

Science achievement - middle schooling



- New Zealand is continuing its high performance in science achievement at the middle schooling level, with the mean performance significantly higher than the international mean

Indicator description

Science scores for Year 9 students.

Rationale

Science is a major influence on many aspects of children's daily lives at play, at school and at home. Science education involves developing skills and knowledge to investigate the living, physical, material, and technological components of the environment and to make sense of them in logical and creative ways.

This indicator draws on the Trends in International Mathematics and Science Study (TIMSS) assessments that included questions on the classification of living things, human health, uses of water, rusting, common energy sources, light, the weather, and changes in the environment. The indicator provides information about the cumulative health of science education after primary and intermediate school, and towards the end of the first year of secondary schooling.

Analysis and discussion

New Zealand's mean science achievement did not change over the 8-year period, although a small non-significant increase in mean achievement was observed from 1998 to 2002. However, the science mean of 520 for Year 9 students in 2002 was significantly above the international country average of 474 for the 46 participating countries.

The Year 9 girls' mean increased significantly over the 8-year period with girls achieving on average 18 score points higher than their female counterparts did in 1994. Year 9 boys' mean achievement remained the same over this period. The significant increase in girls' achievement has resulted in there being no significant gender difference in science achievement. This compares with the results for 1994 when boys did significantly better than girls. Just 11 of the 46 countries participating in TIMSS-02 reported no significant gender differences in science achievement.

A significantly higher proportion of Year 9 students in New Zealand reached the Low and Intermediate international benchmarks for science in 2002 than did the Year 9 cohorts in 1994 or 1998, with increases of about 5 and 6 percentage points respectively.

New Zealand Year 9 students' mean science scores in TIMSS, by gender (1994, 1998, 2002)

Year	Mean (Standard Error)		
	Girls	Boys	Overall
1994	497 (5.6)	524 (6.1)	511 (4.9)
1998	506 (5.4)	513 (7.0)	510 (4.9)
2002	515 (4.8) ▲	525 (6.7)	520 (5.0)

▲ a significant increase over previous year.

New Zealand Year 9 students' science score percentiles in TIMSS (1994, 1998, 2002)

International Benchmarks	New Zealand Students (%)			International Mean (%)		
	1994	1998	2002	1994	1998	2002
Advanced (625)	9	10	7	11	9	7
High (550)	34	35	35	37	30	30
Intermediate (475)	67	66	73 ▲	69	58	61
Low (400)	89	88	94 ▲	90	81	84

Note: International means calculated for trend countries only.
▲ a significant increase over the previous year.

Year 9 students performed significantly above the international mean for each of the 5 science content areas (Earth Science, Life Science, Physics, Chemistry, and Environmental Science). Whereas in previous cycles Physics has been

identified as an area of relative weakness for Year 9 students, closer analysis of the 2002 results revealed that New Zealand students showed a relative weakness in Chemistry. This shift was probably associated with a significant increase in achievement in Physics since 1998. There was no area of science that was found to be an area of strength. Significant gender differences which favoured Year 9 boys were observed in Earth Science and Environmental Science.

Linkages

This indicator is closely linked to other national assessment programs for science, as well as achievement indicators for middle school students, such as:

- Science achievement: primary schooling
- Science literacy achievement: senior secondary school
- Reading achievement: middle schooling
- Mathematics achievement: middle schooling

The Ministry of Education has established an Iterative Best Evidence Synthesis Programme to systematically identify, evaluate, analyse, synthesise and make accessible, relevant evidence linked to a range of learner outcomes. Evidence about what works for this indicator can be found in:

- Quality Teaching for Diverse Students in Schooling: Best Evidence Synthesis

References

- Alton-Lee, A. (2003). *Quality Teaching for Diverse Students in Schooling: Best Evidence Synthesis*. Wellington, Ministry of Education.
- Chamberlain, G. with Chamberlain, M. and Walker, M. (2001), *Trends in Year 9 Students' Mathematics and Science Achievement. Results from a New Zealand study based on the Third International Mathematics and Science Study*. Wellington, Ministry of Education.
- Ministry of Education (2004), *Mathematics and Science Achievement in New Zealand. First results from the Trends in International Mathematics and Science Study (TIMSS) 2002-2003 for Year 9 students*. Wellington: Ministry of Education.
- Mullis, I.V.S., et al. (2004), *TIMSS 2003 International Science Report: Findings from IEA's Trends in International Mathematics and Science Study at the Fourth and Eighth Grades*. Boston, Massachusetts: International Study Centre, Boston College.