

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

Executive summary

This summary accompanies the national report for Northern Ireland (Sturman *et al*, 2012). It summarises the attainment of Year 6 pupils in Northern Ireland in the PIRLS and TIMSS surveys of 2011 and explores the context of that attainment.

PIRLS is an international comparison study of reading achievement 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.

Countries with which Northern Ireland is mainly compared

Northern Ireland's performance in PIRLS and TIMSS 2011 is outlined and compared with that of seven other countries: the five PISA countries which outperformed Northern Ireland in all three subject domains in the most recent PISA cycle (2009), as well as with England and the Republic of Ireland. The comparator group is therefore:

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

These are referenced throughout the summary and report as applicable. Reported findings relate to Northern Ireland unless otherwise specified. Findings are based on the international PIRLS and TIMSS reports (Martin *et al*, 2012 and Mullis *et al*, 2012a and 2012b), available through the NFER website.¹



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Attainment

- In PIRLS, Northern Ireland was outperformed by only four of the 45 participating countries. The mean score for reading was not significantly² different from that of a further four countries, and was significantly higher than all remaining 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 was lower than for mathematics, although still above the TIMSS science international average. Northern Ireland was 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.³
- Girls in Northern Ireland scored significantly 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 not unique in this lack of gender difference in mathematics or science, it was noticeable that some of the high performing countries showed gender differences (favouring boys) in their mathematics and/or science attainment.
- Among the selected comparator countries, only Singapore had more pupils reaching the Advanced international benchmark in reading.
- Almost a quarter of pupils in Northern Ireland reached the Advanced benchmark in mathematics, the sixth highest proportion internationally.
- Only 5 per cent 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 benchmark. This compares with 0 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.

Attainment by content and skill

- On the two reading purposes scales identified in PIRLS (Reading for Literary Experience and Reading to Acquire and Use Information), pupils in Northern Ireland did significantly better 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 better on Life Science and Physical Science, but less well on Earth Science.

- On the processes of reading comprehension scales, pupils in Northern Ireland scored more highly on the Interpreting, Integrating and Evaluating scale, than 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 in Northern Ireland for the science content domains: girls did better than boys on Life Science.

Pupils' engagement

- 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 who *Do Not Like Reading* was higher.
- Pupils 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. The better readers were also the more confident readers 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.
- 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*.

School resources

- In terms of teaching space, teaching materials and supplies, teachers in Northern Ireland rated their working conditions relatively highly compared with international averages.
- 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 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 main basis for teaching was more common internationally than in Northern Ireland, for all three subjects. Even so, text books were the basis for reading, mathematics and science teaching for 30, 43 and 9 per cent of pupils respectively in Northern Ireland.
- Teachers 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*.
- The most commonly used resources as a basis for teaching (for just under half of pupils) were *textbooks* for mathematics and *science equipment and materials* for science.
- For mathematics in Northern Ireland, the most widely used resource (for over 80 per cent of pupils) 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*.
- 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 Year 6 pupils in Northern Ireland attended schools in which a computer was available for every one or two pupils.

The school learning environment

- 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.
- 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.
- 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 of pupils were taught by teachers who feel very well prepared.

The curriculum and learning activities

- 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 Year 6 pupils were taught science by teachers who reported emphasising science investigation in at least half their 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 Year 6 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).

- 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 Year 6 pupils were taught the TIMSS mathematics topics than the TIMSS science topics. This was also the case on average internationally.

Characteristics of pupils and their homes

- 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.

References

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www.nfer.ac.uk/pirls and www.nfer.ac.uk/timss

1 www.nfer.ac.uk/pirls and www.nfer.ac.uk/timss

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

3 Scores on PIRLS, TIMSS and PISA cannot be compared directly. These comparisons relate to Northern Ireland's distance from the international mean score in each case.

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