TIMSS 2019

Ireland's results in mathematics and science

WHAT IS TIMSS?

TIMSS *(**T**rends in **I**nternational **M**athematics and **S**cience **S**tudy)* is one of the world's largest studies of education. It assesses the maths and science skills of students in both primary school (at Fourth Class) and post-primary school (at Second Year). The first TIMSS was in 1995, and it has been repeated every four years since then. TIMSS 2019 is the seventh cycle. Ireland has taken part in 1995, 2011, 2015, and 2019.

In 2019, 64 countries and about 672,000 students participated, with 58 countries participating at primary level and 39 countries taking part at post-primary level. Ireland, along with 32 other countries took part at both levels. For brevity, the rest of this flyer summarises the main Fourth Class results only. For more information on Second Year, see www.erc.ie/timss.

WHAT DOES TIMSS ASSESS?

TIMSS assesses mathematics and science. Within both domains (subjects), it assesses several **content areas** and **cognitive processes**. Content areas are the subject matter or topics assessed, and cognitive processes are the skills students need to demonstrate to answer questions correctly.

There are three content areas for maths (Number, Measurement & Geometry, and Data). There are also three content areas for science (Life Science, Physical Science, and Earth Science). For both domains, the same three cognitive processes are assessed – in increasing order of complexity, these are Knowing, Applying, and Reasoning.

TIMSS IN IRELAND

TIMSS is managed in Ireland by the Educational Research Centre on behalf of the Department of Education. The ERC is supported in this work by a National Advisory Committee that includes groups such as the Inspectorate of the Department of Education, the INTO, the National Parents Council–Primary, the IPPN, the NCCA, the PDST, and Gaelscoileanna.

IEA TIMSS 2019

Foras Taighde ar Oideachas
Educational Research Centre

TIMSS was administered in Ireland in March and April 2019 in 150 primary schools around the country, which were randomly-selected and invited to participate as a nationally representative sample. The quality of the administration was generally very high, ensuring that the data gathered are accurate and reliable.

In total, 4582 Fourth Class pupils completed tests of maths and science, together with a background questionnaire. In addition, pupils' parents and their school principals and teachers completed questionnaires. Together, these provide a detailed snapshot of the broader educational context in Ireland.

MATHS – MAIN FINDINGS

Fourth Class pupils in Ireland achieved a mean (average) score of 548 on the maths assessment. This was statistically significantly higher than the score in 46 other countries (including Finland, Germany, Sweden, the United States and Australia), and was similar to the performance in four countries (England, Latvia, Norway, and Lithuania). Pupils in only seven countries achieved a significantly higher maths score than pupils in Ireland: five East Asian countries (Singapore, Hong Kong, Korea, Chinese Taipei, and Japan), the Russian Federation, and Northern Ireland.

Boys and girls in Ireland achieved similar maths scores. They were relatively stronger on items that assessed Number content knowledge and Applying skills, and relatively weaker on items that assessed two content areas (Measurement & Geometry and Data) and Reasoning skills.

SCIENCE – MAIN FINDINGS

Fourth Class pupils achieved a score of 528 on the science assessment. This was significantly higher than 33 countries (including Northern Ireland, Netherlands, Germany and New Zealand). Twelve countries (including Hong Kong, Canada, Denmark, and Australia) achieved similar scores to Ireland, and another 12 countries (including Singapore, Japan, Finland, the United States and England) achieved significantly higher scores for science.

As with maths, Fourth Class boys and girls performed at a similar level on the science assessment. A relative strength was found in Earth Science (which includes much of the content taught as geography in Ireland), and a relative weakness in Physical Science (which covers physics and chemistry). Fourth Class pupils displayed a relative strength in Knowing in science, with Applying and Reasoning emerging neither as particular strengths or weaknesses.

TRENDS (1995-2011-2015-2019)

In both domains, pupils in Ireland achieved almost identical scores in TIMSS 2019 (548 for maths and 528 for science) as in 2015 (549 and 529). There has therefore been no change in maths or science achievement at Fourth Class since 2015. However, the scores for both domains remain significantly higher than in 2011 (527 and 516) or 1995 (523 and 515).

Between TIMSS 2011 and 2015, substantial improvements were observed among lower-achieving pupils (those at the 5th percentile of all scores in Ireland), which meant that the overall distribution of achievement narrowed considerably (less of a gap between lower- and high-achieving pupils). In contrast, the distribution of achievement in 2019 is very similar to 2015, with no major changes. In fact, a very slight widening of the distribution (lower at the 5th percentile and higher at the 95th percentile) can be seen.

BENCHMARKS OF PERFORMANCE

TIMSS also describes pupils' performance with reference to four International Benchmarks (Low, Intermediate, High or Advanced) which describe the skills that pupils can typically demonstrate. A pupil at the Low Benchmark can consistently demonstrate the most basic mathematical or scientific skills, while someone at the Advanced Benchmark can demonstrate quite complex reasoning and problem-solving skills.

For **maths**, almost all Fourth Class pupils reached the Low Benchmark (97%) compared to 92% internationally. Just over half of Irish pupils (52%) reached the High Benchmark (34% internationally), and 15% reached the Advanced Benchmark (7% internationally) and could therefore demonstrate the most advanced mathematical skills that were tested in the assessment. These percentages were similar to those found in TIMSS 2015.

For comparison, 37-54% of pupils reached the Advanced Benchmark in Korea, Chinese Taipei and Singapore, and 26% reached the Advanced Benchmark in Northern Ireland.

For **science**, 94% of Fourth Class pupils reached the Low, and 41% reached the High Benchmark (compared to 92% and 32% internationally). A small percentage of pupils in Ireland (9%) and internationally (6%) reached the Advanced Benchmark. By comparison, 5% of pupils in Northern Ireland reached the Advanced Benchmark for science, while 15% in the USA and 38% of pupils in Singapore did so.

The percentage of Fourth class pupils reaching each of the science benchmarks in TIMSS 2019 was similar to the corresponding figures in 2015.

CONTEXTUAL INFORMATION

The ERC is preparing detailed contextual reports at Fourth Class and Second Year that will examine more closely the wealth of information provided in the pupil, teacher, principal, and parent questionnaires. They are intended to be released towards the end of 2021. These follow-up reports will include comparisons to other countries, and between Fourth Class and Second Year in Ireland, where appropriate. They will include topics such as pupil engagement and attitudes towards school and maths and science, interactions between the school and home, teaching practices and challenges faced by teachers, use of digital technology at school and at home, and the system-level characteristics of Irish education.

MORE INFORMATION

More information about TIMSS and its implementation in Ireland is available from www.erc.ie/timss.

The initial Irish report on the main achievement results summarised here (*TIMSS 2019: Ireland's results in mathematics and science*) is now available for free download from www.erc.ie/timss/reports. Follow-up contextual reports will also be made available through the ERC's website when released.

The ERC would like to thank all the students, parents, teachers, and principals that took part in TIMSS 2019. We greatly appreciate your cooperation throughout the implementation of the study.

TIMSS results AT A GLANCE

Irish performance in TIMSS 2019 was relatively high compared to other countries (internationally and within the EU). However, at Fourth Class, science performance is not as strong as for maths.

INTERNATIONALLY

Fourth Class - Maths

- **7** Countries **significantly above** Ireland
- **4** Countries **similar** to Ireland
- **46** Countries **significantly below** Ireland

Fourth Class - Science

- **12** Countries **significantly above** Ireland
- **12** Countries **similar** to Ireland
- **33** Countries **significantly below** Ireland

Second Year - Maths

- **6** Countries **significantly above** Ireland
- **6** Countries **similar** to Ireland
- **26** Countries **significantly below** Ireland

Second Year - Science

- **7** Countries **significantly above** Ireland
- **8** Countries **similar** to Ireland
- **23** Countries **significantly below** Ireland

Student performance in Ireland is stable since 2015. There were no significant differences in either mathematics or science achievement, at either Fourth Class or Second Year.

Fourth Class - Maths

547 (2015) 548 (2019)

Fourth Class - Science

529 (2015) 528 (2019)

Second Year - Maths

523 (2015) 524 (2019)

Second Year - Science

530 (2015) 523 (2019)

Lower-achieving students in Ireland **perform well** on TIMSS compared to those in many other countries.

But **higher-achieving students** in Ireland **perform less well** than their peers in other countries, suggesting that they could be stretched further.

There were **no significant differences** between boys' and girls' TIMSS scores at either grade level in Ireland.

Number

is a **relative strength** in maths.

Geometry

is a **relative weakness** in maths.

Earth Science

is a **relative strength** in science.

Physics & Chemistry

are **relative weaknesses** in science.