

CHAPTER 5: Summary

This report provides a descriptive summary of New Zealand Year 5 students' mathematics and science achievement results from a 1998 study based on the Third International Mathematics and Science Study (TIMSS-94). As elaborated upon in Chapter 1, while the TIMSS-94 study involved 26 countries at the middle primary level, New Zealand was the only country to participate at this level in 1998. Thus no international results were available for inclusion in this report. Nevertheless, the national results provide a useful interim indicator of mathematics and science performance at the middle primary level until the next TIMSS study at this level in 2003. The 1998 study (TIMSS-98) allowed us to investigate any changes in achievement at this level over the intervening four years.

The relatively poor international performance of New Zealand nine-year-olds in mathematics and, to a lesser extent, science was highlighted by the media after the release of the TIMSS-94 results in 1997. These results led to the establishment of the Mathematics and Science Taskforce which made a series of recommendations aimed at improving achievement. These included the development of classroom resources and professional development for primary teachers. The impact of these changes may be assessed by future studies.

YEAR 5 STUDENT ACHIEVEMENT IN A NATIONAL CONTEXT

Chapters 2 and 3 provided an outline of mathematics and science performance of Year 5 students in comparison to their Year 5 counterparts in 1994 across a number of sub-populations (eg, gender and ethnic grouping).

Overall, there was a small non-significant increase in the mean mathematics achievement of students between 1994 and 1998. Boys in 1998, on average, performed significantly better in mathematics than their male counterparts in 1994, with Maori boys recording the most notable improvement over this period. On average in 1998, the mathematics achievement level of Year 5 girls was about the same as their counterparts in 1994.

Overall, there was a small non-significant improvement in mean science achievement between 1994 and 1998. The science performance of boys improved significantly over this period, but there was no change in the achievement of Year 5 girls. Maori and Asian students recorded non-significant gains in mean science performance between 1994 and 1998. The improved science performance of Maori boys over the four-year period meant that the significant difference in favour of Maori girls evident in 1994 was no longer apparent in 1998.

In the case of both mathematics and science, there was a marked decrease between 1994 and 1998 in the difference between the mean achievement of those students who reported speaking English frequently in the home and those who rarely did.

There was little overall change in the relative strength and weakness of student achievement on the mathematics content reporting categories between 1994 and 1998. *Data Representation, Analysis and Probability* was still the strongest area and *Whole Numbers* the weakest.

For the science content reporting categories Year 5 students in 1994 and 1998 performed at a similar level in *Earth Science* and *Life Science*. In both years *Physical Science* was identified as an area of relative weakness.

The results presented here for TIMSS-98 are reinforced by reports from the National Education Monitoring Project (NEMP). NEMP provides assessment results using representative samples of students (including Year 4 students), testing all the curriculum areas on a four-yearly cycle which began in 1994. Trend information for science is now available after the collection of data in 1995 and 1999 (Crooks and Flockton, 2000). While Year 4 students' achievement overall had improved across all areas of the science curriculum, the performance of girls relative to boys was poorer over this period. The NEMP results also show that the improvement shown by Maori was quite marked and that most students held positive attitudes towards science.

NEMP trend information for mathematics is not yet available. The main highlight from the first study in 1997 was that Maori Year 4 students were significantly outperformed by their non-Maori counterparts on 80 percent of the assessment tasks. As with science, however, most students held positive attitudes towards mathematics (Flockton and Crooks, 1998). There were some similarities in the Year 4 NEMP findings for both science and mathematics compared to the Year 5 results in this report.

YEAR 5 STUDENT BACKGROUND CHARACTERISTICS, ATTITUDES AND BELIEFS

Chapter 4 described the contextual variables (from the Student Questionnaire) of Year 5 students in relation to their mathematics and science achievement. These included such factors as home language, literacy resources in the home, attitudes towards and self-concepts in mathematics and science, and school environment. In addition to cognitive factors, these contextual variables have been shown to play an important role in student achievement.

Overall, there was little change in the demographic profile and household composition details of students between 1994 and 1998. There was also little change in the proportion of students who spoke English only rarely at home over the intervening four-year period.

Literacy resources (books) in the home proved again to be a good indicator of students' achievement in mathematics and science.

More Year 5 students reported that they undertook mathematics and science homework in 1998 than in 1994 (approximately 10 percentage points more in both subjects). A greater proportion of Asian students than students in the other three main ethnic groups reported undertaking mathematics and science homework in 1998.

Watching television was the most common leisure activity for Year 5 students in both 1994 and 1998. There was also a 13 percentage point increase in the number of computers found in students' homes between the two reporting periods.

Finally, and importantly, over half of Year 5 students held positive attitudes towards both mathematics and science in 1998. Only about 10 percent of students held negative views towards these subjects. Proportionally more Pacific and Asian students indicated positive attitudes towards mathematics than did their Pakeha/European and Maori counterparts.

