

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