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Taking Off With Numeracy

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Summary

The Australian Government funded the Taking Off With Numeracy (TOWN) initiative. TOWN provided explicit guidance in designing a whole-class intervention program which focused on improving the numeracy skills of upper primary students who were identified as not performing at the expected stage (New South Wales Mathematics curriculum, Stage 2 and 3).

Teachers engaged in ongoing professional learning over the school year enhancing knowledge and skills to:

- assess each student's current numeracy understanding and identify where students' solution methods in mathematics were breaking down
- monitor student progress against a research-based framework that describes a clear sequence of conceptual development.

The program assisted teachers with explicit guidance to move each student beyond the identified hurdle in learning. Emphasis was given to the teaching sequence to develop place value, as it underpins written problems, the four operations and decimals, as well as important concepts in measurement. Focus was also given to the teaching of multiplication and division concepts.

State government personnel were required to implement TOWN. This included the initial development of training and support materials in both print and electronic form, and the development of website resources.

Target student group

TOWN assisted upper primary students in years 3, 4, 5, 6, and special school students (including Aboriginal students) and their teachers from metropolitan, regional, rural, remote and very remote locations. Students' numeracy learning was assessed as being at or below the National Minimum Standard.

In 2011, TOWN was implemented in 59 schools under the National Partnership on Literacy and Numeracy (NPLN). The program supported 370 participating teachers and approximately 6000 students.

In 2012, the program was implemented in 115 (non-partnership) schools and three schools under the Low Socio-economic Status (SES) Community of Schools Partnership.



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Method

School teams identified a team leader to coordinate the program within the school and facilitate local discussion and professional learning sessions. The school TOWN team leader participated in an introductory professional learning event for each of the two phases of the program. Schools teams developed an implementation action plan for phase 1 and phase 2, and for sustaining the program beyond 2013.

Participating teachers attended professional learning sessions delivered by the TOWN mentors and participated in ongoing site-based professional learning sessions and discussions. Each teacher required approximately one day release to go through all the phase 1 materials and become familiar with the assessment process. Teachers planned to incorporate short, focused, frequent activities for the target group into daily routines.

Phase 1 equated with one school term. Schools and teachers developed strong understandings of the program's conceptual learning framework. They completed assessment and analysis to determine each student's numeracy learning and matched the learning to the framework using the program materials. Target groups of students were identified within each class. Teachers administered follow-up assessment to the target group, then analysed these assessments to establish baseline data for tracking and monitoring student progress and to inform class differentiation of teaching and learning in numeracy. Teachers recorded assessment information on the TOWN student-tracking sheet. Assessment was updated after ten weeks of teaching and again after 20 weeks of teaching. Teachers created and maintained a school data wall.

Phase 2 equated to three school terms. Phase 2 professional learning sessions were scheduled after school hours. There were six sessions, each of two hours duration, held via videoconference, where teachers engaged in ongoing professional discussion with colleagues and networks. All team members were expected to attend each session and complete between-module tasks. Teachers strengthened the quality of numeracy programming and teaching, and established school models of continuous assessment to improve student outcomes and school planning. Exemplars of high quality numeracy lessons and teaching activities were also developed.

The research-based professional learning program made innovative use of technology. An initial two-day training event was followed by nine videoconferences run by Department of Education and Communities (DEC) State Office staff. DEC staff were also identified as mentors for each participating school to act as their point-of-contact. Scheduled progress implementation phone calls were conducted by the program mentors to each school.



Self-paced professional learning sessions were accessed from the TOWN website along with resources to assist schools in conducting presentations, assessment and classroom teaching. State numeracy personnel supported the maintenance and updating of the programs, website, data management, finance management and collation and distribution of materials.

Results

An NPLN Assessment was developed from the basic skills test and was first administered as a pre-test in 2009 to years 2, 3 and 4. It was administered again in August 2010 and August 2011.

Improvement of numeracy learning was moderate. Evaluation of TOWN was conducted by Erebus International under the National Partnership on Literacy and Numeracy (NPLN). Nineteen schools were selected as case-study schools and Erebus International conducted semi-structured interviews with school leaders and teachers.

In phase 1, interviews were conducted with school leaders and teachers at 12 schools, followed by an online survey of 147 schools. The effectiveness of TOWN for students was determined by looking at three data sources:

- National Assessment Program Literacy And Numeracy (NAPLAN) and NPLN assessment data supplied by New South Wales DEC
- online survey data
- qualitative data collected during school visits.

The online survey and qualitative data indicated that school staff and others believed that TOWN had improved the numeracy skills of students.

The evidence from the NAPLAN and NPLN data was more equivocal. Aggregated student data collected from NAPLAN and NPLN assessments were analysed to review the change in student numeracy outcomes over the NPLN period for each student cohort. In both data sets (NAPLAN and NPLN assessments), gains in mean numeracy scores were observed for all student cohorts at TOWN schools.

The survey of school staff revealed there was a strong view that TOWN had had a positive impact on improving numeracy outcomes for students. For example, 77 per cent of staff surveyed felt that the program had been either effective or very effective in this way.



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Both the quantitative and qualitative data consistently indicated that the areas where improvements in student learning were most commonly observed related to students':

- mathematics skills and use of effective strategies to assist them to engage with mathematics
- confidence in doing mathematics
- enthusiasm for doing mathematics.

Lessons learned

There was widespread agreement in the qualitative consultations among school staff and other stakeholders that the evidence base for TOWN was sound. Core aspects included:

- the focus on place value
- the use of a continuum to provide clearer differentiation between students
- the hands-on approach with practical activities
- improved identification of the student thought processes.

Key factors contributing to the effective implementation of this program include strong school leadership and support from executive school staff, a skilled and enthusiastic TOWN coordinator to drive implementation of the program, and the availability of a knowledgeable TOWN mentor to lead the professional learning of schools.

The online evaluation survey indicated that TOWN had had either a significant positive impact or some positive impact on encouraging a whole-school focus on quality numeracy teaching.

Teachers reported impacts on school practices from using TOWN:

'Numeracy teaching is now more explicit and focused.'

'There is more clarity about the school's goals and expectations in relation to numeracy outcomes.'

'There is greater transparency and consistency in the way numeracy is taught in my school.'



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The teachers and students from Farmborough Rd and Londonderry Public Schools affirmed the benefits of TOWN, with a student recounting a significant benefit from one strategy:

'I know I am faster because I used to have really trouble because all my other friends would be answering and just writing them down and I would be there thinking – What is that question? Then I started learning the jump and split strategies and thought that is a much easier way to do it. And then ever since then I have been keeping up with my friends.'

Next steps

The Phase 1 Evaluation by Erebus International assessed the sustainability, resilience and transferability of National Partnership initiatives after partnership funding ceased. It found that the majority of respondents rated the following elements as either 'very likely to sustain' or 'likely to sustain' over the next two to three years:

- a whole-school approach to literacy or numeracy planning (97%)
- identified leadership positions to coordinate literacy and numeracy (82%)
- specific programs introduced with partnership funding (75%)
- data-driven planning for literacy and numeracy (97%)
- enhanced teaching practices for literacy and numeracy learning (98%)
- enhanced instructional leadership (92%)
- a whole-school approach to teacher professional learning (92%).

Possible challenges for schools preparing to undertake TOWN include developing leadership capacity and the required level of trust and collegiality within schools, establishing transparency and openness within schools to embrace this holistic approach, and increasing capacity to reflect on data to assess the effectiveness or otherwise of this approach within the school setting.

Research base

Investigations into students' answers to contextual mathematics problems (word problems) suggest that about 50 to 60 per cent of students' errors in responding to written numeracy questions occur before students reach the process skills level (Clements 1980; Marinas & Clements 1990; Newman 1977). In contrast, most remediation programs focus solely on the process skills. Also, place value and multiplicative relationships are critical to student development in the middle years of schooling.



Further reading and links

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Further information

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