

Department of Education and Skills

PIRLS & TIMSS 2011

PIRLS and TIMSS 2011: Reading, Mathematics and Science Outcomes for Ireland

INFORMATION NOTE

December 2012

Introduction

PIRLS and TIMSS 2011: Reading, Mathematics and Science Outcomes for Ireland was launched on Tuesday, 11th December 2012 at 9.00am at the Department of Education and Skills. Three international reports¹ on the outcomes of the PIRLS (Progress in International Reading Literacy Study) and TIMSS (Trends in International Mathematics and Science Study) evaluations respectively, will be published simultaneously by the IEA (the International Association for the Evaluation of Educational Achievement) based in Boston, USA and in the Netherlands.

What are PIRLS and TIMSS?

- PIRLS (Progress in International Reading Literacy Study) and TIMSS (Trends in International Mathematics and Science Study) are large, international comparative studies of achievement that assess, respectively, the reading, mathematics and science skills of primary school pupils. TIMSS also has a post-primary component. Combined, the two studies form the world's largest educational assessment at primary school level.
- First conducted in 1995, TIMSS takes place every four years. PIRLS, which was first conducted in 2001, takes place every five years. In 2011, the cycles for the studies coincided for the first time, giving countries the opportunity to take part in one or both assessments.

How often has Ireland participated in PIRLS and TIMSS?

- In 2011, Ireland participated in TIMSS for the second time since 1995 and in PIRLS for the first time. The last international reading study in which Ireland participated was the 1991 Reading Literacy Study, also administered by the IEA. The Reading Literacy Study is widely regarded as the precursor to PIRLS.
- The decision was taken that Ireland would join TIMSS and PIRLS 2011 early in 2010. Participation allows the performance of Irish pupils at primary level to be measured against the performance of students in other countries. In 2011, all three domains – reading (in PIRLS) and maths and science (in TIMSS)

¹ *PIRLS 2011 international results in reading; TIMSS 2011 international results in mathematics; and TIMSS 2011 international results in science*

were tested simultaneously for the first time and this was an opportune occasion for Ireland to join the studies. This decision to join TIMSS and PIRLS was re-confirmed in the commitments contained in the Literacy and Numeracy Strategy, developed in 2010-2011 and published in finalised form in July 2011.

Who administers PIRLS and TIMSS?

- The studies are conducted under the auspices of the International Association for the Evaluation of Educational Achievement (IEA) and are managed at an international level by the international Study Centre in Boston College.

Who administers PIRLS and TIMSS in Ireland?

- TIMSS and PIRLS are managed in Ireland by the Educational Research Centre, Drumcondra on behalf of the Department of Education and Skills. The studies are supported by the various stakeholders at national level including parents, teachers and principals.

How many countries participated in PIRLS and TIMSS 2011?

- 67 countries took part in one or both studies. Ireland was one of 34 countries that took part in both studies at 4th class level.
- 45 countries/territories took part in the PIRLS test at fourth class level in primary schools.
- 50 countries/territories took part in the TIMSS test at fourth class level in primary schools.

In Ireland, who participated in PIRLS and TIMSS?

- Approximately 4,500 4th class pupils in 151 randomly selected schools in Ireland completed tests of reading, mathematics and science. The selection of schools took account of enrolment size, language of instruction, DEIS status and gender mix. As well as the tests, the pupils, their teachers, parents and principals completed contextual questionnaires.

What is the focus of the 'Outcomes for Ireland' Report?

- *PIRLS and TIMSS 2011: Reading, Mathematics and Science Outcomes for Ireland* is the initial Irish report on the studies.
- More detailed *national* analyses of Irish performance on PIRLS and TIMSS, including contextual information from pupils, parents, teachers and principals, will follow in early 2013. Examples of the types of test items on which Irish pupils excelled or struggled, will also be made available.

What is the focus of the International Reports?

- These reports contain the outcomes of the 2011 PIRLS and TIMSS assessments. They provide a broad description of the performance of pupils in all participating countries, and relate performance to selected characteristics of individual pupils, and their home, class and school environment.
- In addition, encyclopaedias for each participating country in PIRLS and TIMSS were published in September 2012. These provide a context within which to understand the results. For example, they can be used to compare curriculum coverage for the target grades in each of the participating countries.
- The encyclopaedias show that the content of our reading, science and mathematics curricula is broadly in line with learning expectations internationally for 10 year old pupils in these aspects of the curriculum.
- *International* analyses on differential school effectiveness and on the relationship between performance on reading, mathematics and science will be published later in 2013.

Mean country scores and standard errors for each domain in PIRLS and TIMSS 2011, and position relative to the study centrepoints and Irish means

Reading	Mean	SE	IRL	Maths	Mean	SE	IRL	Science	Mean	SE	IRL
Hong Kong	571	2.3	↑	Singapore	606	3.2	↑	Korea, Rep.	587	2.0	↑
Russian Fed.	568	2.7	↑	Korea, Rep.	605	1.9	↑	Singapore	583	3.4	↑
Finland	568	1.9	↑	Hong Kong	602	3.4	↑	Finland	570	2.6	↑
Singapore	567	3.3	↑	Ch. Taipei	591	2.0	↑	Japan	559	1.9	↑
N. Ireland	558	2.4	↑	Japan	585	1.7	↑	Russian Fed.	552	3.5	↑
United States	556	1.5	↔	N. Ireland	562	2.9	↑	Ch. Taipei	552	2.2	↑
Denmark	554	1.7	↔	Belgium (Fl.)	549	1.9	↑	United States	544	2.1	↑
Croatia	553	1.9	↔	Finland	545	2.3	↑	Czech Rep.	536	2.5	↑
Chinese Taipei	553	1.9	↔	England	542	3.5	↑	Hong Kong	535	3.8	↑
Ireland	552	2.3		Russian Fed.	542	3.7	↑	Hungary	534	3.7	↑
England	552	2.6	↔	United States	541	1.8	↑	Sweden	533	2.7	↑
Canada	548	1.6	↔	Netherlands	540	1.7	↑	Slovak Rep.	532	3.8	↑
Netherlands	546	1.9	↔	Denmark	537	2.6	↑	Austria	532	2.8	↑
Czech Rep.	545	2.2	↔	Lithuania	534	2.4	↔	Netherlands	531	2.2	↑
Sweden	542	2.1	↓	Portugal	532	3.4	↔	England	529	2.9	↑
Italy	541	2.2	↓	Germany	528	2.2	↔	Denmark	528	2.8	↑
Germany	541	2.2	↓	Ireland	527	2.6		Germany	528	2.9	↑
Israel	541	2.7	↓	Serbia	516	3.0	↓	Italy	524	2.7	↔
Portugal	541	2.6	↓	Australia	516	2.9	↓	Portugal	522	3.9	↔
Hungary	539	2.9	↓	Hungary	515	3.4	↓	Slovenia	520	2.7	↔
Slovak Rep.	535	2.8	↓	Slovenia	513	2.2	↓	N. Ireland	517	2.6	↔
Bulgaria	532	4.1	↓	Czech Rep.	511	2.4	↓	Ireland	516	3.4	
New Zealand	531	1.9	↓	Austria	508	2.6	↓	Croatia	516	2.1	↔
Slovenia	530	2.0	↓	Italy	508	2.6	↓	Australia	516	2.8	↔
Austria	529	2.0	↓	Slovak Rep.	507	3.8	↓	Serbia	516	3.1	↔
Lithuania	528	2.0	↓	Sweden	504	2.0	↓	Lithuania	515	2.4	↔
Australia	527	2.2	↓	Kazakhstan	501	4.5	↓	Belgium (Fl.)	509	2.0	↔
Poland	526	2.1	↓	Centrepoint	500	-	↓	Romania	505	5.9	↔
France	520	2.6	↓	Malta	496	1.3	↓	Spain	505	3.0	↓
Spain	513	2.3	↓	Norway	495	2.8	↓	Poland	505	2.6	↓
Norway	507	1.9	↓	Croatia	490	1.9	↓	Centrepoint	500	-	↓
Belgium (Fr.)	506	2.9	↓	New Zealand	486	2.6	↓	New Zealand	497	2.3	↓
Romania	502	4.3	↓	Spain	482	2.9	↓	Kazakhstan	495	5.1	↓
Centrepoint	500	-	↓	Romania	482	5.8	↓	Norway	494	2.3	↓
Georgia	488	3.1	↓	Poland	481	2.2	↓	Chile	480	2.4	↓
Malta	477	1.4	↓	Turkey	469	4.7	↓	Thailand	472	5.6	↓
Trinidad & Tobago	471	3.8	↓	Azerbaijan	463	5.8	↓	Turkey	463	4.5	↓
Azerbaijan	462	3.3	↓	Chile	462	2.3	↓	Georgia	455	3.8	↓
Iran	457	2.8	↓	Thailand	458	4.8	↓	Iran	453	3.7	↓
Colombia	448	4.1	↓	Armenia	452	3.5	↓	Bahrain	449	3.5	↓
UAE	439	2.2	↓	Georgia	450	3.7	↓	Malta	446	1.9	↓
Saudi Arabia	430	4.4	↓	Bahrain	436	3.3	↓	Azerbaijan	438	5.6	↓
Indonesia	428	4.2	↓	UAE	434	2.0	↓	Saudi Arabia	429	5.4	↓
Qatar	425	3.5	↓	Iran, Rep.	431	3.5	↓	UAE	428	2.5	↓
Oman	391	2.8	↓	Qatar	413	3.5	↓	Armenia	416	3.8	↓
Morocco	310	3.9	↓	Saudi Arabia	410	5.3	↓	Qatar	394	4.3	↓
				Oman	385	2.9	↓	Oman	377	4.3	↓
				Tunisia	359	3.9	↓	Kuwait	347	4.7	↓
				Kuwait	342	3.4	↓	Tunisia	346	5.3	↓
				Morocco	335	4.0	↓	Morocco	264	4.5	↓
				Yemen	248	6.0	↓	Yemen	209	7.3	↓

TABLE KEY

	Significantly above scale centrepoint	↑	Significantly higher than Ireland
	At / near centrepoint	↔	Not significantly different to Ireland
	Significantly below scale centrepoint	↓	Significantly lower than Ireland

How well did we do?

- Overall, Irish students performed at a very high level in reading. In mathematics, they performed well. In science, they performed reasonably well.
- Irish 4th class pupils were placed among the countries performing significantly above the international average (technically the study centrepoint level in reading, mathematics and science).
- Broadly, the tests show that Irish 4th class pupils are performing well or very well, but not among the top performing categories of students internationally. Pupils in a number of countries performed significantly higher than Irish students in all three tests.
- 4th class pupils in Ireland were among the top performers in the reading test (PIRLS).
- Of the three domains, Irish pupils did least well in science, although still above the international mean.
- In analysing the Irish performance, it must be borne in mind that these were one set of tests, performed at a moment in time. It is important to be cautious about reading too much into a single set of assessment outcomes.

Reading:

- 4th class pupils in Ireland were among the top performers in PIRLS. Ireland ranked 10th out of 45 countries. Only five countries performed significantly higher than Ireland namely Hong Kong, Finland, Singapore, the Russian Federation and Northern Ireland. Ireland performed significantly higher than 31 other countries.
- A very broad comparison with the Reading Literacy Study in 1991 (a forerunner of the PIRLS test) suggests that reading achievement among Irish primary pupils has not deteriorated, and may well have improved, in the interim. However, it is not possible to draw firm conclusions about improved Irish performance due to the very different nature of the two studies and two sets of participating countries.
- The performance of Irish 4th class pupils' on PIRLS 2011 is also broadly in line with the performance of Irish fifteen year olds in PISA 2000, 2003 and 2006, but not with the results of PISA 2009 where there was an unexpected drop in Ireland's performance.

Mathematics:

- Out of the 50 countries that participated in TIMSS, Ireland was placed 17th for mathematics. Ireland's performance was higher than 33 other TIMSS participating countries. The performance of thirteen countries, including Northern Ireland, was higher than that of Ireland.

- Irish pupils displayed relative strengths on *Number and Knowing*², and relative weaknesses on *Geometric Shapes and Measures*, and *Data Display and Reasoning*.
- There appears to be no significant change in overall mathematics achievement among Irish 4th class pupils since 1995.
- The data indicate a welcome improved performance among low-achieving pupils. More of the lower-achieving pupils are now attaining at least the lowest benchmark. This reflects the findings of recent DEIS evaluations by both the Inspectorate and the Educational Research Centre. Both reports highlight achievement gains in the numeracy levels of pupils in DEIS primary schools.

Science:

- In science, Ireland is in 22nd position out of the 50 participating countries. Its performance was above that of New Zealand and Norway and similar to that of Northern Ireland. Seventeen countries (including Singapore, Finland, the US and England) performed significantly higher than Ireland.
- Irish pupils performed equally well in the three areas³: Life science⁴, Physical science⁵ and Earth Science⁶.
- As with mathematics, Irish pupils demonstrated a relative weakness on scientific reasoning.
- Achievement by Irish pupils in science now is broadly similar to performance in 1995 and broadly in line with performance on successive cycles of PISA at post-primary level.

Was there a Gender Gap in Ireland?

- A gender gap was apparent in reading but not in either mathematics or science.
- In **reading**, girls significantly outperformed boys in Ireland and in almost every country. In Ireland, the gender gap was largest for literary texts, on which Irish girls performed particularly well. This is similar to the results of the 1991 Reading Literacy Study and all cycles of PISA. However, a gender gap has not been a consistent feature of National Assessments of Reading in Ireland.
- There was no gender gap in 2011 at the TIMSS international average for **mathematics**. Similarly, there were no significant gender differences on **mathematics** performance among Irish pupils. This reflects the international

² *Knowing* covers facts, concepts, and procedures that students need to know.

³ It should be noted that the topics included in these content areas may be taught through science in some countries but also through other subject areas, such as geography.

⁴ Life science includes understandings of the characteristics and life processes of living things, the relationships between them, and their interaction with the environment.

⁵ Physical science includes concepts related to matter and energy, and covers topics in the areas of both chemistry and physics.

⁶ Earth science is concerned with the study of Earth and its place in the solar system.

findings for PISA 2009 and also the National Assessments 2009 which found no gender differences on overall performance.

- In Ireland, and for the overall study average, there was no significant gender difference on **science** performance among 4th class pupils. This mirrors the findings of TIMSS 1995 and successive cycles of PISA from 2000 to 2009.

Performance relative to International Benchmarks

- PIRLS and TIMSS also report performance in terms of benchmarked skills. For each of reading, mathematics and science, pupils are categorised as at one of four International Benchmarks (Advanced, High, Intermediate, or Low). Each International Benchmark has an associated set of skills that pupils at that Benchmark should be able to demonstrate.
- Not all pupils internationally attain even the lowest level. Pupils at the Low benchmark have demonstrated minimum competence; pupils who fall below the “Low” benchmarks have failed to demonstrate even basic competence.
- Benchmarks are cumulative skill sets, meaning that a pupil who is classified as at the Advanced Benchmark can also demonstrate all the skills that exemplify lower International Benchmarks.

Reading benchmarks

- More than half of Irish pupils are categorised at the top two levels (High and Advanced) for reading.
- A very high percentage, double the international average, of Irish pupils reached the Advanced Benchmark for reading. 16% of Irish pupils, compared with the international average of 8%, were in this category. This was very similar to the attainment of the top performing countries (18%-19% with the exception of Singapore: 24%).
- More than half (53%) of Irish pupils reached the High International Benchmark.
- Only 3% failed to at least reach the Low Benchmark compared with the international average of 5%.

Mathematics benchmarks

- More than twice the percentage of pupils in Ireland reached the Advanced Benchmark in mathematics than is the norm internationally (9% vs 4%). However, it is well below the percentages achieved for Northern Ireland and England (24% and 18%, respectively).
- Only 6% of pupils in Ireland fail to reach the Low International Benchmark compared with the international average of 10%. This also compares very favourably with our performance in 1995 when 9% of Irish pupils failed to reach the lowest Benchmark
- These findings suggest that Ireland’s good performance on TIMSS mathematics can be attributed to having very few weak pupils not achieving

the requirements of the 'low' benchmark, and a reasonable number of very advanced pupils.

Science benchmarks

- In Ireland, 7% of pupils reached the Advanced Benchmark compared with 5% internationally. However, this was considerably lower than in high-performing countries such as Singapore and Korea (33% and 29% respectively).
- Slightly more pupils reached the Advanced and High Benchmarks in Ireland than in Northern Ireland or New Zealand (both 5%), and the percentages in Ireland were similar to those in Australia.
- At 8%, the percentage of pupils in Ireland who did not reach the Low International Benchmark was the same as the international median.

Trends

- We can establish some very limited trend information for reading, mathematics and science for TIMSS and PIRLS 2011.
- Prior to 2011, Ireland had never taken part in PIRLS although it has participated in the Reading Literacy Study in 1991 which was a forerunner of PIRLS. However, the tests and the countries involved were substantially different and we can only make limited comparisons between the outcomes.
- Ireland took part in TIMSS in 1995 but did not participate again until 2011. This means that comparisons can be made between the 1995 and 2011 data regarding maths and science. However, the lack of data from a number of rounds of TIMSS means that trend data has to be treated with caution.

Reading

- In the Reading Literacy Study in 1991, 9-year-olds in Ireland obtained an average reading score that was significantly *lower* than that of eight of the 27 countries that participated, and significantly *higher* than that of seven countries.
- In PIRLS 2011, Irish pupils obtained an average reading score that was significantly *lower* than that of only five of the 45 countries that participated, and significantly *higher* than that of 31 countries.
- Thus, it seems reasonable to conclude that reading achievement in Irish primary schools has not declined in the last twenty years. However, it is not possible to draw firm conclusions about improved Irish performance due to the very different nature of the two studies and two sets of participating countries.

Mathematics

- There was no significant change in the overall average score of Irish pupils on mathematics between 1995 and 2011.
- There was evidence of improved performance on the mathematics assessment among low-achieving pupils. While the percentages reaching both the Advanced and High Benchmarks are similar in 1995 and 2011, significantly fewer Irish pupils did not reach the lowest International

Benchmark in 2011. This improvement in the performance of the weakest pupils is welcome.

Science

- There was no significant change in the overall average score of Irish pupils on science between 1995 and 2011. This appears to have occurred despite the formal introduction of a science curriculum in the 1999 Primary School Curriculum.
- Irish performance in science is consistent from 1995 to 2011, both in terms of overall achievement scores and in the proportion of pupils attaining each International Benchmark.

How do these findings compare with PISA 2009?

- The PISA 2009 achievement scores in reading and mathematics for 15 year old students in Ireland showed significant decline when compared with scores in previous cycles of PISA. However, trend analyses in TIMSS suggest that there is no significant change in overall mathematics achievement among Irish 4th class pupils since 1995 and PIRLS suggests that reading achievement among Irish primary pupils has not deteriorated since the Reading Literacy Study in 1991.