

## Foreword 2010

In reading this foreword, you should bear in mind that it is written by an academic who has now retired from the education scene in New Zealand. What follows is in two parts: the first is a quick history of the Numeracy Development Projects (NDP), and the second is a look at some of the issues relating to the future of mathematics teaching and learning. The first part is essentially factual. The second part is my view of matters relating to mathematics education in the future.

There is always the concern that international tests of students' knowledge will lead to league tables that will send a conservative backlash into the education system of countries at the lower end of the tables. This could have happened after the 1996 TIMSS assessment, when New Zealand found itself lower down the international ladder than it had hoped to be. Fortunately, the desire for improvement led to searching for a better way to teach mathematics in New Zealand primary schools. In 1999, in line with recommendations from the 1997 mathematics and science taskforce, a numeracy group explored international ideas and ways to apply them to the improvement of primary mathematics education in New Zealand. They investigated the Count Me in Too numeracy project from New South Wales and used it as the basis for the 2000 NDP pilot study that was conducted in about 80 New Zealand schools. The results in these schools were evaluated in terms of student achievement and adjustments were made accordingly. A key feature of the development of the NDP has been the alignment and use of expertise in policy, research, mathematics, curriculum design, and teacher education.

The early years of the NDP included the Early Numeracy Project for years 0–3, the Advanced Numeracy Project for years 4–6, and the Intermediate Numeracy Project for years 7–8. Te Poutama Tau (the Māori-medium numeracy project) was first piloted in 2001 and extended to wharekura in 2006. The Secondary Numeracy Project, for years 9–10, was piloted in 2005. All these projects are now under the umbrella of the NDP, for New Zealand students from years 1 to 10. The nzmaths website (see [www.nzmaths.co.nz/numeracy-project-information](http://www.nzmaths.co.nz/numeracy-project-information)) provides up-to-date information and access to features of the NDP, including downloadable resource material.

Teachers have been supported by published material in the form of the NDP “pink” support material books, the Figure It Out series, and the nzmaths website. In some ways more importantly, teachers have also been strongly supported by professional development in their own schools.

The NDP's development has relied on research and evaluation, with over 100 papers published in previous compendia and in research journals. The research and evaluation have focused on aspects such as student achievement, professional practice, and the evaluation of various initiatives developed to support teachers. Raising student achievement in mathematics by increasing the capability, knowledge, and confidence of teachers has always been at the heart of the NDP. In recent years, school leadership, consolidation, and sustainability have been a key focus. It is important to point out that the NDP continue to be researched. A key aspect of NDP research is the data that is collected by teachers and entered in a central database (maybe the biggest of its kind in the world). This data is analysed in this volume by several authors. It enables us to have a very good knowledge of what students can do and what they might aspire to.

The Number Framework, which is at the heart of the NDP, helped inform the mathematics and statistics learning area of *The New Zealand Curriculum* (Ministry of Education, 2007). Unfortunately, data in this volume suggests that many students are not achieving at the higher levels of the curriculum. The big questions to me seem to be: How can we get all students to achieve at these levels? What help needs to be given to teachers and schools to ensure that these achievement levels are reached universally?

This brings me to another point. To date, the NDP have been a “work in progress”. They have continued to develop. It is extremely important that mathematics education should continue to evolve and take note of the research that is being undertaken both in New Zealand and overseas. For example, current work in algebra in New Zealand should be acknowledged in an update of the Number Framework because algebra is a natural progression of the number that precedes it. There is also some suggestion in this volume that some of the NDP book material could be revised. It is important that mathematics education continues to progress as we learn more about students’ mathematical development. And it is important that we are able to help teachers to understand these changes and see how to use that knowledge for the benefit of their students.

Providing effective professional development to teachers is an ongoing challenge. The NDP have highlighted the importance of a teacher’s knowledge: knowledge of mathematics, knowledge of how to represent mathematical ideas, and knowledge of effective teaching practices. There seems to be an increasing concern about pre-service teachers’ understanding and confidence in mathematics and how to teach it. I believe that more effort may need to be put into the professional development of all teachers as they begin their professional life.

From my perspective, three of the main items that underpin the philosophy of the NDP were essential to its success and are essential to effective mathematics education in the future. These are:

- Every student can do maths.
- Teachers are key figures in change.
- Understanding before algorithms.

An emphasis on letting students explore and absorb number sense, rather than teaching them learned algorithms without any understanding, seems to be the right way ahead for students to gain an understanding of number and, possibly more importantly, of liking and feeling comfortable with mathematics itself. At all costs, we should ensure that we never return to the hundreds of algorithms that have made mathematics a wasteland full of the rote learning of incomprehensible rules.

However, at the end of the day, the teachers are the key figures in our students’ mathematical development. We need to support them in every way we can. I think that this is a basic tenet of the NDP, and it is one that needs to continue through the next 10 years of the development and consolidation of the NDP as we work towards the improvement of mathematics learning.

Derek Holton  
Emeritus Professor University of Otago