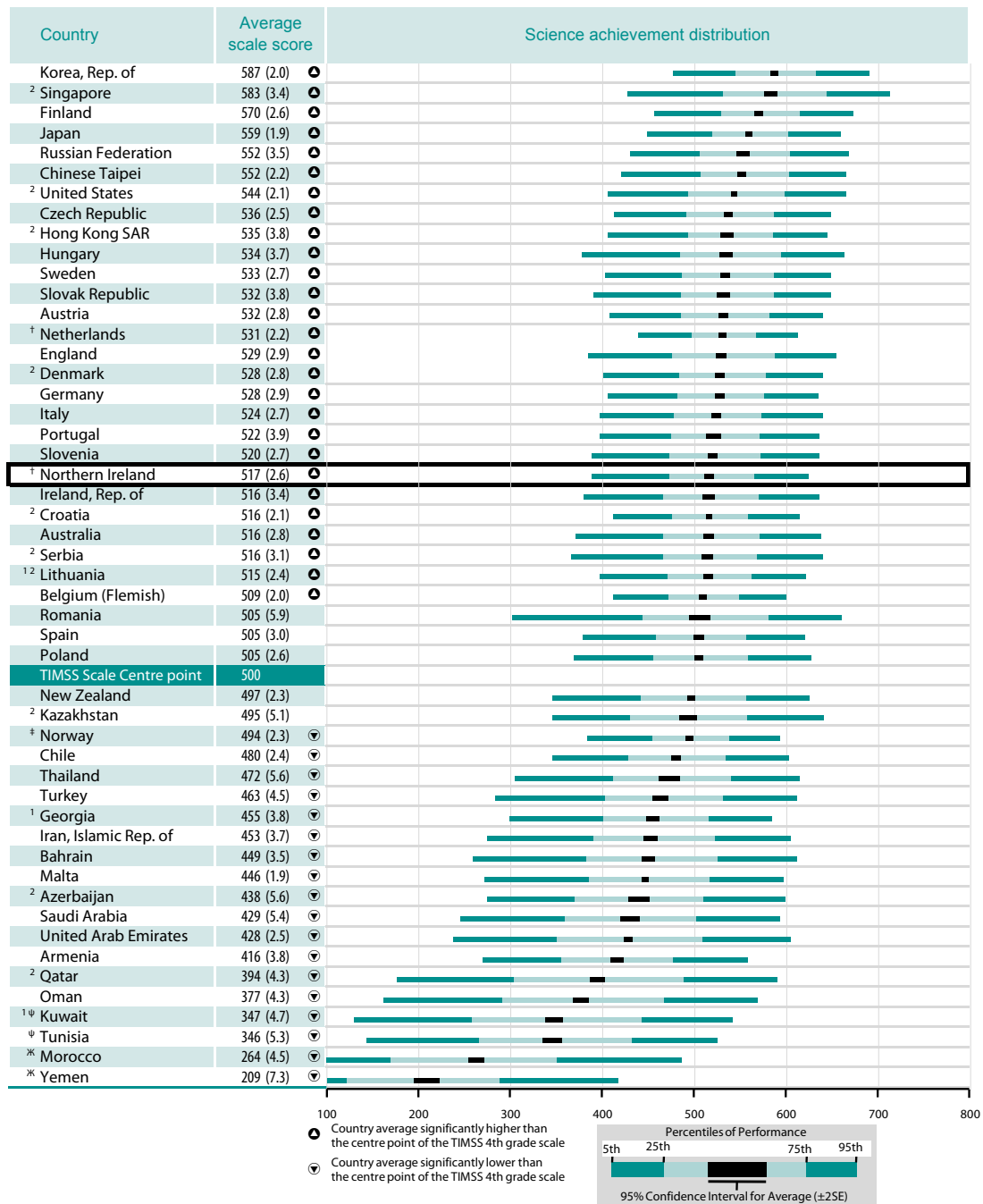
ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

See Appendix C.2 in international report for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, ()

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

Source: Exhibit 1.1, international mathematics report

Table 1.6 Mean scores and distribution of science achievement at ages 9-10, TIMSS 2011



✱ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.
 ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.
 See Appendix C.2 in international report for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes † and ‡.
 () Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 1.1, international science report

Although the scores for all three subjects in Northern Ireland are significantly above the international average in each case, rankings are notably higher for reading and mathematics than for science. Sections 1.2.1 to 1.2.3 below outline this difference in more detail.

1.2.1 Reading attainment: PIRLS 2011

Table 1.4 illustrates Northern Ireland's standing well above the international average in reading and just 13 scale points behind Hong Kong, the highest achieving country in PIRLS 2011. The lowest achieving country, Morocco, has a scale score 248 points below that of Northern Ireland.

In addition to Hong Kong, two further comparator countries, Finland and Singapore, had significantly higher achievement than Northern Ireland. All other comparator countries achieved significantly less well, with Australia, the lowest performing of the comparator countries, having an average scale score of 527, a total of 31 scale points lower.

1.2.2 Mathematics attainment: TIMSS 2011

Table 1.5 emphasises how well Northern Ireland performed in TIMSS 2011 mathematics. Its mean scale score of 562 is 44 scale points behind that of the highest performing country, Singapore, and 314 scale points ahead of the lowest performing country.

Two of the comparator countries outperformed Northern Ireland (Singapore and Hong Kong at 606 and 602 respectively). Among the countries doing significantly less well than Northern Ireland in mathematics, the nearest scoring comparator country was Finland (545). The lowest scoring comparator country was New Zealand (486, 14 scale points below the international average).

1.2.3 Science attainment: TIMSS 2011

Table 1.6 shows that, although Northern Ireland's average scale score for science of 517 is significantly above the international average, its performance in science compares somewhat less favourably than mathematics in international terms. In this instance, Northern Ireland is 70 scale points behind the highest performing country (Korea), although still 308 scale points ahead of the lowest performing country.

In this case, Northern Ireland was outperformed by four of the comparator countries (Singapore, Finland, Hong Kong and England, with scores between 583 and 529 inclusive). Australia and the Republic of Ireland scored similarly to Northern Ireland (516 each, compared with Northern Ireland's 517), while New Zealand again did less well at 497.

1.3 Attainment in PIRLS and TIMSS 2011 compared with PISA 2009

Although the PIRLS and TIMSS surveys are not directly comparable with PISA 2009, some useful insight can be gained from comparisons of scores on each. The key differences of relevance here are that:

- PISA surveys 15 year olds, whereas PIRLS and TIMSS 2011 in Northern Ireland surveyed 9-10 year olds.
- PISA's prime focus is to investigate literacy in reading, mathematics and science, in order to investigate the skills of future citizens. The prime focus for PIRLS and TIMSS is to explore curriculum-based concepts, in order to evaluate school systems.

- While all three surveys use a scale with a mid-point of 500, the scales mean something different in each case (based on the content of each assessment and the different countries participating).
- While TIMSS and PIRLS assess their target subject domains in each cycle, PISA assesses one element in more detail than the others (i.e. each cycle has one ‘major domain’ and two ‘minor domains’). The major domain for the most recently published PISA cycle, 2009, was mathematics. As a result, the PISA 2009 assessment contained more mathematics items and a subset of the available PISA reading and science items.

These differences mean that it would not be valid to say that a score of 500 on PIRLS, for example, means the same as a score of 500 on PISA. However, comparing the two sets of scores gives some indication of the extent to which a country may perform similarly between primary and secondary education on the subjects compared, relative to the comparative performance of the other participating countries on each survey. The three charts below (Figures 1.1 to 1.3) plot Northern Ireland’s scores on each subject in PISA (attainment at age 15) against those for each relevant subject from PIRLS and TIMSS (attainment at primary school). As well as the scores for Northern Ireland, the charts include the scores for the comparator countries and for the OECD countries which participate in PISA. The charts are presented consecutively and discussed below.⁸

1.3.1 PIRLS and TIMSS 2011 compared with PISA 2009 outcomes

Figure 1.1 shows that, for reading, there is a cluster of countries, including Northern Ireland, showing similar trends in performance on PIRLS and PISA reading. These countries tended to score comparatively better on PIRLS than on PISA reading. Outliers for reading include Hong Kong, Finland and Singapore (which performed well in both surveys) and Spain and Norway (which performed less well relative to the other countries on both surveys).

For mathematics, there is some clustering at the lower end of each scale (Figure 1.2). Singapore and Hong Kong are, again, outliers, having performed well on both surveys, with Finland and the Netherlands also having performed relatively well on both. Northern Ireland is also an outlier, having performed relatively well on TIMSS Y6 mathematics and less well on PISA mathematics at age 15. A similar trend applies to the United States, Portugal, Republic of Ireland, Denmark and England. The converse applies in Poland and New Zealand, which did relatively less well on TIMSS 2011 mathematics than on PISA 2009 mathematics.

Science performance was more variable. Figure 1.3 shows two main clusters, one of countries having performed similarly on both TIMSS 2011 and PISA 2009 science and the other having done better on TIMSS science than PISA. Northern Ireland is in the first of these clusters, with similar relative scores in TIMSS and PISA. The main outliers for science are New Zealand (better performance on PISA science than TIMSS), Hong Kong (somewhat better on PISA science than TIMSS), and Finland and Singapore (better performance on TIMSS science than PISA, and much better performance than other countries on science in both surveys).

⁸ The range on the scales for the axes on each chart are determined by the range of scores on the assessments summarised in each chart. Therefore, they vary across the three charts.

Figure 1.1 Reading comparison: reading scores on the PIRLS 2011 and PISA 2009 scales

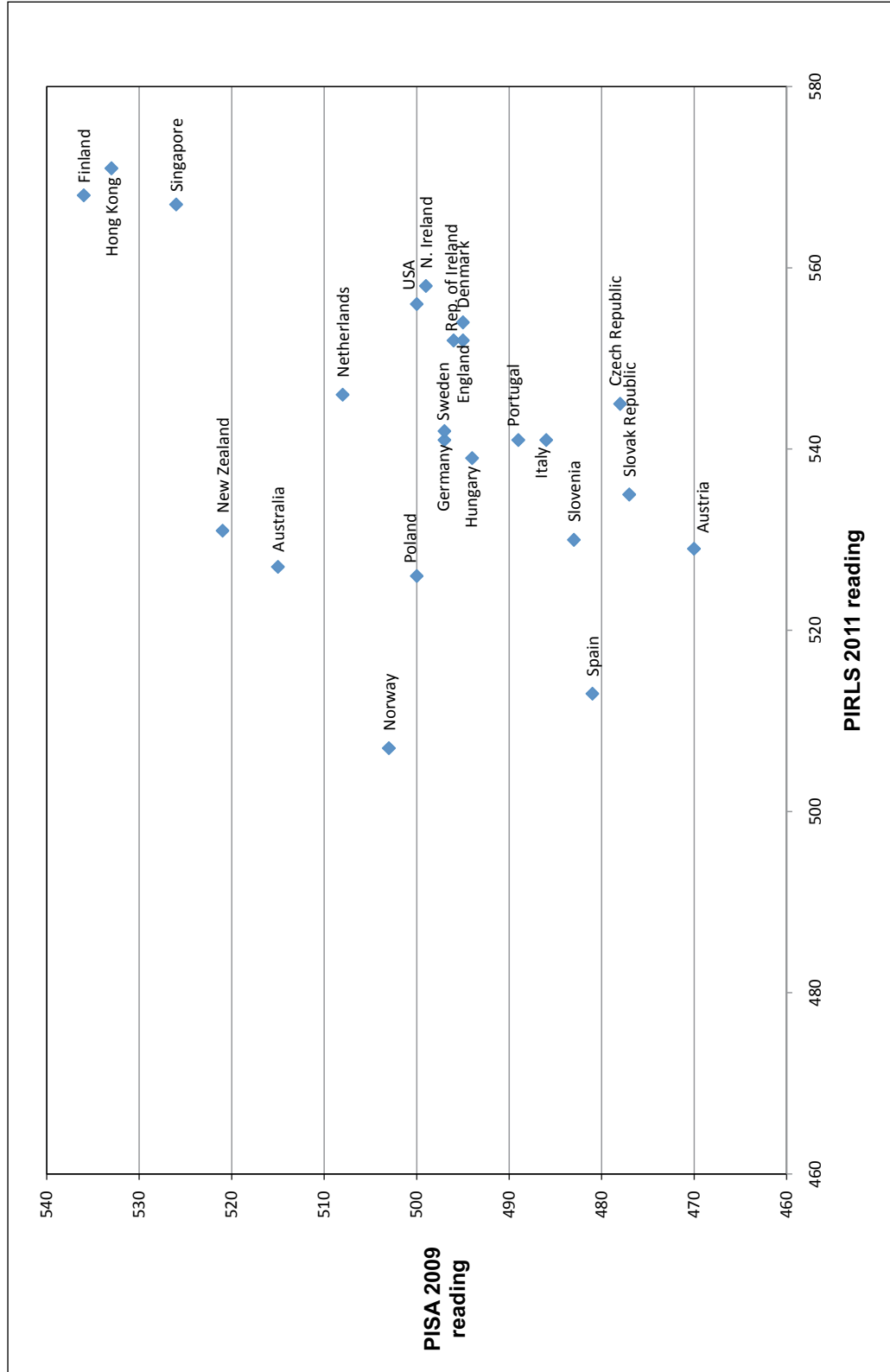


Figure 1.2 Mathematics comparison: mathematics scores on the TIMSS 2011 and PISA 2009 scales

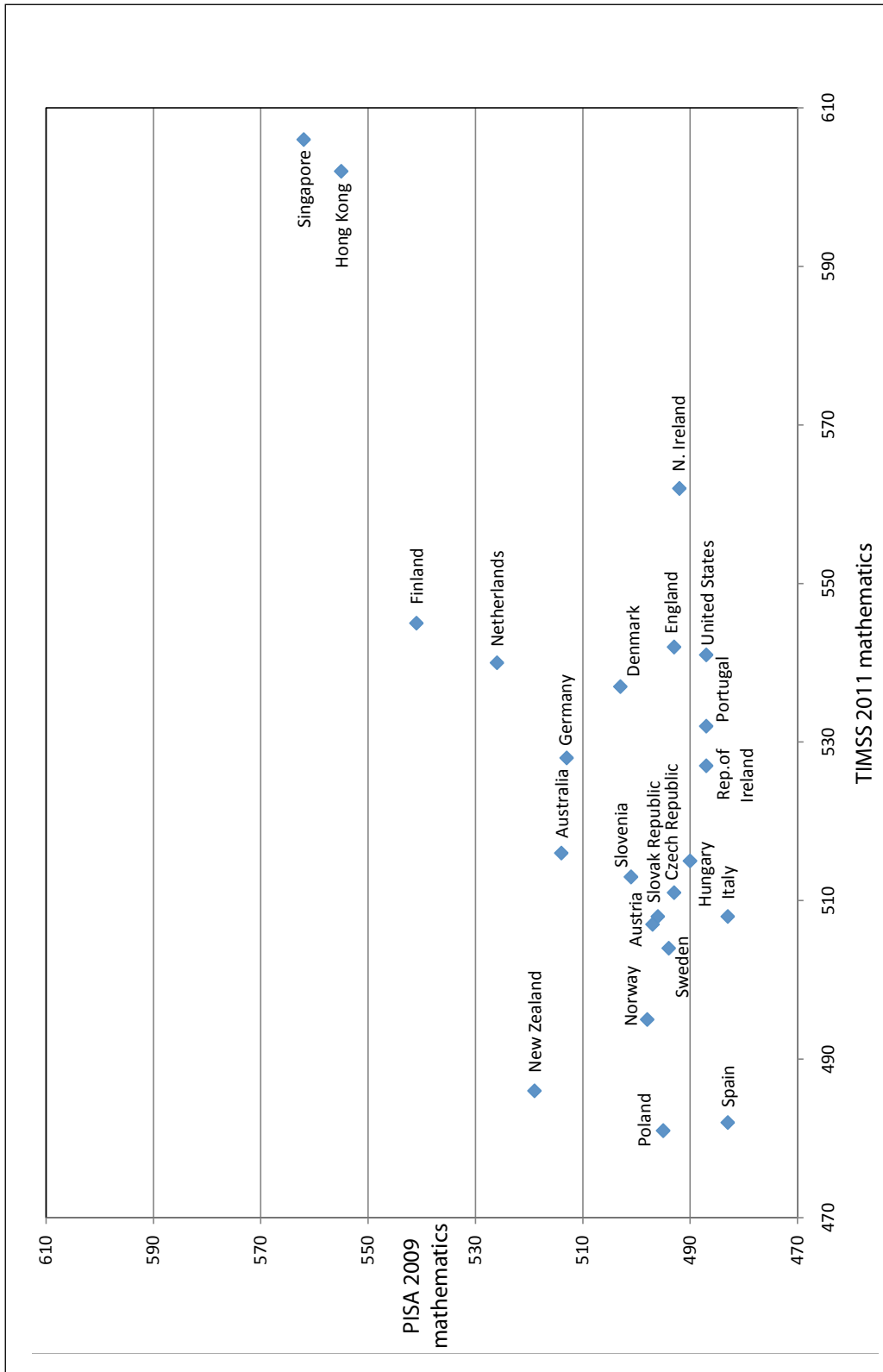
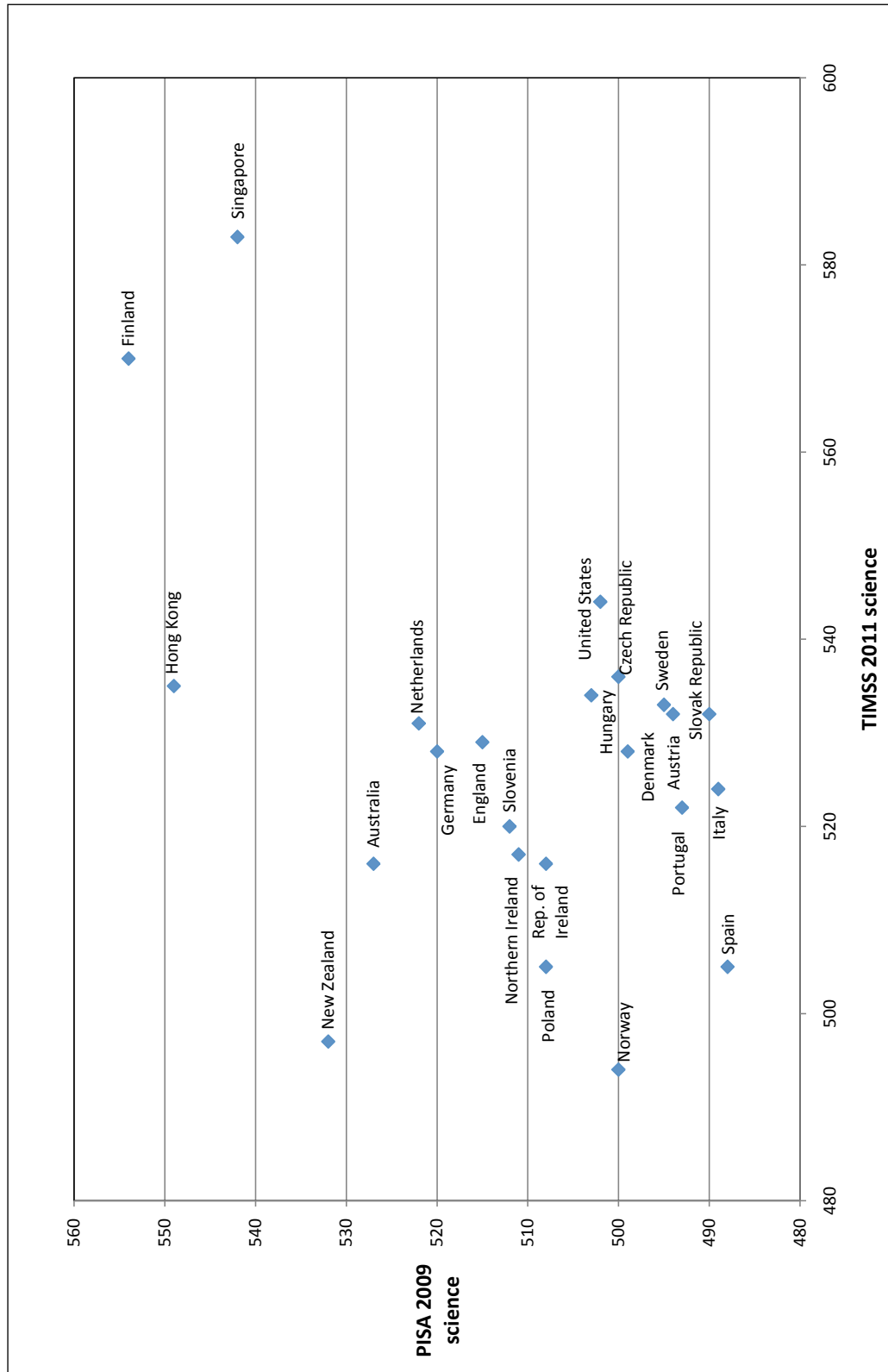


Figure 1.3 Science comparison: science scores on the TIMSS 2011 and PISA 2009 scales



1.4 Conclusion

Northern Ireland's scores for reading and mathematics in PIRLS and TIMSS 2011 indicate high performance. Performance in science is notably weaker, although still above the international average.

The high achievement evident in reading and mathematics in PIRLS and TIMSS at ages 9-10 can be contrasted with performance in these domains in PISA 2009 at age 15, when Northern Ireland's performance was not significantly different from the international average.

In contrast, in PISA 2009, Northern Ireland's science attainment at age 15 was significantly higher than the international average, and similar to its performance in TIMSS science at ages 9-10.

2. Attainment in PIRLS and TIMSS 2011 by gender

Chapter outline

This chapter summarises pupils' attainment by gender, in reading, mathematics and science in Year 6 (Y6, ages 9-10) in 2011. Findings for reading are discussed first, followed by findings for mathematics then science. Outcomes for Northern Ireland are compared with those of other specific nations.

Key findings

- Girls in Northern Ireland scored significantly¹ more highly than boys on PIRLS; the extent of the difference was at the international average. Better performance by girls is a characteristic of many reading assessments.
- In Northern Ireland, there were no significant gender differences in attainment for either mathematics or science.
- While Northern Ireland is not unique in this, it was noticeable that some of the high performing countries showed gender differences in their mathematics and/or science attainment.

2.1 Attainment by gender, PIRLS and TIMSS

Tables 2.1 to 2.3 below show the international average scale scores for each subject (reading, mathematics and science), ranked by the size of any gender difference. Outcomes for Northern Ireland are discussed for each subject in turn.

Interpreting the data: gender differences

The PIRLS and TIMSS achievement scales have a centre point of 500 and a standard deviation of 100. The graphic shows the direction and size of any gender difference for each country. Statistically significant differences are shown in colour while non-significant differences are greyed out.

1 Throughout this report, the term 'significant' refers to statistical significance.

Table 2.1 PIRLS 2011 gender differences, reading at ages 9-10

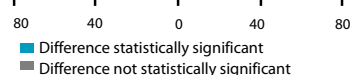
Country	Girls		Boys		Difference (absolute value)	Gender difference	
	Per cent of pupils	Average scale score	Per cent of pupils	Average scale score		Girls scored higher	Boys scored higher
Colombia	49 (1.3)	447 (4.6)	51 (1.3)	448 (4.6)	1 (3.9)		
Italy	50 (0.7)	543 (2.4)	50 (0.7)	540 (2.7)	3 (2.4)		
France	49 (0.8)	522 (3.4)	51 (0.8)	518 (2.4)	5 (2.7)		
Spain	49 (0.8)	516 (2.5)	51 (0.8)	511 (2.8)	5 (2.5)		
^{2†} Belgium (French)	49 (0.9)	509 (3.1)	51 (0.9)	504 (3.1)	5 (2.3)		
³ Israel	51 (1.6)	544 (3.1)	49 (1.6)	538 (3.4)	6 (3.4)		
Czech Republic	49 (1.2)	549 (2.5)	51 (1.2)	542 (2.5)	6 (2.6)		
[†] Netherlands	51 (0.7)	549 (2.1)	49 (0.7)	543 (2.2)	7 (2.0)		
Austria	49 (1.2)	533 (2.2)	51 (1.2)	525 (2.3)	8 (2.3)		
Germany	49 (0.8)	545 (2.3)	51 (0.8)	537 (2.7)	8 (2.5)		
Slovak Republic	49 (0.8)	540 (3.1)	51 (0.8)	530 (2.8)	10 (2.1)		
² United States	51 (0.5)	562 (1.9)	49 (0.5)	551 (1.7)	10 (1.8)		
² Denmark	50 (0.7)	560 (1.9)	50 (0.7)	548 (2.1)	12 (2.2)		
² Canada	49 (0.6)	555 (1.7)	51 (0.6)	542 (2.1)	12 (2.0)		
Poland	48 (0.9)	533 (2.5)	52 (0.9)	519 (2.7)	14 (3.1)		
² Azerbaijan	47 (0.9)	470 (3.6)	53 (0.9)	456 (3.5)	14 (2.3)		
² Croatia	50 (0.8)	560 (2.1)	50 (0.8)	546 (2.2)	14 (2.2)		
Sweden	49 (1.0)	549 (2.4)	51 (1.0)	535 (2.5)	14 (2.7)		
Portugal	49 (1.2)	548 (3.0)	51 (1.2)	534 (2.8)	14 (2.4)		
[‡] Norway	52 (1.0)	514 (2.2)	48 (1.0)	500 (2.7)	14 (3.1)		
Chinese Taipei	47 (0.6)	561 (2.1)	53 (0.6)	546 (2.1)	15 (2.1)		
Bulgaria	49 (0.9)	539 (4.5)	51 (0.9)	524 (4.3)	15 (3.5)		
Romania	48 (0.9)	510 (4.8)	52 (0.9)	495 (4.3)	15 (3.3)		
Ireland, Rep. of	49 (2.2)	559 (2.9)	51 (2.2)	544 (3.0)	15 (3.9)		
Hungary	49 (0.9)	547 (3.2)	51 (0.9)	532 (3.2)	16 (2.6)		
Slovenia	48 (0.8)	539 (2.2)	52 (0.8)	523 (2.7)	16 (3.1)		
[†] Northern Ireland	50 (1.2)	567 (2.5)	50 (1.2)	550 (3.2)	16 (3.4)		
³ Hong Kong SAR	46 (1.2)	579 (2.3)	54 (1.2)	563 (2.5)	16 (2.2)		
Australia	49 (1.1)	536 (2.7)	51 (1.1)	519 (2.7)	17 (3.1)		
² Singapore	49 (0.6)	576 (3.5)	51 (0.6)	559 (3.6)	17 (2.6)		
Malta	49 (0.5)	486 (1.9)	51 (0.5)	468 (2.0)	18 (2.8)		
Indonesia	51 (0.9)	437 (4.5)	49 (0.9)	419 (4.3)	18 (2.3)		
^{1,2} Lithuania	48 (0.8)	537 (2.4)	52 (0.8)	520 (2.4)	18 (2.8)		
Russian Federation	49 (1.0)	578 (2.8)	51 (1.0)	559 (3.1)	18 (2.3)		
Iran, Islamic Rep. of	49 (2.9)	467 (4.3)	51 (2.9)	448 (4.3)	20 (6.4)		
New Zealand	49 (1.0)	541 (2.2)	51 (1.0)	521 (2.7)	20 (3.1)		
Finland	49 (0.8)	578 (2.3)	51 (0.8)	558 (2.2)	21 (2.3)		
¹ Georgia	48 (0.9)	499 (2.7)	52 (0.9)	477 (4.0)	22 (3.0)		
[†] England	49 (1.0)	563 (3.0)	51 (1.0)	540 (3.1)	23 (3.0)		
United Arab Emirates	50 (1.6)	452 (3.0)	50 (1.6)	425 (3.5)	27 (4.8)		
[‡] Morocco	48 (0.8)	326 (4.0)	52 (0.8)	296 (4.6)	29 (3.9)		
² Qatar	47 (3.4)	441 (4.7)	53 (3.4)	411 (4.2)	30 (6.0)		
Trinidad and Tobago	49 (2.0)	487 (4.5)	51 (2.0)	456 (4.3)	31 (4.6)		
^ψ Oman	49 (0.7)	411 (3.0)	51 (0.7)	371 (3.4)	40 (2.9)		
Saudi Arabia	52 (1.5)	456 (3.1)	48 (1.5)	402 (8.2)	54 (8.8)		
International Avg.	49 (0.2)	520 (0.5)	51 (0.2)	504 (0.5)	16 (0.5)		

⌘ Average achievement not reliably measured because the percentage of pupils with achievement too low for estimation exceeds 25%.
 ψ Reservations about reliability of average achievement because the percentage of pupils with achievement too low for estimation does not exceed 25% but exceeds 15%.
 See Appendix C.2 in international report for target population coverage notes 1, 2, and 3. See Appendix C.5 for sampling guidelines and sampling participation notes † and ‡.
 () Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 1.5, international PIRLS report

Table 2.2 TIMSS 2011 gender differences, mathematics at ages 9-10

Country	Girls		Boys		Difference (Absolute Value)	Gender Difference	
	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score		Girls Scored Higher	Boys Scored Higher
Iran, Islamic Rep. of	49 (2.9)	431 (5.2)	51 (2.9)	431 (5.4)	0 (8.0)		
New Zealand	49 (0.8)	486 (3.3)	51 (0.8)	486 (2.8)	0 (3.1)		
† Northern Ireland	49 (1.3)	562 (3.3)	51 (1.3)	563 (3.6)	0 (3.8)		
Russian Federation	49 (1.0)	543 (3.7)	51 (1.0)	542 (4.1)	1 (2.4)		
^{1 2} Lithuania	48 (0.8)	533 (2.6)	52 (0.8)	534 (2.9)	1 (2.6)		
Chinese Taipei	47 (0.6)	592 (2.5)	53 (0.6)	590 (2.4)	2 (2.8)		
Turkey	48 (0.6)	470 (5.2)	52 (0.6)	469 (4.8)	2 (3.8)		
Hungary	49 (1.0)	514 (3.6)	51 (1.0)	517 (3.9)	2 (3.2)		
Romania	48 (0.9)	481 (6.7)	52 (0.9)	484 (5.9)	3 (4.5)		
Japan	49 (0.5)	584 (2.0)	51 (0.5)	587 (2.5)	3 (3.0)		
England	48 (1.0)	541 (4.2)	52 (1.0)	544 (3.5)	3 (3.4)		
Ireland, Rep. of	49 (2.3)	526 (3.7)	51 (2.3)	529 (3.3)	3 (4.6)		
Armenia	47 (0.8)	454 (4.1)	53 (0.8)	451 (3.6)	3 (3.0)		
² Singapore	49 (0.6)	608 (3.6)	51 (0.6)	604 (3.5)	4 (3.0)		
Sweden	49 (1.0)	501 (2.5)	51 (1.0)	506 (2.4)	5 (2.7)		
² Kazakhstan	48 (0.8)	498 (4.4)	52 (0.8)	504 (4.8)	5 (2.6)		
² Denmark	51 (0.7)	534 (2.9)	49 (0.7)	540 (2.9)	6 (2.8)		
Australia	49 (1.0)	513 (3.3)	51 (1.0)	519 (3.6)	6 (3.8)		
Portugal	49 (1.1)	529 (4.1)	51 (1.1)	535 (3.4)	6 (3.2)		
² Serbia	48 (0.9)	513 (3.8)	52 (0.9)	519 (3.5)	6 (4.1)		
² Hong Kong SAR	46 (1.2)	598 (3.2)	54 (1.2)	604 (3.9)	6 (2.3)		
Korea, Rep. of	48 (0.4)	601 (2.1)	52 (0.4)	608 (2.2)	7 (2.0)		
² Azerbaijan	47 (0.8)	466 (6.4)	53 (0.8)	460 (5.9)	7 (3.9)		
* Morocco	48 (0.8)	338 (4.6)	52 (0.8)	331 (4.3)	7 (3.9)		
ψ Tunisia	47 (0.8)	363 (4.5)	53 (0.8)	356 (4.4)	7 (4.4)		
Malta	49 (0.5)	492 (1.6)	51 (0.5)	499 (2.1)	7 (2.5)		
‡ Norway	51 (1.1)	492 (2.8)	49 (1.1)	499 (3.5)	7 (2.8)		
Finland	49 (0.8)	542 (2.5)	51 (0.8)	549 (2.9)	7 (2.8)		
¹ Georgia	48 (0.9)	454 (3.2)	52 (0.9)	447 (4.9)	7 (3.9)		
Bahrain	50 (1.6)	440 (4.5)	50 (1.6)	432 (4.0)	7 (5.5)		
† Netherlands	52 (1.0)	536 (2.1)	48 (1.0)	544 (2.1)	8 (2.4)		
United Arab Emirates	50 (1.6)	438 (2.8)	50 (1.6)	430 (3.5)	8 (5.0)		
Belgium (Flemish)	50 (0.9)	545 (2.2)	50 (0.9)	553 (2.4)	8 (2.5)		
Slovak Republic	49 (0.9)	503 (4.0)	51 (0.9)	511 (3.9)	8 (2.6)		
Germany	49 (0.8)	523 (2.7)	51 (0.8)	532 (2.6)	8 (2.7)		
² United States	51 (0.5)	536 (2.1)	49 (0.5)	545 (1.9)	9 (1.7)		
Italy	50 (0.7)	503 (3.1)	50 (0.7)	512 (2.9)	9 (3.0)		
Poland	48 (0.9)	476 (2.4)	52 (0.9)	486 (2.5)	9 (2.5)		
Austria	49 (1.2)	504 (2.7)	51 (1.2)	513 (3.3)	9 (2.8)		
Chile	51 (1.4)	457 (2.7)	49 (1.4)	466 (2.8)	9 (3.3)		
Slovenia	48 (0.8)	508 (2.2)	52 (0.8)	518 (3.1)	10 (3.2)		
² Croatia	50 (0.8)	485 (2.4)	50 (0.8)	495 (2.4)	10 (2.8)		
Czech Republic	48 (1.2)	505 (2.8)	52 (1.2)	516 (2.7)	11 (2.7)		
Spain	49 (0.8)	477 (3.1)	51 (0.8)	488 (3.4)	11 (3.0)		
* Yemen	40 (2.8)	255 (7.0)	60 (2.8)	243 (7.0)	12 (7.6)		
² Qatar	47 (3.4)	420 (4.7)	53 (3.4)	407 (4.2)	13 (5.6)		
Thailand	49 (0.9)	465 (4.8)	51 (0.9)	451 (5.6)	14 (4.4)		
Saudi Arabia	52 (1.5)	418 (4.6)	48 (1.5)	402 (10.0)	16 (11.2)		
ψ Oman	49 (0.7)	398 (3.2)	51 (0.7)	372 (3.4)	26 (3.3)		
^{1 *} Kuwait	54 (1.6)	358 (3.6)	46 (1.6)	323 (5.8)	35 (6.8)		
International Avg.	49 (0.2)	490 (0.5)	51 (0.2)	491 (0.6)			



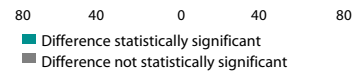
* Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.
 ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but See Appendix C.2 in the international report for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes † and ‡.
 () Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 1.10, international mathematics report ²

² While Exhibit 1.5 gives the PIRLS international average difference, parallel information is not available in Exhibits 1.10 in the international mathematics and science reports.

Table 2.3 TIMSS 2011 gender differences, science at ages 9-10

Country	Girls		Boys		Difference (absolute value)	Gender difference	
	Per cent of students	Average scale score	Per cent of students	Average scale score		Girls scored higher	Boys scored higher
Australia	49 (1.0)	516 (3.1)	51 (1.0)	516 (3.7)	0 (3.9)		
Romania	48 (0.9)	505 (6.9)	52 (0.9)	506 (5.7)	0 (4.7)		
Finland	49 (0.8)	570 (2.9)	51 (0.8)	570 (3.0)	0 (3.0)		
Ireland, Rep. of	49 (2.3)	516 (4.0)	51 (2.3)	516 (4.6)	1 (5.5)		
New Zealand	49 (0.8)	496 (3.0)	51 (0.8)	497 (2.6)	1 (3.2)		
England	48 (1.0)	529 (3.3)	52 (1.0)	528 (3.3)	1 (3.1)		
^{1,2} Lithuania	48 (0.8)	514 (2.4)	52 (0.8)	515 (3.0)	1 (2.6)		
Russian Federation	49 (1.0)	553 (3.5)	51 (1.0)	552 (3.8)	1 (2.4)		
[†] Northern Ireland	49 (1.3)	517 (3.2)	51 (1.3)	516 (3.2)	1 (3.8)		
² Denmark	51 (0.7)	527 (3.3)	49 (0.7)	529 (3.1)	2 (3.0)		
Iran, Islamic Rep. of	49 (2.9)	452 (5.8)	51 (2.9)	454 (5.7)	2 (8.8)		
² Serbia	48 (0.9)	514 (3.6)	52 (0.9)	517 (3.7)	3 (3.9)		
Sweden	49 (1.0)	532 (3.0)	51 (1.0)	535 (3.2)	4 (3.0)		
[‡] Norway	51 (1.1)	492 (2.5)	49 (1.1)	496 (3.2)	4 (3.1)		
² Singapore	49 (0.6)	581 (3.7)	51 (0.6)	585 (3.7)	4 (2.7)		
Turkey	48 (0.6)	465 (5.0)	52 (0.6)	461 (4.7)	4 (3.8)		
Hungary	49 (1.0)	532 (4.0)	51 (1.0)	537 (3.9)	5 (2.9)		
² Croatia	50 (0.8)	514 (2.5)	50 (0.8)	518 (2.5)	5 (2.7)		
Portugal	49 (1.1)	519 (4.6)	51 (1.1)	524 (3.8)	5 (3.2)		
Armenia	47 (0.8)	419 (4.0)	53 (0.8)	414 (4.3)	5 (3.4)		
Japan	49 (0.5)	556 (2.7)	51 (0.5)	561 (2.1)	5 (2.8)		
Slovenia	48 (0.8)	517 (2.8)	52 (0.8)	523 (3.4)	6 (3.2)		
² Hong Kong SAR	46 (1.2)	532 (3.6)	54 (1.2)	538 (4.3)	6 (2.5)		
Poland	48 (0.9)	502 (3.0)	52 (0.9)	508 (2.9)	6 (2.8)		
Malta	49 (0.5)	443 (2.2)	51 (0.5)	449 (2.8)	6 (3.3)		
Chinese Taipei	47 (0.6)	548 (2.6)	53 (0.6)	555 (2.4)	7 (2.3)		
Italy	50 (0.7)	520 (3.2)	50 (0.7)	528 (3.0)	7 (2.9)		
Korea, Rep. of	48 (0.4)	583 (2.4)	52 (0.4)	590 (2.3)	8 (2.3)		
² Kazakhstan	48 (0.8)	490 (5.1)	52 (0.8)	498 (5.5)	8 (3.0)		
² Azerbaijan	47 (0.8)	442 (6.3)	53 (0.8)	434 (5.7)	8 (4.0)		
Slovak Republic	49 (0.9)	528 (4.3)	51 (0.9)	536 (3.6)	8 (2.7)		
¹ Georgia	48 (0.9)	459 (3.2)	52 (0.9)	451 (5.1)	9 (3.9)		
[✳] Morocco	48 (0.8)	268 (5.1)	52 (0.8)	259 (4.9)	9 (4.4)		
Spain	49 (0.8)	500 (2.8)	51 (0.8)	510 (3.7)	10 (2.8)		
Thailand	49 (0.9)	476 (5.7)	51 (0.9)	467 (6.6)	10 (5.0)		
² United States	51 (0.5)	539 (2.3)	49 (0.5)	549 (2.1)	10 (1.5)		
[†] Netherlands	52 (1.0)	526 (2.4)	48 (1.0)	537 (2.6)	10 (2.1)		
Belgium (Flemish)	50 (0.9)	503 (2.6)	50 (0.9)	514 (2.3)	11 (2.9)		
Chile	51 (1.4)	474 (2.8)	49 (1.4)	486 (2.8)	12 (2.9)		
Germany	49 (0.8)	522 (3.0)	51 (0.8)	534 (3.2)	12 (2.5)		
Austria	49 (1.2)	525 (2.8)	51 (1.2)	538 (3.6)	12 (2.9)		
Czech Republic	48 (1.2)	529 (2.9)	52 (1.2)	544 (2.7)	15 (2.6)		
United Arab Emirates	50 (1.6)	437 (3.4)	50 (1.6)	419 (3.8)	18 (5.3)		
Bahrain	50 (1.6)	461 (5.5)	50 (1.6)	438 (4.6)	23 (7.0)		
^ψ Tunisia	47 (0.8)	359 (5.6)	53 (0.8)	334 (5.6)	25 (4.3)		
² Qatar	47 (3.4)	408 (5.1)	53 (3.4)	382 (5.7)	26 (6.5)		
[✳] Yemen	40 (2.8)	225 (7.3)	60 (2.8)	198 (8.8)	27 (8.0)		
Oman	49 (0.7)	394 (4.7)	51 (0.7)	360 (4.6)	34 (3.8)		
Saudi Arabia	52 (1.5)	453 (4.7)	48 (1.5)	405 (9.9)	48 (11.0)		
^{1,ψ} Kuwait	54 (1.6)	371 (5.5)	46 (1.6)	319 (7.1)	53 (8.6)		
International Avg.	49 (0.2)	487 (0.6)	51 (0.2)	485 (0.6)			



✳ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.
 ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.
 See Appendix C.2 in the international report for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ¶.
 () Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 1.10, international science report

2.1.1 Gender differences in reading attainment, PIRLS 2011

Table 2.1 shows that, in keeping with the majority of countries taking part in PIRLS 2011, girls in Northern Ireland scored significantly more highly in reading than boys. Girls achieved an average scale score of 567, and boys had an average scale score of 550. This difference of 16 scale points (taking rounding into account) matched the

international mean difference and was equal smallest (with Hong Kong) of all Northern Ireland's identified comparator countries.

Only five countries had no significant difference between the average reading scores of boys and girls (Colombia, Italy, France, Spain and Israel). In all other participating countries, girls significantly outperformed boys in reading.

2.1.2 Gender differences in mathematics attainment, TIMSS 2011

Northern Ireland is near the top of Table 2.2, with no significant gender difference in mathematics attainment in Y6. Boys in Northern Ireland scored an average of 563 for mathematics and girls an average of 562.

Of the 50 participating countries, just under half (24 countries) had a significant gender difference, all but four of which favoured boys. Northern Ireland was one of 26 countries showing no overall gender difference for mathematics at this age, including England, New Zealand, Australia, Republic of Ireland, and the high performers of Chinese Taipei, Japan and Singapore. In contrast, the high performing countries of Hong Kong, Korea and Finland had small gender differences for mathematics, favouring boys.

2.1.3 Gender differences in science attainment, TIMSS 2011

Northern Ireland also had no significant gender difference in science attainment in Y6 (Table 2.3). Again, the score difference between boys and girls was one scale point (516 and 517 respectively).

Just over half of the participating countries (27 of 50) showed a significant gender difference for science. Most of these (16) favoured boys but a greater number than for mathematics (11) favoured girls).

Northern Ireland was one of 23 countries showing no overall gender difference for science at this age. The other countries included Australia, Finland, Republic of Ireland, New Zealand, England and one of the highest scorers, Singapore. More of the highest scorers had gender differences than was the case for mathematics. Hong Kong and Korea had a gender difference for science in favour of boys, just as they had for mathematics. Chinese Taipei also had a significant difference favouring boys.

2.2 Conclusion

Northern Ireland's high attainment in mathematics at ages 9-10 is achieved through equally high performance from girls and boys and, although overall performance in science is weaker, once again both girls and boys contribute equally to that attainment. A gender difference exists for reading, but this is in line with the trend seen internationally.

3. Distribution of attainment in PIRLS and TIMSS 2011

Chapter outline

This chapter outlines the distribution of attainment in reading, mathematics and science in Northern Ireland in Year 6 (Y6, ages 9-10) in 2011. It describes the PIRLS and TIMSS 'benchmarks' of attainment and the proportions reaching each benchmark.

Key findings

- Among the selected comparator countries, only Singapore had more pupils than Northern Ireland reaching the Advanced international benchmark in reading.
- Almost a quarter of pupils in Northern Ireland reached the Advanced benchmark in mathematics, the sixth highest percentage internationally.
- Only 5 per cent of Northern Ireland's pupils reached the Advanced international benchmark for science.
- For reading, mathematics and science respectively, 3 per cent, 4 per cent and 6 per cent failed to reach the Low international benchmarks. This compares with 1 to 3 per cent for reading, 0 to 1 per cent for mathematics, and 1 to 7 per cent for science, in the countries performing better than Northern Ireland.

3.1 Distribution of attainment, PIRLS and TIMSS

PIRLS and TIMSS achievement outcomes for each country are reported as an average scale score, as outlined in Chapter 1 and broken down by 'international benchmarks' (i.e. levels of attainment within the overall achievement). Tables 3.1 to 3.3 below summarise the international benchmarks for each of reading, mathematics and science respectively.

Interpreting the data: international benchmarks

The PIRLS and TIMSS achievement scales summarise pupil performance on a scale with a centre point of 500 and a standard deviation of 100. PIRLS and TIMSS report achievement at four points along the scale as 'international benchmarks'. The Advanced International Benchmark is set at a scale score of 625, the High International Benchmark at 550, the Intermediate International Benchmark at 475, and the Low International Benchmark at 400. The benchmark descriptions summarise what pupils scoring at each PIRLS or TIMSS International Benchmark typically know and can do in the target subject.

Table 3.1 Summary of international benchmarks for reading, Y6

625	Advanced International Benchmark	<p>When reading literary texts, students can:</p> <ul style="list-style-type: none">• Integrate ideas and evidence across a text to appreciate overall themes• Interpret story events and character actions to provide reasons, motivations, feelings, and character traits with full text-based support <p>When reading information texts, students can:</p> <ul style="list-style-type: none">• Distinguish and interpret complex information from different parts of text, and provide full text-based support• Integrate information across a text to provide explanations, interpret significance, and sequence activities• Evaluate visual and textual features to explain their function• Evaluate content and textual elements to make a generalization
550	High International Benchmark	<p>When reading literary texts, students can:</p> <ul style="list-style-type: none">• Locate and distinguish significant actions and details embedded across the text• Make inferences to explain relationships between intentions, actions, events, and feelings, and give text-based support• Interpret and integrate story events and character actions and traits from different parts of the text• Evaluate the significance of events and actions across the entire story• Recognize the use of some language features (e.g., metaphor, tone, imagery) <p>When reading information texts, students can:</p> <ul style="list-style-type: none">• Locate and distinguish relevant information within a dense text or a complex table• Make inferences about logical connections to provide explanations and reasons• Integrate textual and visual information to interpret the relationship between ideas• Evaluate content and textual elements to make a generalization
475	Intermediate International Benchmark	<p>When reading literary texts, students can:</p> <ul style="list-style-type: none">• Retrieve and reproduce explicitly stated actions, events, and feelings• Make straightforward inferences about the attributes, feelings, and motivations of main characters• Interpret obvious reasons and causes and give simple explanations• Begin to recognize language features and style <p>When reading information texts, students can:</p> <ul style="list-style-type: none">• Locate and reproduce two or three pieces of information from within the text• Use subheadings, text boxes, and illustrations to locate parts of the text
400	Low International Benchmark	<p>When reading literary texts, students can:</p> <ul style="list-style-type: none">• Locate and retrieve an explicitly stated detail <p>When reading information texts, students can:</p> <ul style="list-style-type: none">• Locate and reproduce explicitly stated information that is at the beginning of the text

Source: Exhibit 2.1, international PIRLS report.

Table 3.2 Summary of international benchmarks for mathematics, Y6

625	Advanced International Benchmark	●
	<i>Students can apply their understanding and knowledge in a variety of relatively complex situations and explain their reasoning. They can solve a variety of multi-step word problems involving whole numbers including proportions. Students at this level show an increasing understanding of fractions and decimals. Students can apply geometric knowledge of a range of two- and three-dimensional shapes in a variety of situations. They can draw a conclusion from data in a table and justify their conclusion.</i>	
550	High International Benchmark	○
	<i>Students can apply their knowledge and understanding to solve problems. Students can solve word problems involving operations with whole numbers. They can use division in a variety of problem situations. They can use their understanding of place value to solve problems. Students can extend patterns to find a later specified term. Students demonstrate understanding of line symmetry and geometric properties. Students can interpret and use data in tables and graphs to solve problems. They can use information in pictographs and tally charts to complete bar graphs.</i>	
475	Intermediate International Benchmark	●
	<i>Students can apply basic mathematical knowledge in straightforward situations. Students at this level demonstrate an understanding of whole numbers and some understanding of fractions. Students can visualize three-dimensional shapes from two-dimensional representations. They can interpret bar graphs, pictographs, and tables to solve simple problems.</i>	
400	Low International Benchmark	○
	<i>Students have some basic mathematical knowledge. Students can add and subtract whole numbers. They have some recognition of parallel and perpendicular lines, familiar geometric shapes, and coordinate maps. They can read and complete simple bar graphs and tables.</i>	

Source: Exhibit 2.1, international mathematics report.

Further detail about each benchmark is given in the international report.

Table 3.3 Summary of international benchmarks for science, Y6

625	Advanced International Benchmark	<p><i>Students apply knowledge and understanding of scientific processes and relationships and show some knowledge of the process of scientific inquiry. Students communicate their understanding of characteristics and life processes of organisms, reproduction and development, ecosystems and organisms' interactions with the environment, and factors relating to human health. They demonstrate understanding of properties of light and relationships among physical properties of materials, apply and communicate their understanding of electricity and energy in practical contexts, and demonstrate an understanding of magnetic and gravitational forces and motion. Students communicate their understanding of the solar system and of Earth's structure, physical characteristics, resources, processes, cycles, and history. They have a beginning ability to interpret results in the context of a simple experiment, reason and draw conclusions from descriptions and diagrams, and evaluate and support an argument.</i></p>
550	High International Benchmark	<p><i>Students apply their knowledge and understanding of the sciences to explain phenomena in everyday and abstract contexts. Students demonstrate some understanding of plant and animal structure, life processes, life cycles, and reproduction. They also demonstrate some understanding of ecosystems and organisms' interactions with their environment, including understanding of human responses to outside conditions and activities. Students demonstrate understanding of some properties of matter, electricity and energy, and magnetic and gravitational forces and motion. They show some knowledge of the solar system, and of Earth's physical characteristics, processes, and resources. Students demonstrate elementary knowledge and skills related to scientific inquiry. They compare, contrast, and make simple inferences, and provide brief descriptive responses combining knowledge of science concepts with information from both everyday and abstract contexts.</i></p>
475	Intermediate International Benchmark	<p><i>Students have basic knowledge and understanding of practical situations in the sciences. Students recognize some basic information related to characteristics of living things, their reproduction and life cycles, and their interactions with the environment, and show some understanding of human biology and health. They also show some knowledge of properties of matter and light, electricity and energy, and forces and motion. Students know some basic facts about the solar system and show an initial understanding of Earth's physical characteristics and resources. They demonstrate ability to interpret information in pictorial diagrams and apply factual knowledge to practical situations.</i></p>
400	Low International Benchmark	<p><i>Students show some elementary knowledge of life, physical, and earth sciences. Students demonstrate knowledge of some simple facts related to human health, ecosystems, and the behavioral and physical characteristics of animals. They also demonstrate some basic knowledge of energy and the physical properties of matter. Students interpret simple diagrams, complete simple tables, and provide short written responses to questions requiring factual information.</i></p>

Source: Exhibit 2.1, international science report.

Further detail about each benchmark is given in the international report.

Tables 3.4 to 3.6 show the percentages reaching each benchmark for each subject in Northern Ireland. The outcomes for Northern Ireland are then discussed for each subject in turn.

Interpreting the data: performance at the international benchmarks

These tables indicate the percentage of pupils reaching each of the four benchmarks and this information is summarised in the series of dots on the chart. Percentages are cumulative (reading the chart from left to right). Thus, for each country the black dot shows the percentage reaching at least the Advanced benchmark. The clear dot then shows the percentage reaching at least the High benchmark and this figure includes those who reached the Advanced benchmark. The darker shaded dot indicates the percentage reaching at least the Intermediate benchmark, and this includes those in the two previous categories. The lighter shaded dot shows cumulatively how many reached at least the Low benchmark. The position of that dot also indicates the percentage that did not reach any of the listed benchmarks.

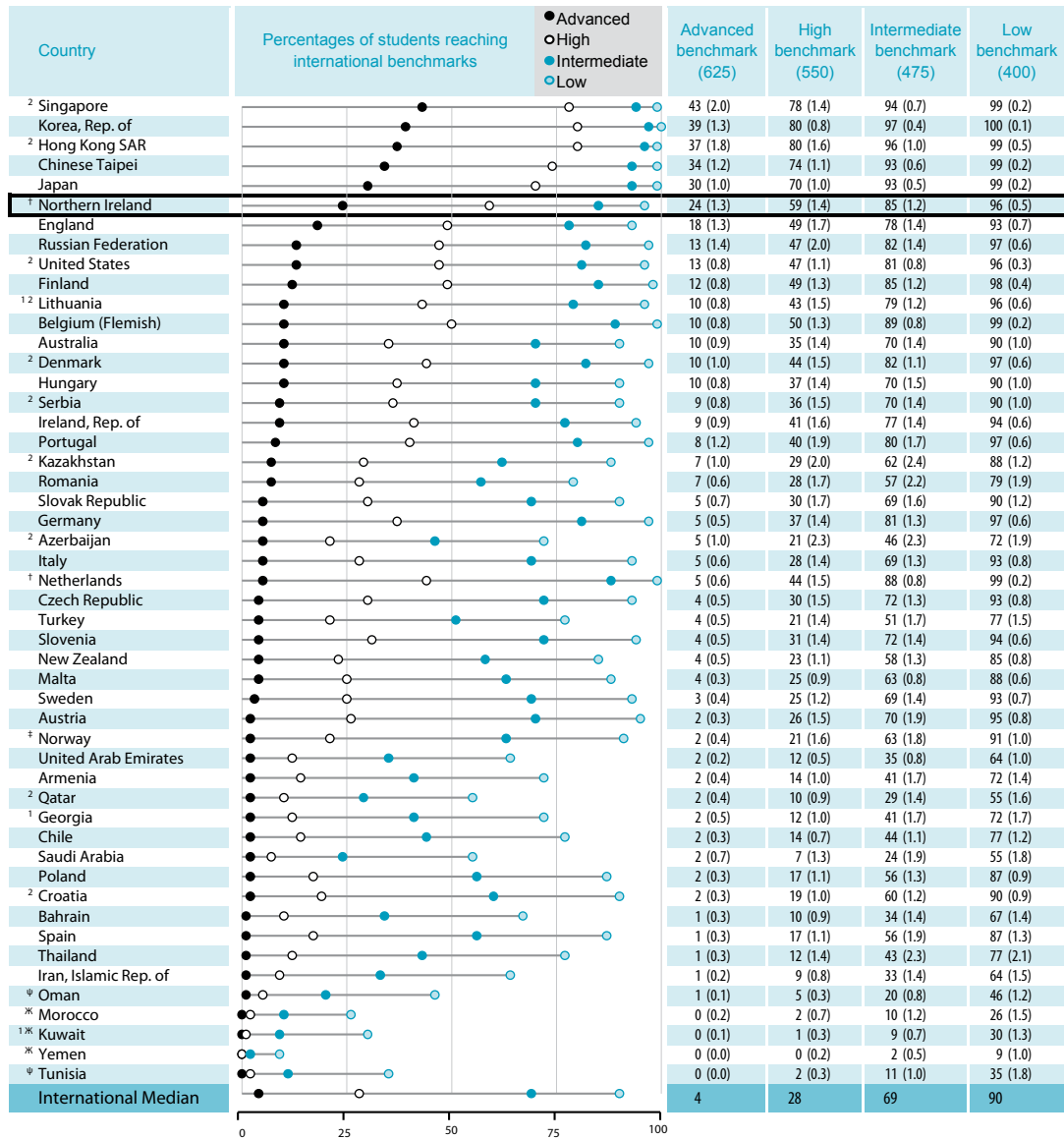
Table 3.4 Percentages reaching each benchmark for reading, Y6

Country	Percentages of pupils reaching international benchmarks	Legend				Advanced international benchmark (625)	High international benchmark (550)	Intermediate international benchmark (475)	Low international benchmark (400)
		● Advanced	○ High	● Intermediate	○ Low				
² Singapore					24 (1.6)	62 (1.8)	87 (1.1)	97 (0.4)	
Russian Federation					19 (1.2)	63 (1.7)	92 (1.1)	99 (0.2)	
¹ Northern Ireland					19 (1.2)	58 (1.4)	87 (0.9)	97 (0.6)	
Finland					18 (0.9)	63 (1.3)	92 (0.7)	99 (0.2)	
[†] England					18 (1.1)	54 (1.3)	83 (1.1)	95 (0.5)	
³ Hong Kong SAR					18 (1.2)	67 (1.5)	93 (0.8)	99 (0.2)	
² United States					17 (0.7)	56 (0.8)	86 (0.6)	98 (0.3)	
Ireland, Rep. of					16 (0.9)	53 (1.4)	85 (0.8)	97 (0.5)	
³ Israel					15 (0.9)	49 (1.3)	80 (1.3)	93 (0.8)	
New Zealand					14 (0.7)	45 (1.1)	75 (0.9)	92 (0.5)	
² Canada					13 (0.7)	51 (1.1)	86 (0.6)	98 (0.2)	
Chinese Taipei					13 (0.9)	55 (1.3)	87 (0.7)	98 (0.3)	
² Denmark					12 (0.8)	55 (1.2)	88 (0.8)	99 (0.2)	
Hungary					12 (0.9)	48 (1.5)	81 (1.2)	95 (0.7)	
Bulgaria					11 (0.8)	45 (2.0)	77 (1.9)	93 (1.0)	
² Croatia					11 (0.7)	54 (1.3)	90 (0.7)	99 (0.2)	
Australia					10 (0.7)	42 (1.1)	76 (1.0)	93 (0.7)	
Italy					10 (0.7)	46 (1.4)	85 (1.1)	98 (0.4)	
Germany					10 (0.8)	46 (1.4)	85 (1.0)	98 (0.3)	
Portugal					9 (1.1)	47 (1.8)	84 (1.2)	98 (0.5)	
Sweden					9 (0.8)	47 (1.6)	85 (1.0)	98 (0.3)	
Czech Republic					8 (0.9)	50 (1.4)	87 (0.9)	98 (0.5)	
Slovak Republic					8 (0.6)	44 (1.5)	82 (1.3)	96 (0.8)	
Slovenia					8 (0.7)	42 (1.2)	79 (0.9)	95 (0.6)	
Poland					7 (0.6)	39 (1.2)	77 (0.9)	95 (0.5)	
Romania					7 (0.7)	32 (1.6)	65 (2.1)	86 (1.5)	
[†] Netherlands					7 (0.5)	48 (1.5)	90 (0.8)	100 (0.2)	
^{1,2} Lithuania					6 (0.5)	39 (1.4)	80 (1.2)	97 (0.4)	
France					5 (0.5)	35 (1.6)	75 (1.5)	95 (0.8)	
Austria					5 (0.5)	39 (1.5)	80 (0.9)	97 (0.3)	
Malta					4 (0.4)	24 (0.7)	55 (0.8)	78 (0.6)	
Spain					4 (0.5)	31 (1.3)	72 (1.2)	94 (0.7)	
Trinidad and Tobago					3 (0.5)	19 (1.4)	50 (1.9)	78 (1.5)	
United Arab Emirates					3 (0.3)	14 (0.6)	38 (1.0)	64 (0.9)	
¹ Georgia					2 (0.3)	21 (1.2)	60 (1.6)	86 (1.4)	
^{2,†} Belgium (French)					2 (0.5)	25 (1.4)	70 (1.7)	94 (1.1)	
² Qatar					2 (0.5)	12 (1.2)	34 (1.4)	60 (1.5)	
[†] Norway					2 (0.4)	25 (1.5)	71 (1.3)	95 (0.7)	
Iran, Islamic Rep. of					1 (0.2)	13 (0.9)	45 (1.6)	76 (1.1)	
Colombia					1 (0.3)	10 (1.3)	38 (2.1)	72 (1.9)	
Saudi Arabia					1 (0.2)	8 (1.0)	34 (2.0)	65 (1.9)	
² Azerbaijan					0 (0.3)	9 (0.9)	45 (2.1)	82 (1.6)	
^ψ Oman					0 (0.1)	5 (0.4)	21 (0.9)	47 (1.2)	
Indonesia					0 (0.1)	4 (0.6)	28 (1.9)	66 (2.2)	
^κ Morocco					0 (0.0)	1 (0.2)	7 (0.7)	21 (1.3)	
International Median					8	44	80	95	

κ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.
 ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.
 See Appendix C.2 in the international report for target population coverage notes 1, 2, and 3. See Appendix C.5 for sampling guidelines and sampling participation notes † and ‡.
 () Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 2.2, international PIRLS report.

Table 3.5 Percentages reaching each benchmark for mathematics, Y6



* Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.
 † Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation is less than 25% but exceeds 15%.
 See Appendix C.2 in the international report for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes † and ‡.
 () Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 2.2, international mathematics report

Table 3.6 Percentages reaching each benchmark for science, Y6

Country	Percentages of students reaching international benchmarks	Advanced benchmark (625)	High benchmark (550)	Intermediate benchmark (475)	Low benchmark (400)
² Singapore		33 (1.7)	68 (1.7)	89 (0.9)	97 (0.4)
Korea, Rep. of		29 (1.5)	73 (1.0)	95 (0.4)	99 (0.1)
Finland		20 (1.1)	65 (1.7)	92 (0.8)	99 (0.3)
Russian Federation		16 (1.4)	52 (2.0)	86 (1.2)	98 (0.4)
Chinese Taipei		15 (0.9)	53 (1.3)	85 (1.1)	97 (0.4)
² United States		15 (0.8)	49 (1.1)	81 (0.8)	96 (0.4)
Japan		14 (1.0)	58 (1.3)	90 (0.7)	99 (0.2)
Hungary		13 (0.9)	46 (2.0)	78 (1.5)	93 (0.9)
Romania		11 (0.9)	37 (2.3)	66 (2.3)	84 (1.8)
England		11 (0.9)	42 (1.6)	76 (1.3)	93 (0.7)
Sweden		10 (1.0)	44 (1.5)	79 (1.1)	95 (0.5)
Czech Republic		10 (0.9)	44 (1.5)	81 (1.1)	97 (0.7)
Slovak Republic		10 (1.0)	44 (1.7)	79 (1.8)	94 (1.0)
² Hong Kong SAR		9 (0.9)	45 (2.1)	82 (1.5)	96 (1.2)
Austria		8 (0.8)	42 (1.6)	79 (1.7)	96 (0.6)
² Denmark		8 (0.8)	39 (1.6)	78 (1.4)	95 (0.7)
² Serbia		8 (0.7)	35 (1.7)	72 (1.5)	91 (1.0)
Italy		8 (0.7)	37 (1.6)	76 (1.3)	95 (1.0)
Australia		7 (0.7)	35 (1.4)	72 (1.3)	91 (1.0)
Portugal		7 (1.1)	35 (1.8)	75 (2.0)	95 (1.0)
Germany		7 (0.6)	39 (1.6)	78 (1.5)	96 (0.7)
² Kazakhstan		7 (1.1)	28 (2.1)	58 (2.6)	84 (1.6)
Ireland, Rep. of		7 (0.9)	35 (1.7)	72 (1.6)	92 (0.9)
Slovenia		7 (0.6)	36 (1.6)	74 (1.3)	93 (0.6)
Poland		5 (0.5)	29 (1.5)	67 (1.2)	91 (0.8)
New Zealand		5 (0.5)	28 (1.1)	63 (1.3)	86 (0.9)
† Northern Ireland		5 (0.6)	33 (1.6)	74 (1.3)	94 (1.0)
Spain		4 (0.6)	28 (1.5)	67 (1.6)	92 (1.2)
^{1 2} Lithuania		4 (0.5)	31 (1.6)	73 (1.2)	95 (0.6)
Thailand		4 (0.6)	20 (1.7)	52 (2.3)	78 (2.2)
Bahrain		4 (0.4)	17 (1.1)	43 (1.2)	70 (1.4)
Turkey		3 (0.4)	18 (1.3)	48 (1.7)	76 (1.5)
² Croatia		3 (0.4)	30 (1.1)	75 (1.4)	96 (0.5)
United Arab Emirates		3 (0.3)	14 (0.6)	36 (0.9)	61 (1.0)
† Netherlands		3 (0.5)	37 (1.8)	86 (1.4)	99 (0.4)
Iran, Islamic Rep. of		3 (0.4)	16 (1.2)	44 (1.7)	72 (1.5)
Saudi Arabia		3 (0.8)	12 (1.3)	35 (1.7)	63 (2.0)
Chile		2 (0.4)	19 (0.9)	54 (1.4)	85 (1.1)
² Azerbaijan		2 (0.7)	13 (1.7)	37 (2.5)	65 (2.1)
² Qatar		2 (0.5)	11 (1.0)	29 (1.3)	50 (1.5)
Malta		2 (0.3)	14 (0.7)	41 (1.0)	70 (1.1)
Belgium (Flemish)		2 (0.3)	24 (1.2)	73 (1.4)	96 (0.5)
¹ Georgia		1 (0.4)	13 (1.2)	44 (1.8)	75 (1.6)
Oman		1 (0.3)	7 (0.7)	23 (1.0)	45 (1.5)
‡ Norway		1 (0.2)	19 (1.2)	64 (1.7)	92 (0.8)
Armenia		1 (0.2)	6 (0.8)	26 (1.5)	58 (1.8)
^{1 ψ} Kuwait		1 (0.2)	4 (0.5)	16 (1.1)	37 (1.5)
‡ Morocco		0 (0.1)	1 (0.4)	6 (0.7)	16 (1.0)
^ψ Tunisia		0 (0.1)	3 (0.4)	14 (1.1)	35 (1.9)
‡ Yemen		0 (0.0)	0 (0.2)	2 (0.4)	6 (0.9)
International Median		5	32	72	92

‡ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.
 ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.
 See Appendix C.2 in the international report for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes † and ‡.
 () Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 2.2, international science report

3.1.1 Distribution in reading attainment: PIRLS 2011

High achievement in reading was evident with 19 per cent of pupils in Northern Ireland reaching the Advanced international benchmark. Among the comparator countries, this proportion was exceeded only by Singapore (24 per cent). A further 39 per cent of pupils in Northern Ireland reached the High benchmark (i.e. 58 per cent in total reaching at least the High benchmark). In relation to the Low benchmark, just 3 per cent of pupils failed to reach this standard. This was the same proportion as Singapore.¹ The highest performing countries were characterised by a very small proportion of pupils failing to reach the Low international benchmark.

3.1.2 Distribution in mathematics attainment: TIMSS 2011

In Northern Ireland, 24 per cent of Y6 pupils reached the Advanced international benchmark in mathematics, with a further 35 per cent reaching the High benchmark (i.e. 59 per cent in total reaching at least the High benchmark). This compared with 70 to 80 per cent reaching at least the High benchmark in the highest scoring Pacific Rim countries. The country with the most pupils reaching the Advanced benchmark was Singapore, with 43 per cent reaching that level in mathematics (in the context of the level of exclusions outlined in the footnote below).

At the other end of the scale, 96 per cent of pupils in Northern Ireland reached at least the Low international benchmark for Y6 mathematics, with 4 per cent achieving below that level. In the five countries performing better than Northern Ireland, 99 or 100 per cent reached at least the Low benchmark.

3.1.3 Distribution in science attainment: TIMSS 2011

For Y6 science, only 5 per cent of pupils in Northern Ireland reached the Advanced international benchmark, with a further 28 per cent achieving the High benchmark (making a total of 33 per cent reaching at least the High international benchmark). Among the three highest scoring countries, the percentage reaching at least the High benchmark ranged from 65 to 73 per cent. The country with the most pupils reaching the Advanced benchmark was, again, Singapore, with 33 per cent reaching that level in science.

For science, 94 per cent of pupils in Northern Ireland reached at least the Low international benchmark for Y6, with 6 per cent achieving below that level. Among the three highest performers, the comparable percentages reaching at least the Low benchmark were 97 to 99 per cent.

¹ Singapore excluded a combined total of 6.3 per cent of 9-10 year old pupils (5.9 per cent at school level and 0.4 per cent within-school exclusions); Hong Kong also had high exclusions at this age range (9.1 per cent at school level and 2.7 per cent within-school exclusions, making a total of 11.8 per cent). The comparable exclusion figures for Northern Ireland were 2.6 per cent and 0.9 per cent respectively (making a total of 3.5 per cent, within the international target limit of 5 per cent exclusions). Exclusions can be for a variety of reasons, including geographical (e.g. remote and/or very small schools), linguistic (e.g. countries opting not to translate the test into minority languages) or due to special educational needs (e.g. special schools teaching pupils who cannot access the assessment). See the technical report (Martin *et al.*, 2011) and Appendix C of the international reports for more information.

3.2 Conclusion

Patterns in Northern Ireland's attainment in each subject overall are reflected in its patterns of distribution of attainment: just as pupils scored better in reading and mathematics than in science, so more pupils reached at least the High international benchmark in reading and mathematics than in science. Correspondingly, the tail of low performance for each subject is relatively small, but marginally greater in science than for reading or mathematics.

4. Attainment by content and skill in Northern Ireland

Chapter outline

This chapter focuses on performance in Northern Ireland in reading, mathematics and science in Year 6 (Y6, ages 9-10). It summarises pupils' reading attainment across the PIRLS Reading Purpose and Comprehension Process domains and their mathematics and science attainment across the TIMSS content and cognitive domains. It also reports any gender differences across these domains. Findings for reading are presented first, followed by findings for mathematics and science.

PIRLS assesses two reading purposes (Literary and Informational) and two comprehension process domains (Retrieving and Straightforward Inferencing, and Interpreting, Integrating and Evaluating). TIMSS assesses content domains in mathematics and science, and the cognitive domains of Knowing, Applying and Reasoning in both subjects. More information about each of these domains is given in sections 4.1 to 4.4. Further information about international performance on these domains is available in the international reports.

Key findings

- On the two reading purposes scales identified in PIRLS, pupils in Northern Ireland scored significantly¹ more highly, relative to the national average reading score, on Literary purposes and less well on Informational purposes.
- In the mathematics content domains, pupils did significantly better on Number and less well on Data Display.
- In the science content domains, they did less well on Earth Science.
- On the processes of reading comprehension scales, pupils in Northern Ireland scored higher on the Interpreting, Integrating and Evaluating scale, and lower on the Retrieving and Straightforward Inferencing scale.
- In the mathematics cognitive domains, they did better on Knowing and less well on Reasoning.
- In the science cognitive domains, they scored better on Applying and less well at Reasoning.
- In almost all countries, including Northern Ireland, girls achieved significantly higher mean scores than boys for each of the two reading purposes and each of the two comprehension processes.
- For both mathematics and science, most countries had gender differences on the content or cognitive domains. Northern Ireland was unusual in having no significant gender differences on the mathematics content or cognitive domains, and no differences on the science cognitive domains.
- There was a single gender difference for the science content domains: girls did better than boys on Life Science.

1 Throughout this report, the term 'significant' refers to statistical significance.

4.1 The content and skill domains, PIRLS and TIMSS 2011

Reading: what PIRLS assesses at ages 9-10

The two reading purposes assessed in Y6 reading are:

- Reading for literary experience
- Reading to acquire and use information.

The four comprehension processes are:

- Focusing on and retrieving explicitly stated information
- Making straightforward inferences
- Interpreting and integrating ideas and information
- Examining and evaluating content, language and textual elements.

These are combined into two domains:

- Retrieving and Straightforward Inferencing
- Interpreting, Integrating and Evaluating.

More information is available in the PIRLS Assessment framework.²

Mathematics: what TIMSS assesses at ages 9-10

The content domains assessed for Y6 mathematics are:

- Number - Whole numbers; Fractions and decimals; Number sentences with whole numbers; Patterns and relationships
- Geometric Shapes and Measures - Points, lines and angles; Two- and three-dimensional shapes
- Data Display - Reading and interpreting; Organizing and representing.

The cognitive domains are:

- Knowing – Recall; Recognize; Compute; Retrieve; Measure; Classify/Order
- Reasoning – Select; Represent; Model; Implement; Solve Routine Problems
- Applying – Analyze; Generalize/Specialize; Integrate/Synthesize; Justify; Solve Non-routine Problems.

More information is available in the TIMSS Assessment framework.³

² Mullis *et al* (2009a)

³ Mullis *et al* (2009b)

Science: what TIMSS assesses at ages 9-10

The content domains assessed in Y6 science are:

- Life Science – Characteristics and life processes of living things; Life cycles, reproduction and heredity; Interaction with the environment; Ecosystems; Human health
- Physical Science – Classification and properties of matter; Sources and effects of energy; Forces and motion
- Earth Science - Earth's structure, physical characteristics and resources; Earth's processes, cycles and history; Earth in the solar system.

The cognitive domains are:

- Knowing – Recall/Recognize; Define; Describe; Illustrate with Examples; Demonstrate Knowledge of Scientific Instruments
- Reasoning – Compare/Contrast/Classify; Use Models; Relate; Interpret Information; Find Solutions; Explain
- Applying – Analyze; Integrate/Synthesize; Hypothesize/Predict; Draw Conclusions; Generalize; Evaluate; Justify.
- More information is available in the TIMSS Assessment Framework.⁴

Although the curriculum in Northern Ireland (CCEA, 2007) does not include science as a discrete subject, it is covered as part of 'The World Around Us'.⁵ While there are some differences between the key stage 2 curriculum in Northern Ireland and the TIMSS Assessment Framework for science, all of the TIMSS science topics are included in Northern Ireland's curriculum. Chapter 1 of this report gives more information.

4 Mullis *et al* (2009b)

5 See the TIMSS 2011 encyclopaedia (Mullis *et al*, 2012a)

4.2 Attainment by reading purpose and content domains, Y6

Interpreting the data: numerical scales

In this section, pupils' attainment across the PIRLS reading purpose and comprehension process domains and across the TIMSS content and cognitive domains for each subject is discussed. To allow this comparison, scale scores are generated for each domain for each subject. It is important to note that the scale scores representing the domains are not directly comparable with each other since they represent different constructs. However, each sub-scale can be compared directly with the overall mean scale score for the subject from which it is drawn, and this allows comparison of the relative strengths and weaknesses of each country for each domain. Differences between the scale score and the mean in each case are rounded to the nearest whole number.

4.2.1 Attainment in the reading purposes domain

Table 4.1 presents the average achievement of Northern Ireland in the two purposes for reading identified in PIRLS: reading for literary experience, and reading to acquire and use information, as compared with overall reading achievement.

Generally, the participating countries with the highest overall reading attainment in PIRLS 2011 also had the highest attainment in both Literary and Informational reading.

The performance of pupils in Northern Ireland significantly differed between the two purposes for reading with pupils scoring significantly more highly on Literary purposes and significantly less well on Informational purposes. In addition to Northern Ireland, the Republic of Ireland and New Zealand also scored significantly more highly on the Literary scale, while Hong Kong and Singapore scored significantly more highly on the Informational scale. The scores of three of Northern Ireland's comparator countries (Finland, England and Australia) did not differ significantly between the two purposes for reading.⁶

Table 4.1 Y6 attainment in reading purposes

Country	Overall Reading Average Scale Score	Literary		Informational	
		Average Scale Score	Difference from Overall Reading Score	Average Scale Score	Difference from Overall Reading Score
† Northern Ireland	558 (2.4)	564 (2.7)	5 (1.4) ⬆	555 (2.6)	-4 (1.7) ⬇

⬆ Subscale score significantly higher than overall reading score

⬇ Subscale score significantly lower than overall reading score

See Appendix C.5 in the international report for sampling guidelines and sampling participation notes † and ‡.

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

Source: Exhibit 3.1, international PIRLS report

⁶ See Exhibit 3.1, international PIRLS report

4.2.2 Attainment in the mathematics content domains

Northern Ireland's mean scale score for TIMSS mathematics was 562. Pupils in Northern Ireland scored significantly above this mean score in the content domain of Number (a mean scale score of 566) and significantly below it in Data Display (555). The score on Geometric Shapes and Measures (560) was similar to the score for mathematics overall (see Table 4.2).

The general pattern internationally was for countries to perform more highly on Number than on the other areas, relative to their own mean performance. However, there was more variability in terms of performance on Data Display and Geometric Shapes and Measures, with some countries significantly exceeding their mean score in these domains, and others doing less well in these domains. There were no patterns of content domain performance among Northern Ireland's comparator countries (Australia, England, Finland, Hong Kong, Republic of Ireland, New Zealand, and Singapore): all had different relative strengths and weaknesses. Finland had a flat profile, scoring similarly to its own mean score on all three domains.⁷

Table 4.2 Y6 attainment in the mathematics content domains

Country	Overall Mathematics Average Scale Score	Number		Geometric Shapes and Measures		Data Display	
		Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score
[†] Northern Ireland	562 (2.9)	566 (2.9)	4 (1.6) ●	560 (3.3)	-2 (2.1)	555 (3.0)	-8 (1.5) ▼

● Subscale score significantly higher than overall mathematics score
 ▼ Subscale score significantly lower than overall mathematics score

See Appendix C.8 in the international report for sampling guidelines and sampling participation notes [†] and [‡].
 () Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 3.1, international mathematics report

4.2.3 Attainment in the science content domains

Northern Ireland's mean scale score for TIMSS science was 517. Pupils in Northern Ireland (see Table 4.3) scored similarly to this mean in the science content domains of Life Science (a mean scale score of 519) and Physical Science (520), but significantly lower in Earth Science (507).

The international pattern was variable, although over half of the TIMSS countries had lower relative scores on Earth Science and/or Physical Science at this age range.⁸ There were no patterns among the comparator countries: each, again, had its own profile of relative strengths and weaknesses. New Zealand and Republic of Ireland had flat profiles, each scoring similarly to its own mean score on all three content domains.⁹

⁷ See Exhibit 3.1, international mathematics report

⁸ See Exhibit 3.1, international science report

⁹ See Exhibit 3.3, international science report

Table 4.3 Y6 attainment in the science content domains

Country	Overall Science Average Scale Score	Life Science		Physical Science		Earth Science	
		Average Scale Score	Difference from Overall Science Score	Average Scale Score	Difference from Overall Science Score	Average Scale Score	Difference from Overall Science Score
† Northern Ireland	517 (2.6)	519 (2.9)	2 (1.3)	520 (3.2)	3 (2.5)	507 (2.7)	-9 (1.6) Ⓣ

Ⓢ Subscale score significantly higher than overall science score
 Ⓣ Subscale score significantly lower than overall science score

See Appendix C.8 in the international report for sampling guidelines and sampling participation notes † and ‡.
 () Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 3.1, international science report

4.3 Attainment by reading process and cognitive domains

4.3.1 Attainment in the reading process domains

The survey also provides the average achievement scales in the two comprehension process domains identified in PIRLS:

- Retrieving and Straightforward Inferencing
- Interpreting, Integrating and Evaluating.

Generally, the PIRLS 2011 participants with the highest attainment overall also had the highest attainment on both comprehension process scales.

Pupils in Northern Ireland scored significantly higher on the Interpreting, Integrating and Evaluating scale relative to their own mean and scored significantly lower than their mean on the Retrieving and Straightforward Inferencing scale. Hong Kong, Singapore, England and New Zealand also scored significantly more highly on the Interpreting, Integrating and Evaluating scale. Hong Kong, England and New Zealand scored significantly lower on the Retrieving and Straightforward Inferencing scale. Three comparator countries (Finland, Republic of Ireland and Australia) did not differ significantly on either of the two comprehension processes.¹⁰

Table 4.4 Y6 attainment in reading comprehension processes

Country	Overall Reading Average Scale Score	Retrieving and Straightforward Inferencing		Interpreting, Integrating, and Evaluating	
		Average Scale Score	Difference from Overall Reading Score	Average Scale Score	Difference from Overall Reading Score
† Northern Ireland	558 (2.4)	555 (2.5)	-3 (1.0) Ⓣ	562 (2.5)	4 (1.0) Ⓢ

Ⓢ Subscale score significantly higher than overall reading score
 Ⓣ Subscale score significantly lower than overall reading score

See Appendix C.5 in the international report for sampling guidelines and sampling participation notes † and ‡.
 () Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 3.3, international PIRLS report

¹⁰ See Exhibit 3.3, international PIRLS report

4.3.2 Attainment in the mathematics cognitive domains

As was the case with the content domains, Northern Ireland showed some differences in its profile of scores on the cognitive domains. Relative to their overall mathematics score of 562, pupils did significantly better on Knowing (a mean scale score of 580) but less well on Reasoning (538). Their score on Applying was similar to the average (565).

Two-fifths of the participating nations had higher scores for Knowing relative to their own mean. Relative performance on Applying and Reasoning was more variable across countries.

Again, there was variability among the comparator countries. As with the mathematics content domains, Finland had a flat profile for the cognitive domains. The other comparator countries showed different patterns of relative strength and weakness, with England and Republic of Ireland having the same pattern as Northern Ireland.¹¹

Table 4.5 Y6 attainment in the mathematics cognitive domains

Country	Overall Mathematics Average Scale Score	Knowing		Applying		Reasoning	
		Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score
† Northern Ireland	562 (2.9)	580 (3.4)	17 (1.7) ●	565 (2.9)	2 (2.0)	538 (3.3)	-25 (2.1) ▼

● Subscale score significantly higher than overall mathematics score
▼ Subscale score significantly lower than overall mathematics score

See Appendix C.8 in the international report for sampling guidelines and sampling participation notes † and ‡.
() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 3.3, international mathematics report

4.3.3 Attainment in the science cognitive domains

Whereas Northern Ireland's pupils scored better in Knowing for mathematics, they scored significantly better than their average on Applying science: a mean scale score of 521 for Applying, compared with their mean score overall of 517 (see Table 4.6). They scored significantly less well than their average on Reasoning (503), as was the case for mathematics.

Again, there was a mixed picture internationally and the comparator countries varied in their respective strengths and weaknesses: among this group, only Australia and New Zealand showed a flat profile on the science cognitive domains.¹²

Table 4.6 Y6 attainment in the science cognitive domains

Country	Overall Science Average Scale Score	Knowing		Applying		Reasoning	
		Average Scale Score	Difference from Overall Science Score	Average Scale Score	Difference from Overall Science Score	Average Scale Score	Difference from Overall Science Score
† Northern Ireland	517 (2.6)	517 (2.9)	1 (2.1)	521 (2.6)	5 (1.4) ●	503 (3.1)	-14 (2.2) ▼

● Subscale score significantly higher than overall science score
▼ Subscale score significantly lower than overall science score

See Appendix C.8 in the international report for sampling guidelines and sampling participation notes † and ‡.
() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 3.3, international science report

¹¹ See Exhibit 3.3, international mathematics report

¹² See Exhibit 3.3, international science report

4.4 Performance by gender

4.4.1 Attainment by gender in reading processes and purposes

Table 4.7 shows that, in Northern Ireland, girls scored significantly more highly than boys in both reading purposes and comprehension processes. In all the comparator countries girls performed better than boys on all four scales: reading purposes and reading processes.¹³

Table 4.7 Achievement in reading purpose and comprehension processes by gender

Country	Reading Purposes				Comprehension Processes			
	Literary		Informational		Retrieving and Straightforward Inferencing		Interpreting, Integrating, and Evaluating	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
† Northern Ireland	575 (3.2) ⬆	552 (3.5)	561 (3.1) ⬆	549 (3.4)	563 (2.8) ⬆	548 (3.4)	571 (2.8) ⬆	553 (3.3)
International Avg.	522 (0.5) ⬆	502 (0.5)	519 (0.5) ⬆	507 (0.5)	521 (0.5) ⬆	505 (0.5)	519 (0.5) ⬆	502 (0.5)

⬆ Average significantly higher than other gender

See Appendix C.5 in the international report for sampling guidelines and sampling participation notes † and ‡.
 () Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 3.7, international PIRLS report

4.4.2 Attainment by gender in mathematics content and cognitive domains

Northern Ireland has no significant gender differences in the Y6 mathematics content domains (see Table 4.8) or cognitive domains (Table 4.9). This is unusual internationally. The international average pattern was for boys to do significantly better than girls in Number, and for girls to do significantly better than boys in Geometric Shapes and Measures and in Data Display. For the cognitive domains, there was more variability across countries, with an average gender difference only for Reasoning, on which boys internationally did significantly better at ages 9-10.

Among the comparator countries, England, Republic of Ireland and Singapore also had no gender differences on either set of mathematics domains. Finland, Hong Kong and New Zealand had differences on the mathematics content domains (favouring girls in New Zealand and favouring boys in Finland and Hong Kong) while Australia and Hong Kong had differences on the mathematics cognitive domains (favouring boys).¹⁴

Table 4.8 Gender differences in the Y6 mathematics content domains

Country	Number		Geometric Shapes and Measures		Data Display	
	Girls	Boys	Girls	Boys	Girls	Boys
† Northern Ireland	566 (3.3)	567 (3.8)	561 (3.8)	559 (4.3)	558 (3.8)	552 (4.1)
International Avg.	493 (0.5)	496 (0.6) ⬆	485 (0.6) ⬆	483 (0.7)	486 (0.7) ⬆	482 (0.7)

⬆ Average significantly higher than other gender

See Appendix C.8 in the international report for sampling guidelines and sampling participation notes † and ‡.
 () Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 3.9, international mathematics report

¹³ See Exhibit 3.7, international PIRLS report

¹⁴ See Exhibit 3.9, international mathematics report

Table 4.9 Gender differences in the Y6 mathematics cognitive domains

Country	Knowing		Applying		Reasoning	
	Girls	Boys	Girls	Boys	Girls	Boys
† Northern Ireland	578 (4.0)	582 (4.5)	566 (3.2)	564 (3.8)	538 (4.0)	537 (4.1)
International Avg.	492 (0.6)	492 (0.6)	488 (0.6)	489 (0.6)	487 (0.6)	489 (0.6) ⬆

⬆ Average significantly higher than other gender

See Appendix C.8 in the international report for sampling guidelines and sampling participation notes † and ‡.
() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 3.11, international mathematics report

4.4.3 Attainment by gender in science content and cognitive domains

Unlike mathematics, there was one gender difference in Northern Ireland for science, relating to the content domains: girls significantly outperformed boys in Life Science (see Table 4.10). There were no significant differences in Northern Ireland for the science cognitive domains.

The international average pattern was for girls to do significantly better than boys in Life Science, while the converse was true for Physical Science and Earth Science: boys on average did better at these internationally. There were some gender differences among the group of comparator countries, mostly with boys outperforming girls at Earth Science. Three of the comparator countries (Australia, England and Republic of Ireland) had no significant gender differences on the science content domains.¹⁵

For the science cognitive domains, there was a more scattered picture internationally. The international averages showed no significant gender differences overall for Knowing or Applying, but showed that Reasoning items were generally answered better by girls overall. Hong Kong and Singapore showed some gender differences, not corresponding to the international patterns, while five of the comparator countries (Australia, England, Finland, Republic of Ireland and New Zealand) had no gender differences at all on the science cognitive domains.¹⁶

Table 4.10 Gender differences in the Y6 science content domains

Country	Life Science		Physical Science		Earth Science	
	Girls	Boys	Girls	Boys	Girls	Boys
† Northern Ireland	523 (3.5) ⬆	514 (3.4)	519 (3.5)	522 (3.8)	503 (3.8)	512 (4.8)
International Avg.	489 (0.6) ⬆	481 (0.6)	484 (0.6)	485 (0.7) ⬆	479 (0.7)	483 (0.7) ⬆

⬆ Average significantly higher than other gender


See Appendix C.8 in the international report for sampling guidelines and sampling participation notes † and ‡.
() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.


Source: Exhibit 3.9, international science report

¹⁵ See Exhibit 3.9, international science report

¹⁶ See Exhibit 3.11, international science report

Table 4.11 Gender differences in the Y6 science cognitive domains

Country	Knowing		Applying		Reasoning	
	Girls	Boys	Girls	Boys	Girls	Boys
† Northern Ireland	518 (3.6)	517 (3.3)	520 (3.3)	523 (3.0)	505 (3.6)	500 (5.5)
International Avg.	486 (0.6)	485 (0.7)	485 (0.6)	484 (0.6)	485 (0.7) 	478 (0.7)

 Average significantly higher than other gender

See Appendix C.8 in the international report for sampling guidelines and sampling participation notes † and ‡.
 () Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 3.11, international science report

4.5 Conclusion

Chapter 1 indicated that Northern Ireland’s pupils scored above the international average in all three subjects of reading, mathematics and science, and performed particularly well in reading and mathematics. Even so, within this overall high achievement, there were areas of relative strength and weakness, as outlined in this chapter.

In terms of content domains, there were areas of strength alongside less well developed areas, for all three subjects. For the cognitive and skill domains, Northern Ireland’s pupils performed better on the more complex reading skills, compared with the more straightforward skills. In contrast, in mathematics and science, they did less well at the more complex Reasoning items than the more straightforward Knowing and/or Applying items.

Gender differences also varied across the subjects. Girls in Northern Ireland did better than boys at reading, mirroring the international trend. However, they did not conform to the international trends in gender differences for mathematics and science. There was only one gender difference in Northern Ireland: girls outperformed boys in Life Science, and there were no other significant gender differences in content or cognitive domains for mathematics or science.

5. Pupils' engagement

Chapter outline

This chapter summarises Year 6 (Y6, ages 9-10) pupils' attitudes towards reading, mathematics and science, and their confidence in the three subjects. The chapter also explores pupils' engagement in reading, mathematics and science, and teachers' approaches towards engaging pupils.

Within each sub-section, findings for reading are presented first, followed by findings for mathematics and then science. Outcomes for Northern Ireland are compared with those of other countries where relevant.

- In several cases, the highest-performing countries in reading, mathematics or science had relatively low percentages of pupils categorised as *Liking* these subjects; being *Confident* in these subjects; and being *Engaged* in lessons.
- In Northern Ireland, and internationally, the pupils who most like reading also had higher average achievement scores.
- The proportion of pupils in Northern Ireland who *Like Reading* was similar to the international mean, although the proportion of pupils who *Do Not Like Reading* was higher.
- Pupils in Northern Ireland who were categorised as *Motivated* or *Somewhat Motivated* readers were higher achieving than those who were *Not Motivated*.
- In Northern Ireland across science and mathematics, the pupils who were categorised into the *Like Learning Mathematics/Like Learning Science* bands were also the pupils with the highest achievement in the subject.
- Pupils' level of *Confidence in Reading* in Northern Ireland was very close to the international average. There was a positive association between reading confidence and reading achievement within most countries, including Northern Ireland.
- Within Northern Ireland, the pupils who were classified as *Confident* in mathematics and science were also the pupils who had higher average achievement scores.
- Northern Ireland had fewer pupils reported as *Engaged* in reading lessons than the international mean. Internationally, the higher achieving countries had the lowest levels of pupils with a high level of engagement. Within many countries, however, as in Northern Ireland, the pattern is more mixed.
- In Northern Ireland, a relatively high percentage of pupils in all three subjects were taught by teachers who were classified as using the listed engagement practices in *Most Lessons*.

5.1 Pupils' attitudes to reading, mathematics and science

Interpreting the data: indices and scales

In order to summarise data from a questionnaire, responses to several related items are sometimes combined to form an index or scale. The respondents to the questionnaire items are grouped according to their responses and the way in which responses have been categorised is shown for each index or scale. The data in an index or scale is often considered to be more reliable and valid than the responses to individual items.

5.1.1 Pupils' attitudes: liking the subject, reading

Table 5.1 shows the proportions of pupils categorised as *Liking*, *Somewhat Liking* and *Not Liking* reading for Northern Ireland and for comparator countries, together with the mean achievement of pupils in each category of the scale. Details on how this scale was created and the eight individual items forming the scale can be seen below the table. In this table, countries are listed in descending order of the proportion of pupils expressing the most positive attitude.

The range of pupils falling into the *Like Reading* category was from 17 per cent (Qatar) to 46 per cent (Portugal).¹ The percentage of pupils in Northern Ireland (29 per cent) who fell into this category was similar to the international mean (28 per cent). The Republic of Ireland was the highest ranking comparator country with more pupils than Northern Ireland in the *Like Reading* category (37 per cent). The two highest achieving comparator countries, Hong Kong and Singapore, had a lower *Like Reading* scale score than Northern Ireland and a lower proportion of pupils in the *Like Reading* category than the international average.

Northern Ireland had 20 per cent of pupils in the *Do Not Like Reading* category, five percentage points above the international average (15 per cent). Regarding English-speaking countries, the United States was the English-speaking country with the highest proportion of pupils in this category (22 per cent); the Republic of Ireland, Canada and New Zealand had the lowest proportion of pupils in this category (14 per cent).

Overall, pupils in Northern Ireland who like reading more had higher average achievement than those who like reading less. This pattern is reflected in most countries and in the international average. Although significance tests have not been conducted in the international analysis, based on the size of the standard errors, the differences in achievement scores are likely to be statistically significant.² The direction of causality is unknown. Able readers may come to enjoy reading more; on the other hand, pupils who enjoy reading may become better readers.

1 See Exhibit 8.1 in the international PIRLS report

2 Throughout this report, the term 'significant' refers to statistical significance.

Table 5.1 Pupils like reading³

Reported by Students

Students were scored on the *Students Like Reading* scale according to their degree of agreement with six statements and how often they did two reading activities outside of school. Students who **Like Reading** had a score on the scale of at least 11.0, which corresponds to their “agreeing a lot” with three of the six statements and “agreeing a little” with the other three, as well as doing both reading activities outside of school “every day or almost every day,” on average. Students who **Do Not Like Reading** had a score no higher than 8.2, which corresponds to their “disagreeing a little” with three of the six statements and “agreeing a little” with the other three, as well as doing both reading activities only “once or twice a month,” on average. All other students **Somewhat Like Reading**.

Country	Like Reading		Somewhat Like Reading		Do Not Like Reading		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Ireland, Rep. of	37 (1.2)	580 (2.5)	49 (0.9)	543 (3.0)	14 (0.9)	514 (4.9)	10.4 (0.07)
New Zealand	32 (0.9)	574 (2.7)	53 (0.8)	515 (2.4)	14 (0.6)	497 (3.6)	10.2 (0.05)
Australia	30 (0.9)	565 (2.7)	52 (0.8)	518 (2.8)	19 (0.7)	494 (4.0)	9.9 (0.05)
Northern Ireland	29 (1.3)	590 (3.3)	51 (1.0)	554 (2.7)	20 (0.9)	527 (3.5)	9.9 (0.07)
England	26 (1.1)	589 (3.9)	53 (0.9)	545 (2.9)	20 (1.0)	519 (4.0)	9.8 (0.06)
Finland	26 (1.0)	596 (2.6)	54 (0.9)	568 (2.3)	21 (0.9)	534 (2.2)	9.7 (0.06)
Singapore	22 (0.8)	610 (3.5)	63 (0.8)	560 (3.4)	15 (0.6)	538 (4.2)	9.8 (0.04)
Hong Kong SAR	21 (1.0)	596 (2.6)	62 (0.8)	568 (2.5)	16 (0.8)	550 (3.2)	9.7 (0.05)
International Avg.	28 (0.2)	542 (0.5)	57 (0.1)	506 (0.5)	15 (0.1)	488 (0.8)	

Centre point of scale set at 10.

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

R7

What do you think about reading? Show how much you agree with each of these statements.

Tick one box for each row.

	Agree a lot	Agree a little	Disagree a little	Disagree a lot
	↓	↓	↓	↓

a) I read only if I have to*..... — — —

b) I like talking to other people about what I read — — —

c) I would be happy if someone gave me a book as a present — — —

d) I think reading is boring*..... — — —

e) I would like to have more time for reading — — —

f) I enjoy reading — — —

* Reverse coded

R2

How often do you do these things outside of school?

Tick one box for each row.

	Every day or almost every day	Once or twice a week	Once or twice a month	Never or almost never
	↓	↓	↓	↓

a) I read for fun — — —

b) I read things that I choose myself — — —

Source: Exhibit 8.1, international PIRLS report and adapted from the international version of the PIRLS and TIMSS 2011 Student Questionnaire ⁴

3 The comparator countries (Australia, England, Finland, Hong Kong, New Zealand, Republic of Ireland and Singapore) have been included in this and all later tables. Other countries have been included where their data may be of particular interest.

4 <http://timssandpirls.bc.edu>

5.1.2 Pupils' attitudes: liking the subject, mathematics

Thirty-six per cent of Y6 pupils in Northern Ireland were in the highest category of *Like Learning Mathematics*. Pupils' attitudes were measured by their responses to five statements about learning mathematics (these statements can be seen below in Table 5.2). The international analysis uses responses to these statements to create the *Students Like Learning Mathematics* scale. Pupils were categorised into three bands: *Like Learning Mathematics*, *Somewhat Like Learning Mathematics*, and *Do Not Like Learning Mathematics* (details of how pupils were assigned to each band are provided in Table 5.2).

Compared with the participating countries in the comparator group, Northern Ireland had a relatively low percentage of pupils in the highest band of the scale. For example in Singapore 48 per cent of pupils were classified in this high *Like Learning Mathematics* category, and in Hong Kong this figure was also higher than for Northern Ireland at 47 per cent. Finland was the only comparator country with fewer pupils than Northern Ireland in the *Like Learning Mathematics* category, at 34 per cent. It may be of interest to note that most of the highest performing countries had very low levels of pupils liking mathematics at this age group.

In Northern Ireland, the average achievement score for pupils categorised in the *Like Learning Mathematics* category was high at 576. Twenty-six per cent of Y6 pupils were in the *Do Not Like Learning Mathematics* category, and the average achievement score for these pupils was lower at 546 (see Table 5.2).

The data in the international averages follow a similar trend; as liking of mathematics decreases, so does achievement. Although significance tests have not been conducted in the international analysis, based on the size of the standard errors, the differences in achievement scores for Northern Ireland are likely to be statistically significant. The direction of causality cannot be inferred from this data. Pupils who like learning mathematics may perform better in the subject, but this relationship could also work in the opposite direction; pupils who perform better in mathematics may have a more positive attitude to their lessons, and may respond to the statements about whether they like learning the subject more positively than other pupils.

Table 5.2 Pupils like learning mathematics

Reported by Students

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

Country	Like Learning Mathematics		Somewhat Like Learning Mathematics		Do Not Like Learning Mathematics		Average Scale Score
	Per cent of pupils	Average Achievement	Per cent of pupils	Average Achievement	Per cent of pupils	Average Achievement	
Singapore	48 (0.8)	625 (3.1)	33 (0.6)	597 (3.8)	19 (0.7)	577 (3.8)	9.9 (0.03)
New Zealand	47 (1.1)	491 (3.4)	35 (0.8)	486 (3.0)	18 (0.8)	481 (3.4)	9.9 (0.05)
Hong Kong SAR	47 (1.0)	619 (4.0)	36 (0.8)	591 (3.6)	17 (0.8)	582 (3.7)	9.9 (0.04)
Australia	45 (1.2)	535 (3.5)	33 (0.9)	508 (3.6)	22 (0.9)	495 (3.8)	9.7 (0.05)
England	44 (1.4)	548 (4.4)	37 (1.1)	543 (4.0)	19 (1.1)	530 (5.5)	9.8 (0.06)
Ireland, Rep. of	41 (1.6)	535 (3.8)	36 (1.0)	529 (3.2)	23 (1.1)	517 (3.3)	9.6 (0.07)
Northern Ireland	36 (1.3)	576 (3.8)	38 (1.0)	564 (3.5)	26 (1.2)	546 (5.6)	9.4 (0.06)
Finland	34 (1.2)	556 (2.9)	35 (1.0)	548 (3.3)	31 (1.3)	533 (2.6)	9.2 (0.06)
International Avg.	48 (0.2)	509 (0.5)	36 (0.1)	478 (0.6)	16 (0.1)	466 (0.9)	

Centre point of scale set at 10.

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

An “r” indicates data are available for at least 70% but less than 85% of the pupils.

MS1

How much do you agree with these statements about learning maths?

Tick one box for each row.

	Agree a lot		Agree a little		Disagree a little		Disagree a lot
	↓		↓		↓		↓
a) I enjoy learning maths	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>
b) I wish I did not have to study maths*	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>
c) Maths is boring*	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>
d) I learn many interesting things in maths	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>
e) I like maths	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>

* Reverse coded

Source: Exhibit 8.1, international mathematics report and adapted from the international version of the PIRLS and TIMSS 2011 Student Questionnaire ⁵

5 <http://timssandpirls.bc.edu>

5.1.3 Pupils' attitudes: liking the subject, science

In Northern Ireland, just over half (51 per cent) of pupils were in the highest category of the *Like Learning Science* scale, a higher percentage than the equivalent for reading and mathematics in Northern Ireland.

For this scale, pupils were scored according to their responses to five statements about learning science. Based on their responses, pupils were categorised into three bands: *Like Learning Science*, *Somewhat Like Learning Science* and *Do Not Like Learning Science*. The statements and details on how pupils were assigned to bands are provided in Table 5.3.

The comparator country with the highest percentage of pupils in the *Like Learning Science* category was the Republic of Ireland, with 59 per cent of pupils in this category. This was followed by Singapore (57 per cent), Australia (55 per cent), New Zealand (55 per cent) and Hong Kong (52 per cent). England and Finland had lower percentages of pupils than Northern Ireland classified in the highest band of *Like Learning Science*, at 44 per cent and 36 per cent respectively.

In Northern Ireland, the average achievement score for pupils in the *Like Learning Science* category was 533, whereas the average achievement score for the 13 per cent of pupils in the *Do Not Like Learning Science* category was lower at 483 (see Table 5.3). As with the mathematics findings, in Northern Ireland (and in the international averages), the lower the level of liking science the lower the achievement scores. The differences in achievement scores are likely to be statistically significant. As noted above, the data cannot identify the direction of causality.

Table 5.3 Pupils like learning science

Reported by Students

Students were scored according to their degree of agreement with five statements on the *Students Like Learning Science* scale. Students who **Like Learning Science** had a score on the scale of at least 9.7, which corresponds to their “agreeing a lot” with three of the five statements and “agreeing a little” with the other two, on average. Students who **Do Not Like Learning Science** had a score no higher than 7.6, which corresponds to their “disagreeing a little” with three of the five statements and “agreeing a little” with the other two, on average. All other students **Somewhat Like Learning Science**.

Country	Like Learning Science		Somewhat Like Learning Science		Do Not Like Learning Science		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Ireland, Rep. of	59 (1.5)	529 (3.2)	29 (1.0)	506 (4.4)	12 (1.0)	490 (9.1)	10.2 (0.07)
Singapore	57 (0.7)	600 (3.4)	31 (0.6)	567 (4.3)	12 (0.5)	555 (5.4)	10.1 (0.03)
Australia	55 (1.0)	529 (2.8)	31 (0.7)	506 (3.9)	14 (0.7)	496 (5.2)	10.0 (0.05)
New Zealand	55 (1.1)	512 (2.5)	32 (0.8)	486 (3.7)	13 (0.8)	468 (5.5)	10.0 (0.05)
Hong Kong SAR	52 (1.3)	551 (3.5)	35 (0.9)	523 (4.9)	14 (0.8)	507 (6.6)	9.9 (0.05)
Northern Ireland	51 (1.4)	533 (2.5)	36 (1.1)	509 (3.9)	13 (0.8)	483 (5.4)	9.8 (0.06)
England	44 (1.5)	535 (4.1)	35 (1.1)	528 (4.1)	21 (1.1)	518 (3.9)	9.4 (0.07)
Finland	36 (1.2)	578 (3.2)	39 (1.0)	571 (3.2)	25 (1.1)	561 (3.4)	9.1 (0.06)
International Avg.	53 (0.2)	504 (0.5)	35 (0.1)	469 (0.7)	12 (0.1)	461 (1.1)	

Centre point of scale set at 10.

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

MS4

How much do you agree with these statements about learning science?

Tick one box for each row.

	Agree a lot		Agree a little		Disagree a little		Disagree a lot
a) I enjoy learning science -----	<input type="checkbox"/>	-----	<input type="checkbox"/>	-----	<input type="checkbox"/>	-----	<input type="checkbox"/>
b) I wish I did not have to study science*-----	<input type="checkbox"/>	-----	<input type="checkbox"/>	-----	<input type="checkbox"/>	-----	<input type="checkbox"/>
d) Science is boring*-----	<input type="checkbox"/>	-----	<input type="checkbox"/>	-----	<input type="checkbox"/>	-----	<input type="checkbox"/>
e) I learn many interesting things in science -----	<input type="checkbox"/>	-----	<input type="checkbox"/>	-----	<input type="checkbox"/>	-----	<input type="checkbox"/>
f) I like science -----	<input type="checkbox"/>	-----	<input type="checkbox"/>	-----	<input type="checkbox"/>	-----	<input type="checkbox"/>

* Reverse coded

Source: Exhibit 8.1, international science report and adapted from the international version of the PIRLS and TIMSS 2011 Student Questionnaire ⁶

6 <http://timssandpirls.bc.edu>

5.2 Motivation to read

Table 5.4 shows pupils' self-reported motivation to read in Northern Ireland and comparator countries, along with their average achievement. Countries are listed in order of the percentage of pupils falling into the *Motivated* category. This scale was created by collapsing responses to six different questions. More detail on how the scale was created can be seen below Table 5.4.

The average proportion of pupils in the *Motivated* category was 74 per cent and ranged from 92 per cent (Georgia) to 52 per cent (Hong Kong).⁷ Northern Ireland had 65 per cent of pupils in this category. With the exception of the Republic of Ireland, all comparator countries had proportions of pupils below the international average for pupils in the *Motivated* category. Generally, the countries with the highest achievement were those with the lowest proportions of motivated pupils. The Russian Federation is the exception, recording both high achievement and high levels of motivation.

Conversely, as shown by the international averages, there was a general trend within most countries that pupils' achievement rose with their motivation. Northern Ireland, however, was one of the few examples where this was not the case and pupils had equal achievement in the *Somewhat Motivated* and the *Motivated* category, although pupil achievement was lower in the *Not Motivated* category. Northern Ireland had a slightly higher percentage of pupils who were *Not Motivated* to read (7 per cent) than the international average (5 per cent).

⁷ See Exhibit 8.2 in the international PIRLS report

Table 5.4 Pupils motivated to read

Reported by Students

Students were scored according to their degree of agreement with six statements on the *Students Motivated to Read* scale. Students **Motivated** to read had a score on the scale of at least 8.7, which corresponds to their “agreeing a lot” with three of the six statements and “agreeing a little” with the other three, on average. Students who were **Not Motivated** had a score no higher than 6.8, which corresponds to their “disagreeing a little” with three of the six statements and “agreeing a little” with the other three, on average. All other students were **Somewhat Motivated To Read**.

Country	Motivated		Somewhat Motivated		Not Motivated		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Ireland, Rep. of	75 (1.0)	554 (2.6)	20 (0.9)	551 (4.1)	4 (0.4)	523 (5.6)	10.0 (0.05)
New Zealand	72 (0.9)	536 (2.1)	23 (0.9)	533 (3.7)	5 (0.4)	483 (6.6)	9.8 (0.04)
Australia	71 (1.0)	532 (2.7)	23 (0.9)	527 (3.2)	7 (0.5)	493 (5.7)	9.7 (0.05)
Northern Ireland	65 (1.2)	561 (2.7)	29 (1.0)	561 (2.9)	7 (0.6)	533 (5.5)	9.4 (0.05)
England	65 (1.4)	551 (2.9)	28 (1.2)	559 (3.2)	7 (0.5)	531 (7.8)	9.4 (0.06)
Singapore	60 (0.7)	576 (3.5)	31 (0.6)	562 (3.6)	8 (0.4)	533 (5.6)	9.3 (0.03)
Finland	59 (1.1)	570 (2.2)	34 (1.0)	571 (2.4)	7 (0.6)	543 (4.4)	9.2 (0.05)
Hong Kong SAR	52 (1.0)	577 (2.4)	34 (0.8)	570 (2.8)	15 (0.8)	551 (3.8)	8.9 (0.05)
International Avg.	74 (0.1)	518 (0.4)	21 (0.1)	503 (0.7)	5 (0.1)	474 (1.3)	

Centre point of scale set at 10.

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

R9

Do you read for any of the following reasons? Show how much you agree with each of these statements.

Tick one box for each row.

	Agree a lot	Agree a little	Disagree a little	Disagree a lot
	↓	↓	↓	↓
a) I like to read things that make me think	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) It is important to be a good reader	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) My family like it when I read	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) I learn a lot from reading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) I need to read well for my future	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) I like it when a book helps me to imagine other worlds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Motivated 8.7 Somewhat Motivated 6.8 Not Motivated

Source: Exhibit 8.2, international PIRLS report and adapted from the international version of the PIRLS and TIMSS 2011 Student Questionnaire ⁸

8 <http://timssandpirls.bc.edu>

5.3 Pupils' confidence in reading, mathematics and science

5.3.1 Pupils' confidence in reading

Table 5.5 shows pupils' reports of their confidence in reading, categorised into three confidence bands, together with pupil average achievement for each confidence band. Northern Ireland and comparator countries are listed in descending order of the proportion of pupils who fell into the *Confident* category. The scale used in this table was made by collapsing pupils' responses to seven individual items. The individual questions and the scale can be seen below Table 5.5.

Israel had the highest proportion (49 per cent) of *Confident* pupils, while Morocco had the lowest (17 per cent);⁹ the average being 36 per cent. Northern Ireland had proportions of pupils very close to the average at all three levels of confidence in reading. Pupils in the Republic of Ireland were the most confident English-speaking pupils at reading, with 44 per cent in the *Confident* category, although Finland was the comparator country with the highest proportion of pupils in this category (48 per cent). Three of the four top performing countries internationally (Hong Kong, Singapore and Russian Federation) had some of the lowest percentages of pupils in the *Confident* category. Within most participating countries there was a positive association between reading confidence and average achievement, and this association applied in Northern Ireland.

9 See Exhibit 8.3 in the international PIRLS report

Table 5.5 Pupils confident in reading

Reported by Students

Students were scored according to their degree of agreement with seven statements on the *Students Confident in Reading Scale*. Students **Confident** in reading had a score on the scale of at least 10.6, which corresponds to their “agreeing a lot” with four of the seven statements and “agreeing a little” with the other three, on average. Students who were **Not Confident** had a score no higher than 7.9, which corresponds to their “disagreeing a little” with four of the seven statements and “agreeing a little” with the other three, on average. All other students were **Somewhat Confident** in reading.

Country	Confident		Somewhat Confident		Not Confident		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Finland	48 (1.2)	590 (2.0)	47 (1.1)	552 (2.3)	5 (0.5)	507 (6.7)	10.5 (0.05)
Ireland, Rep. of	44 (1.1)	580 (2.1)	49 (1.1)	537 (2.9)	8 (0.6)	490 (5.0)	10.3 (0.05)
Australia	37 (0.9)	568 (2.4)	53 (0.8)	515 (2.5)	10 (0.6)	451 (5.4)	10.1 (0.04)
England	37 (1.1)	589 (2.8)	53 (1.2)	539 (3.0)	10 (0.6)	483 (6.0)	10.0 (0.1)
Northern Ireland	35 (1.0)	591 (3.1)	55 (1.1)	549 (2.8)	10 (0.6)	501 (4.7)	10.0 (0.04)
New Zealand	27 (0.8)	585 (2.9)	61 (0.8)	523 (2.2)	13 (0.6)	471 (4.2)	9.6 (0.04)
Singapore	26 (0.7)	607 (3.3)	61 (0.6)	565 (3.0)	13 (0.6)	504 (5.2)	9.5 (0.03)
Hong Kong SAR	20 (0.9)	601 (2.4)	62 (0.8)	571 (2.6)	18 (0.9)	538 (3.3)	9.2 (0.05)
International Avg.	36 (0.2)	547 (0.4)	53 (0.1)	502 (0.4)	11 (0.1)	456 (0.8)	

Centre point of scale set at 10.

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

R8

How well do you read? Show how much you agree with each of these statements.

Tick one box for each row.

	Agree a lot	Agree a little	Disagree a little	Disagree a lot
	↓	↓	↓	↓
a) I usually do well in reading -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Reading is easy for me -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Reading is harder for me than for many of the children in my class* -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) If a book is interesting, I don't care how hard it is to read -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) I have trouble reading stories with difficult words* -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) My teacher tells me I am a good reader -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Reading is harder for me than any other subject -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* Reverse coded

Source: Exhibit 8.3 international PIRLS report and adapted from the international version of the PIRLS and TIMSS 2011 Student Questionnaire ¹⁰

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5.3.2 Pupils' confidence in mathematics

In terms of confidence in mathematics among Y6 pupils in Northern Ireland, just over a third of pupils (35 per cent) were in the highest category of being *Confident* in mathematics, with 44 per cent in the *Somewhat Confident* category, and 21 per cent categorised as *Not Confident* in mathematics (see Table 5.6). As with pupil attitudes, pupil confidence was measured by their responses to a set of statements about their mathematical skills and abilities. Pupils were then categorised into one of the three bands: *Confident*, *Somewhat Confident* and *Not Confident* (details of the statements used and how pupils were assigned to each band are provided in Table 5.6).

Among the comparator group of countries, Northern Ireland had the third highest percentage of pupils classified as *Confident*. Within this group of countries, the Republic of Ireland had the largest percentage of pupils in this category (43 per cent), followed by Australia at 38 per cent. Finland had the same figure as Northern Ireland at 35 per cent.

Among the highest performing countries in mathematics at this age group, the overall levels of pupils' confidence were fairly low, as was the case for positive attitudes towards mathematics. For example, Hong Kong and Singapore both had high mathematics achievement among 9-10 year olds, but low percentages of pupils who are *Confident* in mathematics, at 24 per cent and 21 per cent respectively.

As with pupil attitudes, the findings show that as pupil confidence decreases, so does achievement; pupil achievement in mathematics is higher among those pupils classified as having a higher level of confidence in the subject. In Northern Ireland, among the pupils who were classified as being *Confident* in mathematics the average achievement was very high at 598; and among the pupils who were classified as *Not Confident* in mathematics the average achievement was lower at 519. The differences in achievement data are likely to be statistically significant across the three categories. As with pupil attitudes, the data cannot identify the direction of causality. It could be that pupils who are confident in mathematics are better at it, or the opposite may be true, that pupils who are better at mathematics are more confident in the subject.

Table 5.6 Pupils confident in mathematics

Reported by Students

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

Country	Confident		Somewhat Confident		Not Confident		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Ireland, Rep. of	43 (1.2)	552 (3.7)	41 (1.0)	520 (3.5)	16 (0.8)	489 (4.4)	10.3 (0.05)
Australia	38 (0.9)	550 (3.5)	41 (0.9)	507 (3.1)	21 (0.7)	478 (4.3)	10.1 (0.04)
Northern Ireland	35 (1.3)	598 (4.0)	44 (1.2)	557 (3.0)	21 (0.8)	519 (5.0)	10.0 (0.05)
Finland	35 (0.8)	579 (3.0)	42 (0.7)	543 (2.6)	23 (0.7)	503 (3.2)	9.9 (0.03)
England	33 (1.0)	572 (4.6)	48 (0.9)	538 (3.8)	19 (0.7)	503 (4.4)	10.0 (0.04)
New Zealand	25 (0.7)	520 (3.7)	50 (0.8)	484 (2.9)	25 (0.6)	459 (3.6)	9.6 (0.03)
Hong Kong SAR	24 (0.9)	641 (3.1)	44 (0.9)	600 (5.1)	31 (1.0)	575 (2.9)	9.4 (0.05)
Singapore	21 (0.8)	658 (2.8)	41 (0.7)	614 (3.3)	38 (1.0)	570 (3.1)	9.2 (0.04)
International Avg.	34 (0.1)	527 (0.5)	46 (0.1)	484 (0.5)	21 (0.1)	452 (0.7)	

Centre point of scale set at 10.

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

MS3

How much do you agree with these statements about maths?

Tick one box for each row.

	Agree a lot	Agree a little	Disagree a little	Disagree a lot
	↓	↓	↓	↓
a) I usually do well in maths	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Maths is harder for me than for many of the children in my class*.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) I am just not good at maths*.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) I learn things quickly in maths	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) I am good at working out difficult maths problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) My teacher tells me I am good at maths	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Maths is harder for me than any other subject*.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* Reverse coded

Source: Exhibit 8.4, international mathematics report and adapted from the international version of the PIRLS and TIMSS 2011 Student Questionnaire ¹¹

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5.3.3 Pupils' confidence in science

In Northern Ireland, 37 per cent of pupils were categorised as being *Confident* in science, with 40 per cent categorised as *Somewhat Confident*, and 23 per cent categorised as *Not Confident* in science (see Table 5.7). Confidence was measured by pupils' responses to six statements on the *Students Confident in Science* scale. Based on their responses, pupils were categorised into three bands: *Confident*, *Somewhat Confident* or *Not Confident* (Table 5.7 gives details of the statements and how the scale was derived).

Looking across the group of comparator countries, the Republic of Ireland has the largest percentage of pupils categorised as *Confident* in science, at 47 per cent, followed by Australia at 42 per cent. Finland, at 38 per cent, has a very similar figure to Northern Ireland. Among the highest performing countries in science at this age group, the levels of pupils' confidence are fairly low. For example, Singapore and Hong Kong both perform very well overall in terms of science achievement among 9 to 10 year olds, but have low percentages of pupils found to be *Confident* in science, at 26 per cent and 25 per cent respectively.

As with mathematics, pupil achievement was higher among those pupils with a higher level of confidence. In Northern Ireland, among the pupils who were found to be *Confident* in science the average achievement was 537, and among the pupils who were found to be *Not Confident* in science the average achievement was lower at 482. The differences in achievement data are likely to be statistically significant across the three categories. This pattern is also true across the comparator countries; within each country as the level of pupils' confidence decreases, so do the average achievement scores.

Table 5.7 Pupils confident in science

Reported by Students

Students were scored according to their degree of agreement with six statements on the *Students Confident in Science* scale. Students **Confident** with science had a score on the scale of at least 10.1, which corresponds to their “agreeing a lot” with three of the six statements and “agreeing a little” with the other three, on average. Students who were **Not Confident** had a score no higher than 8.3, which corresponds to their “disagreeing a little” with three of the six statements and “agreeing a little” with the other three, on average. All other students were **Somewhat Confident** with science.

Country	Confident		Somewhat Confident		Not Confident		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Ireland, Rep. of	47 (1.5)	533 (3.6)	36 (1.1)	516 (3.7)	17 (1.0)	481 (7.0)	10.1 (0.06)
Australia	42 (1.0)	535 (3.2)	36 (0.9)	516 (3.4)	22 (0.9)	484 (4.4)	9.9 (0.04)
Finland	38 (1.1)	587 (3.3)	43 (0.9)	571 (2.6)	19 (0.8)	540 (4.6)	9.7 (0.04)
Northern Ireland	37 (1.4)	537 (2.9)	40 (1.0)	520 (3.0)	23 (1.1)	482 (4.4)	9.7 (0.05)
England	33 (1.3)	549 (4.5)	38 (1.1)	530 (3.8)	29 (1.1)	506 (3.4)	9.5 (0.05)
New Zealand	28 (1.2)	530 (3.4)	40 (1.0)	504 (3.5)	32 (1.0)	463 (3.6)	9.3 (0.05)
Singapore	26 (0.6)	620 (3.6)	36 (0.6)	592 (3.6)	37 (0.7)	552 (4.0)	9.1 (0.03)
Hong Kong SAR	25 (0.9)	560 (4.6)	36 (0.9)	539 (3.8)	39 (1.3)	516 (4.8)	9.1 (0.05)
International Avg.	43 (0.2)	514 (0.5)	36 (0.1)	480 (0.6)	21 (0.1)	446 (0.8)	

Centre point of scale set at 10.

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

MS6

How much do you agree with these statements about science?

Tick one box for each row.

	Agree a lot ↓		Agree a little ↓		Disagree a little ↓		Disagree a lot ↓
a) I usually do well in science	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>
b) Science is harder for me than for many of the other children in my class*	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>
c) I am just not good at science*	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>
d) I learn things quickly in science	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>
e) My teacher tells me I am good at science	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>
f) Science is harder for me than any other subject*	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>	—	<input type="checkbox"/>

* Reverse coded

Source: Exhibit 8.4, international science report and adapted from the international version of the PIRLS and TIMSS 2011 Student Questionnaire¹²

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5.4 Teaching to engage pupils in learning in reading, mathematics and science

5.4.1 Engagement in reading

Pupils' reported engagement in reading lessons

Table 5.8 shows the engagement of pupils in reading lessons in Northern Ireland and comparator countries, ranked in descending order based on percentage of pupils in the *Engaged* category. This table is based on a scale, which was made by the amalgamation of responses to seven pupil self-report questions. The questions used to make this scale can be seen below Table 5.8.

The proportions of pupils in the *Engaged* category ranged from 71 per cent (Indonesia) to 15 per cent (Finland).¹³ Northern Ireland had 37 per cent of pupils in the *Engaged* category, which is below the international mean of 42 per cent. Northern Ireland scored above all comparator countries, with the exception of the Republic of Ireland (43 per cent).

Internationally there was a significant negative association between pupils' reported level of engagement in reading lessons and a country's overall achievement. This is exemplified by Finland, one of the highest achieving countries which also recorded the smallest proportion of *Engaged* pupils. In contrast, the Russian Federation stood out as both high achieving and with high reported levels of pupil engagement.

Within Northern Ireland, in contrast to the international averages, there was no association between engagement and achievement.

¹³ See Exhibit 8.7 in the international PIRLS report

Table 5.8 Pupils engaged in reading lessons

Reported by Students

Students were scored according to their degree of agreement with seven statements on the *Engaged in Reading Lessons* scale. Students **Engaged** in reading lessons had a score on the scale of at least 10.5, which corresponds to their “agreeing a lot” with four of the seven statements and “agreeing a little” with the other three, on average. Students who were **Not Engaged** had a score no higher than 7.4, which corresponds to their “disagreeing a little” with four of the seven statements and “agreeing a little” with the other three, on average. All other students were **Somewhat Engaged** in reading lessons.

Country	Engaged		Somewhat Engaged		Not Engaged		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Ireland, Rep. of	43 (1.5)	557 (2.5)	49 (1.2)	550 (3.0)	8 (0.7)	541 (5.6)	10.0 (0.07)
Northern Ireland	37 (1.4)	561 (3.5)	55 (1.2)	559 (2.9)	8 (0.7)	551 (5.4)	9.8 (0.06)
New Zealand	34 (1.1)	534 (3.1)	57 (1.0)	533 (1.8)	9 (0.7)	520 (7.0)	9.7 (0.04)
England	34 (1.5)	551 (4.0)	57 (1.2)	554 (2.8)	9 (0.8)	541 (6.1)	9.6 (0.06)
Australia	33 (1.1)	538 (3.7)	56 (0.9)	526 (2.5)	11 (0.7)	509 (4.4)	9.6 (0.05)
Singapore	31 (0.8)	575 (3.6)	57 (0.7)	568 (3.6)	13 (0.6)	554 (4.4)	9.5 (0.03)
Hong Kong SAR	24 (1.0)	578 (2.5)	58 (0.7)	571 (2.5)	18 (1.0)	563 (3.8)	9.1 (0.06)
Finland	15 (0.8)	568 (3.6)	65 (1.0)	573 (2.1)	20 (1.0)	553 (2.8)	8.7 (0.04)
International Avg.	42 (0.2)	519 (0.5)	50 (0.2)	510 (0.5)	8 (0.1)	494 (1.0)	

Centre point of scale set at 10.

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

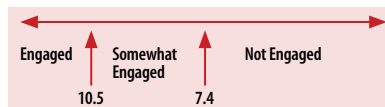
R5

Think about the reading you do for school. How much do you agree with these statements about your reading lessons?

Tick *one* box for each row.

	Agree a lot	Agree a little	Disagree a little	Disagree a lot
a) I like what I read about in school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) My teacher gives me interesting things to read	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) I know what my teacher expects me to do	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) I think of things not related to the lesson*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) My teacher is easy to understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) I am interested in what my teacher says	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) My teacher gives me interesting things to do	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* Reverse coded



Source: Exhibit 8.7, international PIRLS report and adapted from the international version of the PIRLS and TIMSS 2011 Student Questionnaire ¹⁴

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Teachers' reported approaches to engaging pupils in reading

Interpreting the data: percentages in tables

The data in this section is derived from teacher reports. Reported percentages refer to pupils and can usually be interpreted as the percentage of pupils whose teachers reported a particular practice or circumstance.

Y6 pupils were sampled by class. The Y6 teacher questionnaire would, in most cases therefore, have been completed by the class teacher of the sampled class. However, in some cases, it might have been completed by different teachers who teach these pupils reading, mathematics and/or science separately.

This means that the teacher-derived data for reading, mathematics and science may differ slightly as the sample of teachers in each group is not necessarily the same or the distribution of pupils within the sample of teachers may differ by subject.

Table 5.9 shows the percentage of pupils in Northern Ireland and comparator countries whose teachers reported using the listed teaching practices in *Most (every or almost every lesson)*, *About Half*, or *Some* of their lessons, based on a scale. Countries are ranked in descending order of the percentage of pupils who were taught via these engaging teaching strategies in *Most* of their lessons. The scale was formed by collapsing teachers' responses to six questions relating to their use of the specified teaching practices. The six questions, and the resulting scale, can be seen in Table 5.9.

The average proportion of pupils whose teachers reported using these engaging teaching strategies in *Most* of their lessons was 71 per cent; the proportions ranged from 94 per cent in Romania to 23 per cent in Denmark.¹⁵ In Northern Ireland this proportion was 78 per cent. Internationally, within countries, including within Northern Ireland, the relationship between teachers' reported use of engaging teaching practices and pupil achievement is unclear, based on the size of the standard errors.

¹⁵ See Exhibit 8.6 in the international PIRLS report

Table 5.9 Teaching to engage pupils in learning to read

Reported by Teachers

Students were scored according to their teachers' responses to how often they used each of six instructional practices on the *Engaging Students in Learning* scale. Students with teachers who used engagement practices in **Most Lessons** had a score on the scale of at least 9.1, which corresponds to their teachers using three of the six practices "every or almost every lesson" and using the other three in "about half the lessons," on average. Students with teachers who used engagement practices in **Some Lessons** had a score no higher than 5.9, which corresponds to their teachers using three of the six practices in "some lessons" and using the other three in "about half the lessons," on average. All other students had teachers who used engagement practices in **About Half the Lessons**.

Country	Most lessons		About Half the Lessons		Some Lessons		Average Scale Score
	Per cent of students	Average Achievement	Per cent of students	Average Achievement	Per cent of students	Average Achievement	
England	91 (2.2)	551 (3.0)	9 (2.2)	548 (11.5)	0 (0.2)	~ ~	10.5 (0.14)
Northern Ireland	r 78 (3.7)	559 (3.1)	21 (3.8)	565 (6.6)	1 (0.6)	~ ~	9.8 (0.13)
Australia	r 77 (3.3)	534 (3.0)	23 (3.3)	523 (4.7)	0 (0.2)	~ ~	10.0 (0.13)
Singapore	71 (2.4)	569 (4.2)	27 (2.4)	560 (6.3)	2 (0.8)	~ ~	10.0 (0.12)
Ireland, Rep. of	67 (3.2)	552 (2.8)	32 (3.2)	552 (4.6)	1 (0.5)	~ ~	9.8 (0.14)
New Zealand	66 (3.0)	537 (2.6)	34 (3.0)	527 (5.0)	0 (0.2)	~ ~	9.6 (0.09)
Hong Kong SAR	60 (4.6)	567 (3.4)	35 (4.7)	576 (4.5)	5 (1.9)	572 (15.1)	9.5 (0.19)
Finland	33 (3.2)	570 (2.9)	61 (3.2)	566 (2.3)	6 (1.4)	574 (7.0)	8.3 (0.11)
International Avg.	71 (0.5)	513 (0.5)	27 (0.5)	509 (1.1)	2 (0.1)	~ ~	

Centre point of scale set at 10.

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

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

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

G15

How often do you do the following in teaching this class?

Tick **one** circle for each row.

Every or almost every lesson
About half the lessons
Some lessons
Never

a) Summarise what pupils should have learned from the lesson ----- ○ — ○ — ○ — ○

b) Relate the lesson to pupils' daily lives ----- ○ — ○ — ○ — ○

c) Use questioning to elicit reasons and explanations ----- ○ — ○ — ○ — ○

d) Encourage all pupils to improve their performance --- ○ — ○ — ○ — ○

e) Praise pupils for good effort ----- ○ — ○ — ○ — ○

f) Bring interesting materials to class ----- ○ — ○ — ○ — ○

Source: Exhibit 8.6., international PIRLS report and adapted from the international version of the PIRLS and TIMSS 2011 Teacher Questionnaire¹⁶

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5.4.2 Engagement in mathematics

Pupils' reported engagement in mathematics lessons

Pupil engagement was measured by pupils' responses to five statements about their mathematics lessons, and further details on these statements can be found in Table 5.10. The international analysis used responses to these statements to create the *Students Engaged in Mathematics Lessons* scale. Pupils were then categorised into three bands: *Engaged in Mathematics Lessons*, *Somewhat Engaged in Mathematics Lessons*, and *Not Engaged in Mathematics Lessons* (details of how pupils were assigned to each band are provided in Table 5.10).

Table 5.10 shows that in Northern Ireland, 39 per cent of pupils were classified as being *Engaged* in mathematics lessons, 53 per cent *Somewhat Engaged*, and a much smaller percentage of 8 per cent as *Not Engaged*. The Republic of Ireland was the comparator country with the largest percentage of pupils classified as *Engaged* in mathematics lessons, at 45 per cent. This was followed by Australia and England, each with 41 per cent of pupils being categorised at the high end of the scale. The comparator country with the fewest pupils in the high engagement category was Finland, at 21 per cent.

Looking across other TIMSS participants, there does not seem to be a consistent relationship between the countries with the highest levels of pupil engagement and the countries with the highest overall achievement scores; many of the highest performing countries had very low percentages of pupils classified as being engaged in mathematics lessons. This shows that having high overall performance in mathematics is not necessarily indicative of having a high level of reported pupil engagement.

The international averages indicate a trend: a higher level of engagement is associated with higher achievement. However, as with many of the variables regarding pupil attitudes, the data cannot identify the direction of causality: pupils who are good at mathematics may be more engaged in their lessons; alternatively, pupils who are engaged in their mathematics lessons may perform better at mathematics.

Although internationally the data suggests that there is an association between engagement and achievement that is likely to be significant, the apparent differences across the three categories in Northern Ireland are not likely to be significant.

Table 5.10 Pupils engaged in mathematics lessons

Reported by Students

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

Country	Engaged		Somewhat Engaged		Not Engaged		Average Scale Score
	Per cent of students	Average Achievement	Per cent of students	Average Achievement	Per cent of students	Average Achievement	
Ireland, Rep. of	45 (1.3)	538 (3.6)	47 (1.1)	522 (3.3)	8 (0.6)	516 (5.0)	10.0 (0.06)
Australia	41 (1.2)	534 (3.1)	50 (1.1)	506 (3.8)	9 (0.5)	503 (5.3)	9.9 (0.05)
England	41 (1.6)	548 (4.8)	51 (1.4)	540 (3.7)	8 (0.6)	538 (7.7)	9.8 (0.06)
Northern Ireland	39 (1.3)	574 (4.1)	53 (1.1)	558 (3.7)	8 (0.7)	545 (8.2)	9.8 (0.05)
New Zealand	36 (1.0)	495 (3.1)	56 (0.9)	484 (3.0)	8 (0.4)	477 (6.1)	9.7 (0.04)
Singapore	36 (0.8)	626 (3.2)	51 (0.7)	598 (3.4)	13 (0.6)	587 (4.3)	9.6 (0.04)
Hong Kong SAR	33 (1.1)	618 (4.2)	52 (0.9)	595 (3.6)	15 (0.8)	590 (4.7)	9.5 (0.06)
Finland	21 (0.9)	559 (3.1)	59 (0.9)	545 (2.5)	21 (1.0)	536 (3.3)	8.8 (0.05)
International Avg.	42 (0.2)	507 (0.5)	49 (0.2)	482 (0.5)	8 (0.1)	464 (1.0)	

Centre point of scale set at 10.

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

MS2

How much do you agree with these statements about your maths lessons?

Tick **one** box for each row.

	Agree a lot	Agree a little	Disagree a little	Disagree a lot
a) I know what my teacher expects me to do	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) I think of things not related to the lesson*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) My teacher is easy to understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) I am interested in what my teacher says	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) My teacher gives me interesting things to do	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* Reverse coded

Source: Exhibit 8.17, international mathematics report and adapted from the international version of the PIRLS and TIMSS 2011 Student Questionnaire ¹⁷

17 <http://timssandpirls.bc.edu>

Teachers' reported approaches to engaging pupils in mathematics lessons

For this scale measure, pupils were scored according to their teachers' responses to how often they used each of six instructional practices in their lessons. Table 5.11 provides further information on the statements to which teachers responded, and how the bands were categorised.

Table 5.11 presents the data for Northern Ireland. It shows that the majority of pupils (80 per cent) were taught by teachers who were categorised as using the listed engagement practices in *Most Lessons*; among this group the average achievement score in Y6 mathematics was 560.

Among the comparator countries, Northern Ireland had a relatively high percentage of pupils taught mathematics by teachers who were categorised as using engagement practices in *Most Lessons*, with only England reporting a slightly higher percentage at 86 per cent.

Several high-performing countries had small percentages of pupils taught by teachers who used the engagement practices in most lessons.

While there is an international association between frequency of using the listed engagement practices and pupil achievement, the apparent difference in Northern Ireland is not likely to be significant.

Table 5.11 Teaching to engage pupils in learning mathematics

Reported by Teachers

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

Country	Most Lessons		About Half the Lessons		Some Lessons		Average Scale Score
	Per cent of students	Average Achievement	Per cent of students	Average Achievement	Per cent of students	Average Achievement	
England	86 (3.1)	545 (3.9)	14 (3.1)	538 (11.8)	0 (0.0)	~ ~	10.3 (0.14)
Northern Ireland	r 80 (3.5)	560 (3.9)	18 (3.5)	576 (7.4)	2 (1.3)	~ ~	9.8 (0.14)
Australia	r 77 (3.5)	522 (4.0)	23 (3.5)	510 (6.1)	0 (0.2)	~ ~	10.0 (0.13)
Ireland, Rep. of	68 (3.1)	524 (3.0)	31 (3.1)	534 (5.7)	1 (0.5)	~ ~	9.8 (0.12)
New Zealand	67 (3.0)	486 (3.6)	33 (3.0)	487 (4.9)	0 (0.1)	~ ~	9.7 (0.10)
Singapore	60 (2.7)	606 (4.7)	36 (2.7)	603 (5.7)	4 (1.1)	626 (14.2)	9.3 (0.10)
Hong Kong SAR	52 (4.3)	609 (4.1)	44 (4.2)	598 (4.6)	4 (1.8)	555 (51.1)	9.1 (0.18)
Finland	34 (3.1)	551 (3.0)	60 (3.2)	543 (3.4)	6 (1.4)	549 (5.8)	8.3 (0.10)
International Avg.	69 (0.5)	492 (0.6)	30 (0.5)	488 (1.0)	2 (0.1)	~ ~	

Centre point of scale set at 10.

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

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

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

G15

How often do you do the following in teaching this class?

Tick **one** circle for each row.

Every or almost every lesson
About half the lessons
Some lessons
Never

a) Summarise what pupils should have learned from the lesson ----- - - -

b) Relate the lesson to pupils' daily lives ----- - - -

c) Use questioning to elicit reasons and explanations ----- - - -

d) Encourage all pupils to improve their performance --- - - -

e) Praise pupils for good effort ----- - - -

f) Bring interesting materials to class ----- - - -

←-----→
Most Lessons About Half the Lessons Some Lessons
9.1 6.0

Source: Exhibit 8.14, international mathematics report and adapted from the international version of the PIRLS and TIMSS 2011 Teacher Questionnaire ¹⁸

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5.4.3 Engagement in science

Pupils' reported engagement in science lessons

Pupil engagement was measured by pupils' responses to five statements about their science lessons. Based on their responses, pupils were categorised into three bands: *Engaged in Science Lessons*, *Somewhat Engaged in Science Lessons*, and *Not Engaged in Science Lessons*. Details on these statements and how pupils were assigned to each band are provided in Table 5.12.

As seen in Table 5.12, 44 per cent of pupils in Northern Ireland were categorised as being *Engaged* in science lessons, 49 per cent as *Somewhat Engaged*, and a minority (8 per cent) as *Not Engaged*.

Among the group of comparator countries, the Republic of Ireland had the largest percentage of pupils classified as *Engaged* in science lessons, at 51 per cent. This was followed by Australia, with 46 per cent of pupils categorised at the high end of the scale. England had the same percentage of pupils in this high engagement category as Northern Ireland at 44 per cent. The comparator country with the fewest pupils in the high engagement category was Finland, at 23 per cent.

Looking across other TIMSS participants, there does not seem to be a consistent relationship between the countries with the highest levels of pupil engagement and the countries with the highest overall achievement scores; several of the highest performing countries had lower percentages of pupils classified as being engaged in science lessons. This shows that having high overall performance in science is not necessarily indicative of having a high level of reported pupil engagement.

The international averages indicate a trend: a higher level of engagement is associated with higher achievement. However, as with many of the variables regarding pupil attitudes, the data cannot identify the direction of causality: pupils who are good at science may be more engaged in their lessons; alternatively, pupils who are engaged in their science lessons may perform better at science.

Although internationally the data suggests that there is an association between engagement and achievement that is likely to be significant, it is not clear whether the same applies in Northern Ireland.¹⁹

¹⁹ One of the apparent differences in Northern Ireland is likely to be borderline significant and would need to be tested statistically.

Table 5.12 Pupils engaged in science lessons

Reported by Students

Students were scored according to their degree of agreement with five statements on the *Engaged in Science Lessons* scale. Students **Engaged** in science lessons had a score on the scale of at least 10.1, which corresponds to their “agreeing a lot” with three of the five statements and “agreeing a little” with the other two, on average. Students who were **Not Engaged** had a score no higher than 7.4, which corresponds to their “disagreeing a little” with three of the five statements and “agreeing a little” with the other two, on average. All other students were **Somewhat Engaged** in science lessons.

Country	Engaged		Somewhat Engaged		Not Engaged		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Ireland, Rep. of	51 (1.3)	529 (3.5)	41 (1.0)	506 (4.2)	8 (0.7)	503 (6.3)	10.2 (0.06)
Australia	46 (1.0)	532 (2.9)	44 (0.9)	506 (3.4)	9 (0.6)	498 (6.9)	10.0 (0.05)
Northern Ireland	44 (1.4)	531 (3.3)	49 (1.2)	509 (3.6)	8 (0.7)	495 (7.0)	9.9 (0.05)
England	44 (1.2)	534 (4.1)	47 (1.1)	527 (3.2)	9 (0.7)	520 (5.6)	9.8 (0.05)
Singapore	40 (0.8)	604 (3.3)	49 (0.7)	572 (4.0)	11 (0.5)	567 (5.3)	9.7 (0.04)
New Zealand	39 (0.9)	511 (3.0)	51 (0.9)	490 (3.0)	10 (0.6)	488 (4.7)	9.7 (0.04)
Hong Kong SAR	34 (1.2)	550 (3.7)	50 (1.1)	527 (5.3)	16 (0.8)	528 (4.0)	9.4 (0.06)
Finland	23 (0.9)	578 (3.7)	57 (1.1)	571 (2.8)	20 (1.0)	565 (3.5)	8.8 (0.04)
International Avg.	45 (0.2)	504 (0.6)	47 (0.2)	476 (0.6)	8 (0.1)	457 (1.2)	

Centre point of scale set at 10.

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

MS5

How much do you agree with these statements about your science lessons?

Tick one box for each row.

	Agree a lot	Agree a little	Disagree a little	Disagree a lot
a) I know what my teacher expects me to do	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) I think of things not related to the lesson*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) My teacher is easy to understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) I am interested in what my teacher says	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) My teacher gives me interesting things to do	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) My teacher is good at letting me know how my learning can be improved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* Reverse coded

Source: Exhibit 8.17, international science report and adapted from the international version of the PIRLS and TIMSS 2011 Student Questionnaire ²⁰

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Teachers' reported approaches to engaging pupils in science

For this scale, pupils were scored according to their teachers' responses to how often they used each of six instructional practices in their lessons. Table 5.13 provides further information on the statements to which teachers responded, and how the bands were categorised.

Within Northern Ireland, the majority of pupils (80 per cent) were taught by teachers who used the engagement practices in *Most Lessons*; among this group the average achievement score in Y6 science was 515 (see Table 5.13).

Northern Ireland has a relatively high percentage of pupils taught by teachers who were categorised as using engagement practices in most science lessons compared with the comparator countries, with only England reporting a higher percentage at 85 per cent.

Several high-performing countries had small percentages of pupils taught by teachers who used the engagement practices in most lessons.

While there is an international association between frequency of using the listed engagement practices and pupil achievement, the apparent differences in Northern Ireland are not likely to be significant.

Table 5.13 Teaching to engage pupils in learning science

Reported by Teachers

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

Country	Most Lessons		About Half the Lessons		Some Lessons		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
England	85 (3.1)	529 (3.6)	15 (3.1)	530 (8.9)	0 (0.0)	~ ~	10.3 (0.13)
Northern Ireland	r 80 (3.6)	515 (3.6)	19 (3.6)	525 (7.1)	1 (0.6)	~ ~	9.8 (0.12)
Australia	r 78 (3.4)	522 (3.6)	22 (3.4)	511 (7.3)	0 (0.2)	~ ~	10.1 (0.13)
Singapore	68 (2.5)	581 (4.6)	28 (2.8)	583 (6.6)	4 (1.1)	612 (11.3)	9.8 (0.12)
Ireland, Rep. of	68 (3.1)	513 (3.6)	31 (3.1)	522 (7.1)	1 (0.5)	~ ~	9.8 (0.12)
New Zealand	67 (3.1)	497 (3.5)	32 (3.0)	497 (4.1)	0 (0.4)	~ ~	9.7 (0.10)
Hong Kong SAR	62 (4.7)	538 (4.0)	35 (4.4)	527 (10.8)	3 (1.5)	552 (4.6)	9.3 (0.17)
Finland	33 (3.1)	576 (3.1)	61 (3.1)	567 (3.5)	5 (1.3)	576 (6.0)	8.4 (0.10)
International Avg.	71 (0.5)	487 (0.6)	27 (0.4)	484 (1.2)	2 (0.1)	~ ~	

Centre point of scale set at 10.

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

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

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

G15

How often do you do the following in teaching this class?

Tick **one** circle for each row.

Every or almost every lesson
About half the lessons
Some lessons
Never

a) Summarise what pupils should have learned from the lesson ----- ○ — ○ — ○ — ○

b) Relate the lesson to pupils' daily lives ----- ○ — ○ — ○ — ○

c) Use questioning to elicit reasons and explanations ----- ○ — ○ — ○ — ○

d) Encourage all pupils to improve their performance --- ○ — ○ — ○ — ○

e) Praise pupils for good effort ----- ○ — ○ — ○ — ○

f) Bring interesting materials to class ----- ○ — ○ — ○ — ○

Most Lessons About Half the Lessons Some Lessons
9.1 6.0

Source: Exhibit 8.14, international science report and adapted from the international version of the PIRLS and TIMSS 2011 Teacher Questionnaire ²¹

5.5 Conclusion

Overall, pupils in Northern Ireland who were classified in the *Like Reading* category had the highest average achievement in the subject. This association between liking the subject and achievement was also seen in mathematics and science. In mathematics and science, the pupils who were categorised as *Like Learning Mathematics / Like Learning Science* were also the pupils with the highest achievement in the subject.

The pupils who were classified as being *Confident* in reading, mathematics and science were also the pupils who had higher average achievement scores.

Internationally, in all three subjects there is an association between pupil engagement and achievement that is likely to be significant. However, the apparent achievement differences across the levels of engagement in Northern Ireland are not likely to be significant. This is true for reading and mathematics and may be borderline significant for science.

In Northern Ireland, a relatively high percentage of pupils across reading, mathematics and science were taught by teachers who were classified as using the listed engagement practices in *Most Lessons*.

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In several cases, the highest-performing countries overall in reading, mathematics and science had a low percentage of pupils categorised as *Liking* each subject, being *Confident* in the subject and being *Engaged* in their lessons. This is evident in the data from the two highest achieving comparator countries, Hong Kong and Singapore, and is also the case for Northern Ireland.

6. School resources

Chapter outline

This chapter summarises teacher reports concerning the working conditions and resources available in their school for teaching reading, mathematics and science in Year 6 (Y6, ages 9-10). Principals also reported the extent to which their school's capacity to teach was limited by a shortage of resources.

Within each sub-section, findings for reading are presented first, followed by findings for mathematics and science. Outcomes for Northern Ireland are compared with the international averages.

Key Findings

- In terms of teaching space, teaching materials and supplies, teachers in Northern Ireland rated their working conditions relatively highly compared to international averages.
- In Northern Ireland, the majority of pupils were taught reading, mathematics and science by teachers who were classified as having *Minor Problems* or *Hardly Any Problems* with their working conditions; teachers of 16 per cent of pupils in all three subjects reported *Moderate Problems*.
- For all three subjects, principals reported that almost all pupils in Northern Ireland attended schools in which teaching was *Not Affected* or *Somewhat Affected* by resource shortages.
- For reading and mathematics, only 1 per cent of pupils were in schools in which teaching was reported to be *Affected A Lot* by shortages in resources; for science the equivalent figure was 3 per cent.
- Textbook use as the basis for teaching was more common internationally than in Northern Ireland, for all three subjects. Even so, textbooks were the basis for reading, mathematics and science teaching for 30, 43 and 9 per cent of pupils respectively in Northern Ireland.
- Teachers in Northern Ireland made use of a wide range of different materials for teaching reading. The most widely used resource was a *variety of children's books* followed by *reading schemes*.
- For mathematics in Northern Ireland, the most widely used resource was supplementary use of *computer software*, followed by *workbooks or worksheets*.
- For science, the same 'top two' were reversed: supplementary use of *workbooks or worksheets* was most common, followed by *computer software*.
- The most commonly used resources as a basis for teaching were *textbooks for mathematics* and *science equipment and materials* for science.
- Thirty-one per cent of pupils attended schools that had no school library. However, 97 per cent of pupils had a class library, often of 50 books or more.
- For reading, mathematics and science, Northern Ireland had among the highest levels of computer provision among all participating countries. The majority of Y6 pupils in Northern Ireland attended schools in which a computer was available for every one or two pupils.

Interpreting the data: percentages in tables

Most of the data in this chapter is derived from teacher and principal reports. Reported percentages refer to pupils and can usually be interpreted as the percentage of pupils whose teachers or principals reported a particular practice or circumstance.

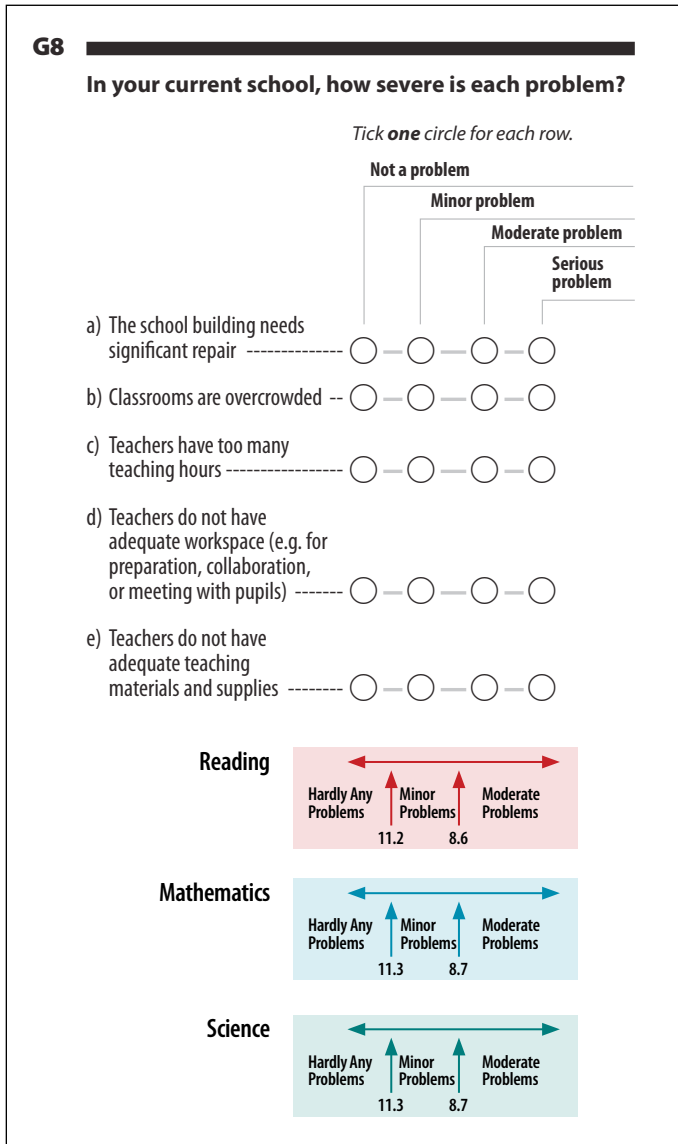
Y6 pupils were sampled by class. The Y6 teacher questionnaire would, in most cases therefore, have been completed by the class teacher of the sampled class. However, in some cases, it might have been completed by different teachers who teach these pupils reading, mathematics and/or science separately.

This means that the teacher-derived data for reading, mathematics and science may differ slightly as the sample of teachers in each group is not necessarily the same or the distribution of pupils within the sample of teachers may differ by subject.

6.1 Teacher working conditions

Teachers were asked to rate the working conditions in their current school in terms of five potential problem areas. Pupils were scored according to their teachers' responses concerning the five potential problem areas on the *Teacher Working Conditions* scale: buildings, workspace, teaching hours, classroom space and materials. The question asked is shown below (Figure 6.1) and it was analysed as a separate scale for each subject. The scale cut-scores for each subject are summarised below the question in Figure 6.1 and the data for each subject is shown in Table 6.1.

Figure 6.1 Teacher Working Conditions



Source: adapted from Exhibits 5.6 (international PIRLS report), 5.10 (international mathematics report) and 5.9 (international science report) and from the international version of the PIRLS and TIMSS 2011 Teacher Questionnaire ¹

Interpreting the data: indices and scales

In order to summarise data from a questionnaire, responses to several related items are sometimes combined to form an index or scale. The respondents to the questionnaire items are grouped according to their responses and the way in which responses have been categorised is shown for each index or scale. The data in an index or scale is often considered to be more reliable and valid than the responses to individual items.

¹ <http://timssandpirls.bc.edu>

Table 6.1 Teacher working conditions**Reading***Reported by Teachers*

Students were scored according to their teachers' responses concerning five potential problem areas on the *Teacher Working Conditions* scale. Students whose teachers had **Hardly Any Problems** with their working conditions had a score on the scale of at least 11.2, which corresponds to their teachers reporting "not a problem" for three of five areas and "minor problem" for the other two, on average. Students whose teachers had **Moderate Problems** had a score no higher than 8.6, which corresponds to their teachers reporting "moderate problem" for three of five conditions and "minor problem" for the other two, on average. All other students had teachers that reported **Minor Problems** with their working conditions.

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	r 35 (4.8)	564 (4.8)	49 (4.3)	560 (4.2)	16 (3.5)	550 (6.5)	10.6 (0.20)
International Avg.	27 (0.5)	518 (0.9)	48 (0.6)	514 (0.7)	25 (0.5)	509 (0.9)	

Mathematics*Reported by Teachers*

Students were scored according to their teachers' responses concerning five potential problem areas on the *Teacher Working Conditions* scale. Students whose teachers had **Hardly Any Problems** with their working conditions had a score on the scale of at least 11.3, which corresponds to their teachers reporting "not a problem" for three of five areas and "minor problem" for the other two, on average. Students whose teachers had **Moderate Problems** had a score no higher than 8.7, which corresponds to their teachers reporting "moderate problem" for three of five conditions and "minor problem" for the other two, on average. All other students had teachers that reported **Minor Problems** with their working conditions.

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	r 35 (4.8)	567 (5.4)	49 (4.3)	564 (5.0)	16 (3.5)	553 (8.4)	10.7 (0.19)
International Avg.	26 (0.5)	498 (1.1)	47 (0.5)	491 (0.7)	27 (0.5)	487 (1.0)	

Science*Reported by Teachers*

Students were scored according to their teachers' responses concerning five potential problem areas on the *Teacher Working Conditions* scale. Students whose teachers had **Hardly Any Problems** with their working conditions had a score on the scale of at least 11.3, which corresponds to their teachers reporting "not a problem" for three of five areas and "minor problem" for the other two, on average. Students whose teachers had **Moderate Problems** had a score no higher than 8.7, which corresponds to their teachers reporting "moderate problem" for three of five conditions and "minor problem" for the other two, on average. All other students had teachers that reported **Minor Problems** with their working conditions.

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	r 34 (4.7)	522 (5.6)	50 (4.3)	517 (4.3)	16 (3.5)	506 (7.4)	10.6 (0.19)
International Avg.	26 (0.5)	494 (1.2)	47 (0.5)	487 (0.8)	27 (0.5)	481 (1.1)	

Centre point of scale set at 10.

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

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

Sources: Exhibit 5.6, international PIRLS report, Exhibit 5.10, international mathematics report, and Exhibit 5.9, international science report

Teachers in Northern Ireland rated their working conditions relatively highly. The percentages in each category are similar for each subject, with teachers of around a third of pupils reporting *Hardly Any Problems* and those of approximately half reporting *Minor Problems* compared with international averages of around a quarter and a half respectively.

Internationally, there are apparent associations with achievement for each subject. Pupils in schools where teachers report *Moderate Problems* appear, on average, to have lower scores than those whose teachers report *Minor* or *Hardly Any Problems*.² However, the apparent differences for Northern Ireland are not likely to be significant.³

2 The direction of causality cannot be inferred.

3 Throughout this report, the term 'significant' refers to statistical significance. Although no significance tests have been carried out in this international analysis, the sizes of the standard errors for Northern Ireland suggest that the differences in achievement of pupils in each category are not likely to be statistically significant.

6.2 Resources used in teaching

Teachers were asked about a range of resources used for teaching reading, mathematics and science. They were also asked to indicate whether they used each resource as a basis for teaching or as a supplement to their teaching. Responses to this question are shown in Table 6.2.

Across all three subjects internationally, textbooks were the most common resource used as a basis for teaching, including in the high performing countries of Hong Kong and Finland.

6.2.1 Resources used in teaching reading

Teachers in Northern Ireland made use of a wide range of different materials, but the most widely used resource was a *variety of children's books*: teachers of 69 per cent of pupils in Northern Ireland used a variety of children's books as a basis for teaching. This was followed by the use of *reading schemes*, reported as a main resource by teachers of 54 per cent of pupils. The international averages for pupils being taught by these methods were both 27 per cent.

The other resources were more likely to be used as supplements. Teachers of 81 per cent of pupils used *workbooks or worksheets* as a supplement to their teaching of reading, as well as *textbooks* (66 per cent) and *computer software* (73 per cent).

Pupils in other countries were more likely to receive their main teaching through the use of *textbooks* (international mean 72 per cent) and *workbooks or worksheets* (40 per cent) compared with pupils in Northern Ireland (30 per cent and 17 per cent respectively as the main basis for teaching).

6.2.2 Resources used in teaching mathematics

Each of the four resources was more likely to be used as a supplement rather than as a basis for mathematics teaching. Teachers of 82 per cent of pupils reported that they used *computer software* as a supplement to their teaching of mathematics, as well as *workbooks or worksheets* (76 per cent), *concrete objects or materials that help pupils understand quantities or procedures* (63 per cent), and *textbooks* (56 per cent).

Teachers of 43 per cent used *Textbooks* as the main basis for teaching, followed by the use of *concrete objects or materials that help pupils understand quantities or procedures*. These were reported as a main resource by teachers of 37 per cent of pupils. The international averages for these approaches were 75 and 37 per cent respectively.

Pupils in other countries were more likely to receive their main teaching of mathematics through the use of *textbooks* (international mean 75 per cent) and *workbooks or worksheets* (46 per cent) compared with pupils in Northern Ireland (43 per cent and 24 per cent respectively as the main basis for teaching).

6.2.3 Resources used in teaching science

A similar picture emerged for science teaching: each of the four resources was more likely to be used as a supplement rather than as a basis for teaching. Teachers of 82 per cent of pupils reported that they used *workbooks or worksheets* as a supplement to their teaching of science, as well as *computer software* (69 per cent), *science equipment and materials* (66 per cent), and *textbooks* (52 per cent).

Teachers of 33 per cent used *science equipment and materials* as the main basis for teaching, followed by the use of *workbooks and worksheets* (reported as a main resource by teachers of 16 per cent of pupils). The international averages for pupils being taught primarily by these methods were 36 and 41 per cent respectively.

Once again, pupils in other countries were more likely to receive their main teaching of science through the use of *textbooks* (international mean 70 per cent) and *workbooks or worksheets* (41 per cent) compared with pupils in Northern Ireland (9 per cent and 16 per cent respectively as the main basis for teaching).

Table 6.2 Resources used in teaching

Reading

Reported by Teachers

Country	Per cent of Students Whose Teachers Use									
	A Variety of Children's Books		Textbooks		Reading Series		Workbooks or Worksheets		Computer Software for Reading Instruction	
	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement
Northern Ireland	r 69 (4.6)	31 (4.6)	r 30 (3.9)	66 (4.2)	r 54 (4.2)	41 (4.2)	r 17 (3.2)	81 (3.3)	r 9 (2.2)	73 (4.1)
International Avg.	27 (0.4)	69 (0.5)	72 (0.4)	23 (0.4)	27 (0.4)	59 (0.5)	40 (0.5)	56 (0.5)	8 (0.3)	48 (0.5)

Mathematics

Reported by Teachers

Country	Per cent of Students Whose Teachers Use									
	Textbooks		Workbooks or Worksheets		Concrete Objects or Materials that Help Students Understand Quantities or Procedures		Computer Software for Mathematics Instruction			
	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement		
Northern Ireland	r 43 (4.5)	56 (4.5)	r 24 (4.1)	76 (4.1)	r 37 (3.9)	63 (3.9)	r 13 (3.1)	82 (3.3)		
International Avg.	75 (0.4)	21 (0.4)	46 (0.5)	53 (0.5)	37 (0.5)	62 (0.5)	9 (0.3)	56 (0.5)		

Science

Reported by Teachers

Country	Per cent of Students Whose Teachers Use									
	Textbooks		Workbooks or Worksheets		Science Equipment and Materials		Computer Software for Science Instruction			
	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement	As Basis for Instruction	As a Supplement		
Northern Ireland	r 9 (2.4)	52 (4.6)	r 16 (3.0)	82 (3.2)	r 33 (4.8)	66 (4.8)	r 11 (2.8)	69 (4.1)		
International Avg.	70 (0.4)	22 (0.4)	41 (0.5)	56 (0.5)	36 (0.5)	60 (0.5)	11 (0.3)	53 (0.5)		

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

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

Sources: Exhibit 8.12, international PIRLS report, Exhibit 8.25, international mathematics report, and Exhibit 8.25, international science report

6.3 Views about limitations on teaching caused by resourcing

Principals were asked to rate the extent to which their school's capacity to teach was limited by a shortage of resources. These included general school resources as well as specific resources for teaching reading, mathematics and science.

Pupils were scored according to their teachers' responses concerning the listed resources in each case. The questions asked are shown below (Figure 6.2). In each case, the scale contained the general resources and the relevant subject-specific resources. The question was analysed as three separate scales, one for each subject. The data for each subject is shown in Table 6.3.

Figure 6.2

10

How much is your school's capacity to provide teaching affected by a shortage or inadequacy of the following?

Tick one circle for each row.

Not at all *A little* *Some* *A lot*

A. General School Resources

a) Teaching materials (e.g. textbooks) ----- ○ — ○ — ○ — ○

b) Supplies (e.g. paper, pencils) ----- ○ — ○ — ○ — ○

c) School buildings and grounds ----- ○ — ○ — ○ — ○

d) Heating/cooling and lighting systems ----- ○ — ○ — ○ — ○

e) Teaching space (e.g. classrooms) ----- ○ — ○ — ○ — ○

f) Technologically competent staff ----- ○ — ○ — ○ — ○

g) Computers for teaching ----- ○ — ○ — ○ — ○

B. Resources for Teaching Reading

a) Teachers with a specialisation in reading ----- ○ — ○ — ○ — ○

b) Computer software for teaching reading ----- ○ — ○ — ○ — ○

c) Library books ----- ○ — ○ — ○ — ○

d) Audio-visual resources for teaching reading ----- ○ — ○ — ○ — ○

Not at all *A little* *Some* *A lot*

C. Resources for Teaching Mathematics

a) Teachers with a specialisation in mathematics ----- ○ — ○ — ○ — ○

b) Computer software for teaching mathematics ----- ○ — ○ — ○ — ○

c) Library materials relevant to teaching mathematics ----- ○ — ○ — ○ — ○

d) Audio-visual resources for teaching mathematics ----- ○ — ○ — ○ — ○

e) Calculators for teaching mathematics ----- ○ — ○ — ○ — ○

D. Resources for Teaching Science

a) Teachers with a specialisation in science ----- ○ — ○ — ○ — ○

b) Computer software for teaching science ----- ○ — ○ — ○ — ○

c) Library materials relevant to teaching science ----- ○ — ○ — ○ — ○

d) Audio-visual resources for teaching science ----- ○ — ○ — ○ — ○

e) Science equipment and materials ----- ○ — ○ — ○ — ○

Reading

Mathematics

Science

Source: adapted from Exhibits 5.5 (international PIRLS report), 5.8 (international mathematics report) and 5.7 (international science report) and from the international version of the PIRLS and TIMSS 2011 School Questionnaire ⁴

⁴ <http://timssandpirls.bc.edu>

Table 6.3 Limitations on teaching caused by resourcing**Reading***Reported by Principals*

Students were scored according to their principals' responses concerning eleven school and classroom resources on the *Reading Resource Shortages* scale. Students in schools where instruction was **Not Affected** by resource shortages had a score on the scale of at least 11.2, which corresponds to their principals reporting that shortages affected instruction "not at all" for six of the eleven resources and "a little" for the other five, on average. Students in schools where instruction was **Affected A Lot** had a score no higher than 6.7, which corresponds to their principals reporting that shortages affected instruction "a lot" for six of the eleven resources and "some" for the other five, on average. All other students attended schools where instruction was **Somewhat Affected** by resource shortages.

Country	Not Affected		Somewhat Affected		Affected A Lot		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	28 (4.4)	562 (5.6)	71 (4.5)	557 (3.0)	1 (1.0)	~ ~	10.5 (0.18)
International Avg.	24 (0.5)	523 (1.1)	71 (0.5)	511 (0.5)	5 (0.2)	478 (3.0)	

Mathematics*Reported by Principals*

Students were scored according to their principals' responses concerning twelve school and classroom resources on the *Mathematics Resource Shortages* scale. Students in schools where instruction was **Not Affected** by resource shortages had a score on the scale of at least 11.1, which corresponds to their principals reporting that shortages affected instruction "not at all" for six of the twelve resources and "a little" for the other six, on average. Students in schools where instruction was **Affected A Lot** had a score no higher than 6.8, which corresponds to their principals reporting that shortages affected instruction "a lot" for six of the twelve resources and "some" for the other six, on average. All other students attended schools where instruction was **Somewhat Affected** by resource shortages.

Country	Not Affected		Somewhat Affected		Affected A Lot		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	29 (4.5)	568 (6.4)	70 (4.6)	561 (4.3)	1 (1.0)	~ ~	10.6 (0.17)
International Avg.	25 (0.5)	497 (1.2)	70 (0.5)	488 (0.6)	5 (0.2)	462 (3.5)	

Science*Reported by Principals*

Students were scored according to their principals' responses concerning twelve school and classroom resources on the *Science Resource Shortages* scale. Students in schools where instruction was **Not Affected** by resource shortages had a score on the scale of at least 11.3, which corresponds to their principals reporting that shortages affected instruction "not at all" for six of the twelve resources and "a little" for the other six, on average. Students in schools where instruction was **Affected A Lot** had a score no higher than 7.1, which corresponds to their principals reporting that shortages affected instruction "a lot" for six of the twelve resources and "some" for the other six, on average. All other students attended schools where instruction was **Somewhat Affected** by resource shortages.

Country	Not Affected		Somewhat Affected		Affected A Lot		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	23 (4.1)	523 (6.9)	74 (4.0)	516 (3.6)	3 (2.4)	501 (8.0)	10.3 (0.18)
International Avg.	22 (0.4)	495 (1.3)	72 (0.5)	485 (0.6)	7 (0.3)	460 (4.0)	

Centre point of scale set at 10.

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

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

Source: *Exhibit 5.5, international PIRLS report, Exhibit 5.8, international mathematics report, and Exhibit 5.7, international science report*

According to their principals, the majority of pupils in Northern Ireland (just under three quarters) were *Somewhat Affected* by resource shortages. Based on principals' responses, around a quarter of pupils were in schools in the *Not Affected* category (a little lower for science than for reading or mathematics), and the remainder were in the *Affected A Lot* category (1 per cent for reading and mathematics, and 3 per cent for science).

These figures were relatively close to the international averages in each case. However, for all three subjects, Northern Ireland had fewer pupils in the *Affected A Lot* category, compared with the international averages for that category.

Internationally, the pattern was for students in less well resourced schools to show lower attainment in each subject. This pattern does not hold for pupils in Northern Ireland: due to the sizes of the standard errors, the apparent trends were unlikely to be significant at national level in Northern Ireland.

6.4 School library books and classroom libraries: reading

Principals were asked to indicate the number of books, with different titles, available in their school libraries (Table 6.4) and teachers were asked to provide information about the kinds of books that were available to pupils in their class libraries (Table 6.5). Questions relating to school and class libraries were only asked of participants in the PIRLS survey and not of TIMSS participants.

6.4.1 School libraries

Principals in Northern Ireland reported that 51 per cent of pupils attended schools that had between 501 and 5,000 book titles in their school libraries, whereas the international average was 40 per cent. Fifteen per cent of pupils attended schools with 500 books or fewer and only 3 per cent of pupils went to schools with over 5,000 book titles in their libraries (the international averages were 18 per cent and 28 per cent respectively). However, 31 per cent of pupils attended schools that had no school library, whereas the international average was 14 per cent.

In comparator countries, Hong Kong and Singapore reported most school libraries with more than 5,000 books (in the schools of 82 per cent and 77 per cent of pupils respectively). Northern Ireland and Finland reported the fewest large school libraries with more than 5,000 books (3 per cent and 4 per cent respectively). Among comparator countries, the Republic of Ireland (49 per cent), Northern Ireland (31 per cent) and Finland (21 per cent) had a high percentage of pupils with no school libraries. The international average was 14 per cent. Internationally, there was an association between the size of the school library and achievement, although this was not the case in Northern Ireland. The international report points out that some countries have well-resourced classroom libraries rather than a larger central library, so the lack of a school library does not necessarily mean that pupils do not have access to a variety of books. Demographics within a country, particularly the range of rural and urban communities that schools serve, seem likely to have a bearing on the size and availability of libraries at different levels.

6.4.2 Classroom libraries

Teachers of 97 per cent of pupils in Northern Ireland reported that they had a class library. Class libraries had more than 50 books for 89 per cent of pupils in Northern Ireland, and 91 per cent of pupils had teachers who gave time to use the class library at least once a week. The international averages on these scales were 32 and 60 per cent respectively. Eighty-eight per cent of pupils were able to borrow books from their class library. This is a high proportion: internationally the average was 56 per cent.

Internationally, on average, 72 per cent of pupils had class libraries and their average reading achievement was higher than their counterparts in classrooms without libraries (514 compared to 507 scale points).

For most of the comparator countries, class libraries were available for a smaller percentage of their pupils than in Northern Ireland. The exceptions were New Zealand and the Republic of Ireland. In Northern Ireland, access to a class library did not appear to be associated with pupil attainment.

Among the comparator countries, Finland is notable for having class libraries available to just 51 per cent of pupils. Pupils in Finland, New Zealand, Australia and Singapore were also much more likely than Northern Ireland to have fewer than 50 books in their class libraries. Teachers in Finland and England reported having fewer magazines in their class libraries than those in other comparator countries.

Table 6.4 Size of school library

Reported by Principals (Does not include classroom libraries)

Country	More than 5,000 Book Titles		501–5,000 Book Titles		500 Book Titles or Fewer		No School Library	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r 3 (1.5)	549 (11.0)	51 (4.6)	556 (4.0)	15 (3.9)	549 (7.9)	31 (4.0)	569 (5.5)
International Avg.	28 (0.4)	525 (1.4)	40 (0.6)	513 (1.1)	18 (0.4)	500 (1.3)	14 (0.4)	498 (1.8)

Table 6.5 Classroom libraries

Reported by Teachers

Country	Have a Classroom Library			Per cent of Students	Per cent of Students	Per cent of Students	Per cent of Students	Per cent of Students
	Per cent of Students	Average Achievement		With More than 50 Books in Their Classroom Library	With At Least 3 Magazine Titles in Their Classroom Library	Given Class Time to Use Classroom Library At Least Once a Week	Who Can Borrow Books From Classroom Library	Whose Teachers Take Them to Library Other than the Classroom Library At Least Once a Month
		Yes	Yes					
Northern Ireland	r 97 (1.5)	561 (2.9)	532 (33.7)	r 89 (2.6)	r 35 (4.2)	r 91 (2.6)	r 88 (3.2)	r 61 (4.5)
International Avg.	72 (0.5)	514 (0.6)	507 (1.3)	32 (0.4)	31 (0.5)	60 (0.5)	56 (0.5)	68 (0.5)

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

Sources: Exhibits 5.7 and 8.13, international PIRLS report

6.5 Availability of computers for teaching

In order to calculate the availability of computers for lessons, principals were asked to indicate the number of pupils in Y6 and the total number of computers available for teaching. The question asked is shown below (Figure 6.3) and outcomes were generated for each subject. The calculated ratios for Northern Ireland are shown in Table 6.6.

Figure 6.3 Availability of computers for teaching

<p>1 _____</p> <p>What is the total number of pupils on roll in your school as of 1st May 2011?</p> <p>_____ pupils <i>Write in a number.</i></p> <p>7 _____</p> <p>What is the total number of computers in your school that can be used for educational purposes by Year 6 pupils?</p> <p>_____ computers <i>Write in the number.</i></p>

Source: adapted from the international version of the PIRLS and TIMSS 2011 School Questionnaire⁵

In Northern Ireland, just over three quarters of pupils were in schools where a computer was available for every one to two pupils. The international average was 38 to 41 per cent. For 17 per cent of pupils in Northern Ireland, computers were shared between three to five pupils and for the remaining 5 per cent, the ratio was one computer for six or more pupils. Principals in Northern Ireland reported among the highest levels of computer provision among comparator countries. Only headteachers in England reported more (89 per cent to 90 per cent). Internationally, there was considerable variation from country to country. In most of the comparator countries, teachers reported computer provision above the international average.

There were no clear patterns of achievement across the different categories of computer availability.⁶ It is worth bearing in mind that the relationship between computer availability and average attainment is complex. In some countries computer availability is highly interrelated with socio-economic levels, in others computers are used widely for remedial purposes. In addition, teaching practice and the quality of software programmes varies greatly between, and within, countries. For these, and other, reasons achievement data in this area should be interpreted with caution.

⁵ <http://timssandpirls.bc.edu>

⁶ Tests of statistical significance were not carried out in this international analysis, but the sizes of the standard errors in the national data suggest that any apparent differences in attainment across categories would not be statistically significant.

Table 6.6 Availability of computers for teaching**Reading***Reported by Principals*

Country	1 Computer for 1–2 Students		1 Computer for 3–5 Students		1 Computer for 6 or More Students		No Computers Available	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r 77 (4.3)	557 (3.1)	17 (3.8)	562 (7.1)	5 (2.3)	564 (9.5)	0 (0.0)	~ ~
International Avg.	41 (0.5)	513 (1.0)	29 (0.5)	517 (0.9)	23 (0.5)	517 (1.3)	7 (0.3)	488 (2.5)

Mathematics*Reported by Principals*

Country	1 Computer for 1–2 Students		1 Computer for 3–5 Students		1 Computer for 6 or More Students		No Computers Available	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r 77 (4.3)	558 (4.4)	17 (3.8)	574 (6.6)	5 (2.3)	569 (11.1)	0 (0.0)	~ ~
International Avg.	38 (0.5)	491 (1.1)	30 (0.5)	493 (1.2)	24 (0.5)	493 (1.3)	8 (0.3)	452 (2.9)

Science*Reported by Principals*

Country	1 Computer for 1–2 Students		1 Computer for 3–5 Students		1 Computer for 6 or More Students		No Computers Available	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r 77 (4.3)	514 (4.0)	17 (3.8)	524 (5.9)	5 (2.3)	523 (15.9)	0 (0.0)	~ ~
International Avg.	38 (0.5)	486 (1.2)	30 (0.5)	487 (1.3)	24 (0.5)	491 (1.4)	8 (0.3)	450 (2.8)

() 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.

Sources: Exhibits 5.8, international PIRLS report, Exhibit 5.14, international mathematics report, and Exhibit 5.13, international science report

6.6 Conclusion

Teachers were asked about a number of potential problems in working conditions that might impact on their teaching. These included the condition of their school buildings and the workspace available for preparation, collaboration and working with pupils. They were also asked about teaching conditions such as overcrowding in classrooms, the availability of teaching materials and whether they had too many teaching hours. Overall, the majority of pupils in Northern Ireland were taught by teachers classified as having *Minor Problems* or *Hardly Any Problems* with their working conditions, although a sizeable minority reported *Moderate Problems*.

Textbook use as a basis for teaching was more common internationally than in Northern Ireland, for all three subjects. Children's books were the most commonly used resources for teaching reading followed by reading schemes. A variety of resources were used in mathematics and science teaching.

Shortage of resources, generally, was not an issue for teachers in Northern Ireland and very few reported that their teaching was limited by lack of resources.

Compared with international averages, pupils in Northern Ireland were less likely to attend schools with a school library, but more likely to have a class library of 50 books or more.

In terms of computer provision, teachers in Northern Ireland reported among the highest availability of computers for teaching of all participating countries. This was true for the teaching of all three subjects, with the majority of Y6 pupils attending schools in which computers were available for every one to two pupils.

7. The school learning environment

Chapter outline

This chapter presents findings relating to the school learning environment, as reported by teachers and principals. Sections relate to the emphasis placed on academic success and perceptions of safety, orderliness, discipline, bullying and the impact of disruptive and uninterested pupils. These are followed by sections that examine factors related to teaching and teaching practices including: levels of career satisfaction, the extent to which teachers collaborate in order to improve their teaching practice, how prepared teachers feel to teach mathematics and science and teachers' major areas of study during training. Outcomes for Northern Ireland are compared with the international averages, and where relevant, with those of other countries.

Key findings

- Principals and teachers in Northern Ireland reported the highest levels of emphasis on academic success: no other participating country had higher overall averages on this scale.
- The vast majority of pupils in Northern Ireland attended schools which were categorised as safe and orderly (teacher reports) and had hardly any, or minor, problems of discipline and safety (principal reports). These factors appeared to relate to higher pupil attainment.
- Pupils reported relatively low levels of bullying and teachers reported that their teaching was rarely limited by disruptive or uninterested pupils.
- In Northern Ireland, at least 95 per cent of pupils had teachers who reported that they were *Satisfied* or *Somewhat Satisfied* with their careers. However, higher levels of career satisfaction did not appear to be associated with increased pupil achievement.
- Compared with international averages, teachers in Northern Ireland reported less frequent collaboration to improve teaching. However, teacher responses on this scale did not appear to be associated with pupil attainment.
- In relation to teachers' educational emphasis during training, for teachers of reading, the most common specialism was English/language. Compared to international averages, teachers in Northern Ireland reported a lower emphasis on specialisms such as Language, Pedagogy/Teaching Reading and Reading Theory during their formal education and training.
- In Northern Ireland, most pupils (just over three quarters) were taught mathematics by teachers whose main area of study was primary education without specialisation in mathematics. The same was true of science, where a similar proportion of pupils were taught by non-science specialists. Similar proportions were seen in a number of comparator countries, including Australia, Finland and New Zealand.
- In terms of preparedness to teach the TIMSS mathematics and science topics, in Northern Ireland, just over half of pupils were taught by teachers who feel very well prepared to teach the TIMSS science topics. This was lower than the equivalent percentage for mathematics for this age group, where the vast majority were taught by teachers who feel very well prepared.

Interpreting the data: percentages in tables

Most of the data in this chapter is derived from teacher and principal reports. Reported percentages refer to pupils and can usually be interpreted as the percentage of pupils whose teachers or principals reported a particular practice or circumstance.

Y6 pupils were sampled by class. The Y6 teacher questionnaire would, in most cases therefore, have been completed by the class teacher of the sampled class. However, in some cases, it might have been completed by different teachers who teach these pupils reading, mathematics and/or science separately.

This means that the teacher-derived data for reading, mathematics and science may differ slightly as the sample of teachers in each group is not necessarily the same or the distribution of pupils within the sample of teachers may differ by subject.

Interpreting the data: indices and scales

In order to summarise data from a questionnaire, responses to several related items are sometimes combined to form an index or scale. The respondents to the questionnaire items are grouped according to their responses and the way in which responses have been categorised is shown for each index or scale. The data in an index or scale is often considered to be more reliable and valid than the responses to individual items.

7.1 Schools' emphasis on academic success – views of teachers and principals

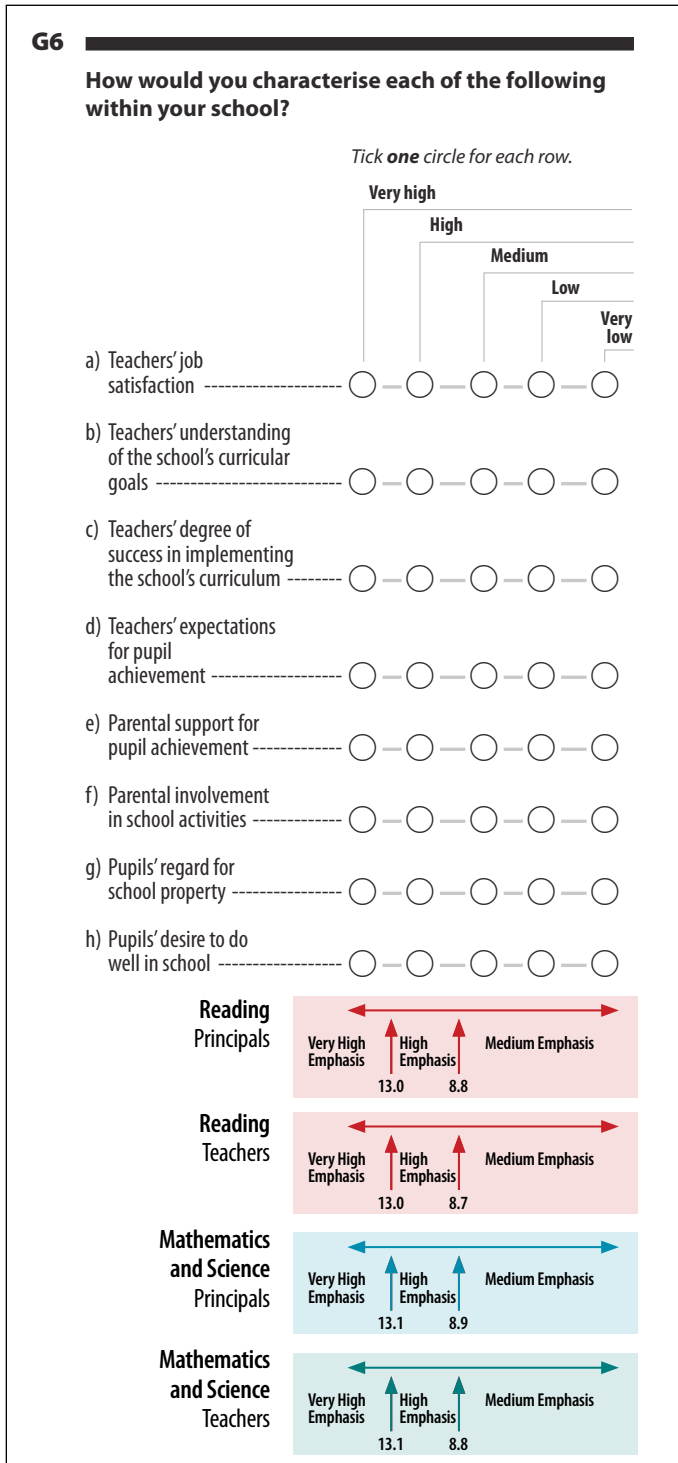
Principals and teachers were asked to rate the emphasis placed on academic success within their school by teachers, parents and pupils. Both principals and teachers were given the same set of questions, shown in Figure 7.1 below, and invited to rate levels of parental support and pupil motivation, as well as teachers' understanding of curricula goals and their expectations of pupils.

The questions were analysed as a separate scale for each subject. The scale categories for each subject (for principals and teachers) are summarised below the question in Figure 7.1 and the data for each subject is shown in Table 7.1.

It should be noted that the data provided by principals and teachers for this scale comes from the school and teacher questionnaires. The majority of the questions are not subject specific and therefore the overall proportions are broadly the same for reading, mathematics and science.¹ Differences in achievement scores, however, are subject specific and have been reported separately where appropriate.

¹ Small differences in percentages may be due to slight differences in the PIRLS and TIMSS teacher samples or may arise from patterns of non-response, or rounding.

Figure 7.1 School's emphasis on academic success



Items a, f and g did not contribute to this scale.

Source: adapted from Exhibits 6.1 and 6.2, international PIRLS Report, Exhibits 6.1 and 6.3, international mathematics report, and Exhibits 6.1 and 6.3, international science report

Table 7.1 School emphasis on academic success

Reading

Reported by Principals and Teachers

Students were scored according to their principals' and teachers' responses characterizing five aspects on the School Emphasis on Academic Success scale. Students in schools where their principals/teachers reported a **Very High Emphasis** on academic success had a score on the scale of at least 13.0, which corresponds to their principals/teachers characterizing three of the five aspects as "very high" and the other two as "high," on average. Students in schools with a **Medium Emphasis** on academic success had a score no higher than 8.8 (principals)/8.7 (teachers) which corresponds to their principals/teachers characterizing three of the five aspects as "medium" and the other two as "high," on average. All other Students attended schools with a **High Emphasis** on academic success.

Country		Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
		Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	<i>Principals</i>	33 (4.2)	570 (4.9)	60 (4.3)	556 (2.9)	7 (2.5)	529 (9.8)	11.9 (0.19)
	<i>Teachers</i> <i>r</i>	28 (4.2)	572 (3.9)	65 (4.4)	557 (3.7)	7 (2.2)	533 (8.5)	11.7 (0.19)
International Avg.	<i>Principals</i>	9 (0.3)	527 (1.9)	59 (0.6)	517 (0.6)	32 (0.5)	497 (0.8)	
	<i>Teachers</i>	9 (0.3)	529 (1.8)	60 (0.6)	517 (0.6)	31 (0.5)	497 (0.8)	

Centre point of scale set at 10.

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

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

Mathematics

Reported by Principals and Teachers

Students were scored according to their principals/ teachers responses characterizing five aspects on the School Emphasis on Academic Success scale. Students in schools where their principals/teachers reported a **Very High Emphasis** on academic success had a score on the scale of at least 13.1, which corresponds to their principals/teachers characterizing three of the five aspects as "very high" and the other two as "high," on average. Students in schools with a **Medium Emphasis** on academic success had a score no higher than 8.9 (principals)/8.8 (teachers), which corresponds to their principals/teachers characterizing three of the five aspects as "medium" and the other two as "high," on average. All other students attended schools with a **High Emphasis** on academic success.

Country		Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
		Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	<i>Principals</i>	33 (4.2)	577 (4.9)	60 (4.3)	558 (4.1)	7 (2.5)	540 (13.6)	12.0 (0.19)
	<i>Teachers</i> <i>r</i>	31 (4.3)	573 (6.9)	65 (4.4)	559 (4.6)	5 (1.6)	550 (10.5)	11.9 (0.17)
International Avg.	<i>Principals</i>	8 (0.3)	511 (2.2)	58 (0.5)	496 (0.7)	34 (0.5)	477 (0.9)	
	<i>Teachers</i>	7 (0.3)	503 (3.3)	60 (0.5)	496 (0.7)	33 (0.5)	477 (0.9)	

Science

Reported by Principals and Teachers

Students were scored according to their principals' and teachers' responses characterizing five aspects on the *School Emphasis on Academic Success* scale. Students in schools where their principals/teachers reported a **Very High Emphasis** on academic success had a score on the scale of at least 13.1, which corresponds to their principals/teachers characterizing three of the five aspects as "very high" and the other two as "high," on average. Students in schools with a **Medium Emphasis** on academic success had a score no higher than 8.9 (principals)/8.8 (teachers), which corresponds to their principals/teachers characterizing three of the five aspects as "medium" and the other two as "high," on average. All other students attended schools with a **High Emphasis** on academic success.

Country		Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
		Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	<i>Principals</i>	33 (4.2)	532 (4.2)	60 (4.3)	511 (3.9)	7 (2.5)	495 (12.1)	12.0 (0.19)
	<i>Teachers</i> <i>r</i>	28 (4.2)	527 (6.6)	66 (4.3)	514 (3.8)	6 (1.9)	496 (9.8)	11.8 (0.18)
International Avg.	<i>Principals</i>	8 (0.3)	508 (2.3)	58 (0.5)	492 (0.7)	34 (0.5)	471 (1.0)	
	<i>Teachers</i>	8 (0.3)	499 (2.2)	60 (0.5)	492 (0.7)	33 (0.5)	472 (1.0)	

Centre point of scale set at 10.

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

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

Sources: Exhibits 6.1 and 6.2, international PIRLS report, Exhibits 6.1 and 6.3, international mathematics report, and Exhibits 6.1 and 6.3, international science report

In Northern Ireland, across the three subjects, principals of over 90 per cent of pupils reported that their schools placed a *High* or *Very High* emphasis on academic success.

Teacher reports broadly reflected those of the principals. Again, well over 90 per cent of pupils were in schools where their teachers reported a *High* or *Very High* emphasis on academic success.

No other country participating in the PIRLS and TIMSS surveys had a higher proportion of pupils whose principals and teachers reported placing a *Very High Emphasis* on academic success, or had higher overall average scores on this scale. Principals had average scores on this scale of: 11.9 for PIRLS and 12.0 for TIMSS mathematics and science. Teachers had average scale scores of: 11.7 for PIRLS; 11.9 for TIMSS mathematics; and 11.8 for TIMSS science (details of how the scale scores were calculated is provided in Table 7.1).

Northern Ireland had the highest percentage of pupils (33 per cent) in schools where principals reported a *Very High Emphasis* on academic success, followed by Qatar (31 per cent) and the Republic of Ireland (28 per cent).

Hong Kong and Singapore were among the comparator countries where over a quarter of pupils were in schools whose principals and/or teachers reported a much lower emphasis on academic success.

Internationally, across all countries, pupil attainment in all subjects tended to be higher where teachers and principals reported a higher emphasis on academic success.

Pupil attainment in reading in Northern Ireland reflected the international pattern of higher attainment, on average, in schools where academic success was more highly emphasised. The standard errors, shown in Table 7.1, suggest that these differences are likely to be statistically significant.² However, the findings were more mixed for mathematics and science, and some apparent achievement differences across the categories of emphasis on academic success were likely to not be statistically significant for these subjects.³

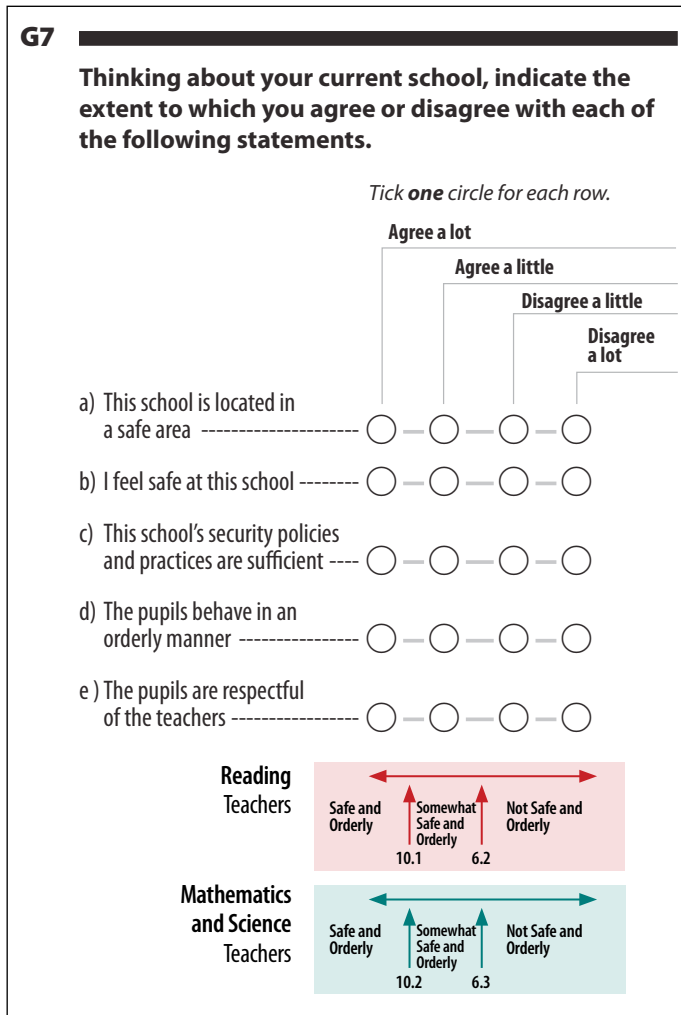
7.2 Teachers' ratings of the extent to which their schools are 'safe and orderly'

Teachers were asked about their perceptions of safety and the behaviour of pupils in their school. Based on teachers' responses, pupils were categorised as attending schools which were *Safe and Orderly*; *Somewhat Safe and Orderly*; or *Not Safe and Orderly*. The questions and details of the scaling are shown in Figure 7.2 and the results for each subject are shown in Table 7.2.

² Throughout this report, findings listed as 'significant' are statistically significant.

³ Based on low percentages in some categories and/or the size of standard errors.

Figure 7.2 Safe and orderly schools



Source: adapted from Exhibit 6.5, international PIRLS Report, Exhibit 6.7, international mathematics report, and Exhibit 6.7, international science report

Table 7.2 Safe and orderly schools**Reading***Reported by Teachers*

Students were scored according to their teachers' degree of agreement with five statements on the *Safe and orderly school* scale. Students in **Safe and Orderly** schools had a score on the scale of at least 10.1, which corresponds to their teachers "agreeing a lot" with three of the five qualities of a safe and orderly school and "agreeing a little" with the other two, on average. Students in **Not Safe and Orderly** schools had a score no higher than 6.2, which corresponds to their teachers "disagreeing a little" with three of the five qualities and "agreeing a little" with the other two, on average. All other students attended **Somewhat Safe and Orderly** schools.

Country	Safe and Orderly		Somewhat Safe and Orderly		Not Safe and Orderly		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	r 84 (2.9)	564 (3.1)	16 (2.8)	538 (7.9)	0 (0.4)	~ ~	11.4 (0.14)
International Avg.	55 (0.5)	518 (0.6)	41 (0.5)	505 (0.8)	4 (0.2)	486 (3.6)	

Mathematics*Reported by Teachers*

Students were scored according to their teachers' degree of agreement with five statements on the *Safe and Orderly School* scale. Students in **Safe and Orderly** schools had a score on the scale of at least 10.2, which corresponds to their teachers "agreeing a lot" with three of the five qualities of a safe and orderly school and "agreeing a little" with the other two, on average. Students in **Not Safe and Orderly** schools had a score no higher than 6.3, which corresponds to their teachers "disagreeing a little" with three of the five qualities and "agreeing a little" with the other two, on average. All other students attended **Somewhat Safe and Orderly** schools.

Country	Safe and Orderly		Somewhat Safe and Orderly		Not Safe and Orderly		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	r 85 (2.7)	568 (4.0)	15 (2.6)	537 (8.6)	0 (0.4)	~ ~	11.5 (0.14)
International Avg.	53 (0.5)	498 (0.7)	43 (0.5)	483 (0.8)	4 (0.2)	470 (2.9)	

Science*Reported by Teachers*

Students were scored according to their teachers' degree of agreement with five statements on the *Safe and Orderly School* scale. Students in **Safe and Orderly** schools had a score on the scale of at least 10.2, which corresponds to their teachers "agreeing a lot" with three of the five qualities of a safe and orderly school and "agreeing a little" with the other two, on average. Students in **Not Safe and Orderly** schools had a score no higher than 6.3, which corresponds to their teachers "disagreeing a little" with three of the five qualities and "agreeing a little" with the other two, on average. All other students attended **Somewhat Safe and Orderly** schools.

Country	Safe and Orderly		Somewhat Safe and Orderly		Not Safe and Orderly		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	r 85 (2.7)	521 (3.5)	15 (2.6)	493 (7.2)	0 (0.4)	~ ~	11.5 (0.13)
International Avg.	53 (0.5)	493 (0.7)	43 (0.5)	480 (0.9)	4 (0.2)	449 (4.0)	

Centre point of scale set at 10.

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

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

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

Source: adapted from Exhibit 6.5, *international PIRLS Report*, Exhibit 6.7, *international mathematics report*, and Exhibit 6.7, *international science report*

Across all three subjects, the vast majority of pupils (over 80 per cent) in Northern Ireland had teachers who reported that their schools were *Safe and Orderly*. This was the highest percentage for TIMSS and, among all countries participating in PIRLS, only teachers in Indonesia reported a higher percentage of pupils in *Safe and Orderly* schools.⁴

Among comparator countries, there was a lot of variation in terms of the percentage of pupils in each of the three categories of this scale. The majority of comparator countries had over 60 per cent of pupils in the *Safe and Orderly* category; the

4 Indonesia participated only in PIRLS.

exceptions were Finland and Hong Kong. Notably, Finland had one of the lowest percentages of pupils in schools that were considered to be *Safe and Orderly*, with less than 40 per cent of pupils in this category (35 per cent in PIRLS, 36 per cent for TIMSS mathematics and 38 per cent for TIMSS science).

Internationally, pupils in schools that teachers reported as being *Safe and Orderly*, on average, scored more highly than those in schools that teachers reported were *Somewhat Safe and Orderly*, which scored more highly in turn than those deemed *Not Safe and Orderly*. This suggests there may be an association between safety and orderliness and attainment,⁵ but this relationship was not seen in all participating countries. The direction of causality cannot be inferred from this data.

In Northern Ireland, there did appear to be an association between attending a school that was judged to be safe and orderly and higher average achievement, as can be seen in Table 7.2. The standard error statistics suggest that, in Northern Ireland, these differences are likely to be statistically significant. This pattern was seen for other high performing participants including Finland.

The full international tables follow, for reference, showing data for all countries (Tables 7.3 to 7.5, derived from PIRLS Exhibit 6.5; TIMSS mathematics and science Exhibit 6.7).

⁵ Tests of statistical significance were not carried out in this international analysis. However, based on the size of the standard errors, it is likely that these findings are statistically significant.

Table 7.3 International table for safe and orderly schools

Reported by Teachers

Students were scored according to their teachers' degree of agreement with five statements on the *Safe and Orderly School* scale. Students in **Safe and Orderly** schools had a score on the scale of at least 10.1, which corresponds to their teachers "agreeing a lot" with three of the five qualities of a **Safe and Orderly** school and "agreeing a little" with the other two, on average. Students in **Not Safe and Orderly** schools had a score no higher than 6.2, which corresponds to their teachers "disagreeing a little" with three of the five qualities and "agreeing a little" with the other two, on average. All other students attended **Somewhat Safe and Orderly** schools.

Country	Safe and Orderly		Somewhat Safe and Orderly		Not Safe and Orderly		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Indonesia	91 (2.6)	429 (4.5)	9 (2.6)	425 (13.8)	0 (0.0)	~ ~	11.9 (0.13)
Northern Ireland ^r	84 (2.9)	564 (3.1)	16 (2.8)	538 (7.9)	0 (0.4)	~ ~	11.4 (0.14)
Azerbaijan	82 (2.9)	463 (3.8)	16 (2.8)	463 (9.2)	1 (0.7)	~ ~	11.3 (0.13)
Israel	81 (3.2)	546 (3.5)	17 (3.3)	530 (9.5)	3 (1.4)	485 (41.9)	11.0 (0.14)
Georgia	79 (2.7)	489 (3.2)	19 (2.7)	482 (7.9)	1 (0.7)	~ ~	11.1 (0.13)
Ireland, Rep. of	77 (3.4)	560 (2.4)	21 (3.3)	527 (5.2)	2 (1.0)	~ ~	11.2 (0.15)
Australia ^r	76 (3.2)	540 (3.1)	21 (3.1)	509 (6.9)	4 (1.4)	489 (15.1)	11.0 (0.16)
United Arab Emirates	75 (1.8)	443 (2.9)	24 (1.8)	423 (4.7)	1 (0.4)	~ ~	10.8 (0.08)
Croatia	73 (3.1)	551 (2.0)	26 (3.0)	558 (4.0)	1 (0.7)	~ ~	10.7 (0.12)
England	72 (3.7)	561 (3.0)	27 (3.7)	524 (5.2)	0 (0.3)	~ ~	10.9 (0.14)
Netherlands	72 (3.2)	551 (1.8)	27 (3.1)	533 (4.3)	1 (0.0)	~ ~	10.8 (0.15)
New Zealand	72 (2.5)	545 (2.4)	25 (2.3)	504 (4.6)	4 (1.2)	490 (16.0)	10.8 (0.12)
Qatar	70 (3.4)	431 (4.9)	29 (3.3)	409 (8.5)	1 (0.6)	~ ~	10.7 (0.13)
Singapore	64 (2.2)	576 (4.1)	34 (2.2)	551 (5.2)	2 (0.6)	~ ~	10.3 (0.09)
Norway	64 (4.6)	510 (2.4)	36 (4.6)	501 (3.2)	0 (0.0)	~ ~	10.5 (0.15)
Denmark	64 (2.9)	561 (1.9)	35 (2.9)	543 (2.7)	1 (0.8)	~ ~	10.5 (0.11)
United States	64 (2.1)	567 (2.0)	30 (2.1)	542 (2.9)	6 (1.1)	521 (7.2)	10.3 (0.09)
Canada	62 (2.8)	555 (2.2)	34 (2.6)	540 (2.6)	4 (0.9)	521 (4.5)	10.3 (0.13)
Iran, Islamic Rep. of	60 (3.5)	464 (3.7)	39 (3.4)	449 (4.9)	1 (0.8)	~ ~	10.2 (0.14)
Austria	58 (3.4)	535 (2.2)	40 (3.5)	522 (3.2)	2 (1.5)	~ ~	10.0 (0.12)
Saudi Arabia	56 (3.8)	441 (6.0)	40 (3.9)	420 (7.4)	4 (1.4)	377 (18.3)	10.1 (0.14)
Oman	56 (2.9)	394 (3.3)	43 (3.0)	390 (4.7)	2 (0.7)	~ ~	10.1 (0.10)
Poland	55 (3.4)	524 (3.2)	44 (3.4)	529 (2.9)	1 (0.6)	~ ~	9.9 (0.12)
Bulgaria	55 (3.9)	537 (5.4)	43 (3.8)	530 (5.6)	3 (1.1)	461 (27.8)	9.9 (0.13)
Hong Kong SAR	52 (4.5)	574 (2.8)	46 (4.3)	566 (3.5)	3 (1.5)	572 (30.3)	9.9 (0.17)
Hungary	51 (3.8)	548 (4.2)	45 (3.7)	531 (5.0)	3 (1.5)	502 (14.4)	9.6 (0.13)
Malta	50 (0.1)	488 (2.0)	49 (0.1)	470 (2.0)	2 (0.0)	~ ~	9.9 (0.00)
Russian Federation	49 (4.0)	569 (5.4)	49 (3.8)	569 (3.7)	2 (1.3)	~ ~	9.7 (0.17)
Lithuania	47 (3.2)	531 (3.1)	51 (3.1)	526 (3.1)	2 (0.9)	~ ~	9.6 (0.12)
Portugal	46 (5.1)	546 (4.9)	50 (4.8)	538 (3.6)	4 (1.2)	516 (9.9)	9.5 (0.19)
Czech Republic	46 (3.8)	547 (3.2)	52 (3.6)	544 (3.1)	2 (0.9)	~ ~	9.5 (0.12)
Spain	46 (3.7)	524 (3.7)	49 (3.6)	507 (3.1)	5 (1.8)	476 (9.9)	9.5 (0.16)
Germany	45 (3.9)	549 (2.9)	51 (3.8)	536 (3.2)	4 (1.4)	519 (11.1)	9.6 (0.12)
France	40 (3.4)	533 (3.3)	55 (3.5)	514 (3.1)	5 (1.5)	484 (18.2)	9.4 (0.12)
Slovak Republic	40 (3.7)	537 (3.8)	59 (3.7)	535 (3.8)	1 (0.6)	~ ~	9.3 (0.08)
Romania	40 (3.6)	498 (7.8)	55 (3.7)	505 (6.2)	5 (1.6)	469 (15.2)	9.4 (0.13)
Sweden	40 (4.7)	551 (2.9)	55 (4.8)	540 (3.0)	5 (1.4)	498 (10.1)	9.4 (0.15)
Finland	35 (3.5)	573 (2.6)	59 (3.8)	566 (2.3)	6 (1.7)	554 (4.7)	9.2 (0.12)
Colombia	35 (4.4)	458 (8.9)	54 (4.7)	442 (5.3)	11 (2.8)	447 (8.2)	8.9 (0.21)
Belgium (French)	33 (3.9)	523 (3.7)	58 (3.8)	501 (4.0)	9 (2.5)	490 (9.4)	8.7 (0.17)
Chinese Taipei	31 (3.8)	552 (2.9)	62 (3.7)	556 (2.5)	7 (2.0)	532 (5.8)	8.9 (0.15)
Morocco	30 (3.3)	337 (7.5)	56 (3.7)	303 (6.0)	14 (2.3)	289 (10.7)	8.6 (0.15)
Trinidad and Tobago	28 (3.9)	482 (8.6)	52 (3.9)	469 (6.1)	20 (3.1)	461 (9.1)	8.4 (0.19)
Slovenia	27 (3.1)	528 (3.6)	67 (3.2)	532 (2.5)	6 (1.6)	515 (8.5)	8.8 (0.11)
Italy	18 (2.9)	546 (4.9)	78 (3.3)	542 (2.3)	4 (1.4)	506 (26.2)	8.6 (0.09)
International Avg.	55 (0.5)	518 (0.6)	41 (0.5)	505 (0.8)	4 (0.2)	486 (3.6)	

Centre point of scale set at 10.

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

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

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

Source: Exhibit 6.5 international PIRLS report

Table 7.4 International table for safe and orderly schools

Reported by Teachers

Students were scored according to their teachers' degree of agreement with five statements on the *Safe and Orderly School* scale. Students in **Safe and Orderly schools** had a score on the scale of at least 10.2, which corresponds to their teachers "agreeing a lot" with three of the five qualities of a safe and orderly school and "agreeing a little" with the other two, on average. Students in **Not Safe and Orderly** schools had a score no higher than 6.3, which corresponds to their teachers "disagreeing a little" with three of the five qualities and "agreeing a little" with the other two, on average. All other students attended **Somewhat Safe and Orderly** schools.

Country	Safe and Orderly		Somewhat Safe and Orderly		Not Safe and Orderly		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	r 85 (2.7)	568 (4.0)	15 (2.6)	537 (8.6)	0 (0.4)	~ ~	11.5 (0.14)
Georgia	83 (2.5)	453 (3.9)	16 (2.4)	442 (10.4)	1 (0.7)	~ ~	11.3 (0.12)
Azerbaijan	83 (2.9)	465 (6.5)	16 (2.8)	459 (16.7)	1 (0.7)	~ ~	11.4 (0.13)
Ireland, Rep. of	78 (3.3)	537 (3.0)	20 (3.3)	497 (6.0)	2 (1.0)	~ ~	11.3 (0.15)
Australia	r 76 (3.1)	529 (3.7)	20 (3.0)	491 (7.9)	4 (1.4)	460 (12.4)	11.1 (0.16)
United Arab Emirates	76 (2.2)	440 (3.0)	24 (2.2)	418 (5.7)	0 (0.2)	~ ~	10.8 (0.08)
Croatia	73 (3.1)	489 (2.2)	26 (3.0)	495 (4.2)	1 (0.7)	~ ~	10.8 (0.12)
Thailand	72 (3.9)	462 (4.5)	26 (3.8)	462 (10.1)	3 (1.8)	352 (15.0)	11.0 (0.18)
Armenia	72 (2.7)	455 (4.2)	26 (2.6)	447 (6.6)	2 (1.1)	~ ~	10.9 (0.13)
Kuwait	70 (3.1)	346 (3.9)	30 (3.1)	331 (6.3)	0 (0.0)	~ ~	10.4 (0.10)
New Zealand	70 (2.3)	501 (2.9)	29 (2.3)	456 (4.8)	1 (0.5)	~ ~	11.0 (0.10)
Denmark	68 (3.5)	544 (2.7)	32 (3.5)	534 (4.6)	0 (0.0)	~ ~	10.6 (0.12)
Kazakhstan	67 (4.0)	505 (5.8)	33 (4.0)	495 (9.2)	1 (0.4)	~ ~	10.7 (0.15)
England	67 (4.3)	557 (3.8)	31 (4.1)	519 (7.9)	2 (1.3)	~ ~	10.7 (0.18)
United States	66 (2.4)	553 (2.3)	30 (2.3)	526 (3.4)	4 (0.8)	503 (8.4)	10.5 (0.09)
Qatar	65 (3.6)	421 (6.1)	34 (3.7)	393 (8.1)	1 (0.0)	~ ~	10.5 (0.11)
Norway	64 (4.6)	501 (3.5)	36 (4.6)	484 (4.6)	0 (0.0)	~ ~	10.7 (0.17)
Saudi Arabia	62 (4.4)	425 (7.2)	36 (4.4)	389 (7.2)	2 (0.9)	~ ~	10.4 (0.16)
Singapore	61 (2.5)	613 (3.8)	37 (2.5)	595 (5.6)	2 (0.7)	~ ~	10.3 (0.10)
Iran, Islamic Rep. of	60 (3.5)	440 (4.2)	39 (3.4)	419 (6.1)	1 (0.8)	~ ~	10.3 (0.15)
Bahrain	57 (4.2)	446 (4.0)	42 (4.3)	423 (4.9)	1 (0.0)	~ ~	10.3 (0.17)
Austria	57 (3.4)	513 (3.0)	40 (3.5)	504 (3.3)	2 (1.5)	~ ~	10.0 (0.13)
Netherlands	r 56 (4.6)	541 (2.6)	43 (4.6)	536 (3.8)	1 (0.8)	~ ~	10.2 (0.18)
Poland	55 (3.4)	478 (2.8)	44 (3.4)	485 (3.3)	1 (0.6)	~ ~	10.0 (0.12)
Hong Kong SAR	55 (4.7)	603 (4.6)	44 (4.8)	602 (6.0)	1 (0.6)	~ ~	10.2 (0.17)
Hungary	52 (3.8)	525 (4.9)	46 (3.6)	506 (5.6)	3 (1.3)	452 (24.4)	9.7 (0.14)
Spain	51 (3.8)	497 (3.2)	45 (3.9)	470 (4.4)	5 (1.8)	449 (14.4)	9.7 (0.16)
Russian Federation	49 (4.0)	546 (5.0)	48 (3.8)	539 (5.4)	2 (1.3)	~ ~	9.9 (0.17)
Malta	49 (0.1)	503 (1.8)	46 (0.1)	488 (2.1)	5 (0.1)	500 (5.9)	9.9 (0.01)
Lithuania	47 (3.2)	538 (3.7)	51 (3.1)	530 (3.2)	2 (0.9)	~ ~	9.7 (0.12)
Germany	47 (3.8)	533 (3.0)	52 (3.7)	525 (3.1)	2 (0.9)	~ ~	9.8 (0.13)
Portugal	46 (5.1)	541 (6.9)	50 (4.9)	527 (4.6)	4 (1.3)	507 (12.7)	9.6 (0.20)
Belgium (Flemish)	46 (3.0)	555 (2.6)	52 (2.9)	545 (2.3)	1 (0.8)	~ ~	9.7 (0.11)
Oman	46 (2.6)	400 (3.7)	52 (2.7)	374 (4.1)	2 (0.9)	~ ~	9.8 (0.09)
Yemen	46 (4.4)	257 (8.4)	52 (4.5)	235 (7.9)	2 (0.9)	~ ~	9.9 (0.15)
Czech Republic	45 (3.8)	512 (3.7)	53 (3.6)	510 (3.5)	2 (0.9)	~ ~	9.6 (0.12)
Sweden	r 41 (4.8)	516 (3.4)	54 (4.9)	501 (3.2)	5 (1.3)	453 (3.6)	9.6 (0.16)
Chile	41 (3.7)	484 (4.6)	46 (3.7)	451 (4.2)	13 (3.1)	430 (13.1)	9.2 (0.19)
Slovak Republic	40 (3.6)	509 (5.9)	58 (3.6)	506 (4.8)	1 (0.7)	~ ~	9.4 (0.09)
Serbia	40 (4.2)	515 (4.8)	55 (4.1)	520 (3.9)	5 (1.6)	478 (20.5)	9.4 (0.16)
Romania	40 (3.6)	480 (9.7)	55 (3.7)	483 (7.4)	5 (1.6)	459 (17.9)	9.5 (0.14)
Tunisia	40 (3.9)	367 (6.9)	51 (3.8)	355 (4.8)	10 (2.6)	347 (17.0)	9.3 (0.16)
Turkey	37 (3.3)	495 (4.8)	45 (3.1)	461 (6.8)	18 (2.7)	438 (15.9)	8.9 (0.17)
Finland	36 (3.5)	554 (3.5)	59 (4.0)	544 (2.7)	6 (1.7)	519 (8.8)	9.4 (0.12)
Chinese Taipei	31 (3.8)	590 (2.4)	62 (3.7)	594 (2.7)	7 (2.0)	575 (5.2)	9.0 (0.15)
Morocco	29 (3.7)	363 (8.8)	53 (4.4)	331 (7.0)	17 (3.0)	321 (11.7)	8.8 (0.18)
Slovenia	27 (3.1)	511 (3.6)	67 (3.2)	515 (2.8)	6 (1.6)	498 (9.0)	8.9 (0.11)
Korea, Rep. of	24 (3.7)	615 (5.0)	69 (3.8)	603 (2.2)	7 (2.2)	593 (4.5)	8.7 (0.18)
Italy	18 (2.6)	508 (5.6)	75 (2.8)	511 (3.4)	6 (2.0)	487 (12.1)	8.6 (0.12)
Japan	5 (1.7)	589 (5.7)	83 (3.1)	587 (1.9)	12 (2.6)	574 (5.6)	7.9 (0.09)
International Avg.	53 (0.5)	498 (0.7)	43 (0.5)	483 (0.8)	4 (0.2)	470 (2.9)	

Centre point of scale set at 10.

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

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

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

Source: Exhibit 6.7, international mathematics report

Table 7.5 International table for safe and orderly schools

Reported by Teachers

Students were scored according to their teachers' degree of agreement with five statements on the *Safe and Orderly School* scale. Students in **Safe and Orderly** schools had a score on the scale of at least 10.2, which corresponds to their teachers "agreeing a lot" with three of the five qualities of a safe and orderly school and "agreeing a little" with the other two, on average. Students in **Not Safe and Orderly** schools had a score no higher than 6.3, which corresponds to their teachers "disagreeing a little" with three of the five qualities and "agreeing a little" with the other two, on average. All other students attended **Somewhat Safe and Orderly** schools.

Country	Safe and Orderly		Somewhat Safe and Orderly		Not Safe and Orderly		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	r 85 (2.7)	521 (3.5)	15 (2.6)	493 (7.2)	0 (0.4)	~ ~	11.5 (0.13)
Azerbaijan	85 (2.9)	437 (6.3)	14 (2.8)	444 (15.7)	1 (0.7)	~ ~	11.5 (0.13)
Georgia	82 (2.5)	456 (4.0)	17 (2.4)	454 (9.3)	1 (0.7)	~ ~	11.3 (0.12)
Ireland, Rep. of	78 (3.3)	527 (3.6)	20 (3.3)	482 (7.0)	2 (1.0)	~ ~	11.3 (0.15)
Australia	r 75 (3.5)	528 (3.5)	21 (3.2)	497 (7.8)	4 (1.4)	462 (15.4)	11.0 (0.17)
United Arab Emirates	74 (2.0)	434 (3.5)	25 (2.0)	421 (4.6)	0 (0.3)	~ ~	10.8 (0.08)
Croatia	73 (3.1)	514 (2.4)	26 (3.0)	520 (3.9)	1 (0.7)	~ ~	10.8 (0.12)
Thailand	72 (3.9)	477 (5.0)	26 (3.8)	478 (11.5)	3 (1.8)	338 (24.3)	11.0 (0.18)
Armenia	72 (2.7)	418 (4.3)	26 (2.6)	411 (7.3)	2 (1.1)	~ ~	10.9 (0.13)
New Zealand	70 (2.3)	512 (2.6)	29 (2.3)	466 (4.5)	1 (0.6)	~ ~	11.0 (0.10)
England	68 (4.0)	541 (3.8)	30 (3.9)	504 (7.0)	2 (1.2)	~ ~	10.8 (0.16)
Kazakhstan	67 (4.0)	498 (6.6)	33 (4.0)	489 (10.1)	1 (0.4)	~ ~	10.7 (0.15)
United States	r 65 (2.1)	556 (2.3)	30 (1.9)	530 (4.2)	5 (0.9)	497 (7.7)	10.5 (0.10)
Singapore	64 (2.1)	594 (4.1)	33 (2.1)	564 (5.3)	3 (0.5)	576 (17.5)	10.3 (0.09)
Qatar	62 (4.9)	398 (6.5)	34 (3.4)	392 (9.2)	4 (3.0)	362 (32.3)	10.3 (0.20)
Norway	62 (4.7)	500 (2.7)	38 (4.7)	485 (3.7)	0 (0.0)	~ ~	10.6 (0.15)
Denmark	61 (3.5)	533 (3.0)	38 (3.5)	531 (4.4)	1 (0.9)	~ ~	10.3 (0.11)
Iran, Islamic Rep. of	60 (3.5)	462 (4.4)	39 (3.4)	441 (6.6)	1 (0.8)	~ ~	10.3 (0.15)
Kuwait	60 (3.7)	352 (6.4)	38 (3.4)	337 (7.4)	3 (1.4)	353 (41.1)	10.1 (0.15)
Austria	58 (3.5)	538 (3.2)	39 (3.7)	525 (4.0)	2 (1.5)	~ ~	10.1 (0.13)
Netherlands	r 56 (4.6)	533 (2.9)	43 (4.6)	527 (4.0)	1 (0.8)	~ ~	10.2 (0.18)
Malta	56 (0.1)	456 (2.2)	43 (0.1)	437 (2.6)	2 (0.0)	~ ~	10.5 (0.00)
Poland	55 (3.4)	503 (3.3)	44 (3.4)	508 (3.8)	1 (0.6)	~ ~	10.0 (0.12)
Yemen	55 (4.2)	204 (7.8)	41 (4.1)	210 (13.1)	5 (1.8)	251 (23.2)	10.1 (0.18)
Bahrain	53 (5.4)	463 (5.0)	43 (5.3)	431 (7.1)	4 (1.9)	477 (10.0)	10.1 (0.19)
Hungary	52 (3.7)	543 (4.6)	44 (3.5)	526 (5.6)	4 (1.4)	491 (18.1)	9.8 (0.13)
Spain	51 (3.8)	518 (3.5)	45 (3.9)	495 (4.5)	5 (1.8)	472 (11.4)	9.7 (0.16)
Saudi Arabia	50 (4.6)	432 (7.0)	46 (4.5)	427 (9.5)	4 (1.8)	429 (29.2)	9.9 (0.17)
Russian Federation	49 (4.1)	554 (5.4)	49 (3.9)	551 (4.7)	2 (1.3)	~ ~	9.8 (0.17)
Hong Kong SAR	49 (5.0)	539 (3.8)	47 (4.9)	536 (6.4)	4 (1.8)	467 (60.0)	9.9 (0.17)
Oman	47 (2.5)	393 (6.2)	49 (2.6)	364 (4.7)	4 (1.4)	353 (21.1)	9.9 (0.10)
Lithuania	47 (3.2)	519 (3.4)	52 (3.1)	510 (3.4)	2 (0.9)	~ ~	9.7 (0.12)
Portugal	46 (5.1)	530 (8.0)	50 (4.9)	516 (4.5)	4 (1.3)	493 (14.4)	9.6 (0.20)
Belgium (Flemish)	46 (3.0)	516 (2.5)	52 (2.9)	504 (2.7)	1 (0.8)	~ ~	9.7 (0.11)
Germany	43 (3.7)	538 (3.7)	54 (3.7)	523 (3.5)	3 (1.3)	503 (10.8)	9.6 (0.12)
Slovak Republic	42 (3.3)	533 (5.9)	57 (3.3)	531 (5.2)	1 (0.7)	~ ~	9.4 (0.08)
Chile	41 (3.7)	503 (4.3)	46 (3.7)	469 (4.4)	13 (3.1)	449 (13.2)	9.2 (0.19)
Czech Republic	41 (3.9)	538 (4.3)	57 (3.8)	536 (3.3)	2 (0.9)	~ ~	9.4 (0.12)
Serbia	40 (4.2)	515 (4.7)	55 (4.1)	519 (3.8)	5 (1.6)	480 (17.5)	9.4 (0.16)
Romania	40 (3.6)	501 (10.1)	55 (3.7)	509 (7.3)	5 (1.6)	466 (22.0)	9.5 (0.14)
Sweden	r 39 (4.4)	551 (3.6)	57 (4.4)	529 (3.9)	4 (1.3)	465 (4.8)	9.5 (0.16)
Tunisia	38 (4.3)	359 (9.0)	52 (3.9)	340 (5.9)	9 (2.6)	322 (21.2)	9.3 (0.19)
Finland	38 (3.6)	581 (4.0)	57 (4.0)	566 (2.7)	6 (1.7)	548 (6.6)	9.4 (0.13)
Chinese Taipei	37 (4.1)	557 (3.7)	59 (4.1)	550 (2.5)	4 (1.5)	526 (15.7)	9.3 (0.15)
Turkey	37 (3.3)	487 (4.9)	45 (3.1)	455 (6.3)	18 (2.7)	432 (14.0)	8.9 (0.17)
Morocco	34 (3.4)	294 (6.8)	52 (3.9)	251 (8.1)	13 (2.4)	236 (10.8)	8.8 (0.14)
Slovenia	27 (3.1)	518 (4.0)	67 (3.2)	523 (3.5)	6 (1.6)	502 (9.1)	8.9 (0.11)
Korea, Rep. of	25 (3.7)	593 (5.0)	68 (3.7)	586 (2.1)	7 (2.1)	574 (5.4)	8.8 (0.18)
Italy	15 (2.2)	524 (7.3)	79 (2.9)	528 (2.9)	7 (2.0)	493 (16.8)	8.5 (0.11)
Japan	5 (1.8)	569 (10.5)	80 (3.4)	559 (2.1)	16 (2.8)	551 (4.3)	7.8 (0.10)
International Avg.	53 (0.5)	493 (0.7)	43 (0.5)	480 (0.9)	4 (0.2)	449 (4.0)	

Centre point of scale set at 10.

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

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

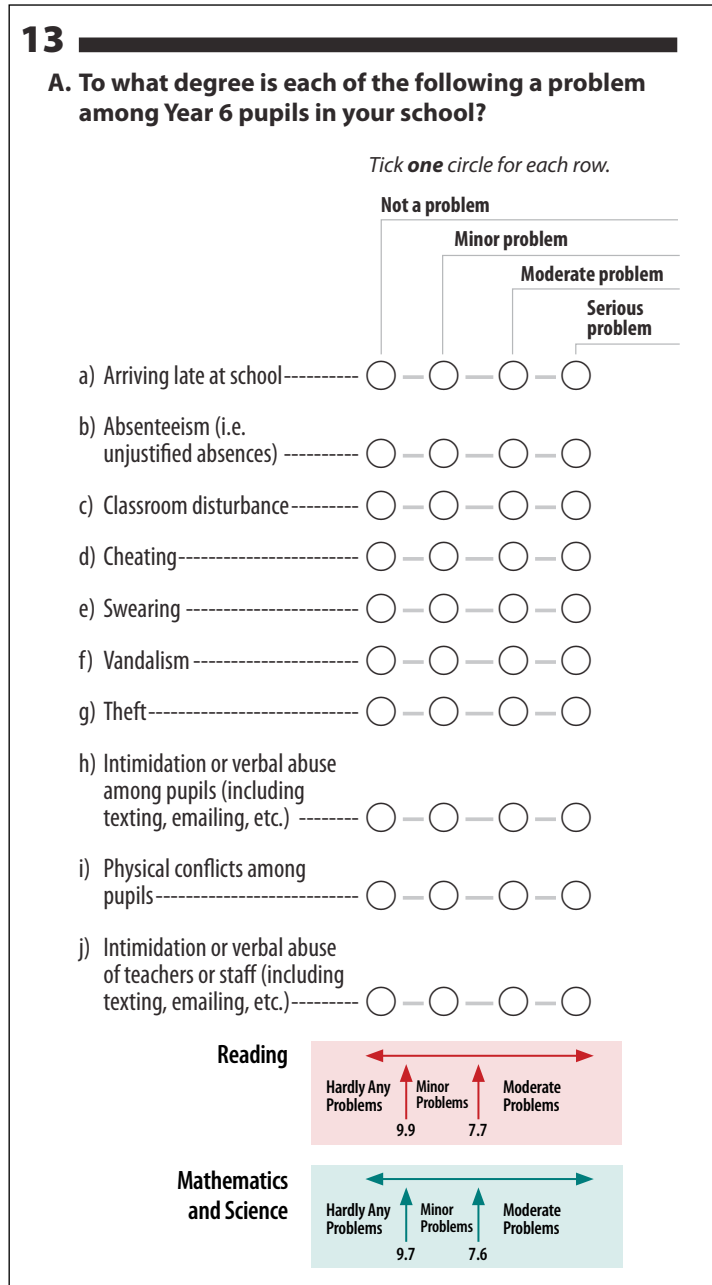
An "r" indicates data are available for at least 70% but less than 85% of the students.

Source: Exhibit 6.7, international science report

7.3 Principals' views of school discipline and safety

Principals were asked about the degree to which a number of potential safety and discipline issues were a problem in their school. Based on principals' responses, pupils were categorised as attending schools with *Hardly Any Problems*, *Minor Problems* or *Moderate Problems*. The questions and details of the scoring are shown in Figure 7.3 and the results for all three subjects are shown in Table 7.6.

Figure 7.3 School discipline and safety



Source: adapted from Exhibit 6.6, international PIRLS Report, Exhibit 6.9, international mathematics report, and Exhibit 6.9, international science report

Table 7.6 School discipline and safety**Reading***Reported by Principals*

Students were scored according to their principals' responses concerning ten potential school problems on the *School Discipline and Safety scale*. Students in schools with **Hardly Any Problems** had a score on the scale of at least 9.9, which corresponds to their principals reporting "not a problem" for five of the ten discipline and safety issues and "minor problem" for the other five, on average. Students in schools with **Moderate Problems** had a score no higher than 7.7, which corresponds to their principals reporting "moderate problem" for five of the ten issues and "minor problem" for the other five, on average. All other students attended schools with **Minor Problems**.

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	85 (3.7)	561 (2.9)	15 (3.7)	546 (7.1)	0 (0.0)	~ ~	11.1 (0.13)
International Avg.	58 (0.5)	519 (0.7)	31 (0.5)	504 (1.0)	11 (0.3)	476 (2.0)	

Mathematics*Reported by Principals*

Students were scored according to their principals' responses concerning ten potential school problems on the *School Discipline and Safety scale*. Students in schools with **Hardly Any Problems** had a score on the scale of at least 9.7, which corresponds to their principals reporting "not a problem" for five of the ten discipline and safety issues and "minor problem" for the other five, on average. Students in schools with **Moderate Problems** had a score no higher than 7.6, which corresponds to their principals reporting "moderate problem" for five of the ten issues and "minor problem" for the other five, on average. All other students attended schools with **Minor Problems**.

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	85 (3.7)	566 (3.8)	15 (3.7)	542 (7.7)	0 (0.0)	~ ~	11.0 (0.13)
International Avg.	61 (0.5)	496 (0.7)	29 (0.5)	482 (1.1)	11 (0.3)	451 (2.2)	

Science*Reported by Principals*

Students were scored according to their principals' responses concerning ten potential school problems on the *School Discipline and Safety scale*. Students in schools with **Hardly Any Problems** had a score on the scale of at least 9.7, which corresponds to their principals reporting "not a problem" for five of the ten discipline and safety issues and "minor problem" for the other five, on average. Students in schools with **Moderate Problems** had a score no higher than 7.6, which corresponds to their principals reporting "moderate problem" for five of the ten issues and "minor problem" for the other five, on average. All other students attended schools with **Minor Problems**.

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	85 (3.7)	520 (3.4)	15 (3.7)	502 (7.3)	0 (0.0)	~ ~	11.0 (0.13)
International Avg.	61 (0.5)	492 (0.7)	29 (0.5)	477 (1.2)	11 (0.3)	448 (2.2)	

Centre point of scale set at 10.

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

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

Sources: *Exhibit 6.6, international PIRLS Report, Exhibit 6.9, international mathematics report, and Exhibit 6.9, international science report*

The vast majority of pupils in Northern Ireland (85 per cent) had principals who reported *Hardly Any Problems* of discipline or safety in their schools. In PIRLS, this was higher than any other participating country except Hong Kong, and compares with an international average of 58 per cent. In TIMSS, only Kazakhstan and Armenia reported fewer problems than Northern Ireland. The remaining 15 per cent of pupils in Northern Ireland were in schools where principals reported *Minor Problems*.

Principals in all comparator countries reported a low percentage of pupils (3 per cent or less) in schools with *Moderate Problems* of discipline and safety.

Internationally, pupils in schools with lower problem ratings, on average, scored higher than those in schools with more reported problems. Northern Ireland followed this pattern: pupils in schools judged to have *Hardly Any Problems* had higher average scores than those in schools judged to have *Minor Problems*. The standard error statistics for Northern Ireland on this scale suggest that the apparent differences in the three subjects are probably significant (shown in Table 7.6). However, across

countries, rankings in ratings for discipline and safety problems did not necessarily relate directly to overall rankings of average pupil achievement.

The full international tables follow, for reference, showing data for all countries (Tables 7.7 to 7.9, derived from PIRLS Exhibit 6.6; TIMSS mathematics and science Exhibit 6.9).

Table 7.7 International table for school discipline and safety (reading)

Reported by Principals

Students were scored according to their principals' responses concerning ten potential school problems on the *School Discipline and Safety scale*. Students in schools with **Hardly Any Problems** had a score on the scale of at least 9.9, which corresponds to their principals reporting "not a problem" for five of the ten discipline and safety issues and "minor problem" for the other five, on average. Students in schools with **Moderate Problems** had a score no higher than 7.7, which corresponds to their principals reporting "moderate problem" for five of the ten issues and "minor problem" for the other five, on average. All other students attended schools with **Minor Problems**.

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Hong Kong SAR	87 (2.9)	570 (2.5)	12 (2.8)	566 (10.1)	1 (0.0)	~ ~	11.4 (0.12)
Northern Ireland	85 (3.7)	561 (2.9)	15 (3.7)	546 (7.1)	0 (0.0)	~ ~	11.1 (0.13)
Ireland, Rep. of	83 (3.5)	556 (2.5)	16 (3.3)	531 (9.0)	1 (1.0)	~ ~	11.2 (0.12)
Georgia	81 (2.8)	489 (3.6)	13 (2.4)	481 (9.5)	6 (1.4)	484 (13.2)	10.8 (0.14)
Chinese Taipei	77 (3.3)	552 (2.1)	23 (3.3)	555 (4.5)	0 (0.0)	~ ~	11.4 (0.13)
Spain	77 (3.3)	517 (2.8)	14 (2.7)	499 (6.7)	10 (2.5)	510 (9.2)	10.7 (0.17)
Bulgaria	75 (3.6)	540 (4.2)	19 (3.6)	509 (11.8)	6 (2.0)	498 (14.7)	10.6 (0.15)
Lithuania	75 (3.5)	531 (2.4)	25 (3.5)	522 (4.6)	0 (0.0)	~ ~	10.6 (0.11)
England	75 (4.4)	557 (3.3)	24 (4.3)	532 (5.8)	1 (1.0)	~ ~	10.8 (0.15)
Iran, Islamic Rep. of	74 (3.9)	462 (4.1)	26 (3.9)	446 (6.8)	0 (0.0)	~ ~	10.8 (0.11)
Czech Republic	68 (3.6)	547 (2.7)	29 (3.5)	542 (4.1)	2 (1.0)	~ ~	10.3 (0.11)
New Zealand	68 (3.3)	544 (2.9)	32 (3.3)	514 (5.7)	0 (0.4)	~ ~	10.6 (0.11)
Singapore	67 (0.0)	568 (4.0)	33 (0.0)	565 (5.8)	0 (0.0)	~ ~	10.8 (0.00)
Portugal	65 (5.2)	543 (3.2)	30 (5.3)	538 (6.5)	5 (1.7)	524 (8.0)	10.4 (0.17)
Croatia	65 (4.0)	557 (2.3)	33 (4.0)	544 (3.2)	2 (1.2)	~ ~	10.5 (0.12)
Russian Federation	65 (3.9)	571 (3.5)	35 (3.8)	564 (4.3)	0 (0.5)	~ ~	10.3 (0.09)
Australia	64 (3.9)	534 (3.5)	34 (3.8)	521 (4.5)	2 (1.0)	~ ~	10.5 (0.12)
Finland	64 (4.5)	571 (2.3)	34 (4.4)	564 (3.2)	2 (1.2)	~ ~	10.3 (0.12)
Romania	64 (4.1)	512 (5.2)	23 (3.4)	500 (10.6)	13 (2.9)	454 (14.3)	10.3 (0.17)
Malta	64 (0.1)	492 (1.9)	30 (0.1)	454 (2.8)	6 (0.1)	448 (6.3)	10.2 (0.00)
United States	63 (2.7)	564 (2.0)	35 (2.8)	548 (2.7)	2 (0.8)	~ ~	10.3 (0.09)
Qatar	63 (3.2)	441 (5.2)	23 (2.6)	405 (8.7)	14 (2.3)	384 (12.2)	10.1 (0.14)
Azerbaijan	62 (4.2)	464 (4.0)	8 (2.3)	455 (9.5)	30 (3.9)	461 (7.5)	9.6 (0.26)
France	62 (4.5)	527 (2.6)	33 (4.3)	507 (5.5)	5 (1.8)	502 (14.3)	10.4 (0.12)
United Arab Emirates	61 (2.3)	449 (3.1)	24 (1.9)	414 (4.7)	15 (1.7)	412 (6.6)	10.0 (0.11)
Canada	60 (2.4)	554 (2.0)	37 (2.4)	539 (2.4)	3 (0.7)	531 (4.5)	10.3 (0.07)
Norway	58 (4.4)	507 (2.9)	39 (4.2)	507 (3.2)	3 (1.6)	496 (10.2)	10.0 (0.13)
Belgium (French)	57 (4.7)	515 (3.2)	38 (4.5)	496 (5.7)	5 (2.2)	496 (8.1)	10.1 (0.16)
Slovak Republic	57 (3.6)	539 (2.6)	35 (3.4)	534 (5.5)	9 (2.0)	514 (15.0)	10.0 (0.12)
Italy	56 (3.9)	541 (3.1)	25 (3.8)	546 (4.7)	19 (2.9)	538 (5.5)	9.6 (0.14)
Denmark	56 (3.5)	557 (2.4)	42 (3.3)	550 (2.7)	2 (1.0)	~ ~	10.1 (0.09)
Slovenia	53 (3.7)	530 (2.8)	42 (3.6)	532 (3.2)	4 (1.4)	519 (7.6)	10.1 (0.12)
Poland	51 (3.9)	527 (2.7)	46 (4.2)	524 (3.8)	3 (1.4)	530 (16.0)	9.9 (0.09)
Hungary	50 (4.2)	553 (4.3)	45 (4.2)	533 (4.9)	5 (1.5)	470 (20.2)	9.8 (0.13)
Sweden	49 (4.7)	551 (2.7)	45 (4.7)	534 (4.0)	6 (1.2)	523 (7.6)	9.8 (0.13)
Austria	46 (4.3)	533 (2.9)	42 (4.1)	527 (3.6)	12 (3.3)	522 (5.1)	9.5 (0.14)
Israel	46 (4.5)	550 (6.5)	39 (4.3)	549 (5.6)	16 (3.1)	493 (12.2)	9.2 (0.21)
Saudi Arabia	45 (3.9)	440 (4.8)	25 (3.8)	412 (13.5)	30 (3.8)	430 (8.6)	9.2 (0.18)
Germany	41 (3.3)	554 (3.1)	53 (3.5)	538 (3.2)	6 (1.5)	498 (9.3)	9.6 (0.08)
Trinidad and Tobago	38 (4.3)	483 (7.2)	52 (4.4)	464 (6.0)	10 (2.4)	460 (10.6)	9.4 (0.12)
Oman	28 (2.9)	397 (4.2)	37 (3.1)	377 (4.5)	35 (3.0)	382 (5.8)	8.5 (0.15)
Netherlands	25 (4.6)	555 (3.9)	67 (5.3)	545 (2.3)	8 (3.3)	536 (14.0)	9.1 (0.10)
Colombia	25 (3.4)	463 (9.0)	33 (4.7)	435 (6.8)	42 (4.4)	449 (7.2)	8.0 (0.19)
Morocco	14 (2.5)	330 (11.0)	22 (2.9)	294 (6.6)	63 (3.7)	316 (5.1)	7.3 (0.15)
Indonesia	7 (2.4)	442 (14.2)	18 (3.6)	428 (11.8)	75 (4.3)	428 (4.8)	6.2 (0.21)
International Avg.	58 (0.5)	519 (0.7)	31 (0.5)	504 (1.0)	11 (0.3)	476 (2.0)	

Centre point of scale set at 10.

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

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

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

Source: Exhibit 6.6, international PIRLS report

Table 7.8 International table for school discipline and safety (mathematics)

Reported by Principals

Students were scored according to their principals' responses concerning ten potential school problems on the *School Discipline and Safety* scale. Students in schools with **Hardly Any Problems** had a score on the scale of at least 9.7, which corresponds to their principals reporting "not a problem" for five of the ten discipline and safety issues and "minor problem" for the other five, on average. Students in schools with **Moderate Problems** had a score no higher than 7.6, which corresponds to their principals reporting "moderate problem" for five of the ten issues and "minor problem" for the other five, on average. All other students attended schools with **Minor Problems**.

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Kazakhstan	91 (2.2)	505 (5.0)	9 (2.4)	465 (13.3)	1 (0.6)	~ ~	11.1 (0.10)
Armenia	87 (2.7)	450 (3.8)	8 (2.3)	460 (11.8)	4 (1.7)	479 (20.6)	11.1 (0.12)
Northern Ireland	85 (3.7)	566 (3.8)	15 (3.7)	542 (7.7)	0 (0.0)	~ ~	11.0 (0.13)
Netherlands	85 (3.6)	544 (2.2)	15 (3.6)	524 (6.9)	0 (0.0)	~ ~	11.3 (0.16)
Hong Kong SAR	84 (2.9)	606 (3.0)	15 (2.8)	574 (16.0)	1 (0.0)	~ ~	11.2 (0.12)
Ireland, Rep. of	83 (3.1)	532 (2.9)	16 (3.0)	512 (9.9)	1 (1.0)	~ ~	11.1 (0.13)
Georgia	81 (2.8)	449 (4.7)	13 (2.4)	447 (9.8)	6 (1.4)	471 (14.3)	10.7 (0.15)
Spain	80 (3.3)	487 (2.7)	12 (2.8)	459 (10.1)	8 (2.3)	481 (14.2)	10.7 (0.17)
Chinese Taipei	77 (3.3)	591 (2.5)	23 (3.3)	591 (4.2)	0 (0.0)	~ ~	11.4 (0.13)
England	77 (4.1)	551 (4.2)	20 (4.2)	515 (11.0)	3 (1.6)	495 (10.9)	10.6 (0.11)
Korea, Rep. of	76 (3.6)	606 (2.3)	18 (3.4)	599 (3.9)	6 (2.0)	596 (7.5)	10.9 (0.15)
Lithuania	75 (3.5)	538 (2.8)	25 (3.5)	523 (5.8)	0 (0.0)	~ ~	10.5 (0.11)
Iran, Islamic Rep. of	74 (3.9)	437 (4.6)	25 (3.9)	417 (7.8)	0 (0.0)	~ ~	10.7 (0.11)
Japan	72 (3.2)	585 (1.9)	24 (3.3)	587 (4.8)	4 (1.6)	582 (10.4)	10.5 (0.12)
New Zealand	69 (3.4)	502 (3.3)	28 (3.2)	458 (5.5)	3 (1.3)	419 (15.2)	10.7 (0.12)
Czech Republic	68 (3.6)	512 (3.0)	29 (3.5)	506 (5.1)	2 (1.0)	~ ~	10.2 (0.11)
Belgium (Flemish)	67 (4.4)	553 (2.2)	32 (4.3)	545 (3.9)	1 (0.0)	~ ~	10.4 (0.13)
Singapore	67 (0.0)	606 (3.9)	33 (0.0)	603 (6.0)	0 (0.0)	~ ~	10.7 (0.00)
Croatia	66 (4.0)	492 (2.6)	31 (4.0)	484 (3.8)	2 (1.2)	~ ~	10.4 (0.12)
Portugal	66 (5.4)	536 (4.1)	30 (5.5)	525 (7.9)	5 (1.7)	529 (18.7)	10.3 (0.17)
Russian Federation	65 (3.9)	545 (4.5)	35 (3.8)	536 (5.4)	0 (0.5)	~ ~	10.1 (0.09)
United States	64 (2.7)	551 (3.0)	34 (2.6)	531 (3.3)	2 (0.7)	~ ~	10.3 (0.09)
Australia	64 (3.9)	523 (4.1)	34 (3.8)	511 (5.3)	2 (1.0)	~ ~	10.4 (0.12)
Finland	64 (4.5)	549 (2.5)	34 (4.4)	540 (4.8)	2 (1.2)	~ ~	10.2 (0.12)
Romania	64 (4.1)	495 (5.6)	23 (3.4)	478 (12.3)	13 (2.9)	430 (27.6)	10.2 (0.17)
Malta	64 (0.1)	503 (1.8)	30 (0.1)	486 (2.4)	6 (0.1)	473 (4.9)	10.1 (0.00)
Bahrain	63 (4.2)	438 (4.8)	25 (4.1)	430 (9.2)	12 (4.7)	437 (7.4)	10.1 (0.10)
Qatar	63 (3.2)	430 (5.1)	23 (2.6)	391 (10.1)	14 (2.3)	373 (10.2)	9.9 (0.14)
Azerbaijan	62 (4.2)	461 (7.6)	8 (2.3)	462 (13.8)	30 (3.9)	466 (9.3)	9.5 (0.26)
United Arab Emirates	61 (2.3)	444 (2.9)	24 (2.0)	411 (4.6)	15 (1.7)	415 (6.8)	9.9 (0.11)
Denmark	60 (4.0)	543 (3.4)	40 (4.0)	535 (4.1)	1 (0.0)	~ ~	10.0 (0.09)
Norway	58 (4.4)	495 (3.7)	39 (4.2)	492 (4.0)	3 (1.6)	485 (10.1)	9.9 (0.13)
Thailand	58 (4.6)	469 (4.8)	36 (4.4)	444 (9.0)	6 (2.3)	442 (21.5)	10.1 (0.16)
Slovak Republic	57 (3.6)	513 (3.7)	35 (3.4)	503 (7.5)	9 (2.0)	477 (16.9)	9.9 (0.12)
Italy	56 (3.9)	509 (3.8)	25 (3.8)	509 (5.9)	19 (2.9)	505 (6.3)	9.5 (0.14)
Serbia	55 (4.7)	514 (4.8)	30 (4.2)	524 (5.8)	15 (3.2)	506 (6.9)	9.7 (0.18)
Slovenia	53 (3.7)	512 (3.4)	42 (3.6)	516 (3.6)	4 (1.4)	500 (5.6)	10.0 (0.12)
Poland	51 (3.9)	481 (3.0)	46 (4.2)	481 (3.2)	3 (1.4)	493 (14.4)	9.7 (0.09)
Hungary	50 (4.2)	530 (4.8)	45 (4.2)	509 (6.0)	5 (1.5)	433 (24.6)	9.7 (0.13)
Sweden	49 (4.7)	514 (2.8)	45 (4.7)	495 (3.7)	6 (1.2)	479 (12.7)	9.7 (0.13)
Austria	46 (4.3)	513 (3.4)	42 (4.1)	508 (3.7)	12 (3.3)	492 (9.1)	9.4 (0.14)
Saudi Arabia	45 (3.9)	417 (6.2)	25 (3.8)	395 (13.8)	30 (3.8)	414 (9.8)	9.1 (0.18)
Germany	41 (3.3)	539 (3.1)	53 (3.5)	526 (3.0)	6 (1.5)	487 (7.8)	9.5 (0.08)
Chile	39 (3.4)	481 (5.0)	43 (4.1)	459 (4.6)	18 (2.9)	439 (6.4)	9.2 (0.14)
Turkey	38 (2.9)	491 (6.8)	35 (3.4)	464 (7.2)	26 (3.4)	445 (12.0)	8.9 (0.14)
Oman	28 (2.9)	385 (4.8)	37 (3.1)	374 (4.6)	35 (3.0)	380 (6.2)	8.4 (0.15)
Tunisia	26 (3.3)	362 (7.1)	27 (3.2)	357 (7.9)	46 (4.0)	359 (6.2)	8.0 (0.19)
Kuwait	24 (3.5)	348 (6.8)	48 (4.2)	345 (5.0)	29 (3.6)	332 (7.3)	8.4 (0.15)
Morocco	14 (2.4)	340 (9.1)	24 (3.1)	317 (7.6)	62 (3.9)	342 (6.1)	7.2 (0.15)
Yemen	13 (2.8)	263 (12.4)	33 (4.1)	259 (10.5)	54 (4.0)	238 (9.7)	7.5 (0.16)
International Avg.	61 (0.5)	496 (0.7)	29 (0.5)	482 (1.1)	11 (0.3)	451 (2.2)	

Centre point of scale set at 10.

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

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

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

Source: Exhibit 6.9, international mathematics report

Table 7.9 International table for school discipline and safety (science)

Reported by Principals

Students were scored according to their principals' responses concerning ten potential school problems on the *School Discipline and Safety* scale. Students in schools with **Hardly Any Problems** had a score on the scale of at least 9.7, which corresponds to their principals reporting "not a problem" for five of the ten discipline and safety issues and "minor problem" for the other five, on average. Students in schools with **Moderate Problems** had a score no higher than 7.6, which corresponds to their principals reporting "moderate problem" for five of the ten issues and "minor problem" for the other five, on average. All other students attended schools with **Minor Problems**.

Country	Hardly Any Problems		Minor Problems		Moderate Problems		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Kazakhstan	91 (2.2)	498 (5.6)	9 (2.4)	463 (17.7)	1 (0.6)	~ ~	11.1 (0.10)
Armenia	87 (2.7)	414 (4.0)	8 (2.3)	422 (13.9)	4 (1.7)	445 (20.7)	11.1 (0.12)
Northern Ireland	85 (3.7)	520 (3.4)	15 (3.7)	502 (7.3)	0 (0.0)	~ ~	11.0 (0.13)
Netherlands	85 (3.6)	536 (2.7)	15 (3.6)	516 (6.5)	0 (0.0)	~ ~	11.3 (0.16)
Hong Kong SAR	84 (2.9)	540 (3.0)	15 (2.8)	505 (19.5)	1 (0.0)	~ ~	11.2 (0.12)
Ireland, Rep. of	83 (3.1)	521 (3.5)	16 (3.0)	499 (11.2)	1 (1.0)	~ ~	11.1 (0.13)
Georgia	81 (2.8)	454 (4.7)	13 (2.4)	454 (9.5)	6 (1.4)	470 (10.8)	10.7 (0.15)
Spain	80 (3.3)	510 (2.9)	12 (2.8)	486 (8.7)	8 (2.3)	498 (13.8)	10.7 (0.17)
Chinese Taipei	77 (3.3)	552 (2.7)	23 (3.3)	551 (4.4)	0 (0.0)	~ ~	11.4 (0.13)
England	77 (4.1)	537 (3.5)	20 (4.2)	500 (10.0)	3 (1.6)	486 (7.3)	10.6 (0.11)
Korea, Rep. of	76 (3.6)	588 (2.3)	18 (3.4)	580 (3.6)	6 (2.0)	582 (7.0)	10.9 (0.15)
Lithuania	75 (3.5)	518 (2.8)	25 (3.5)	505 (5.3)	0 (0.0)	~ ~	10.5 (0.11)
Iran, Islamic Rep. of	74 (3.9)	458 (5.0)	25 (3.9)	440 (8.7)	0 (0.0)	~ ~	10.7 (0.11)
Japan	72 (3.2)	559 (2.1)	24 (3.3)	558 (4.2)	4 (1.6)	557 (8.2)	10.5 (0.12)
New Zealand	69 (3.4)	512 (3.1)	28 (3.2)	469 (6.0)	3 (1.3)	428 (14.4)	10.7 (0.12)
Czech Republic	68 (3.6)	539 (2.9)	29 (3.5)	529 (5.1)	2 (1.0)	~ ~	10.2 (0.11)
Belgium (Flemish)	67 (4.4)	512 (2.3)	32 (4.3)	504 (4.4)	1 (0.0)	~ ~	10.4 (0.13)
Singapore	67 (0.0)	584 (4.1)	33 (0.0)	581 (6.5)	0 (0.0)	~ ~	10.7 (0.00)
Croatia	66 (4.0)	517 (2.6)	31 (4.0)	512 (3.6)	2 (1.2)	~ ~	10.4 (0.12)
Portugal	66 (5.4)	527 (4.3)	30 (5.5)	512 (8.6)	5 (1.7)	519 (20.6)	10.3 (0.17)
Russian Federation	65 (3.9)	555 (4.4)	35 (3.8)	549 (5.1)	0 (0.5)	~ ~	10.1 (0.09)
United States	64 (2.7)	555 (3.0)	34 (2.6)	532 (3.6)	2 (0.7)	~ ~	10.3 (0.09)
Australia	64 (3.9)	523 (4.1)	34 (3.8)	510 (5.0)	2 (1.0)	~ ~	10.4 (0.12)
Finland	64 (4.5)	574 (2.9)	34 (4.4)	565 (3.8)	2 (1.2)	~ ~	10.2 (0.12)
Romania	64 (4.1)	519 (6.1)	23 (3.4)	501 (12.0)	13 (2.9)	446 (23.8)	10.2 (0.17)
Malta	64 (0.1)	457 (2.3)	30 (0.1)	429 (2.7)	6 (0.1)	419 (7.2)	10.1 (0.00)
Bahrain	63 (4.2)	453 (5.3)	25 (4.1)	437 (9.7)	12 (4.7)	452 (7.3)	10.1 (0.30)
Qatar	63 (3.2)	414 (5.9)	23 (2.6)	366 (11.8)	14 (2.3)	347 (14.8)	9.9 (0.14)
Azerbaijan	62 (4.2)	438 (7.2)	8 (2.3)	431 (12.8)	30 (3.9)	440 (10.6)	9.5 (0.26)
United Arab Emirates	61 (2.3)	438 (3.1)	24 (2.0)	402 (5.1)	15 (1.7)	411 (7.7)	9.9 (0.11)
Denmark	60 (4.0)	534 (3.3)	40 (4.0)	525 (5.1)	1 (0.0)	~ ~	10.0 (0.09)
Norway	58 (4.4)	494 (3.1)	39 (4.2)	492 (3.3)	3 (1.6)	483 (10.2)	9.9 (0.13)
Thailand	58 (4.6)	484 (5.5)	36 (4.4)	457 (10.7)	6 (2.3)	444 (24.5)	10.1 (0.16)
Slovak Republic	57 (3.6)	537 (3.5)	35 (3.4)	529 (7.4)	9 (2.0)	503 (18.4)	9.9 (0.12)
Italy	56 (3.9)	525 (4.0)	25 (3.8)	526 (6.1)	19 (2.9)	520 (6.6)	9.5 (0.14)
Serbia	55 (4.7)	513 (4.7)	30 (4.2)	524 (5.3)	15 (3.2)	506 (7.3)	9.7 (0.18)
Slovenia	53 (3.7)	519 (3.9)	42 (3.6)	523 (4.2)	4 (1.4)	503 (8.3)	10.0 (0.12)
Poland	51 (3.9)	505 (3.4)	46 (4.2)	505 (3.6)	3 (1.4)	518 (14.9)	9.7 (0.09)
Hungary	50 (4.2)	550 (5.0)	45 (4.2)	528 (5.8)	5 (1.5)	456 (21.6)	9.7 (0.13)
Sweden	49 (4.7)	547 (3.1)	45 (4.7)	522 (4.8)	6 (1.2)	504 (11.0)	9.7 (0.13)
Austria	46 (4.3)	538 (3.7)	42 (4.1)	529 (4.4)	12 (3.3)	515 (8.0)	9.4 (0.14)
Saudi Arabia	45 (3.9)	439 (6.1)	25 (3.8)	409 (15.0)	30 (3.8)	433 (10.2)	9.1 (0.18)
Germany	41 (3.3)	541 (3.4)	53 (3.5)	526 (4.0)	6 (1.5)	475 (10.7)	9.5 (0.08)
Chile	39 (3.4)	498 (5.1)	43 (4.1)	477 (4.5)	18 (2.9)	459 (6.4)	9.2 (0.14)
Turkey	38 (2.9)	486 (6.7)	35 (3.4)	458 (6.9)	26 (3.4)	436 (10.5)	8.9 (0.14)
Oman	28 (2.9)	378 (6.4)	37 (3.1)	366 (5.8)	35 (3.0)	372 (8.9)	8.4 (0.15)
Tunisia	26 (3.3)	345 (9.3)	27 (3.2)	343 (10.1)	46 (4.0)	348 (8.2)	8.0 (0.19)
Kuwait	24 (3.5)	358 (9.6)	48 (4.2)	351 (7.5)	29 (3.6)	334 (9.6)	8.4 (0.15)
Morocco	14 (2.4)	271 (12.0)	24 (3.1)	244 (8.6)	62 (3.9)	271 (6.3)	7.2 (0.15)
Yemen	13 (2.8)	226 (14.4)	33 (4.1)	217 (12.0)	54 (4.0)	201 (11.4)	7.5 (0.16)
International Avg.	61 (0.5)	492 (0.7)	29 (0.5)	477 (1.2)	11 (0.3)	448 (2.2)	

Centre point of scale set at 10.

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

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

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

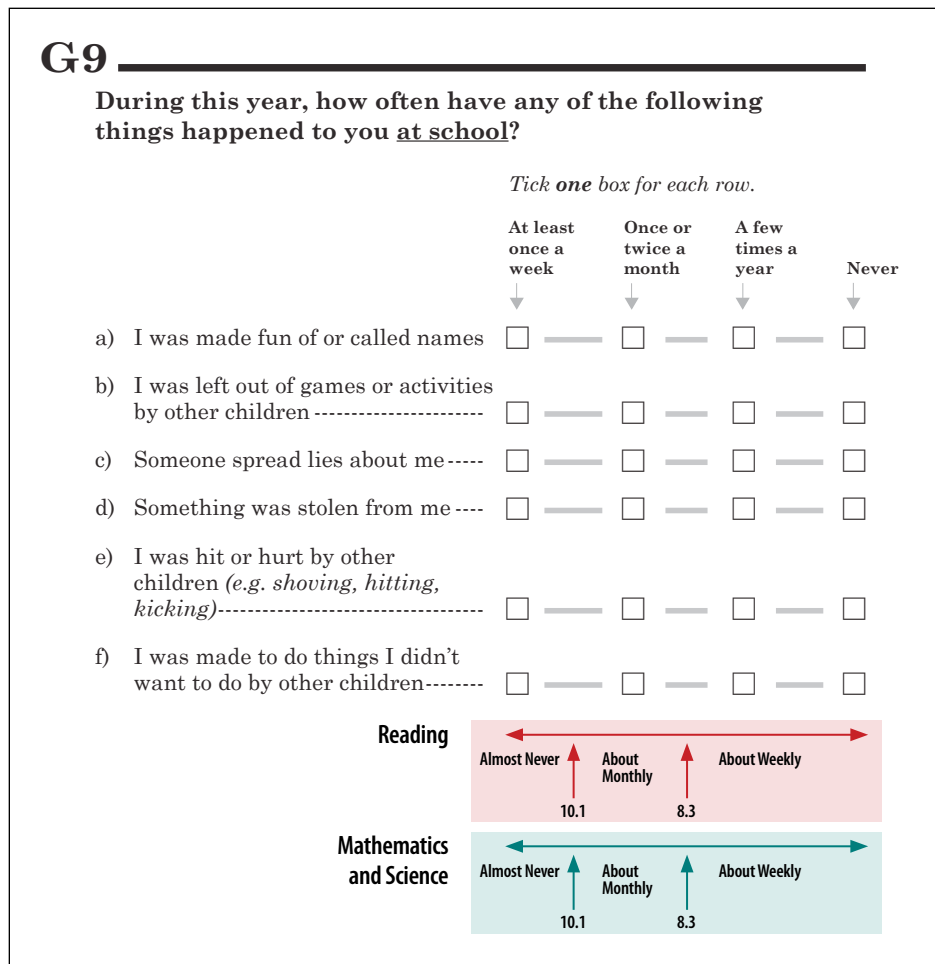
Source: Exhibit 6.9, international science report

7.4 Pupil reports of bullying in school

Pupils were asked about the extent to which they had experienced a range of behaviours which were considered to demonstrate bullying at school. The questions and details of the scaling are shown in Figure 7.4 and the results for each subject are shown in Table 7.10.

Based on their responses, pupils were categorised as being in one of three bands which described the frequency with which they had experienced the six bullying behaviours in their school during the last year: *Almost Never*, *About Monthly* and *About Weekly*.

Figure 7.4 Pupils bullied at school



Source: adapted from Exhibit 6.7, international PIRLS Report, Exhibit 6.11, international mathematics report, and Exhibit 6.11, international science report

Table 7.10 Pupils bullied at school**Reading***Reported by Students*

Students were scored according to their responses to how often they experienced six bullying behaviors on the *Students Bullied at School* scale. Students bullied **Almost Never** had a score on the scale of at least 10.1, which corresponds to “never” experiencing three of the six bullying behaviors and each of the other three behaviors “a few times a year,” on average. Students bullied **About Weekly** had a score no higher than 8.3, which corresponds to their experiencing each of three of the six behaviors “once or twice a month” and each of the other three “a few times a year,” on average. All other students were bullied **About Monthly**.

Country	Almost Never		About Monthly		About Weekly		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	57 (1.3)	567 (2.7)	29 (1.0)	557 (3.8)	14 (0.9)	527 (5.0)	10.4 (0.06)
International Avg.	47 (0.2)	523 (0.5)	33 (0.1)	513 (0.5)	20 (0.1)	489 (0.7)	

Mathematics*Reported by Students*

Students were scored according to their responses to how often they experienced six bullying behaviors on the *Students Bullied at School* scale. Students bullied **Almost Never** had a score on the scale of at least 10.1, which corresponds to “never” experiencing three of the six bullying behaviors and each of the other three behaviors “a few times a year,” on average. Students bullied **About Weekly** had a score no higher than 8.3, which corresponds to their experiencing each of three of the six behaviors “once or twice a month” and each of the other three “a few times a year,” on average. All other students were bullied **About Monthly**.

Country	Almost Never		About Monthly		About Weekly		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	57 (1.3)	571 (3.4)	29 (1.0)	565 (4.1)	14 (1.0)	528 (7.3)	10.4 (0.06)
International Avg.	48 (0.2)	501 (0.5)	32 (0.1)	493 (0.6)	20 (0.1)	469 (0.7)	

Science*Reported by Students*

Students were scored according to their responses to how often they experienced six bullying behaviors on the *Students Bullied at School* scale. Students bullied **Almost Never** had a score on the scale of at least 10.1, which corresponds to “never” experiencing three of the six bullying behaviors and each of the other three behaviors “a few times a year,” on average. Students bullied **About Weekly** had a score no higher than 8.3, which corresponds to their experiencing each of three of the six behaviors “once or twice a month” and each of the other three “a few times a year,” on average. All other students were bullied **About Monthly**.

Country	Almost Never		About Monthly		About Weekly		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	57 (1.3)	523 (2.6)	29 (1.0)	519 (3.2)	14 (1.0)	490 (6.7)	10.4 (0.06)
International Avg.	48 (0.2)	497 (0.6)	32 (0.1)	489 (0.6)	20 (0.1)	464 (0.8)	

Centre point of scale set at 10.

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

Sources: Exhibit 6.7, *international PIRLS Report*, Exhibit 6.11, *international mathematics report*, and Exhibit 6.11, *international science report*

Pupils in Northern Ireland reported that, on average, they experienced bullying behaviours less frequently than those in most other participating countries. The average scale scores on this scale were 10.4 for PIRLS and TIMSS placing them in the *Almost Never* bullied category overall. Fifty-seven per cent of pupils reported that they were *Almost Never* bullied, while responses from 29 per cent were categorised as experiencing bullying *About Monthly* and 14 per cent *About Weekly*. These figures compare favourably with the international averages of PIRLS (47 per cent, 33 per cent and 20 per cent) and TIMSS (48 per cent, 32 per cent and 20 per cent).

Among comparator countries, only the Republic of Ireland and Finland were ranked higher on this scale. These two countries also reported experiencing the lowest levels of bullying behaviour, while the highest levels among comparator countries were reported in New Zealand and Australia.

Internationally, average pupil attainment in all three subjects tended to be higher where less bullying was reported (but causality cannot be inferred). Pupils in Northern Ireland appeared to conform to this general pattern. However, the standard errors shown in Table 7.10 suggest that, in Northern Ireland, these differences were statistically significant across all categories for reading only, with possibly significant differences for mathematics and science only between pupils with *About Weekly* and *About Monthly* experience of bullying behaviours.

7.5 Teachers' reports of the extent to which their teaching is limited by disruptive or uninterested pupils

Teachers were asked to indicate the extent to which they felt that their teaching was limited by disruptive or uninterested pupils. The results for each subject are shown in Table 7.11. Teachers' responses led to them being categorised as having their teaching limited *Some or Not At All*, or *A Lot* by these factors.

Table 7.11 Teaching limited by disruptive or uninterested pupils

Reading

Reported by teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Disruptive Students				Students in Classrooms Where Teachers Report Instruction Is Limited by Uninterested Students			
	Some or Not At All		A Lot		Some or Not At All		A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r 95 (2.1)	560 (2.9)	5 (2.1)	554 (10.5)	r 97 (1.6)	561 (2.7)	3 (1.6)	535 (8.3)
International Avg.	88 (0.3)	514 (0.4)	12 (0.3)	501 (1.4)	90 (0.3)	515 (0.4)	10 (0.3)	494 (1.6)

Mathematics

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Disruptive Students				Students in Classrooms Where Teachers Report Instruction Is Limited by Uninterested Students			
	Some or Not At All		A Lot		Some or Not At All		A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r 96 (1.7)	564 (3.4)	4 (1.7)	539 (29.7)	r 98 (1.2)	563 (3.5)	2 (1.2)	~ ~
International Avg.	87 (0.3)	493 (0.5)	13 (0.3)	479 (1.6)	89 (0.3)	494 (0.5)	11 (0.3)	468 (1.9)

Science

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Disruptive Students				Students in Classrooms Where Teachers Report Instruction Is Limited by Uninterested Students			
	Some or Not At All		A Lot		Some or Not At All		A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r 95 (2.0)	519 (2.9)	5 (2.0)	485 (23.3)	r 98 (1.2)	517 (3.1)	2 (1.2)	~ ~
International Avg.	87 (0.3)	488 (0.6)	13 (0.3)	472 (1.6)	89 (0.3)	489 (0.6)	11 (0.3)	463 (1.9)

() 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.

Sources: Exhibit 8.11, international PIRLS Report, Exhibit 8.23, international mathematics report, and Exhibit 8.23, international science report

The vast majority of pupils in Northern Ireland had teachers who felt that their teaching was limited *Some or Not At All* by disruptive or uninterested pupils.

Across all three subjects, only 4 or 5 per cent of pupils had teachers who reported that their teaching was limited *A Lot* by disruptive pupils and 2 or 3 per cent of pupils had teachers who reported that their lessons were limited *A Lot* by pupils who were uninterested. These compare with respective international averages of 12 to 13 per cent and 10 to 11 per cent.

Among the comparator countries, teachers in Northern Ireland reported the lowest levels of limitation to teaching caused by disruptive pupils. In terms of teaching limited by uninterested pupils, teachers in Northern Ireland, England, Finland, Republic of Ireland and New Zealand all reported very low levels (5 per cent or less).

Internationally, pupil attainment tended to be lower where teachers reported high levels of limitation caused by disruptive or uninterested pupils,⁶ but the direction of causality cannot be inferred from this data.

In Northern Ireland for all three subjects, there appeared to be a difference between the average achievement scores of those pupils whose teachers are limited *Some or Not at All* by disruptive pupils and those pupils whose teachers are limited *A Lot* by disruptive pupils. However, the small percentage of pupils in the *A Lot* category and large standard errors mean that these apparent differences in achievement are not likely to be significant.

For mathematics and science, differences in the average achievement scores of those pupils whose teachers are limited to varying extents by uninterested pupils could not be determined because of the small percentage of pupils whose teachers were limited *A Lot* by uninterested pupils. However, differences in average scale scores for reading did appear likely to be significantly different where teachers reported that their teaching was limited *A Lot* by uninterested pupils (based on the size of the standard error statistics). In Northern Ireland, pupils in classes where teachers reported that their teaching was limited *A Lot* by uninterested pupils scored an average 26 scale points less in reading than those whose teachers reported *Some or Not at All*.

⁶ Tests of statistical significance were not carried out in this international analysis. However, based on the size of the standard errors, it is likely that these findings are statistically significant.

7.6 Teachers' reported career satisfaction

Teachers were asked to indicate the extent to which they were satisfied with their profession as a teacher. The questions and details of the scaling are shown in Figure 7.5 and the results for each subject are shown in Table 7.12. Teachers were categorised as being *Satisfied*, *Somewhat Satisfied* or *Less than Satisfied*.

Figure 7.5 Teacher career satisfaction

G11

How much do you agree with the following statements?

Tick **one** circle for each row.

Agree a lot

Agree a little

Disagree a little

Disagree a lot

a) I am content with my profession as a teacher ----- ○ — ○ — ○ — ○

b) I am satisfied with being a teacher at this school ----- ○ — ○ — ○ — ○

c) I had more enthusiasm when I began teaching than I have now* ----- ○ — ○ — ○ — ○

d) I do important work as a teacher ----- ○ — ○ — ○ — ○

e) I plan to continue as a teacher for as long as I can ---- ○ — ○ — ○ — ○

f) I am frustrated as a teacher* --- ○ — ○ — ○ — ○

* Reverse Coded

	Reading	
	Mathematics and Science	

Source: adapted from Exhibit 7.5, international PIRLS Report, Exhibit 7.15, international mathematics report, and Exhibit 7.15, international science report

Table 7.12 Teacher career satisfaction**Reading***Reported by Teachers*

Students were scored according to their teachers' degree of agreement with six statements on the *Teacher Career Satisfaction* scale. Students with **Satisfied** teachers had a score on the scale of at least 10.0, which corresponds to their teachers "agreeing a lot" with three of the six statements and "agreeing a little" with the other three, on average. Students with **Less Than Satisfied** teachers had a score no higher than 6.5, which corresponds to their teachers "disagreeing a little" with three of the six statements and "agreeing a little" with the other three, on average. All other students had **Somewhat Satisfied** teachers.

Country	Satisfied		Somewhat Satisfied		Less Than Satisfied		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	54 (4.3)	564 (4.0)	41 (4.5)	555 (4.2)	5 (1.9)	557 (12.6)	10.1 (0.18)
International Avg.	54 (0.5)	516 (0.6)	40 (0.5)	509 (0.8)	5 (0.2)	511 (1.9)	

Mathematics*Reported by Teachers*

Students were scored according to their teachers' degree of agreement with six statements on the *Teacher Career Satisfaction* scale. Students with **Satisfied** teachers had a score on the scale of at least 10.1, which corresponds to their teachers "agreeing a lot" with three of the six statements and "agreeing a little" with the other three, on average. Students with **Less Than Satisfied** teachers had a score no higher than 6.6, which corresponds to their teachers "disagreeing a little" with three of the six statements and "agreeing a little" with the other three, on average. All other students had **Somewhat Satisfied** teachers.

Country	Satisfied		Somewhat Satisfied		Less Than Satisfied		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	56 (4.3)	564 (4.2)	41 (4.6)	562 (6.8)	4 (1.5)	562 (12.0)	10.3 (0.18)
International Avg.	54 (0.5)	494 (0.7)	41 (0.5)	487 (0.8)	5 (0.2)	486 (2.1)	

Science*Reported by Teachers*

Students were scored according to their teachers' degree of agreement with six statements on the *Teacher Career Satisfaction* scale. Students with **Satisfied** teachers had a score on the scale of at least 10.1, which corresponds to their teachers "agreeing a lot" with three of the six statements and "agreeing a little" with the other three, on average. Students with **Less Than Satisfied** teachers had a score no higher than 6.6, which corresponds to their teachers "disagreeing a little" with three of the six statements and "agreeing a little" with the other three, on average. All other students had **Somewhat Satisfied** teachers.

Country	Satisfied		Somewhat Satisfied		Less Than Satisfied		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	55 (4.3)	520 (3.8)	40 (4.6)	513 (5.7)	5 (1.9)	512 (12.5)	10.2 (0.18)
International Avg.	54 (0.5)	490 (0.7)	41 (0.5)	483 (0.9)	5 (0.2)	483 (2.1)	

Centre point of scale set at 10.

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

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

Source: Exhibit 7.5, international PIRLS Report, Exhibit 7.15, international mathematics report, and Exhibit 7.15, international science report

In Northern Ireland, 54 to 56 per cent of pupils, across all three subjects, had teachers who reported that they were *Satisfied* with their career and a further 40 to 41 per cent had teachers who were *Somewhat Satisfied*. Teachers of only 4 or 5 per cent of pupils reported that they were *Less Than Satisfied*.

The percentage of pupils in Northern Ireland falling into each category corresponded closely with the international averages on this scale.

Among the comparator countries, the highest percentage of pupils who had *Satisfied* teachers were in the Republic of Ireland (68 to 69 per cent), compared with an international average of 54 per cent of pupils taught by *Satisfied* teachers.

Teacher career satisfaction in some high performing Pacific Rim countries was considerably lower than in Northern Ireland. For example, the percentage of pupils in Singapore taught by teachers who reported being *Satisfied* with their careers was between 29 and 35 per cent across all three subjects. At the opposite end of the scale, the percentages *Less than Satisfied* in Singapore were 11 to 12 per cent, compared with international averages of 5 per cent.

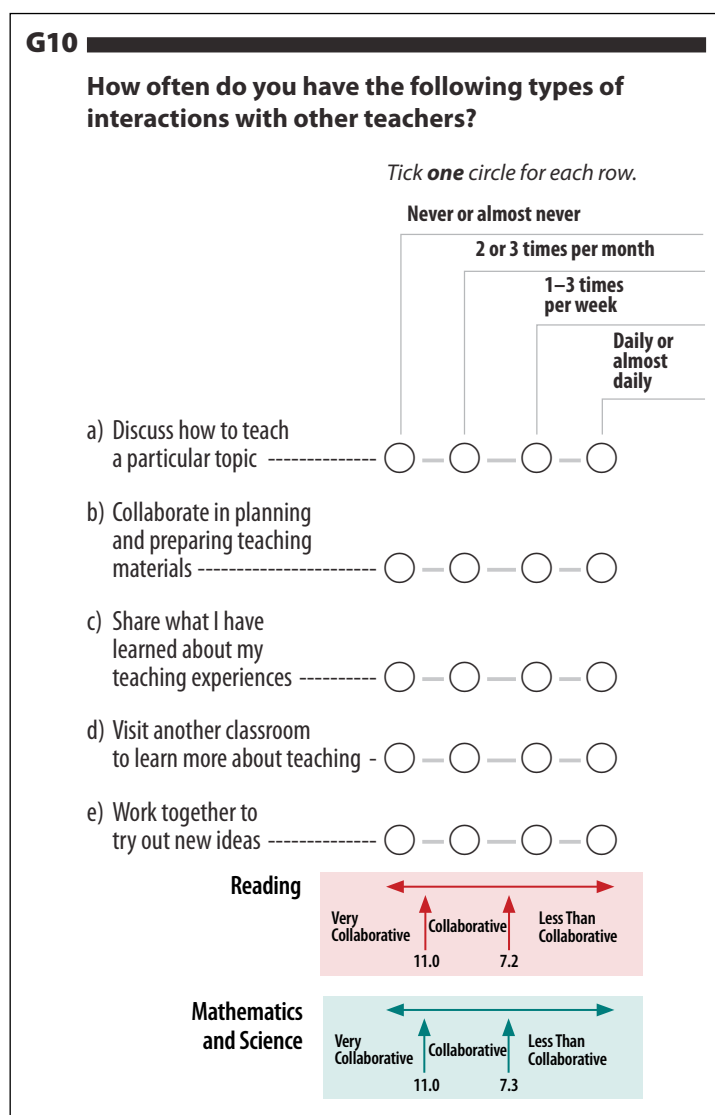
Teacher career satisfaction in a number of comparator countries was lower than in Northern Ireland. For example, the percentages of pupils in Finland taught by teachers who reported being *Satisfied* with their careers was 40 to 42 per cent across the three subjects.

Across the three subjects, few clear patterns of pupil attainment were apparent in relation to teachers' reported levels of career satisfaction and any apparent differences are not likely to be significant. The international averages show no clear patterns across all three categories for reading, mathematics or science internationally. There were also no clear patterns in Northern Ireland: for all three subjects, attainment does not appear to be associated with teacher career satisfaction.

7.7 Teacher reports of collaboration to improve teaching in each subject

Teachers were asked to indicate the extent to which they worked with their colleagues in particular aspects of teaching. The questions and details of the scaling are shown in Figure 7.6 and the results for each subject are shown in Table 7.13. On the basis of their responses to the questions, teachers were categorised as *Very Collaborative*, *Collaborative* or *Somewhat Collaborative*.

Figure 7.6 Collaboration to improve teaching



Source: adapted from Exhibit 8.5, international PIRLS Report, Exhibit 8.12, international mathematics report, and Exhibit 8.12, international science report

Table 7.13 Collaborate to improve teaching**Reading***Reported by Teachers*

Students were scored according to their teachers' responses to how often they interacted with other teachers in each of five teaching areas on the *Collaborate to Improve Teaching* scale. Students with **Very Collaborative** teachers had a score on the scale of at least 11.0, which corresponds to their teachers having interactions with other teachers at least "one to three times per week" in each of three of the five areas and "two or three times per month" in each of the other two, on average. Students with **Somewhat Collaborative** teachers had a score no higher than 7.2, which corresponds to their teachers interacting with other teachers "never or almost never" in each of three of the five areas and "two or three times per month" in each of the other two, on average. All other students had **Collaborative** teachers.

Country	Very Collaborative		Collaborative		Somewhat Collaborative		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	r 21 (4.0)	562 (6.6)	55 (4.9)	559 (3.6)	24 (3.7)	560 (6.5)	9.3 (0.22)
International Avg.	35 (0.5)	513 (0.8)	54 (0.5)	512 (0.6)	11 (0.3)	510 (1.9)	

Mathematics*Reported by Teachers*

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

Country	Very Collaborative		Collaborative		Somewhat Collaborative		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	r 22 (4.1)	562 (6.5)	55 (4.8)	563 (4.3)	23 (3.6)	565 (8.2)	9.4 (0.21)
International Avg.	36 (0.5)	493 (0.9)	53 (0.5)	491 (0.7)	11 (0.3)	488 (2.0)	

Science*Reported by Teachers*

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

Country	Very Collaborative		Collaborative		Somewhat Collaborative		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	r 22 (4.1)	515 (5.7)	54 (4.9)	519 (4.1)	24 (3.7)	514 (7.0)	9.3 (0.22)
International Avg.	35 (0.5)	487 (1.0)	53 (0.5)	487 (0.7)	12 (0.3)	479 (2.1)	

Centre point of scale set at 10.

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

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

Sources: *Exhibit 8.5, international PIRLS Report, Exhibit 8.12, international mathematics report, and Exhibit 8.12, international science report*

Teachers in Northern Ireland reported relatively low levels of collaboration to improve teaching. Across the subjects, teachers of 21 to 22 per cent of pupils were categorised as being *Very Collaborative* compared with international averages of 35 or 36 per cent in the *Very Collaborative* category.

Of the comparator countries, teachers in England, Australia and New Zealand had the highest percentages on this index.

Teachers in Northern Ireland and the Republic of Ireland reported least collaboration among the comparator countries in PIRLS. In TIMSS, teachers in Hong Kong and Republic of Ireland had the lowest percentages in the *Very Collaborative* category.

In Northern Ireland and comparator countries, average achievement scores for pupils were similar whether their teachers had *Very Collaborative* practice, *Collaborative* practice or *Somewhat Collaborative* practice.

7.8 Teachers feeling prepared to teach mathematics and science

Teachers were asked how prepared they feel to teach the mathematics and science content topics assessed by TIMSS (the content topics are listed in Figures 7.7 and 7.8). For each topic teachers had to indicate whether they feel *very well prepared*, *somewhat prepared* or *not well prepared*. This question was not included in the PIRLS teacher questionnaire.

7.8.1 Teachers' reports of how well prepared they feel to teach mathematics

Teachers' responses about how well prepared they feel to teach the TIMSS mathematics topics were averaged across all 18 topics to give a perspective on mathematics overall as well as separately by content domain (Number, Geometric Shapes and Measures, and Data Display). Table 7.14 shows the percentage of pupils in Northern Ireland taught by teachers who feel *very well prepared* to teach the TIMSS mathematics topics (the findings for all countries can be seen in Exhibit 7.9 in the international mathematics report).

Figure 7.7 TIMSS mathematics topics

TIMSS 2011 Mathematics Topics	
A. Number	
1)	Concepts of whole numbers, including place value and ordering
2)	Adding, subtracting, multiplying, and/or dividing with whole numbers
3)	Concepts of fractions
4)	Adding and subtracting with fractions
5)	Concepts of decimals, including place value and ordering
6)	Adding and subtracting with decimals
7)	Number sentences
8)	Number patterns
B. Geometric Shapes and Measures	
1)	Lines: measuring, estimating length of; parallel and perpendicular lines
2)	Comparing and drawing angles
3)	Using informal coordinate systems to locate points in a plane
4)	Elementary properties of common geometric shapes
5)	Reflections and rotations
6)	Relationships between two-dimensional and three-dimensional shapes
7)	Finding and estimating areas, perimeters, and volumes
C. Data Display	
1)	Reading data from tables, pictographs, bar graphs, or pie charts
2)	Drawing conclusions from data displays
3)	Displaying data using tables, pictographs and bar graphs

Source: adapted from Exhibit 7.9, international mathematics report

Table 7.14 Teachers feel “very well” prepared to teach TIMSS mathematics topics

Country	Per cent of Students Whose Teachers Feel “Very Well” Prepared to Teach TIMSS Mathematics Topics			
	Overall Mathematics (18 Topics)	Number (8 Topics)	Geometric Shapes and Measures (7 Topics)	Data Display (3 Topics)
Northern Ireland	r 91 (1.7)	r 94 (1.8)	r 88 (2.0)	r 92 (2.4)
International Avg.	83 (0.3)	87 (0.3)	82 (0.3)	74 (0.4)

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

An “r” indicates data are available for at least 70% but less than 85% of the students.

Source: Exhibit 7.9, international mathematics report

In Northern Ireland, 91 per cent of pupils were taught by teachers who feel *very well prepared* to teach the TIMSS topics. This compares favourably with the comparator countries where the percentage of pupils taught by teachers who were *well prepared* is similar or lower than that in Northern Ireland, for example England (90 per cent), Australia (90 per cent), Singapore (89 per cent), Republic of Ireland (88 per cent), Finland (83 per cent), New Zealand (79 per cent) and Hong Kong (77 per cent). In terms of the three content domains, there was little difference in the percentage of pupils in Northern Ireland whose teachers feel *very well prepared* to teach the topics within each domain; the percentages for each domain can be seen in Table 7.14. Notably, in some countries, including Finland and Republic of Ireland, a smaller percentage of pupils were taught by teachers who feel *very well prepared* to teach Geometric Shapes and Measures compared with Number. This may indicate that there is a greater focus on Number in the curricula of these countries, a conjecture which is borne out by data in Exhibit 8.8 in the international mathematics report.

7.8.2 Teachers’ reports of how well prepared they feel to teach science

As noted above, teachers were asked how prepared they feel to teach the science content topics assessed by TIMSS (the content topics can be found in Figure 7.8). The responses were averaged across all 20 topics to give a perspective on science overall as well as separately by content domain (Life Science, Physical Science and Earth Science). Table 7.15 shows the percentage of pupils in Northern Ireland taught by teachers who feel *very well prepared* to teach the TIMSS science topics (the findings for all countries can be seen in Exhibit 7.9 in the international science report).

Figure 7.8 TIMSS science topics

TIMSS 2011 Science Topics	
A. Life Science	
1)	Major body structures and their functions in humans and other organisms (plants and animals)
2)	Life cycles and reproduction in plants and animals
3)	Physical features, behavior, and survival of organisms living in different environments
4)	Relationships in a given community (e.g., simple food chains, predator-prey relationships)
5)	Changes in environments (effects of human activity, pollution and its prevention)
6)	Human health (e.g., transmission/ prevention of communicable diseases, signs of health/ illness, diet exercise)
B. Physical Science	
1)	States of matter (solids, liquids, gases) and differences in their physical properties (shape, volume), including changes in state of matter by heating and cooling
2)	Classification of objects/ materials based on physical properties (e.g., weight/ mass, volume, magnetic attraction)
3)	Forming and separating mixtures
4)	Familiar changes in materials (e.g., decaying, burning, rusting, cooking)
5)	Common energy sources/ forms and their practical uses (e.g., Sun, electricity, water, wind)
6)	Light (e.g., sources, behavior)
7)	Electrical circuits and properties of magnets
8)	Forces that cause objects to move (e.g., gravity, push/ pull forces)
C. Earth Science	
1)	Water on Earth (location, types, and movement) and air (composition, proof of its existence, uses)
2)	Common features of Earth's landscape (e.g., mountains, plains, rivers, deserts) and relationship to human use (e.g., farming, irrigation, land development)
3)	Weather conditions from day to day or over the seasons
4)	Fossils of animals and plants (age, location, formation)
5)	Earth's solar system (planets, Sun, moon)
6)	Day, night, and shadows due to Earth's rotation and its relationship to the Sun

Source: adapted from Exhibit 7.9, international science report

Table 7.15 Teachers feel “very well” prepared to teach TIMSS science topics

Country	Per cent of Students Whose Teachers Feel “Very Well” Prepared to Teach TIMSS Science Topics			
	Overall Science (20 Topics)	Life Science (6 Topics)	Physical Science (8 Topics)	Earth Science (6 Topics)
Northern Ireland	r 54 (3.4)	r 62 (3.9)	r 56 (3.6)	r 44 (3.7)
International Avg.	62 (0.3)	70 (0.4)	62 (0.4)	53 (0.4)

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

An “r” indicates data are available for at least 70% but less than 85% of the students.

Source: Exhibit 7.9, international science report

In Northern Ireland, just over half of pupils (54 per cent) were taught by teachers who feel *very well prepared* to teach the TIMSS science topics. This was lower than the equivalent percentage for mathematics for this age group, where 91 per cent of pupils were taught by teachers who feel *very well prepared*. However, in terms of the international picture, the percentage of pupils in Northern Ireland who were taught by teachers who feel *very well prepared* to teach the TIMSS science topics was lower than the international average (62 per cent), but similar to a number of comparator countries, e.g. Hong Kong (49 per cent), Finland (51 per cent), and Australia (51 per cent). As for the three content domains, there was a difference in the percentages of pupils in Northern Ireland whose teachers feel *very well prepared* to teach Earth Science compared with Physical Science and Life Science. The percentages for each domain can be seen in Table 7.15. Although it was also the case in England that teachers of a lower percentage of pupils feel *very well prepared* to teach Earth Science, across participating countries there was variation in the science content domains that teachers feel *very well prepared* to teach. This may indicate that within these countries the focus of curricula is different (see chapter 8 of the international science report for more information about curricula).

7.9 Teachers' educational emphasis/major areas of training

7.9.1 Reading: teachers' educational emphasis during training

Teachers were asked to indicate the extent to which, during their formal education and training, they studied in specialist areas related to language and the teaching of reading. The question is shown in Figure 7.9 and results are shown in Table 7.16.

Figure 7.9 Reading: teacher's educational emphasis during training

R20

As part of your formal education and/or training, to what extent did you study the following areas?

Tick one circle for each row.

	Not at all	Overview or introduction to topic	It was an area of emphasis
a) English -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Pedagogy/teaching reading --	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Educational psychology -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Teaching reading to children with reading difficulties -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Reading theory -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) Special education -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) Second language learning ----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) Assessment methods in reading -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Source: adapted from the international version of the PIRLS and TIMSS Teacher Questionnaire.

The most common specialist area of study, reported by teachers of 62 per cent of pupils in Northern Ireland, was *English (Language)*. This compares with an international average of 72 per cent.

Forty-four per cent of pupils had teachers whose studies emphasised *pedagogy/teaching reading* and 20 per cent had teachers whose formal education and training studies had emphasised *reading theory*. These figures compare with respective international averages of 62 and 33 per cent in these areas.

Among the comparator countries, more pupils in the Republic of Ireland and Hong Kong had teachers who reported an emphasis on *Language* study (i.e. the language of the test) during their education and training. In terms of studying *pedagogy and the teaching of reading*, more pupils in the Republic of Ireland and Singapore had teachers who reported an emphasis on this area than other comparator countries. Similarly, more pupils in the Republic of Ireland had teachers who reported an emphasis on *reading theory* in their formal education and training than in other comparator countries.

The areas of *language, pedagogy* and *reading theory* might be expected to play a significant part in the study of education generally, and of reading in particular. While teachers in the Republic of Ireland reported greater emphases on each of these three areas than other comparator countries, this can be contrasted with teachers in Finland who reported the lowest emphases across all three.

There does not appear to be any clear pattern of pupil attainment within individual countries in relation to the different areas of emphasis in their teachers' formal training and education.

7.9.2 Mathematics: teacher's major area of study during training

In order to discover the percentage of pupils taught by subject specialists, in this case mathematics, teachers were asked to indicate their main area of study and whether they had specialised in any specific subjects during their post-secondary education (the findings for teachers in Northern Ireland are shown in Table 7.17). In Northern Ireland, the majority of pupils (76 per cent) were taught mathematics by teachers whose main area of study was primary education without specialisation in mathematics. Only 11 per cent of pupils were taught mathematics by teachers who are mathematics specialists (for 10 per cent, their teachers had a specialism in mathematics and primary education and for a further 1 per cent, their teachers specialised in mathematics but not primary education). However, in Hong Kong and Singapore a much larger percentage of pupils were taught by mathematics specialists (54 per cent in each case). There was not a clear pattern within individual countries, or on average, between being taught by a subject specialist and average achievement. This was the case in Northern Ireland and a number of comparator countries, for example England, Australia and the Republic of Ireland.

7.9.3 Science: teacher's major area of study during training

The findings for teachers in Northern Ireland are shown in Table 7.18. In Northern Ireland, three-quarters of pupils in Y5 were taught science by teachers whose main area of study was primary education (without specialisation in science). Only 14 per cent of pupils were taught science by teachers who are science specialists (3 per cent of these were taught by teachers with a specialism in science but not primary education; the remainder had teachers who specialised in science and primary education). The percentage of pupils taught by science specialists was similar to a

number of comparator countries, namely Australia, Finland, Republic of Ireland and New Zealand. There was not a clear association within individual countries between a teacher specialisation during training and the average achievement in science at this level.

Table 7.16 Teachers' educational emphasis during training

Country	Language			Pedagogy / Teaching Reading			Reading Theory		
	Per cent of Students	Average Achievement		Per cent of Students	Average Achievement		Per cent of Students	Average Achievement	
	Area Emphasised	Area Emphasised	Area not Emphasised	Area Emphasised	Area Emphasised	Area not Emphasised	Area Emphasised	Area Emphasised	Area not Emphasised
Northern Ireland	r 62 (4.5)	560 (4.2)	561 (3.4)	r 44 (4.9)	563 (4.2)	557 (4.0)	r 20 (3.6)	563 (8.0)	559 (3.2)
International Avg.	72 (0.5)	513 (0.5)	510 (1.3)	62 (0.5)	513 (0.6)	511 (1.0)	33 (0.5)	514 (0.8)	512 (0.6)

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

Source: Exhibit 7.2, international PIRLS Report

Table 7.17 Teachers' major area of study during training

Country	Major in Primary Education and Major (or Specialization) in Mathematics		Major in Primary Education but No Major (or Specialization) in Mathematics		Major in Mathematics but No Major in Primary Education		All Other Majors		No Formal Education Beyond Upper-secondary*	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r 10 (3.1)	564 (12.2)	76 (4.2)	567 (3.9)	1 (0.0)	~ ~	13 (3.1)	537 (16.4)	0 (0.0)	~ ~
International Avg.	28 (0.5)	490 (1.4)	46 (0.4)	501 (1.0)	10 (0.3)	457 (3.1)	10 (0.3)	486 (2.0)	6 (0.2)	444 (3.0)

*Countries have been increasing their certification requirements and providing professional development to teachers certified under earlier guidelines. () Standard errors appear in parentheses. Because of rounding some results may appear inconsistent. A tilde (~) indicates insufficient data to report achievement. An "r" indicates data are available for at least 70% but less than 85% of the students.

Source: Exhibit 7.3, international mathematics report

Table 7.18 Teachers' major area of study during training

Country	Major in Primary Education and Major (or Specialization) in Science		Major in Primary Education but No Major (or Specialization) in Science		Major in Science but No Major in Primary Education		All Other Majors		No Formal Education Beyond Upper-secondary*	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r 11 (2.8)	538 (7.9)	75 (3.9)	518 (3.4)	3 (1.7)	513 (22.7)	10 (3.0)	490 (19.1)	0 (0.0)	~ ~
International Avg.	25 (0.4)	482 (1.5)	48 (0.4)	489 (1.3)	12 (0.3)	462 (2.4)	10 (0.3)	479 (1.9)	6 (0.2)	433 (2.9)

*Countries have been increasing their certification requirements and providing professional development to teachers certified under earlier guidelines. () Standard errors appear in parentheses. Because of rounding some results may appear inconsistent. A tilde (~) indicates insufficient data to report achievement. An "r" indicates data are available for at least 70% but less than 85% of the students.

Source: Exhibit 7.3, international science report

7.10 Conclusion

In terms of school learning environment, teachers and principals were asked about the emphasis placed on academic success and their perceptions of safety, orderliness and discipline in their schools; and about the impact of disruptive and uninterested pupils. Pupils were also asked about their experience of bullying behaviours. The findings of the surveys showed that schools in Northern Ireland are considered safe, orderly and well disciplined by their principals and teachers. Pupils reported relatively low levels of bullying and very few teachers reported that their teaching was limited *A Lot* by disruptive or uninterested pupils. Across all three subjects there was an association between some factors of the school learning environment and pupil attainment (specifically, the safety and orderliness of the school, and school discipline and safety).

The surveys explored factors related to teaching and teaching practices. Teachers reported high levels of career satisfaction; this was true of all three subjects. However, higher levels of career satisfaction did not appear to be associated with increased pupil achievement. Teachers in Northern Ireland reported relatively low levels of collaboration: as with career satisfaction, no clear links were seen with achievement in any of the subjects.

In terms of how prepared teachers feel to teach the TIMSS mathematics and science topics, a vast majority of pupils were taught by teachers who feel *very well prepared* to teach the TIMSS mathematics topics. In contrast, about half of pupils were taught by teachers who feel *very well prepared* to teach the TIMSS science topics.

Teachers were asked about the focus of their formal education and training. For teachers of reading, the most common specialism was English/language. Compared to international averages, teachers in Northern Ireland reported a lower emphasis on specialisms such as Language, Pedagogy/Teaching Reading and Reading Theory during their formal education and training. For mathematics, about three-quarters of pupils were taught by teachers whose main area of study was primary education without specialisation in mathematics. The same was true of science, where a similar proportion of pupils were taught by non-science specialists.

8. The curriculum and learning activities

Chapter outline

This chapter presents findings relating to teaching practices and the curriculum in reading, mathematics and science in Year 6 (Y6, ages 9-10) reported by teachers, principals and National Research Coordinators (or their designated national contact). Within each sub-section, findings for reading are presented first, followed by findings for mathematics and science. Where relevant, outcomes for Northern Ireland are compared with international averages and comparator countries.

Key findings

- In Northern Ireland, teaching time for reading and mathematics was higher than the international average. However, for science, teaching time was lower than the international average.
- A small proportion of Y6 pupils in Northern Ireland were taught science by teachers who reported emphasising science investigation in at least half their science lessons; this proportion is considerably below the international average. In a number of the highest performing countries, teachers tended to report emphasising science investigation to a greater extent than in Northern Ireland.
- Computers were available to the majority of Y6 pupils in their reading, mathematics and science lessons. No obvious patterns emerged regarding computer availability and average achievement in PIRLS and TIMSS.
- There was variation internationally in the age at which schools emphasised the teaching of a range of reading skills and strategies; in Northern Ireland just over half of pupils were at schools that emphasised the teaching of these reading skills at or before the academic year in which they turned eight (Year 4). Generally, English-speaking countries had the highest proportions of pupils who were taught a range of reading skills at or before the academic year in which they turned eight.
- Internationally, the average achievement of pupils in schools where the teaching of a range of reading skills was emphasised earlier was higher than that of pupils in schools where these skills were emphasised later. However, in Northern Ireland, average achievement was similar regardless of the age at which these reading skills were first emphasised.
- Northern Ireland's intended national curriculum includes all of the topics assessed in the TIMSS mathematics and science assessments. According to teachers' reports of topics taught in lessons, a higher proportion of Y6 pupils are taught the TIMSS mathematics topics than the TIMSS science topics. This is also the case on average internationally.

Interpreting the data: percentages in tables

Most of the data in this chapter is derived from teacher and principal reports. Reported percentages refer to pupils and can usually be interpreted as the percentage of pupils whose teachers or principals reported a particular practice or circumstance.

Y6 pupils were sampled by class. The Y6 teacher questionnaire would, in most cases therefore, have been completed by the class teacher of the sampled class. However, in some cases, it might have been completed by different teachers who teach these pupils reading, mathematics and/or science separately.

This means that the teacher-derived data for reading, mathematics and science may differ slightly as the sample of teachers in each group is not necessarily the same or the distribution of pupils within the sample of teachers may differ by subject.

8.1 Teaching time

Total teaching time¹ for all subjects, as reported by principals and teachers, was calculated using the following formula. These calculations enabled direct comparison of teaching time to be made between different countries.

Figure 1 Formula for calculation of teaching time

Total Instructional Hours per Year	=	Principal Reports of School Days per Year	x	Principal Reports of Instructional Hours per Day
Hours per Year for Instruction in Language/Mathematics/Science	=	$\frac{\text{Teacher Reports of Weekly Language/Mathematics/Science Instructional Hours}}{\text{Principal Reports of School Days per Week}}$	x	Principal Reports of School Days per Year

Source: adapted from Exhibit 8.4 international PIRLS report, Exhibit 8.6 international TIMSS mathematics report, Exhibit 8.6 international TIMSS science report

Data was collected on total teaching time for all three subjects. As part of PIRLS 2011, data was also collected from teachers on the total amount of *Time Spent On Reading as Part of Language Instruction* and *Reading Across the Curriculum, Including Time Spent on Reading Instruction* in a typical week. In the questionnaires in Northern Ireland, the phrase *Language Instruction* was adapted to *English teaching*.

Overall teaching time was higher than the international average in Northern Ireland. Among the comparator countries, teaching time was higher than the international average in Australia, England, Hong Kong, New Zealand and Singapore, and below the average in Finland and the Republic of Ireland.

1 Teaching time is referred to as 'Instructional time' in the international data and report.

8.1.1 Teaching time for language and reading

Table 8.1 shows the amount of time spent teaching English to Y6 pupils in Northern Ireland was 274 out of 970 teaching hours per year, higher than the international average. Comparator countries differed considerably in the amount of time devoted to the teaching of reading and reading activities. Compared with the international average, most English-speaking countries reported spending more time both on language instruction in total and on the two teaching approaches specified. Conversely, in most of the top performing countries, teachers reported spending less time than the international average teaching *Reading Across the Curriculum, Including Time Spent on Reading Instruction*.

8.1.2 Teaching time for mathematics

Table 8.1 shows in Northern Ireland the amount of time for teaching mathematics to Y6 pupils was 232 hours per year, out of a possible 970 (total hours of teaching per year), higher than the international average (162 hours). Among comparator countries, Northern Ireland was similar to Australia. Like the majority of countries, in Northern Ireland, teaching time was higher for mathematics than science in Y6.

8.1.3 Teaching time for science

Table 8.1 shows that in Northern Ireland, the amount of time for teaching science to Y6 pupils was 72 hours out of 970 (total hours of teaching per year), lower than the international average (85 hours). Among comparator countries, teaching time for science was higher in Finland and Singapore (98 and 96 hours respectively), as well as in most other high performing countries. It was lower in Australia and New Zealand (65 and 52 hours respectively).

Table 8.1 Teaching time in Y6

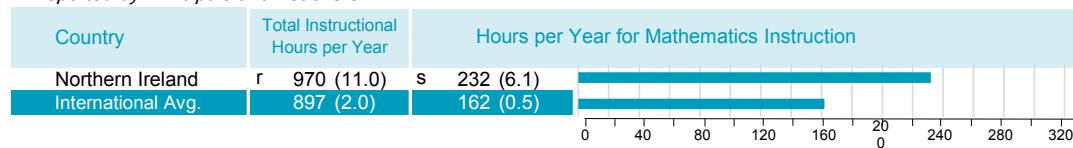
Language and reading

Reported by Principals and Teachers

Country	Instructional Hours per Year			
	Total	Language Instruction	Time Spent on Reading as Part of Language Instruction	Reading Across the Curriculum, Including Time Spent on Reading Instruction
Northern Ireland	r 970 (11.0)	s 274 (7.7)	s 80 (3.7)	s 155 (9.9)
International Avg.	905 (2.1)	232 (1.2)	70 (0.5)	146 (1.4)

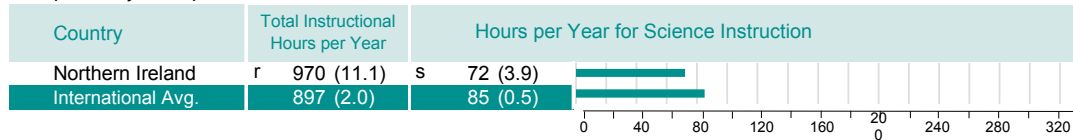
Mathematics

Reported by Principals and Teachers



Science

Reported by Principals and Teachers



() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent. An "r" indicates data are available for at least 70% but less than 85% of the pupils. An "s" indicates data are available for at least 50% but less than 70% of the pupils.

Source: Exhibit 8.4 international PIRLS report, Exhibit 8.6 international mathematics report, Exhibit 8.6 international science report

8.2 Teachers' emphasis on science investigation in Y6

Interpreting the data: indices and scales

In order to summarise data from a questionnaire, responses to several related items are sometimes combined to form an index or scale. The respondents to the questionnaire items are grouped according to their responses and the way in which responses have been categorised is shown for each index or scale. The data in an index or scale is often considered to be more reliable and valid than the responses to individual items.

Teachers' emphasis on science investigation is measured by their responses to six statements about teaching science (these statements can be seen below Table 8.2). The international analysis used responses to these statements to create the *Emphasize Science Investigation* scale.² Pupils were categorised into two bands: those whose teachers emphasise science investigation in *About Half the Lessons or More* and those whose teachers emphasise science investigation in *Less than Half the Lessons* (details of how pupils were assigned to each band is provided above Table 8.2).

Table 8.2 shows that 13 per cent of Y6 pupils in Northern Ireland were taught by teachers who emphasised science investigation in *About Half the Lessons or More*. This was considerably below the international average (40 per cent), and lower than in England (41 per cent) and the Republic of Ireland (43 per cent), but similar to Finland (the third highest performing country in science, 13 per cent) and Hong Kong (12 per cent). Emphasis on science investigation was much more prevalent in Korea, the highest performing country in science, and in Singapore, where 58 and 50 per cent of pupils respectively were taught by teachers who emphasised science investigation in *About Half the Lessons or More*.

There are no clear associations between teachers' emphasis on science investigation and pupils' average achievement within Northern Ireland and most comparator countries. Among pupils in Northern Ireland whose teachers emphasised science investigation in *About Half the Lessons or More*, average achievement appears to have been lower than among those for whom it was emphasised in *Less Than Half the Lessons*. However, this difference is unlikely to be statistically significant.³ Differences in average achievement between the equivalent categories of pupils in the majority of comparator countries were also unlikely to be significant.⁴ However, this was not the case in Australia, or on average internationally, where the average achievement of pupils whose teachers emphasised science investigation in *About Half the Lessons or More* was 24 points higher and 4 points higher respectively than that of pupils whose teachers emphasised science investigation to a lesser extent, differences that were likely to be statistically significant.

2 The scale is labelled as such in the international report; hence American spelling may be used in such scale labels in this report.

3 Differences in achievement between groups have not been tested formally for statistical significance in this international analysis, but the sizes of the standard errors in the national data suggest that this apparent difference between groups would not be statistically significant.

4 Throughout this report, findings listed as 'significant' are statistically significant.

Table 8.2 Teachers' emphasis on science investigation in Y6

Reported by Teachers

Students were scored according to their teachers' responses to how often they used each of six instructional activities on the *Emphasize Science Investigation* scale. Students with teachers who emphasized science investigation in **About Half the Lessons or More** had a score on the scale of at least 10.7, which corresponds to their teachers using all six activities in "about half the lessons," on average. All other students had teachers who emphasized science investigation in **Less than Half the Lessons**.

Country	About Half the Lessons or More		Less than Half the Lessons		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	13 (3.1)	510 (12.2)	87 (3.1)	518 (4.0)	8.0 (0.16)
International Avg.	40 (0.5)	488 (0.9)	60 (0.5)	484 (0.9)	

Centre point of scale set at 10.

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

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

S3

In teaching science to the pupils in this class, how often do you usually ask them to do the following?

Tick one circle for each row.

Every or almost every lesson
About half the lessons
Some lessons
Never

a) Observe natural phenomena such as the weather or a plant growing and describe what they see ----- ○ — ○ — ○ — ○

b) Watch me demonstrate an experiment or investigation --- ○ — ○ — ○ — ○

c) Design or plan experiments or investigations ----- ○ — ○ — ○ — ○

d) Conduct experiments or investigations ----- ○ — ○ — ○ — ○

g) Give explanations about something they are studying ----- ○ — ○ — ○ — ○

h) Relate what they are learning in science to their daily lives ----- ○ — ○ — ○ — ○

← About Half the Lessons or More 10.7 Less than Half the Lessons →

Source: Exhibit 8.27 international science report and adapted from the international version of the PIRLS and TIMSS Teacher Questionnaire.⁵

5 <http://timssandpirls.bc.edu>

8.3 Use of computers

Teachers were asked whether computers were available during English, mathematics and science lessons, including the frequency of their use for different subject-specific computer-based activities. Table 8.3 summarises this information, giving the results for Northern Ireland and the international average.

8.3.1 Use of computers in Y6 reading lessons

Table 8.3 shows that in Northern Ireland, 65 per cent of pupils were taught by teachers who reported that computers were available for use in reading lessons, 20 percentage points above the international average (45 per cent).

In most of the highest performing countries in PIRLS 2011 the proportion of pupils who had access to a computer for reading lessons was equal to or higher than the international average. The Russian Federation was the exception where 29 per cent of pupils were in schools with access to computers in reading lessons.

In the comparator countries, availability was above the international average in Australia, Finland, New Zealand, Republic of Ireland and Singapore, and was close to the average in England and Hong Kong.

The international average achievement did not vary whether pupils had access to a computer for reading lessons or not. The average achievement scores of pupils in Northern Ireland were very similar in the two categories, as in several comparator countries including New Zealand and Finland.

Teachers reported on pupils' use of computers for a variety of activities. In most of the high performing countries, the percentage of pupils who used computers for each of the four activities identified in Table 8.3 at least monthly was above the international average; this pattern was also seen in Northern Ireland. In Northern Ireland, pupils most commonly used computers *to write stories or other texts*, whereas on average internationally they were most commonly used *to look up information*.

8.3.2 Use of computers in Y6 mathematics lessons

Table 8.3 shows that, in Northern Ireland, 76 per cent of pupils were taught by teachers who reported that computers were available for use in mathematics lessons, almost double the international average (42 per cent). Computer availability varied across comparator countries and across the highest performing countries. Among comparator countries, only Australia and New Zealand had a higher percentage of pupils with access to computers during mathematics lessons, compared with Northern Ireland (79 and 87 per cent respectively). In Korea, the second highest performing country in mathematics, computer availability was below the international average at 31 per cent.

Internationally there was no clear pattern of achievement according to whether computers were available in mathematics lessons. In Northern Ireland, average achievement appears to be lower among those pupils who did have access to computers. However, this difference is unlikely to be statistically significant. It is also worth bearing in mind that the relationship between computer availability and average attainment is complex, and that achievement data in this area should be interpreted with caution. For example, in some cases, computers might be made available to able pupils in order to challenge them and stretch their skills. In other cases, they might be made available to lower-achieving pupils for drill and practice. Thus, any association,

or lack of association, with achievement might be affected by such varying reasons for making computers available.

In Northern Ireland, where pupils did have access to computers for their mathematics lessons, they were mainly used *to practice skills and procedures*. This was also the case in Australia, New Zealand, Finland and England, but not in Singapore, Hong Kong and the Republic of Ireland, where they were used *to practice skills and procedures* and *to explore mathematical principles and concepts* to a similar extent.

8.3.3 Use of computers in Y6 science lessons

Table 8.3 shows that, in Northern Ireland, 78 per cent of Y6 pupils were taught by teachers who reported that computers were available for use in science lessons, 31 percentage points above the international mean. This percentage was similar in Australia and England, but was higher in New Zealand (85 per cent). As was the case for mathematics, computer availability for science lessons was generally lower in the highest performing countries and the remaining comparator countries than in Northern Ireland. In many countries, computer availability was higher for science than for mathematics. Again, computer availability was particularly low in Korea, the highest performing country in science, with only 35 per cent of pupils taught by teachers who reported that computers were available for science lessons (below the international average).

In Northern Ireland and internationally, there was no clear pattern of science achievement according to whether computers were available in science lessons. Where pupils did have access to computers for science lessons, they were mainly used *to look up ideas and information*. This was the case across the majority of participants.

Table 8.3 Use of computers in Y6 lessons

Reading

Reported by Teachers

Country	Computers Available for Reading Lessons			Per cent of Students Whose Teachers Have Them Use Computers At Least Monthly			
	Per cent of Students	Average Achievement		To Look Up Information	To Read Stories or Other Texts	To Write Stories or Other Texts	To Develop Reading Skills and Strategies with Instructional Software
	Yes	Yes	No				
Northern Ireland	r 65 (4.2)	559 (3.1)	562 (5.6)	r 61 (4.3)	r 51 (4.4)	r 63 (4.2)	r 40 (4.8)
International Avg.	45 (0.5)	513 (0.9)	513 (0.6)	38 (0.5)	32 (0.5)	32 (0.5)	29 (0.5)

Mathematics

Reported by Teachers

Country	Computers Available for Mathematics Lessons			Per cent of Students Whose Teachers Have Them Use Computers At Least Monthly		
	Per cent of Students	Average Achievement		To Explore Mathematics Principles and Concepts	To Look Up Ideas and Information	To Practice Skills and Procedures
	Yes	Yes	No			
Northern Ireland	r 76 (3.9)	561 (4.3)	570 (6.4)	r 66 (4.4)	r 62 (4.4)	r 74 (4.0)
International Avg.	42 (0.5)	491 (1.1)	490 (0.7)	27 (0.4)	26 (0.5)	34 (0.5)

Science

Reported by Teachers

Country	Computers Available for Science Lessons			Per cent of Students Whose Teachers Have Them Use Computers At Least Monthly			
	Per cent of Students	Average Achievement		To Look Up Ideas and Information	To Do Scientific Procedures or Experiments	To Study Natural Phenomena Through Simulations	To Practice Skills and Procedures
	Yes	Yes	No				
Northern Ireland	r 78 (3.5)	519 (3.6)	511 (6.3)	r 73 (3.9)	r 47 (4.0)	r 42 (4.3)	r 53 (4.4)
International Avg.	47 (0.5)	488 (1.0)	486 (0.8)	41 (0.5)	24 (0.4)	25 (0.4)	31 (0.5)

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

Source: Exhibit 8.14, international PIRLS Report, Exhibit 8.29 international mathematics report, Exhibit 8.29, international science report

8.4 Emphasis in early years on reading skills and strategies

In order to investigate the teaching of early reading skills and strategies, principals reported the age at which the teaching of a range of specific skills, including *reading isolated sentences, comparing different texts, describing the style or structure of a text and determining the author's perspective or intention*, were emphasised. A full list of these 11 skills can be seen below Table 8.4. This table shows Northern Ireland and comparator countries listed in descending order of the percentage of pupils in schools where these skills and strategies had a major emphasis *At or before the academic year in which they turn eight*. This is Year 4 in Northern Ireland.

Table 8.4 shows that there was large variation in the percentage of pupils in schools where the teaching of all 11 of these skills was emphasised *At or before the academic year in which they turn eight*; the international averages range from 84 per cent of pupils (in England) to 1 per cent (in Morocco). Northern Ireland had 55 per cent of pupils in this category. The comparator country with the lowest proportion in this category was Finland (10 per cent).

Mostly, English-speaking countries had high proportions of pupils in schools where the teaching of these skills was emphasised *At or before the academic year in which they turn eight*. Only eight participating countries, six of which were English-speaking, had 50 per cent of pupils or more attending schools where these skills received a major emphasis *At or before the academic year in which they turn eight*.

Hong Kong, the highest performing country in PIRLS 2011, had only 16 per cent of pupils receiving emphasis on these skills *At or before the academic year in which they turn eight* and Finland, the third highest, had 10 per cent. Completing the top four achieving countries, the Russian Federation and Singapore had around half of their pupils in this category. In all four of the top performing countries, the statutory age for starting school is later than that of the four English-speaking countries (England, United States,⁶ Australia and New Zealand) which have the highest proportions of pupils in schools where these skills are emphasised at or before the equivalent of Northern Ireland's Year 4.

Although pupils in several countries showed similar achievement regardless of their age when the range of skills and strategies is emphasised (for example, United States, Singapore and Finland), internationally the overall average achievement scores suggest that earlier teaching of a range of reading skills and strategies is associated with higher reading achievement. The average achievement scores were similar within Northern Ireland,⁷ regardless of the age at which the range of reading skills were emphasised.

Table 8.4 Emphasis in early years on reading skills and strategies

Reported by Principals

Students were scored according to their principals' responses about the earliest academic year at which each of eleven reading skills and strategies were emphasised. Students in schools where their principals reported reading skills and strategies were emphasised **in or before the academic year in which students are eight** had a score on the scale of at least 11.1, which corresponds to all eleven skills and strategies being emphasised in Year 4, on average. Students in schools where their principals reported reading skills and strategies were emphasised **in the academic year in which students are ten or later** had a score no higher than 6.5, which corresponds to all eleven skills and strategies being emphasised in Year 6, on average. All other students attended schools where reading skills and strategies were emphasised in **Year 5**.

Country	In or before the academic year in which students are eight (Year 4)		In the academic year in which students are nine (Year 5)		In the academic year in which students are ten or later (Year 6)		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
England	84 (3.3)	553 (3.2)	15 (3.2)	538 (7.3)	1 (0.9)	~ ~	12.6 (0.20)
Australia	73 (4.0)	528 (2.9)	27 (4.0)	531 (5.9)	0 (0.0)	~ ~	12.6 (0.19)
New Zealand	73 (3.6)	538 (2.8)	27 (3.6)	523 (7.2)	0 (0.0)	~ ~	12.2 (0.16)
Northern Ireland	r 55 (4.6)	561 (3.0)	45 (4.6)	557 (4.6)	0 (0.0)	~ ~	11.6 (0.17)
Singapore	46 (0.0)	567 (4.0)	54 (0.0)	566 (5.4)	0 (0.0)	~ ~	10.9 (0.00)
Ireland, Rep. of	40 (4.0)	558 (3.9)	60 (4.0)	547 (3.4)	0 (0.0)	~ ~	10.6 (0.13)
Hong Kong SAR	16 (3.5)	579 (6.7)	81 (3.8)	569 (2.9)	3 (1.6)	548 (15.3)	9.5 (0.14)
Finland	10 (2.6)	569 (5.6)	87 (2.8)	568 (2.0)	3 (1.5)	555 (8.2)	9.2 (0.12)
International Avg.	28 (0.5)	522 (1.1)	68 (0.5)	511 (0.6)	4 (0.2)	450 (3.3)	

Centre point of scale set at 10.

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

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

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

6 Including the customary, though not statutory, kindergarten year.

7 The small difference was not likely to be statistically significant.

17

In which year group do the following reading skills and strategies first receive a major emphasis in teaching in your school?

Tick **one** circle for each row.

	Year 3 or earlier	Year 4	Year 5	Year 6	Not in these year groups
a) Knowing letters of the alphabet -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Knowing letter-sound relationships -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Reading words -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Reading isolated sentences ---	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Reading connected text -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) Locating information within the text -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) Identifying the main idea of a text -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) Explaining or supporting understanding of a text -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i) Comparing a text with personal experience -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j) Comparing different texts -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k) Making predictions about what will happen next in a text -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l) Making generalisations and drawing inferences based on a text -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m) Describing the style or structure of a text -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n) Determining the author's perspective or intention -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Items a, b and c did not contribute to the scale.

Source: Exhibit 6.4 international PIRLS report and adapted from the international version of the PIRLS and TIMSS School Questionnaire.⁸

8 <http://timssandpirls.bc.edu>

8.5 Teachers' focus on specific comprehension skills and strategies

In order to assess how teachers develop pupils' reading comprehension skills, teachers were asked to specify the frequency with which pupils in their class were asked to practise a range of nine reading skills and strategies. These skills range from the ability to retrieve information from the text to those requiring some analysis of the whole text. Table 8.5 shows how teachers responded to these questions, listing Northern Ireland and comparator countries alphabetically.

For three of the nine activities the proportion of pupils in Northern Ireland whose teachers asked them to do the activity at least weekly was more than 10 percentage points lower than the international mean. In most of the comparator countries the percentages of pupils practising each skill at least weekly were above the international average in most or all activities. However the percentage of pupils in Finland was below the international average in all of the activities, sometimes considerably so. Generally, lower percentages were also seen in Norway, Denmark and Sweden, the other Scandinavian countries.

In the majority of countries, most pupils were taught by teachers who frequently asked them to *Locate information within the text*, *Identify the main ideas of what they have read* and *Explain or support their understanding of what they have read*. Although the percentages generally remained high, there was more variation across countries in the proportions of pupils asked to practise the remaining six activities on a weekly basis.

Table 8.5 Teachers develop students' reading comprehension skills and strategies

Reported by teachers

Country	Per cent of Students whose teachers ask them to do the following at least weekly								
	Locate information within the text	Identify the main ideas of what they have read	Explain or support their understanding of what they have read	Compare what they have read with experiences they have had	Compare what they have read with other things they have read	Make predictions about what will happen next in the text	Make generalizations and draw inferences	Describe the style or structure of the text	Determine the author's perspective or intention
Australia	r 96 (1.6)	r 95 (2.2)	r 96 (1.7)	r 87 (2.4)	r 72 (3.7)	r 92 (1.4)	r 92 (1.9)	r 84 (2.8)	r 73 (3.4)
England	97 (1.4)	97 (1.4)	95 (1.8)	78 (3.3)	74 (3.5)	96 (1.4)	93 (1.9)	82 (3.2)	72 (3.6)
Finland	86 (2.2)	88 (2.8)	80 (2.8)	67 (3.5)	39 (3.5)	44 (3.4)	66 (3.2)	24 (2.6)	15 (2.1)
Hong Kong SAR	100 (0.0)	96 (1.9)	96 (1.9)	81 (3.6)	70 (3.9)	78 (4.0)	84 (3.3)	77 (4.2)	82 (3.7)
Ireland, Rep. of	98 (0.9)	97 (1.1)	96 (1.3)	87 (2.5)	68 (3.6)	91 (2.1)	83 (3.0)	58 (3.7)	52 (4.2)
New Zealand	99 (0.5)	98 (0.7)	97 (0.9)	89 (2.3)	74 (3.0)	94 (1.6)	94 (1.4)	72 (2.4)	72 (2.5)
Northern Ireland	r 99 (1.1)	r 94 (2.5)	r 98 (1.3)	r 67 (3.8)	r 59 (3.7)	r 84 (3.4)	r 82 (3.4)	r 64 (4.4)	r 50 (4.6)
Singapore	95 (1.2)	95 (1.2)	95 (1.2)	89 (1.8)	81 (2.1)	90 (1.7)	90 (1.7)	78 (2.4)	72 (2.3)
International Avg.	96 (0.2)	95 (0.3)	95 (0.2)	81 (0.4)	70 (0.5)	74 (0.4)	80 (0.4)	66 (0.5)	63 (0.5)

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

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

Source: Exhibit 8.8, international PIRLS report

8.6 The Y6 mathematics and science curriculum

The TIMSS mathematics and science Assessment Frameworks are not designed to match exactly the curriculum of any one participating country. In order to assess the degree of correspondence between national curricula and the topics covered in TIMSS 2011, National Research Coordinators (NRCs), or their designated person, were asked to indicate whether each of the TIMSS 2011 mathematics and science topics (listed in Figures 2 and 3) within the content domains, was included in their country's intended curriculum for pupils aged 9-10 (Y6), and, if so, whether the topics were intended to be taught to *all or almost all students* or *only the more able students*. The outcomes are summarised in Table 8.6.

Teachers were also asked to indicate whether each of the topics was *mostly taught before this year*, *mostly taught this year* or *not yet taught or just introduced*. Table 8.7 shows the percentage of pupils whose teachers reported that they had been taught the topics either prior to or during the year of the assessment, averaged across topics, presented both as an overall percentage and according to content domain.

8.6.1 The Y6 mathematics curriculum

Figure 2 TIMSS 2011 mathematics topics

TIMSS 2011 Mathematics Topics
A. Number
1) Concepts of whole numbers, including place value and ordering
2) Adding, subtracting, multiplying, and/or dividing with whole numbers
3) Concepts of fractions
4) Adding and subtracting with fractions
5) Concepts of decimals, including place value and ordering
6) Adding and subtracting with decimals
7) Number sentences
8) Number patterns
B. Geometric Shapes and Measures
1) Lines: measuring, estimating length of; parallel and perpendicular lines
2) Comparing and drawing angles
3) Using informal coordinate systems to locate points in a plane
4) Elementary properties of common geometric shapes
5) Reflections and rotations
6) Relationships between two-dimensional and three-dimensional shapes
7) Finding and estimating areas, perimeters, and volumes
C. Data Display
1) Reading data from tables, pictographs, bar graphs, or pie charts
2) Drawing conclusions from data displays
3) Displaying data using tables, pictographs and bar graphs

Source: Exhibit 7.9, *international mathematics report*

Table 8.6 shows that, in Northern Ireland, all 18 TIMSS mathematics topics were intended to be taught to all Y6 pupils. This was higher than the international average (13 topics). Fewer topics were intended to be taught in Hong Kong and Finland, where some topics from Number and Geometric Shapes and Measures were not included in the curriculum. In England, New Zealand and Australia, some topics in Number (and one in Geometric Shapes and Measures for New Zealand) were intended to be taught only to more able pupils. However, on average internationally, very few topics were taught only to more able pupils.

Table 8.7 shows that 93 per cent of pupils in Northern Ireland were taught the TIMSS mathematics topics either before or during the year of the TIMSS assessment. This percentage was the highest across all countries and 21 percentage points above the international average. There was a mixed picture internationally in terms of the content domains that were most commonly taught to pupils. The most commonly taught domains in Northern Ireland were Number and Data Display. On average internationally, topics from these two content domains were most commonly taught, while Geometric Shapes and Measures topics were less commonly taught. However, in England, New Zealand, Hong Kong and Australia, Data Display was more commonly taught than Number. Northern Ireland was similar to Singapore in its teaching of the TIMSS Number topics; 97 per cent and 100 per cent of pupils respectively were taught these topics, in comparison to 76 per cent on average internationally. However, Northern Ireland was also similar to Australia and England in that a higher proportion of pupils in these countries were taught Geometric Shapes and Measures topics than in Finland, Hong Kong, New Zealand, the Republic of Ireland and Singapore.

8.6.2 The Y6 science curriculum

Figure 3 TIMSS 2011 science topics

TIMSS 2011 Science Topics	
A. Life Science	
1)	Major body structures and their functions in humans and other organisms (plants and animals)
2)	Life cycles and reproduction in plants and animals
3)	Physical features, behavior, and survival of organisms living in different environments
4)	Relationships in a given community (e.g., simple food chains, predator-prey relationships)
5)	Changes in environments (effects of human activity, pollution and its prevention)
6)	Human health (e.g., transmission/ prevention of communicable diseases, signs of health/ illness, diet exercise)
B. Physical Science	
1)	States of matter (solids, liquids, gases) and differences in their physical properties (shape, volume), including changes in state of matter by heating and cooling
2)	Classification of objects/ materials based on physical properties (e.g., weight/ mass, volume, magnetic attraction)
3)	Forming and separating mixtures
4)	Familiar changes in materials (e.g., decaying, burning, rusting, cooking)
5)	Common energy sources/ forms and their practical uses (e.g., Sun, electricity, water, wind)
6)	Light (e.g., sources, behavior)
7)	Electrical circuits and properties of magnets
8)	Forces that cause objects to move (e.g., gravity, push/ pull forces)
C. Earth Science	
1)	Water on Earth (location, types, and movement) and air (composition, proof of its existence, uses)
2)	Common features of Earth's landscape (e.g., mountains, plains, rivers, deserts) and relationship to human use (e.g., farming, irrigation, land development)
3)	Weather conditions from day to day or over the seasons
4)	Fossils of animals and plants (age, location, formation)
5)	Earth's solar system (planets, Sun, moon)
6)	Day, night, and shadows due to Earth's rotation and its relationship to the Sun

Source: Exhibit 7.9, international science report

Table 8.6 shows that in Northern Ireland, all 20 TIMSS science topics were intended to be taught to all Y6 pupils. In all of the highest performing countries at this level, fewer topics were intended to be taught: in the highest achieving country, Korea, only eight topics were

included. The picture was mixed internationally in that the topics identified as not included in the curriculum were drawn from across the content domains. In particular, on average internationally, and in the majority of comparator countries, some of the Earth Science and Physical Science topics tended not to be included. Singapore, for example, did not include any of the Earth Science topics. This may have been because these topics were located elsewhere in the curriculum in these countries (notably in geography). Very few countries intended to teach particular science topics only to more able pupils.

Table 8.7 shows that 61 per cent of pupils in Northern Ireland were taught the TIMSS science topics either before or during the year of the TIMSS assessment. This was similar to the international average. Fewer pupils were taught the TIMSS science topics than were taught the TIMSS mathematics topics both in Northern Ireland and on average internationally.

The percentage of pupils taught the TIMSS science topics was lower in most of the comparator countries and this was especially noticeable for Singapore. However, the percentage was higher in England and the Republic of Ireland. The most commonly taught content domain in Northern Ireland was Life Science, the same as in all the comparator countries except for England and Singapore, where the most commonly taught domain was Physical Science.

Table 8.6 Number of TIMSS topics intended to be taught by the year of assessment

Mathematics

Reported by National Research Coordinators

Country	All Mathematics (18 Topics)			Number (8 Topics)			Geometric Shapes and Measures (7 Topics)			Data Display (3 Topics)		
	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 4	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 4	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 4	Topics Taught to All or Almost All Students	Topics Taught to Only the More Able Students (Top Track)	Not Included in the Curriculum Through Grade 4
Australia	16	2	0	6	2	0	7	0	0	3	0	0
England	17	1	0	7	1	0	7	0	0	3	0	0
Finland	13	0	5	5	0	3	5	0	2	3	0	0
Hong Kong SAR	14	0	4	7	0	1	4	0	3	3	0	0
Ireland, Rep. of	17	0	1	7	0	1	7	0	0	3	0	0
New Zealand	15	2	1	7	1	0	6	1	0	2	0	1
Northern Ireland	18	0	0	8	0	0	7	0	0	3	0	0
Singapore	16	0	2	8	0	0	5	0	2	3	0	0
International Avg.	13	1	4	6	0	2	5	0	2	2	0	1

Science

Reported by National Research Coordinators

Country	All Science (20 Topics)			Life Science (6 Topics)			Physical Science (8 Topics)			Earth Science (6 Topics)		
	Topics Taught to All or Almost All Pupils	Topics Taught to Only the More Able Pupils (Top Track)	Not Included in the Curriculum Through Grade 4	Topics Taught to All or Almost All Pupils	Topics Taught to Only the More Able Pupils (Top Track)	Not Included in the Curriculum Through Grade 4	Topics Taught to All or Almost All Pupils	Topics Taught to Only the More Able Pupils (Top Track)	Not Included in the Curriculum Through Grade 4	Topics Taught to All or Almost All Pupils	Topics Taught to Only the More Able Pupils (Top Track)	Not Included in the Curriculum Through Grade 4
Australia	15	1	4	5	0	1	5	1	2	5	0	1
England	16	0	4	6	0	0	7	0	1	3	0	3
Finland	11	0	9	3	0	3	4	0	4	4	0	2
Hong Kong SAR	17	0	3	6	0	0	7	0	1	4	0	2
Ireland, Rep. of	18	0	2	6	0	0	8	0	0	4	0	2
New Zealand	12	8	0	3	3	0	5	3	0	4	2	0
Northern Ireland	20	0	0	6	0	0	8	0	0	6	0	0
Singapore	6	0	14	3	0	3	3	0	5	0	0	6
International Avg.	14	1	5	5	0	1	5	0	2	4	0	2

Source: Exhibit 8.10 international mathematics report, Exhibit 8.10 international science report

Table 8.7 Percentage of students taught the TIMSS mathematics and science topics**Mathematics***Reported by Teachers*

Country	All Mathematics (18 Topics)	Number (8 Topics)	Geometric Shapes and Measures (7 Topics)	Data Display (3 Topics)
Australia	r 87 (1.0)	r 85 (1.2)	r 86 (1.4)	r 94 (1.3)
England	91 (0.9)	91 (0.8)	89 (1.5)	96 (1.2)
Finland	73 (1.1)	88 (1.1)	53 (2.2)	83 (2.2)
Hong Kong SAR	78 (0.8)	83 (1.1)	66 (1.4)	95 (1.6)
Ireland, Rep. of	78 (1.0)	87 (0.9)	63 (1.5)	87 (2.3)
New Zealand	74 (1.0)	74 (1.1)	66 (1.6)	90 (1.8)
Northern Ireland	r 93 (0.6)	r 97 (0.6)	r 88 (1.3)	r 96 (1.5)
Singapore	85 (0.5)	100 (0.2)	65 (1.1)	94 (1.0)
International Avg.	72 (0.2)	76 (0.2)	65 (0.2)	76 (0.4)

Science*Reported by Teachers*

Country	All Science (20 Topics)	Life Science (6 Topics)	Physical Science (8 Topics)	Earth Science (6 Topics)
Australia	r 58 (1.8)	r 69 (2.0)	s 47 (2.6)	s 62 (2.3)
England	r 71 (1.7)	r 72 (2.4)	r 78 (1.8)	r 62 (2.9)
Finland	55 (1.2)	73 (1.6)	43 (1.8)	53 (1.6)
Hong Kong SAR	56 (1.9)	72 (2.4)	48 (2.3)	51 (2.1)
Ireland, Rep. of	71 (1.4)	73 (1.8)	68 (2.0)	72 (1.8)
New Zealand	54 (1.7)	66 (2.0)	44 (2.2)	56 (1.9)
Northern Ireland	r 61 (2.1)	r 74 (2.3)	r 57 (2.8)	r 53 (3.0)
Singapore	41 (0.8)	47 (1.3)	59 (0.9)	12 (1.1)
International Avg.	64 (0.2)	75 (0.2)	57 (0.3)	63 (0.3)

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

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

Source: Exhibit 8.8, *international mathematics report*, Exhibit 8.8 *international science report*

8.7 Conclusion

Teachers, principals and National Research Coordinators were asked a range of questions relating to learning activities and the curriculum in Y6 English, mathematics and science lessons. This included total teaching time and use of computers for all three subjects. For reading, information was obtained on schools' emphasis in the early years on reading skills and strategies, and the frequency of teachers' focus on specific comprehension skills and strategies. For science, teachers were asked about the extent to which they emphasised science investigation. For both mathematics and science, to assess the degree of correspondence between participants' curricula and the TIMSS assessment frameworks, National Research Coordinators reported on their country's intended curriculum, and teachers reported on whether the TIMSS topics were covered in lessons, according to content domain.

In Northern Ireland, teaching time for English and mathematics was higher than the international average. However, for science, teaching time was lower than the international average.

There was a high level of computer availability for reading, mathematics and science lessons in Y6. However, a higher proportion of pupils had access to computers in mathematics and science lessons compared with reading lessons. No clear patterns emerged relating computer availability to average achievement in any of the three subjects. This was the case both on average internationally and within Northern Ireland.

In Northern Ireland, a small proportion of Y6 pupils were taught science by teachers who emphasise science investigation in at least half of their science lessons; this proportion was considerably below the international average. In some (but not all) of the highest performing countries, science investigation was emphasised to a greater extent. However patterns relating emphasis on science investigation to average achievement within countries were not generally apparent.

There was variation internationally in the age at which schools emphasised a range of reading skills and strategies; in Northern Ireland just over half of pupils were taught in schools that emphasised these reading skills in Year 4. Generally, English-speaking countries had the highest proportions of pupils who were taught a range of reading skills *At or before the academic year in which they turn eight*. On average internationally, there appeared to be a positive association between the early introduction of a range of reading skills and strategies and average PIRLS achievement. However, in Northern Ireland, no such pattern was apparent.

In three of nine activities used to develop comprehension skills and strategies, noticeably fewer pupils in Northern Ireland were asked to practise these activities weekly than pupils on average internationally.

Northern Ireland's curriculum included all of the TIMSS assessment topics for mathematics and science. However, according to teachers' reports of topics taught in lessons, a higher proportion of Y6 pupils were taught the TIMSS mathematics topics than the TIMSS science topics, as was also the case on average internationally.

9. Characteristics of pupils and their homes

Chapter summary

This chapter considers the relationship between children's home circumstances in Northern Ireland and their performance on the PIRLS 2011 reading assessment and the TIMSS 2011 mathematics and science assessments. Within each sub-section, findings for reading are presented first, followed by findings for mathematics and science. Outcomes for Northern Ireland are compared with international averages, and with comparator countries of interest where relevant.

Key findings

- A higher proportion of children in Northern Ireland reported having many resources for learning at home compared with the average internationally. Pupils with access to more home resources for learning had higher average achievement in reading, mathematics and science.
- Teachers of pupils in Northern Ireland were more likely to report pupils' lack of sleep as limiting their teaching compared with pupils' lack of nutrition.
- The proportion of pupils whose teachers reported lack of sleep as a limiting factor was greater in Northern Ireland than the international average for all subjects.
- Pupils in Northern Ireland whose teachers reported that pupils' lack of basic nutrition and lack of sufficient sleep limited teaching had lower average achievement in reading, mathematics and science than those whose teachers reported not having these limitations. This pattern was also seen in the international data.

9.1 Home resources for learning

Interpreting the data: indices and scales

In order to summarise data from a questionnaire, responses to several related items are sometimes combined to form an index or scale. The respondents to the questionnaire items are grouped according to their responses and the way in which responses have been categorised is shown for each index or scale. The data in an index or scale is often considered to be more reliable and valid than the responses to individual items.

Access to resources, as well as indicators of socio-economic status such as parents' education level and occupation, are associated with educational achievement (OECD, 2012). In order to acquire information about these background factors, which are referred to in the international data and report as *Home Resources for Learning*, the TIMSS & PIRLS 2011 *Learning to Read Survey* asked parents of children involved in TIMSS and PIRLS to report on the availability of three key home variables highly related to achievement in school:

- parents' education
- parents' occupation and
- number of children's books in the home.

In addition, children were asked (among other things) about:

- number of books in the home and
- availability of key study supports at home: an internet connection and their own room.

Table 9.1 in this section presents the results for the PIRLS and TIMSS 2011 *Home Resources for Learning* scale, which was created based on parents' and children's reports about the variables listed above. Results on this scale are shown for all three subjects for countries that administered the *Learning to Read* questionnaire.¹

Pupils were categorised into three groups, according to the availability of the *Home Resources for Learning* (details of how responses were categorised during analysis is given in Figure 1, below Table 9.1).

In Northern Ireland, 30 per cent of children were in the *Many Resources* category, 68 per cent were in the *Some Resources* category, and a very small proportion (2 per cent) were in the *Few Resources* category. A higher proportion of children were reported to have *Many Resources* in Northern Ireland than internationally. In Table 9.1, the percentages of children in each category are the same for the three assessments since they refer to the same pupils, but the data on average achievement is different for each assessment.

In Northern Ireland, there were patterns of achievement across the different categories of resources. Children who were in the *Many Resources* category scored higher in all three subjects than those who were in the *Some Resources* category.² This was also the case on average internationally. No comparisons could be made between achievement of children in the *Many Resources* and *Few Resources* categories (for all subjects) because only 2 per cent of children in Northern Ireland were categorised as having *Few Resources*.

1 This was typically countries that administered both TIMSS and PIRLS assessments to the same pupils, which was the case in Northern Ireland and most of Northern Ireland's comparator countries. The exception was England, where the *Learning to Read (Parent) Questionnaire* was not administered. The response rates for the parent questionnaires in Northern Ireland and some other comparator countries were below 70 per cent.

2 The differences in achievement have not been tested for statistical significance in this international analysis but, based on the size of the standard errors, are likely to be significant.

Table 9.1 Home resources for learning in Year 6*

Reported by Parents, except Number of Books and Study Supports Reported by Students

Students were scored according to their own and their parents' responses concerning the availability of five resources on the *Home Resources for Learning* scale. Students with **Many Resources** had a score of at least 11.9, which is the point on the scale corresponding to students reporting they had more than 100 books in the home and two home study supports, and parents reporting that they had more than 25 children's books in the home, that at least one parent had finished university, and that at least one parent had a professional occupation, on average. Students with **Few Resources** had a score no higher than 7.3, which is the scale point corresponding to students reporting that they had 25 or fewer books in the home and neither of the two home study supports, and parents reporting that they had 10 or fewer children's books in the home, that neither parent had gone beyond upper-secondary education, and that neither parent was a small business owner or had a clerical or professional occupation, on average. All other students were assigned to the **Some Resources** category.

Reading

Country	Many Resources		Some Resources		Few Resources		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	30 (1.6)	607 (4.2)	68 (1.6)	560 (3.2)	2 (0.3)	~ ~	10.9 (0.07)
International Avg.	18 (0.2)	571 (0.7)	73 (0.2)	510 (0.4)	9 (0.1)	448 (1.4)	

Mathematics

Country	Many Resources		Some Resources		Few Resources		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	30 (1.5)	617 (4.7)	68 (1.6)	564 (3.9)	2 (0.4)	~ ~	10.9 (0.07)
International Avg.	17 (0.2)	555 (0.9)	74 (0.2)	497 (0.6)	9 (0.1)	436 (1.8)	

Science

Country	Many Resources		Some Resources		Few Resources		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland	30 (1.5)	562 (3.4)	68 (1.6)	518 (3.2)	2 (0.4)	~ ~	10.9 (0.07)
International Avg.	17 (0.2)	559 (0.9)	74 (0.2)	495 (0.6)	9 (0.1)	428 (2.0)	

* Available only for countries that administered both TIMSS and PIRLS to the same fourth grade students because this item was included in the PIRLS Home Questionnaire completed by parents.

Centre point of scale set at 10.

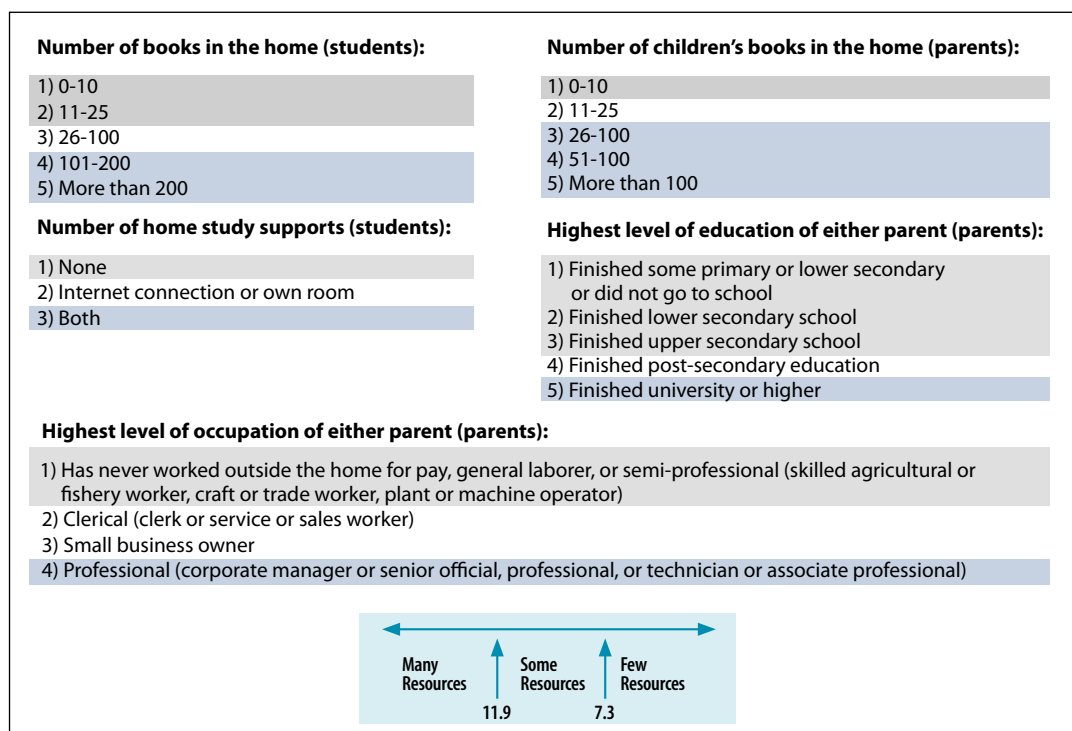
() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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

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

Source: Exhibit 4.1, international PIRLS report, Exhibit 4.1 international mathematics report and Exhibit 4.1 international science report.

Figure 1 The Home Resources for Learning scale



Source: Exhibit 4.1, international PIRLS report and international mathematics and science reports.

Table 9.2 provides supporting detail about the availability of the specific home resources included in the *Home Resources for Learning* scale. It shows that in Northern Ireland, 31 per cent of children reported having more than 100 books in their home. This was higher than the international average and similar to countries such as Singapore, Republic of Ireland and England. In Northern Ireland, 83 per cent of children had more than 25 children's books in their home. This was also higher than the international average.

In Northern Ireland, 70 per cent of pupils reported having both their own room and an internet connection at home. This was higher than the international average and similar to countries such as Australia, Finland, England, Republic of Ireland and New Zealand.

As reported by parents, in Northern Ireland 35 per cent of children had at least one parent with a university degree or higher. This was just above the international average and was similar to countries such as the Republic of Ireland and Singapore. The percentage was slightly higher in Finland and Australia.

In Northern Ireland, around half of children had at least one parent in a professional occupation. This was higher than the international average (36 per cent).

Table 9.2 Components of the Home Resources for Learning scale³

Reading

Columns 1-2 Reported by Students and Columns 3-5 Reported by Parents

Country	Per cent of Students with				
	More than 100 Books in Their Home	Own Room and Internet Connection in Home	At least One Parent with a University Degree or Higher	At least One Parent in a Professional Occupation**	More than 25 Children's books in Their Home
Northern Ireland	31 (1.4)	70 (1.1)	s 35 (1.7)	s 49 (1.6)	s 83 (1.2)
International Avg.	31 (0.2)	36 (0.2)	59 (0.2)	27 (0.2)	55 (0.2)

Mathematics

Columns 1-2 Reported by Students and Columns 3-5 Reported by Parents

Country	Per cent of Students with				
	More than 100 Books in Their Home	Own Room and Internet Connection in Home	At Least One Parent with a University Degree or Higher	At Least One Parent in a Professional Occupation**	More than 25 Children's Books in Their Home
Northern Ireland	31 (1.4)	70 (1.1)	s 35 (1.7)	s 50 (1.7)	s 83 (1.2)
International Avg.	25 (0.2)	52 (0.2)	30 (0.2)	36 (0.2)	58 (0.2)

Science

Columns 1-2 Reported by Students and Columns 3-5 Reported by Parents

Country	Per cent of Students with				
	More than 100 Books in Their Home	Own Room and Internet Connection in Home	At Least One Parent with a University Degree or Higher	At Least One Parent in a Professional Occupation**	More than 25 Children's Books in Their Home
Northern Ireland	31 (1.4)	70 (1.1)	s 35 (1.7)	s 50 (1.7)	s 83 (1.2)
International Avg.	25 (0.2)	52 (0.2)	30 (0.2)	36 (0.2)	58 (0.2)

* Data reported in columns 3-5 were from the PIRLS Home Questionnaire completed by parents, so data are available only for countries that administered both TIMSS and PIRLS to the same fourth grade students.

** Includes corporate manager or senior official, professional, and technician or associate professional.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent. An "s" indicates data are available for at least 50% but less than 70% of the students.

Source: Exhibit 4.2, international PIRLS report and international mathematics and science reports

3 Although parents who responded to the questionnaire were based on a single sample, percentages may vary slightly across subjects for the parent-reported data. The reasons for this are not certain. It may be due to patterns of non-response across questions, or to rounding.

9.2 Pupil level factors that limit teaching

Interpreting the data: percentages in tables

Some of the data in this chapter is derived from teacher reports. Reported percentages refer to pupils and can usually be interpreted as the percentage of pupils whose teachers reported a particular practice or circumstance.

Y6 pupils were sampled by class. The Y6 teacher questionnaire would, in most cases therefore, have been completed by the class teacher of the sampled class. However, in some cases, it might have been completed by different teachers who teach these pupils reading, mathematics and/or science separately.

This means that the teacher-derived data for reading, mathematics and science may differ slightly as the sample of teachers in each group is not necessarily the same or the distribution of pupils within the sample of teachers may differ by subject.

Teachers were asked to report the extent to which a number of pupil level factors limited their teaching. The question to which teachers responded is shown in Figure 2 below. This section is concerned with the first three elements of the question: teachers' perceptions of pupils' lack of prerequisite skills and knowledge, pupils' lack of basic nutrition and pupils suffering from not enough sleep. Table 9.3 presents teachers' reports on the extent to which pupils' lack of prerequisite knowledge or skills limited teaching, and Table 9.4 presents the equivalent findings relating to teachers' reports of the impact on their teaching of pupils suffering from a lack of basic nutrition and pupils suffering from not enough sleep.

Figure 2 The limitations on teaching question

G16

In your view, to what extent do the following limit how you teach this class?

Tick one circle for each row.

Not applicable
 Not at all
 Some
 A lot

a) Pupils lacking prerequisite knowledge or skills ----- — — —

b) Pupils suffering from lack of basic nutrition ----- — — —

c) Pupils suffering from insufficient sleep ----- — — —

d) Pupils with special needs (e.g. physical disabilities, mental or emotional/psychological impairment) --- — — —

e) Disruptive pupils ----- — — —

f) Uninterested pupils ----- — — —

Source: adapted from the international version of the PIRLS and TIMSS 2011 Teacher Questionnaire ⁴

Pupils lacking prerequisite knowledge or skills

Table 9.3 shows that in Northern Ireland, over two thirds of pupils were taught by teachers who reported that their teaching was limited by pupils lacking prerequisite knowledge or skills to *some* extent, while around a quarter reported that their teaching was *not at all* limited by pupils' lack of prerequisite skills.

In all comparator countries for all subjects, the percentage of pupils whose teachers reported that their teaching was limited to *some* extent by pupils' lack of prerequisite knowledge or skills, was similar to or lower than for Northern Ireland. However, in the majority of comparator countries, the percentage of pupils whose teachers reported that their teaching was limited *a lot* by pupils' lack of prerequisite knowledge or skills was higher than in Northern Ireland.

Table 9.3 suggests an association between attainment and teachers' reports of limitations based on pupils' lack of prerequisite knowledge or skills. It is likely that these associations are significant⁵ across the international sample as a whole, but not within Northern Ireland.⁶

⁴ <http://timssandpirls.bc.edu/pirls2011/index.html>, <http://timssandpirls.bc.edu/timss2011/index.html>

⁵ Throughout this report, findings listed as 'significant' are statistically significant.

⁶ The differences in achievement have not been tested for statistical significance in this international analysis but, based on the size of the standard errors, the apparent differences in Northern Ireland are not likely to be significant.

Table 9.3 Year 6 teaching limited by pupils' lacking prerequisite knowledge or skills

Reading

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills					
	Not At All		Some		A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	26 (3.7)	573 (5.4)	68 (3.9)	557 (3.6)	6 (2.1)	541 (9.6)
International Avg.	28 (0.5)	526 (0.9)	61 (0.5)	512 (0.5)	11 (0.3)	485 (1.6)

Mathematics

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills					
	Not At All		Some		A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	26 (3.6)	574 (7.4)	68 (3.9)	560 (4.2)	6 (2.1)	543 (14.9)
International Avg.	27 (0.5)	506 (1.0)	61 (0.5)	489 (0.6)	12 (0.3)	467 (1.9)

Science

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills					
	Not At All		Some		A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	25 (3.6)	530 (7.1)	69 (3.8)	514 (3.4)	6 (2.1)	500 (9.6)
International Avg.	28 (0.5)	501 (1.1)	60 (0.5)	485 (0.7)	11 (0.3)	460 (2.1)

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

Source: Exhibit 8.9 PIRLS international report, Exhibit 8.19, international mathematics report, Exhibit 8.19, international science report

Pupils suffering from a lack of basic nutrition/lack of sufficient sleep

In the international analysis (see Table 9.4), the response categories *some* and *a lot* were combined, both for pupils suffering from a lack of basic nutrition and for pupils suffering from not enough sleep. In Northern Ireland, the percentage of pupils whose teachers reported that their teaching was *not at all* limited by pupils' lack of basic nutrition was similar in all three subjects (around 80 per cent). In comparison to Northern Ireland, the percentage was consistently higher, for all three subjects, in Finland, Hong Kong and Singapore while it was consistently lower in Australia and New Zealand and similar in England and Republic of Ireland.

Teachers of pupils in Northern Ireland were more likely to report pupils' lack of sleep as limiting their teaching compared with pupils' lack of nutrition. In Northern Ireland, just under two thirds of pupils were taught by teachers who reported that their teaching was limited to *some* extent or *a lot* by pupils' lack of sleep, for all three subjects. Among comparator countries, the percentage of pupils whose teachers reported that their teaching was limited to *some* extent or *a lot* by pupils' lack of sleep was consistently lower in Hong Kong and Singapore, for all three subjects.

Pupils in Northern Ireland whose teachers reported that pupils' lack of basic nutrition and lack of sufficient sleep limited teaching appeared to have lower average achievement in reading, mathematics and science than those whose teachers reported not having these limitations.⁷

Table 9.4 Teaching limited by pupils suffering from lack of basic nutrition/not enough sleep

Reading

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition				Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep			
	Not At All		Some or A Lot		Not At All		Some or A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r 80 (3.1)	567 (3.0)	20 (3.1)	535 (7.3)	r 40 (4.7)	573 (3.6)	60 (4.7)	552 (3.8)
International Avg.	73 (0.4)	519 (0.6)	27 (0.4)	495 (1.0)	51 (0.5)	518 (0.6)	49 (0.5)	507 (0.7)

Mathematics

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition				Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep			
	Not At All		Some or A Lot		Not At All		Some or A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r 81 (2.9)	571 (3.9)	19 (2.9)	532 (6.8)	r 41 (4.8)	580 (4.4)	59 (4.8)	551 (5.0)
International Avg.	71 (0.4)	498 (0.7)	29 (0.4)	472 (1.1)	53 (0.5)	497 (0.7)	47 (0.5)	486 (0.8)

Science

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition				Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep			
	Not At All		Some or A Lot		Not At All		Some or A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r 80 (3.1)	524 (3.4)	20 (3.1)	489 (5.7)	r 39 (4.7)	532 (3.9)	61 (4.7)	507 (4.3)
International Avg.	71 (0.4)	493 (0.8)	29 (0.4)	467 (1.1)	54 (0.5)	492 (0.7)	46 (0.5)	481 (0.9)

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

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

Source: Exhibit 8.10 PIRLS international report, Exhibit 8.21, international mathematics report, Exhibit 8.21, international science report

9.3 Conclusion

Children involved in PIRLS and TIMSS 2011, and their parents and teachers, were asked about a number of factors relating to children's home background which may have impacted upon their achievement. These included key resources available at home, and parents' occupation and level of education. Teachers were also asked about a number of pupil-level factors which may limit classroom teaching, including pupils' lack of prerequisite knowledge and skills, and pupils' lack of basic nutrition and lack of sufficient sleep.

⁷ Tests of statistical significance have not been carried out in this international analysis but, given the size of the standard errors, it is likely that these differences are statistically significant.

Overall, the majority of children in Northern Ireland were categorised as having access to *Some* or *Many Resources*, and parents' level of education and occupational status were higher than the international averages. However, there were considerable differences in achievement between children categorised as having *Many Resources* or *Some Resources*, in all subjects, in Northern Ireland and on average internationally.

In Northern Ireland, a high proportion of teachers reported that their teaching was limited to *some* extent by pupils' lack of prerequisite knowledge or skills, in all subjects. This was consistent with the international averages. The majority of pupils were taught by teachers who reported that their teaching was *not at all* limited by pupils' lack of nutrition. However, teachers of more pupils reported that pupils' lack of sleep limited teaching, compared with those reporting lack of basic nutrition to be a problem. A similar pattern was also seen in the international averages. The average achievement of pupils whose teachers reported that pupils' lack of basic nutrition and/or sleep limited their teaching was lower than that of pupils whose teachers reported that these factors did not limit their teaching at all.

Appendix A

Progress in International Reading Literacy Study (PIRLS) and Trends in International Mathematics and Science Study (TIMSS) 2011: Overview

A.1 PIRLS and TIMSS 2011: Introduction

Although this is the first time that Northern Ireland has participated in PIRLS and TIMSS these are established international surveys. The PIRLS 2011 survey is the third in the IEA's¹ series of comparative international surveys of reading achievement. PIRLS is administered on a five-yearly cycle, so the 2011 survey updates the picture of performance from 2006. PIRLS was first run in 2001 and the next PIRLS cycle is planned for 2016.

The TIMSS 2011 survey is the fifth in the IEA's series of comparative international surveys of mathematics and science achievement. TIMSS is administered on a four-yearly cycle, so the 2011 survey updates the picture of performance from 2007. Earlier cycles took place in 2003, 1999 and 1995.² The next TIMSS cycle is planned for 2015.

2011 is the first time in which the two surveys have been administered in the same year. This has provided the unique opportunity to administer tests from both surveys to the same cohort of pupils. A brief introduction to each of the surveys is given below.

A.2 PIRLS and TIMSS 2011 participants

PIRLS 2011 involved 57 participants: 45 countries testing at 'fourth grade'; three countries tested at 'sixth grade';³ one country tested at fourth and sixth grade; and there were 9 benchmarking participants, one of which tested at fifth grade.⁴

Fourth grade is ages 9-10 and so Year 6 in Northern Ireland.

TIMSS 2011 involved 74 participants: 60 countries and 14 benchmarking participants,⁵ taking part at one or both of the target grades: 'fourth grade', ages 9-10 and 'eighth grade', ages 13-14 (Year 6 and Year 10 respectively in Northern Ireland). Three countries also took part at sixth grade.⁶ Participant numbers for fourth grade (the target grade in Northern Ireland) were: 57 participants (50 countries and 7 benchmarking participants).

1 International Association for the Evaluation of Educational Achievement (IEA): <http://www.iea.nl>

2 The 1995 TIMSS study was originally entitled the Third International Mathematics and Science Study, and followed earlier mathematics surveys in 1964 and 1980-1982 and science surveys in 1970 and 1984.

3 Honduras, Kuwait and Botswana tested at sixth grade only. Morocco tested at fourth and sixth grade.

4 Countries participating in PIRLS follow guidelines and strict sampling targets to provide samples that are nationally representative. 'Benchmarking participants' are regional entities which follow the same guidelines and targets to provide samples that are representative at regional level. One participant (Malta) entered the main survey as a country testing in English, and as a benchmarking participant testing in Maltese. The Republic of South Africa entered as a benchmarking participant, testing grade 5 pupils in English or Afrikaans only.

5 Countries participating in TIMSS follow guidelines and strict sampling targets to provide samples that are nationally representative. 'Benchmarking participants' are regional entities which follow the same guidelines and targets to provide samples that are representative at regional level.

6 Botswana and Honduras at sixth grade only, and Yemen at both fourth and sixth grades.

PIRLS 2011 and TIMSS 2011 involved different participants, although there were a number (both countries and benchmarking participants) that took part in both surveys, as was the case in Northern Ireland. Table A.1 below gives the list of participants in each survey (for TIMSS this shows participants for the fourth grade assessment only) and Exhibit A.1 in the international reports indicates the previous cycles in which each participant was involved.

The PIRLS and TIMSS 2011 participants are varied, ranging from highly developed countries or regions through to developing ones. Their education systems also vary, differing for example in the age at which children start school.⁷ More information about the educational system in each participating country and region can be found in the PIRLS and TIMSS encyclopaedias (Mullis *et al*, 2012c and 2012a).

A.3 PIRLS and TIMSS 2011 in the UK

The countries which comprise the United Kingdom are regarded separately by the IEA, and, of the four, Northern Ireland and England chose to participate in the 2011 surveys. The 2011 cycle represented Northern Ireland's first PIRLS and TIMSS participation. England has participated in all PIRLS and TIMSS cycles, so comparisons can be made with all earlier cycles where appropriate. Scotland has also participated in previous cycles.

Previous PIRLS and TIMSS surveys in the UK were administered by NFER. Outcomes from previous cycles of PIRLS and TIMSS internationally and in the UK are available through the NFER website: www.nfer.ac.uk/pirls and www.nfer.ac.uk/timss

A.4 PIRLS and TIMSS 2011 sampling strategy

The PIRLS and TIMSS samples are drawn based on internationally specified criteria, and are designed to be representative of the national population of pupils in the target age group (or regional population, for benchmarking participants). Each participant is therefore expected to provide a sampling pool that covers all or almost all of the target national population. Where exclusions are considered necessary, these must be within set limits. Exclusions may be for a variety of reasons, including:

- geographical (e.g. remote and/or very small schools may be excluded at sampling stage);
- linguistic (e.g. participants may exclude some language groups at sampling stage, if they opt to translate the assessment into majority languages only, not all languages spoken within the country/region); or
- special educational needs (e.g. special schools teaching pupils who cannot access the assessment may be excluded at sampling stage, or individual pupils who cannot access the assessment may be excluded at the administration stage).

The guidance for both surveys stipulates that no more than five per cent of the population in total should be excluded across all stages of the survey. See the technical report (Martin and Mullis (Eds), 2011) and Appendix C of the international reports for more information.

⁷ See Appendix C.1 in the PIRLS and TIMSS international reports for a summary of school starting ages in the participating countries/regions.

Table A.1 PIRLS and TIMSS 2011 participants

Participant	PIRLS	TIMSS: 4th grade, ages 9 -10	Participant	PIRLS	TIMSS: 4th grade, ages 9 -10
Countries			Countries		
Armenia		✓	Korea, Rep. of		✓
Australia	✓	✓	Kuwait		✓
Austria	✓	✓	Lithuania	✓	✓
Azerbaijan	✓	✓	Malta	✓	✓
Bahrain		✓	Morocco	✓	✓
Belgium (Flemish)		✓	Netherlands	✓	✓
Belgium (French)	✓		New Zealand	✓	✓
Bulgaria	✓		Northern Ireland	✓	✓
Canada	✓		Norway	✓	✓
Chile		✓	Oman	✓	✓
Chinese Taipei	✓	✓	Poland	✓	✓
Colombia	✓		Portugal	✓	✓
Croatia	✓	✓	Qatar	✓	✓
Czech Republic	✓	✓	Romania	✓	✓
Denmark	✓	✓	Russian Federation	✓	✓
England	✓	✓	Saudi Arabia	✓	✓
Finland	✓	✓	Serbia		✓
France	✓		Singapore	✓	✓
Georgia	✓	✓	Slovak Republic	✓	✓
Germany	✓	✓	Slovenia	✓	✓
Hong Kong SAR	✓	✓	Spain	✓	✓
Hungary	✓	✓	Sweden	✓	✓
Indonesia	✓		Thailand		✓
Iran, Islamic Rep. of	✓	✓	Trinidad and Tobago	✓	
Ireland, Rep. of	✓	✓	Tunisia		✓
Israel	✓		Turkey		✓
Italy	✓	✓	United Arab Emirates	✓	✓
Japan		✓	United States	✓	✓
Kazakhstan		✓	Yemen		✓
Benchmarking participants			Benchmarking participants		
Alberta, Canada	✓	✓	South Africa ⁸	✓	
Ontario, Canada	✓	✓	Abu Dhabi, UAE	✓	✓
Quebec, Canada	✓	✓	Dubai, UAE	✓	✓
Malta	✓		Florida, US	✓	✓
Andalusia, Spain	✓		North Carolina, US		✓

8 Republic of South Africa (RSA) tested 5th grade students receiving instruction in English or Afrikaans.

Each participating country has a ‘main sample’ and two matched ‘replacement samples’ which are used if the main sample schools decline to participate. The main sample is designed to be nationally representative of pupils in the target age group and so the sampling criteria (‘stratifiers’) for each country are designed to address key characteristics of the nation’s school system.⁹ Each main sample school is then assigned a ‘first replacement’ school and a ‘second replacement’ school, both of which share the same key sampling characteristics as the main sample school. This ensures that, if the main sample school declines to participate, its first replacement school can be used instead and the sample will still be nationally representative. If the first replacement school also declines to participate, the second replacement school will be invited to participate and, again, the sample will remain nationally representative. If the second replacement school declines to participate, then the country cannot include any other school, to avoid skewing the sample.

Classes of pupils of the target age are then randomly sampled within the participating schools and 95 per cent of these classes are expected to take part. Within each sampled class, at least 85 per cent of pupils are expected to take part. Samples are inspected and, if they meet the sampling criteria, accepted by the IEA’s sampling referee.

In order to meet the stringent PIRLS/TIMSS participation targets, countries are expected to achieve participation of:

- At least 85 per cent of their main sample schools; OR
- At least 85 per cent of sampled schools of which at least 50 per cent must be from the main sample and the remainder matched replacement schools; OR
- A combined pupil/school rate of at least 75 per cent.

Participants achieving at least 85 per cent of the main sample schools or a combined pupil/school figure of at least 75 per cent are deemed to have met the sampling requirements fully. Those achieving at least 85 per cent with the use of replacement schools are deemed to have achieved a sample that is suitably representative at national level, but are ‘annotated’ in the report, to indicate that replacement schools were used.

A.5 Northern Ireland’s PIRLS/TIMSS 2011 samples

Northern Ireland’s sampling strategy

Samples for Northern Ireland were drawn by Statistics Canada, assisted by the NFER Research and Statistics teams. The sample was stratified by region and deprivation level. Schools were recruited by the NFER Research Operations team. Once a school had agreed to participate, one or more Y6 classes were randomly sampled, using the IEA’s within-school sampling software. This selected the number of classes automatically. Pupils in the sampled classes were required to complete both the PIRLS and TIMSS assessments. Irish-medium schools were offered the option to offer the TIMSS assessment to all of their pupils in Irish instead of English. One school took up this option.

⁹ Schools are sampled using systematic, random sampling with probability proportional to their measures of size.

Northern Ireland's sample

The sample in Northern Ireland met the stringent sampling standards described above, with the inclusion of replacement schools. Of 160 schools sampled, a total of 136 primary schools took part (100 main sample schools and 36 replacement schools). Class participation was 100 per cent and pupil participation 93 per cent (see Table A.2). Overall participation was 79 per cent, exceeding the combined target of at least 75 per cent of pupils and schools. Total exclusions for Northern Ireland were just 3.5 per cent. Pupils completed the PIRLS and TIMSS assessments on different days (the order of testing was alternated). In some cases pupils did not participate in both assessment sessions and as a result the recorded number of absent pupils and participating pupils differs for the two surveys (as shown in Table A.2).

Internationally, participation rates at this grade ranged from 70 per cent in Norway for TIMSS (71 per cent for PIRLS) to 100 per cent in Azerbaijan (this was the case for PIRLS and TIMSS). For PIRLS the highest exclusion rate was 24.6 per cent in Israel (this included 18.5 per cent at school level), followed by Hong Kong (11.8 per cent) and Canada (9.9 per cent). The lowest exclusion rate was in Trinidad and Tobago (0.9 per cent). For TIMSS the exclusion rates ranged from 0.3 per cent in Kuwait to 12.1 per cent in Florida (a benchmarking participant). The highest exclusion rate among countries was 9.4 per cent in Serbia.

The average age of participating pupils in Northern Ireland was 10.4. The range internationally for those in the target grade was from 9.7 (in Italy and Norway) to 10.9 in Denmark for PIRLS and 9.7 (in Italy, Kuwait and Norway) to 11.2 in Yemen for TIMSS at grade 4. See Appendix C of the international reports for more information.

Table A.2 Sample information for Northern Ireland

The information in this table is taken from the international reports. The source of each element within the reports is indicated.

Country	Number of Schools in Original Sample	Number of Eligible Schools in Original Sample	Number of Schools in Original Sample that Participated	Number of Replacement Schools that Participated	Total Number of Schools that Participated
Northern Ireland	160	160	100	36	136

Source: Exhibit C.3, international PIRLS report and Exhibit C4, international mathematics and science reports

Country	Within-school Student Participation (Weighted Percentage)	Number of Sampled Students in Participating Schools	Number of Students Withdrawn from Class/School	Number of Students Excluded	Number of Eligible Students	Number of Students Absent		Number of Students Assessed	
						PIRLS	TIMSS	PIRLS	TIMSS
Northern Ireland	93%	3,942	27	49	3,866	280	295	3,586	3,571

Source: Exhibit C.4, international PIRLS report and Exhibit C.6, international mathematics and science reports

Country	School Participation		Class Participation	Student Participation	Overall Participation	
	Before Replacement	After Replacement			Before Replacement	After Replacement
† Northern Ireland	62%	85%	100%	93%	58%	79%

Source: Exhibit C.5 international PIRLS report and Exhibit C.8, international mathematics and science reports

Country	International Target Population		Exclusions from National Target Population		
	Coverage	Notes on Coverage	School-level Exclusions	Within-sample Exclusions	Overall Exclusions
Northern Ireland	100%		2.6%	0.9%	3.5%

Source: Exhibit C.2, international PIRLS, mathematics and science reports

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