

# NEMP Probe Study Findings 2003

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## INTRODUCTION

### Background

The National Education Monitoring Project (NEMP) is funded by the Ministry of Education and organised by the Educational Assessment Research Unit (EARU) at the University of Otago. NEMP monitors and reports on what New Zealand primary school children know and can do, and covers all areas of the curriculum over consecutive four-year assessment cycles.

Each year, NEMP collects very large amounts of information on the capabilities, achievements and attitudes of representative national samples of Year 4 and Year 8 children. Year 8 children in Māori-medium classrooms are assessed in Māori. A large number of tasks are administered, using a variety of approaches: one-to-one interviews, teams of four children, stations, and independent. There are three different sets of tasks, but each of the approximately 1,300 students at

each year level who make up the national sample takes only one third of the tasks. This means that there are about 450 Year 4 children and 450 Year 8 children per individual task. With team tasks, the number of groups per task is about 120. Children's efforts are recorded on videotape and/or on paper (about 3,500 hours of videotape and 60,000 pages of paper each year).

NEMP reports, released each July, summarise the performance of children, both overall and within subgroups (by gender and ethnicity, location in New Zealand, type of community, and type of school attended). While these reports contain a lot of information, there remains substantial scope for more detailed analysis of student performance on individual tasks or clusters of tasks through probe studies.

### The NEMP Probe Studies

Probe studies fall into four broad categories:

- Studies that improve understanding or provide further interpretation of student performance.
- Studies that improve understanding of assessment tasks and student responses to them.
- Studies related to performance of trends (i.e., changes over time) and subgroups (e.g., gender or ethnic subgroups).
- Studies significant to future policy development in the areas of curriculum, assessment and student achievement.

### Probe Study Findings

This document presents brief summaries of 31 probe studies that have been undertaken since 1995. For each study, the author(s) have highlighted the primary purposes, how the study was undertaken (method), the main findings, and the implications for teaching and learning.

The studies are presented in four sections:

- Curriculum studies
- Assessment design studies
- Trend and subgroup studies
- Professional development studies.

Those of you wanting to follow up on any of the studies presented will find contact details of the researchers, references to the full NEMP probe study reports (where available; some reports have yet to be completed) and any other related publications listed at the back of this document.

## New Probe Studies

Probe studies may be undertaken by NEMP staff or under contract by educational researchers around New Zealand. Funding is available to support external probe studies of varying scope, from small-scale to large-scale. The external probe study contracts are managed by Alison Gilmore at the Unit for Studies for Educational Evaluation (USEE), University of Canterbury, Christchurch (full address details are in the NEMP Contact Information and Resources section at the end of this publication).

In addition to the probe studies summarised in this document, the following probe studies are currently underway:

- The relationship between students' attitudes, perceptions of competence and actual achievement.
- Cultural bias in the design and administration of selected NEMP music tasks.
- Students' knowledge, skills and attitudes relating to mathematics as a function of participating in a numeracy development project.
- Assessment issues related to children with special needs.
- Analysis of the planning, writing and editing skills used in a three-stage writing task.
- Language used by students in mathematics for quantitative and numerical comparisons.
- Evaluation of the NEMP compact model of the World Wide Web for exploring children's information skills.
- Changes in students' mathematics achievement over four years.

We invite expressions of interest and proposals from curriculum specialists, teachers, post-graduate research students and educational researchers wishing to conduct probe studies. These, along with more general enquiries about probe studies, should be directed to Alison.

## Acknowledgements

The publication of the NEMP probe study findings was made possible with the support of EARU. We are particularly indebted to the directors of NEMP, Lester Flockton and Terry Crooks. We would also like to thank the researchers who contributed summaries of their probe studies; Lynette Jones of EARU for her valuable and timely advice and design assistance; James Rae for the initial design; and Paula Wagemaker for her editorial expertise.

Alison Gilmore  
Clare van Hasselt  
Susan Lovett

## Other NEMP Resources

The following two resources have been developed by USEE and were distributed to all primary and intermediate schools in 2002.

### The NEMP Curriculum Map

This resource is an aid for teachers looking for tasks to match the National Curriculum documents. The Map contains nearly 400 NEMP assessment tasks from 1995 to 2000. Teachers reading the Map can readily identify tasks appropriate for assessing and/or teaching particular strands/disciplines and processes within each curriculum area.

Each task within the Map is referenced to a NEMP report that provides comprehensive instructions, stimulus materials and marking criteria. Exemplars of students' work are also displayed for many of the tasks.

The Map is available on the NEMP website. Additional copies can be purchased from USEE.

### Teachers' Choice of NEMP Tasks

The 23 NEMP tasks in this resource come highly recommended. They were selected by a team of teachers, who chose them because they considered them

- exciting
- innovative
- good models of an assessment activity
- highly motivating for students
- valuable for providing information about what students know and can do
- linked to the New Zealand Curriculum Framework.

Teachers can use the tasks with the minimum of difficulty and also adapt them for use with students at all year levels. We urge teachers to try them and explore other equally valuable NEMP tasks from the annual NEMP reports.

Additional copies can be purchased from the New Zealand Council for Educational Research (NZCER; address details at the end of this publication).

## GENDER DIFFERENCES IN READING ACHIEVEMENT

Liz Eley

The detailed information obtained by NEMP on student performance across a wide range of assessment activities allows us to examine differences in achievement between boys and girls. Twelve different areas of the New Zealand school curriculum have been assessed by NEMP and, contrary to the reporting of other research, the results do not present a blanket picture of under-achievement by boys. However, the difference in achievement in literacy areas is of particular concern. In all aspects of literacy assessed by NEMP (reading, speaking, writing, listening and viewing) girls outperform boys. This study looked specifically at the difference in performance between boys and girls in the 2000 NEMP assessment of reading.

### Method

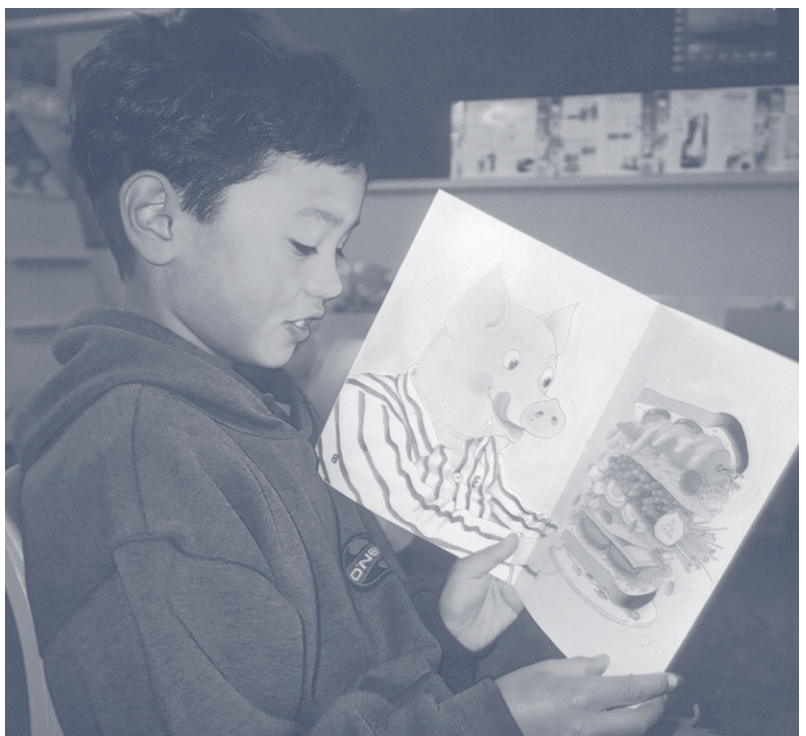
Three aspects of student reading were examined. The first, reading *accuracy*, was ascertained from the NEMP oral reading record task, which required students to read from fiction, non-fiction and non-book texts. Here, student achievement was reported in broad reading 'levels' rather than the more precise information gathered by teachers to inform reading instruction. The second aspect required students to *silently read* passages of text then locate, recall or deduce information from the text to answer questions. The third, students' *oral presentations of written texts*, involved teams of four students presenting plays, reading poetry or telling jokes and riddles. Individual performances within each team were then assessed.

### Significance for Teaching and Learning

Girls are reading at higher levels and more accurately than boys. They are also better able to gain information from text, particularly where responses require more than one piece of information. The biggest differences in performance are in oral presentations, with girls reading more accurately, with greater clarity and with more expression. While this information gives guidance for teachers in tailoring reading programmes for individual needs, it needs to be remembered that New Zealand students are experiencing high success in reading. Also, other studies have concluded that boys seem to be reluctant to expend sustained effort to achieve deep understandings. They tend to seek correct answers quickly. Given these considerations and that students are reading at or above the level expected for their age, highlighting the difference in performance by labelling boys as reading failures is misguided.

### Main Findings

- Although 80% of students had the technical skills to read at or above levels regarded as normal for their time at school, at both age groups (Years 4 and 8) girls were reading at higher levels than boys.
- The gap in boys' and girls' performance in reading levels widened between Years 4 and 8.
- Girls were more successful than boys in obtaining information from text and were more likely to give fuller responses to questions requiring more than one piece of information.
- In the oral presentations of text, girls at both age groups had a higher accuracy level than boys.
- Girls obtained higher scores than boys when their oral presentations were judged for clarity of presentation and for characterisation or expressiveness in reading.





## GENDER DIFFERENCES IN ATTITUDES TO READING

Liz Eley

While the difference in achievement of boys and girls in reading is well documented, there are many factors that influence student achievement. The factors identified as having a positive effect on student achievement are being positive, enjoying the learning area, and seeing a purpose for what is being learned. Other factors affecting student achievement include experiences and opportunities in and out of school, the expectations and support of significant people in students' lives, and the extent to which students experience personal success in the subject. This study examined the differences in responses by boys and girls to 24 questions designed to determine their reading attitudes and habits.

### Method

The questionnaire was administered as part of the 2000 NEMP assessment of reading. Approximately 460 Years 4 and 8 students answered the questions on their own, but with a teacher available to assist with reading questions and/or recording responses. They were asked three types of question: Likert-type scale questions, choosing responses from a list of options, and open questions.

### Main Findings

- In terms of favourite subjects at school, reading was more popular at Year 4 than Year 8. Students were very positive about reading at school, with nearly 90% giving a positive rating when asked how much they liked doing this.
- At Year 4, boys liked reading at school more than girls did, but at Year 8, girls were more positive than boys.
- Students had a very positive perception of their reading ability—girls more so than boys. A high proportion of students reported that they did not know how good their teacher thought they were at reading. At both age levels, girls were more likely than boys to report this.
- Having the teacher read to the class was the most popular reading activity, with girls more positive than boys about this at Year 4 and boys more positive at Year 8.
- Reading out loud to the class (i.e., the student doing the reading) was the least popular reading activity, with boys less positive about this than girls.
- Reading for leisure was a popular pastime, with girls more positive about this than boys.
- Younger students were much more positive than older students about getting a book for a present. Girls were also more positive about this than boys.



- Fiction was the preferred reading material for leisure by Year 4 girls and boys and Year 8 girls. Year 8 boys identified magazines as their preferred reading material. Interest in non-fiction decreased between Years 4 and 8, although boys at both levels expressed a greater interest in this type of reading material than did girls.

### Significance for Teaching and Learning

The survey confirmed that reading at school is very popular with students and highlighted that students perceive themselves as good readers at home. This enjoyment and positive attitude should have a positive influence on further success in reading. However, boys' decreasing enjoyment of reading at school as they get older is of concern. This consideration and the different types of reading material that students choose for their leisure reading highlight the need to carefully select texts for reading instruction that cater for individual interests.

# ASSESSING CHILDREN'S COMPREHENSION THROUGH ORAL READING

Ray Griffiths

This study involved a random sample of nine Year 4 students and 10 Year 8 students reading aloud two fiction passages as part of the NEMP 2000 reading assessment. The purpose of this study was to see how the students' comprehension of what they were reading (determined by teacher-administrators asking them questions) compared with their word accuracy on the tasks and was influenced by various factors surrounding task administration and marking.

## Method

Complete running observational records were made of the students' videotaped reading performances. The asking of the comprehension questions was observed and marked. Word accuracy, self-correction rates and comprehension were scored and a descriptive comment was made about the students' reading and other observable behaviours. The teacher-administrators' handling of the task was also observed.

## Main Findings

- The comprehension performance of both Year 4 and Year 8 students fell far short of their word accuracy ability.
- The average self-correcting ratios of 1:7 and 1:4.3 for Years 4 and 8 respectively are a concern. Thirty-three percent of the Year 4 sample and 62% of the Year 8 sample achieved an acceptable rate of self-correction.
- Achievement on the literal questions was markedly better than on the questions requiring higher order thinking.
- The inferential/higher order type questions fell into the categories of passage dependent and passage independent. Year 4 students correctly answered 33% and 0% respectively. Year 8 students correctly answered 30% and 53% respectively.



- Many students were given reading assessments based on passages that could be read at an easy rather than instructional level.
- Some students were disadvantaged by lack of access to the text during questioning, little engagement with the teacher-administrator in terms of eye contact, expressions of interest or clear instructions, and seemingly little flexibility for teachers to repeat, prompt or rephrase questions.

## Significance for Teaching and Learning

- Findings appear to confirm the concern of many teachers that reading instruction produces word-accurate readers at the expense of understanding. Reasons for this may be:
  - pressure on teachers to show progress by using the Ready to Read colour wheel and reading age compared to chronological age
  - over-emphasis on word accuracy measures of reading achievement
  - teachers' lack of knowledge of the comprehension process, its complexity, range of levels and the strategies readers need to have at their disposal.
- Reading is a skill that goes well beyond literal and inferential meanings. When interacting with texts, readers require specific and generalised experience and world knowledge that will enable reasoned responses to questions, issues and problems that arise and are outside of anything that is stated or inferred in the text (i.e., are text independent).
- Students need considerable ongoing opportunity to engage in reading as a search for meaning. Identifying when text doesn't make sense, wanting to improve it, having the strategies to do this and then making the self-correction must be taught and practised.
- Oral reading assessment tasks remain common practice, but they are not a suitable means of determining comprehension performance. Better ways are needed.
- Comprehension happens mostly during reading, not after the event. Teachers must ensure readers know the task, establish rapport with them, capitalise on their interests, establish eye contact, engage them before giving instructions or asking questions, and be prepared to do some prompting and to repeat and rephrase questions.



## STUDENTS' MATHEMATICAL CONJECTURES AND JUSTIFICATIONS

Glenda Anthony and Margaret Walshaw

A pervasive theme emerging from mathematics education discussions in recent years is the issue of students' active engagement with mathematical ideas. This theme also focuses on establishing inquiry-based classrooms that allow students to communicate their ideas. Communication is looked at closely in this study in relation to commutative and identity rules in mathematics.

### Method

Data were collected from random samples of 50 Year 4 and 50 Year 8 students on five NEMP tasks. These tasks required students to justify their responses verbally and by manipulating cubes to illustrate commutative and identity rules in mathematics.

### Main Findings

- *Is 4 plus 3 the same as 3 plus 4?*

Students were reasonably confident about the commutative property under addition. However, Year 8 students were noticeably more precise and more convincing in their explanations. Many Year 4 students were unable to provide a model to justify their conjecture.

- *What about 4 minus 3 and 3 minus 4?*

Are they the same? Students appeared much less assured about the commutative property for subtraction. They took longer to answer, and many students altered their original standpoint. Many Year 4 students modelled the equation directly rather than operated on the number relationship. Most Year 8 students could demonstrate the importance of number order, but were more likely to change their conjecture as they talked through the demonstration.

- *Does 2 times 5 give the same answer as 5 times 2?*

Students were more comfortable with commutativity under multiplication than under subtraction and just slightly more than they had been under addition. While most could provide a model to represent the problem, the understandings of Year 4 students evolved from often ill-founded ideas and inappropriate explanations. Those for Year 8 students demonstrated a more advanced conceptual understanding. No student exhibited sophisticated multiplicative thinking through



the use of an array structure. Commutativity of multiplication was often modelled by way of additive reasoning.

- *Is there a number you can add to or take away from this number [7] but the number still stays the same?*

Just over half of the students could identify zero as the identity for addition and subtraction and were able to provide some explanation. While most Year 8 students confidently discussed the identity for multiplication, very few Year 4 students could recognise and explain it. A small number of students at both year levels were familiar with the identity for division.

- *What about multiplying or dividing? Is there a number you can multiply (or times) this number by or divide it by, so that the number stays the same? Tell me what it is and how this works.*

Many students appeared to be unfamiliar with the task of justifying a conjecture using cubes. While many confidently offered a conjecture and could provide a verbal explanation for the problems, they were not at ease when asked to model their thinking.

### Significance for Teaching and Learning

If students are to realise that learning and doing mathematics involves solving problems in ways that are meaningful, classroom instruction must encourage and support discussion and reflection on the mathematics structure of number from an early age. More specifically, in relation to the assessment tasks analysed in this project, when students genuinely understand arithmetical ideas and can explain and justify the properties that they are using as they carry out calculations, they have learned the foundations of concepts belonging to algebra.

## DIVIDING UP THE PIZZA? A CONTEXT FOR ASSESSING FRACTIONS

Glenda Anthony and Margaret Walshaw

Manipulative and representational models of mathematical concepts create a reference framework through which abstract mathematical knowledge and procedures can be introduced, exemplified and understood in the classroom. Analysis of a NEMP task involving a contextually based ‘sharing’ problem that used circular representations of pizzas enabled an exploration of the influence of children’s informal knowledge on their developing understanding of fractions.

### Method

The videotaped responses of 60 Year 4 and 60 Year 8 students to five questions were studied. Two model pizzas (one ham/one pepperoni) cut into sections of four and set on plates were provided.

The questions were:

1. How much of the pepperoni pizza is left?
2. How much of the ham and pineapple is left?
3. All together, how much pizza is left?
4. Let’s now think about two different ways of using up the pizza that’s left over. If four children had a quarter piece of pizza each, how much would be left?

*Prompt, if answer not given as fraction:  
What fraction or part is left?*

Year 8 students were asked two extra questions:

1. Now imagine that the two of us are going to have an equal share of the pizza that is left. What fraction or part of a whole pizza do we each get?
2. Can you explain to me how you worked that out?

*Prompt: You can move the pieces of pizza around to help you work it out.*

### Significance for Teaching and Learning

The findings emphasise the important role of students’ contextual and informal knowledge. For Year 4 students who have yet to receive extensive ‘formal’ instruction about fractions, informal knowledge dominated their solution strategies. Their solutions were more often dependent on the situation with its concrete and visual supports, rather than on symbolic manipulation.

Year 8 students were more able to mathematise the problem situation, generally using mathematical language to provide an answer. However, some Year 8 students demonstrated a lack of ‘operation sense’ with regards to fractions. Their formal knowledge took precedence over their informal, and for those students who relied on partially constructed and remembered algorithms, mathematically non-sensible answers were proffered.

Developing a productive mathematical disposition requires frequent opportunities for students to experience the rewards of sense-making in mathematics. Unless children are given sufficient opportunity to ‘make sense’ of realistic problem examples in appropriate contexts, they are unlikely to connect their informal knowledge of rational number concepts to their knowledge of formal symbols and procedures, or develop flexible understandings of fractions.

### Main Findings

- Fractional understanding builds incrementally, over considerable time, rather than being an all-or-nothing occurrence and is very much a function associated with educational experiences.
- Context played a significant part for Year 4 students, with about 12% of the answers to Q1 and Q2 revolving around the orientation or specific toppings of the pizza.
- About one quarter of Year 4 students responded with a natural number response to Q1 and Q2.
- There was marked development between the age groups in understanding part/whole distributions (81% versus 35%).
- Few Year 4 students exhibited knowledge of fraction addition of parts greater than one (Q3). Ten percent of Year 4 students adequately dealt with the whole pizza but could not name the remaining fraction.
- Year 8 students solved the sharing questions by physically sharing the pieces, division by 2, halving, or estimation. Most students’ preferred approach involved referencing whole number partitioning strategies rather than more formal fraction operations.



# A PROFILE OF YEAR 8 STUDENTS' MATHEMATICS ACHIEVEMENT

Garth Ritchie

The question at the heart of this probe study sought to determine if there were groups (clusters) of Year 8 students who shared similar performance profiles across the 2001 NEMP mathematics tasks.

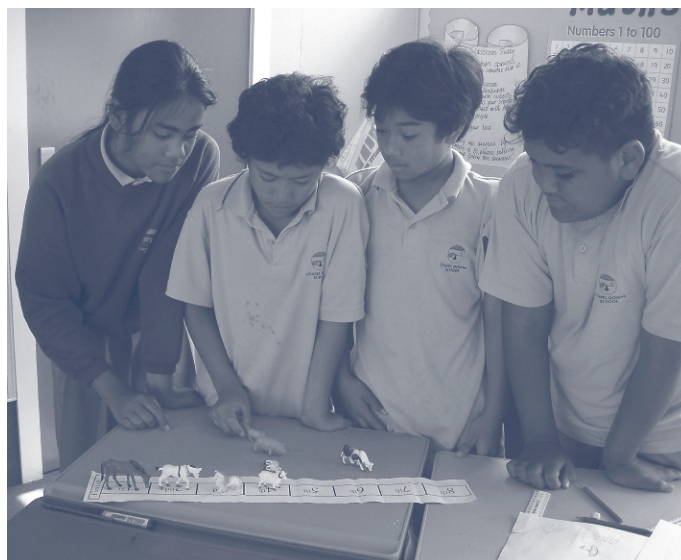
## Method

Cluster analysis methods were used to investigate this question. The analyses aimed to determine the following:

- If there were groups of learners (clusters) showing similar structural characteristics in their responses to (and errors on) the NEMP tasks.
- If these groups of learners could be seen as having 'different competency styles'.
- If variables such as social location, school, and school experiences predicted what cluster a student would be in.
- If there were differentiating cluster group profiles on the tasks associated with particular strands of mathematics.

## Main Findings

- There were well-defined cluster groups, with some presenting excellence in mathematics (i.e., succeeding in the mathematics taught in the New Zealand Curriculum), and some having difficulties (not able to do the majority of the NEMP mathematics tasks).
- Most of the students in poorly performing cluster groups showed a good level of performance on number facts and a moderate level of performance on algorithms (subtraction being an exception). However, in problem-solving tasks involving more than procedural knowledge these students performed very poorly.
- For particular types of tasks, students were often located in well-defined cluster groups characterised by particular mathematical misunderstandings and



difficulties. For example, there were three separate groups of students identifiable by their particular difficulties with placement of fractions, decimals or percentages.

- Amongst students in poorly performing clusters there was an impoverished 'drill and practice' understanding of what mathematics education entails. These students 'asked a teacher first', and they placed a higher emphasis on the knowing of mathematical facts and on doing teacher-set worksheets or working in their books.
- Ethnicity and school decile influenced the development of competence in school mathematics. Māori students and/or students in low-decile schools were very over-represented in poorly performing cluster groups.

## Significance for Teaching and Learning

- The scope of mathematics education for students experiencing difficulties needs to be expanded—beyond algorithms and the recall of mathematical facts ('the basics') to being able to develop their own 'mathematical intelligence'.
- The NEMP tasks along with the emergent cluster groups highlight the need for teachers to develop strategies for dealing with the learning needs of students located in the developmental bands between achievement levels. Knowledge of the cluster groups likely to be represented in the classroom is an important first step in planning learning experiences.
- Poorly performing students appear to regard mathematics as drill-and-practice, 'ask the teacher first', pencil-and-paper tasks. There are many good open-ended, open-middle, even open-beginning mathematical experiences available to mathematics educators that can help change that view and foster metacognitive mathematics skills.
- More effective interventions must be found for mathematics education in low-decile schools. Directing funding towards Māori and Pacific Island family mathematics programmes might be more effective than targeted school funding.



## SOCIAL DECISION-MAKING: HOW WELL ARE STUDENTS DOING?

Christine Harris

Concern that social decision-making skills may not develop in sequential stages for many primary school students sparked interest in exploring social decision-making data from the 1997 and the 2001 NEMP assessments of social studies. Social decision-making is about students developing the necessary skills to address problems they might encounter in their daily lives. It involves a degree of critical thinking that needs to be taught to students and not just assumed that it will occur as part of cognitive development. This study focused on the ability of Year 4 and Year 8 children participating in NEMP to perform three skills defined in the New Zealand Social Studies Curriculum as achievement indicators for social decision-making. These were identifying a problem/issue, suggesting solutions, and deciding on the best solution.

### Method

From the 44 NEMP social studies tasks showing some evidence of social decision-making skills, four tasks were identified that provided equal opportunity for the three skills to be evident. The tasks were 'We Need a Leader', 'Tree Troubles', 'Saikaloni', and 'Playground'. Videotaped recordings of 200 children (50 per task), randomly selected from all students tested during 1997 and 2001, as they worked on these tasks, were then examined. The performances of the Year 4 and Year 8 children and the performances of the children tested in 1997 and those tested in 2001 were then compared.

### Main Findings

- Across the two age levels and year spans, the skill the children were most proficient at was suggesting a possible action or solution, with 70% of students able to do this. Only 40% were able to decide on an appropriate action.
- Overall, the Year 8 students were better than the Year 4 students at the three skills. This was particularly so for the decision-making aspect of the process.
- Over the four years, the Year 4 students showed an increase in skill achievement, while the Year 8 students showed a slight decrease.
- The skill achievement of the 2001 Year 4 students was better than that of their 1997 counterparts. The achievement of the 2001 Year 8 students was slightly poorer than that of the 1997 Year 8 students.

### Significance for Teaching and Learning

- The results indicate that while social decision-making skills increase steadily with age and time, deciding a solution is the skill where students make slowest progress, probably because it requires more higher order thinking.
- There needs to be a stronger focus on decision-making at all levels of the social studies curriculum.
- Social studies programmes should provide opportunities for students to work in real situations that are relevant to their environment and their chronological age. For example, an appropriate scenario at Level 1 might be: "What if no one fed the fish in the class aquarium? How can we make sure that the fish are always fed?"
- There is a case for more in-depth as opposed to breadth of coverage of social studies topics across the five strands.
- Micro-teaching should focus on teaching the skills of social decision-making as separate entities.
- Teachers' pre- and in-service programmes should focus on strategies that enable teachers to teach social decision-making skills more effectively.
- Teaching children the types of thinking skills that enable them to participate in social decision-making (e.g., how to establish criteria for judging the merits of various solutions to a problem) would provide some skill consolidation and extension in this area.



## DEVELOPING CHILDREN'S SCIENCE INVESTIGATION SKILLS

Rosemary Hipkins and Natasha Kenneally

This research builds on an earlier NEMP probe study that found many teachers seem not to actively teach students the investigative skills called for in the 'Developing Scientific Skills and Attitudes' strand of the New Zealand Science Curriculum.

### Method

Descriptions of children's investigative actions obtained from 200 videotaped episodes of Year 4 or Year 8 groups of children carrying out three NEMP science investigation tasks ('Truck Track', 'Ball Bounce', and 'Emptying Rate') were analysed in the light of research literature describing children's actual and potential investigative skills development.

### Main Findings

- Children can recognise 'fair tests' before they are able to produce these independently. When children are asked to undertake pre-devised 'investigations', this recognition may take the form of intuitive actions, carried out silently with no discussion during any stage of the investigation.
  - When presented with a prescribed task, children may perceive little meaning beyond task completion in the actions they carry out. Unless the context is familiar, children may struggle to recognise variables that need to be controlled, or to develop a considered causal theory that gives a sense of science meaning to their investigation.
  - Year 8 children recognise and acknowledge more features of fair tests than do Year 4 children. They are more likely to control at least some variables, although they do not usually display any other types of development in their approach to/understanding of fair testing.
  - Children find measuring laborious, and the context of a task can greatly influence the measuring skills demanded of them (e.g., unfamiliar measuring tools distract from the main focus).
  - The act of measuring followed by written recording seems to partition sequential tests into distinct episodes so that they are not immediately seen as parts of a whole, coherent test design. Even when they have planned a series of tests, children may deviate from their intended plan part way through. Children's more limited memory capacity perhaps exacerbates this effect.
  - Children typically ignore experimental error, apart from occasional single instances of repetition when a result diverges too widely from what they expected. However, they do understand that even though individual results vary, main effects are robust.
- Rich opportunities that allow children to recognise fair tests before they are required to produce these via independent planning. Strategies to support such approaches are straightforward, although some require specialist materials to be developed.
  - Rich exploratory experiences from which children can build a library of causal mechanisms that they can draw on to shape their own investigative questions and/or explanations of the phenomena they explore.
  - Visual strategies that bring more of the overall investigation structure and/or results into view simultaneously, helping to transcend memory demands. Such strategies support children's ability to identify fair tests and/or to see meaningful data patterns from single repeated tests, or from sequences of tests.
  - Simplifying measuring may free children to pay more attention to the overall patterns and purposes of their tests. Collection of category rather than continuous data is one such strategy.
  - Encouraging children to explore patterns of data variability may make the process of test repetition more meaningful for them.



### Significance for Teaching and Learning

Primary teachers can use relatively simple measures to help children actively learn the skills of investigating 'scientifically':

## CHILDREN'S CONSTRUCTIONS OF 'HEALTH' AND 'FITNESS'

Lisette Burrows, Jan Wright and Justine Jungersen-Smith

School-children are both constructed by and construct their own notions and practices of health and fitness on the basis of what they see around them. This study examined the beliefs, knowledge and attitudes that Year 4 and Year 8 students expressed about these concepts in the 1999 NEMP assessment of the health and physical education learning area.

### Method

All results from Year 4 and Year 8 tasks that addressed students' understandings about health and fitness were collated and analysed using the NUD.IST qualitative software package. Recurrent themes were identified and students' responses analysed in relation to messages about health and fitness expressed in the media and school-based and government health and physical education resources. The institutional and cultural sets of ideas that may contribute to children's understandings about health and/or fitness were also examined.

### Main Findings

- Many students equated 'being healthy' with 'being fit', and being fit with 'looking good'.
- The majority of students at both year levels equated fitness with 'non-fatness'.
- Year 8 students offered more holistic, expanded understandings than did Year 4 students, and were more aware of the consequences of specific behaviours on health and fitness.
- Being 'healthy' for the majority of students meant eating 'right', being clean, not smoking and not being overweight.
- Being 'fit' for the majority of students meant being able to run, 'not being fat' and having a 'better life'.
- Some coherence between the imperatives of health and physical education in the New Zealand Curriculum statement and students' responses was evident. Many students, particularly at Year 8, mentioned mental, social, spiritual and environmental constituents of 'wellbeing' together with physical elements of health.
- Most students regarded health and fitness as states of being that are dependent on 'the individual'.
- Many students, especially at Year 8, drew links between achieving health and being a 'good' and/or 'moral' person. They perceived an unfit person as one who is not healthy and is therefore lazy and/or weak.
- Very few responses suggested that becoming healthy and/or fit is pleasurable. Rather, students recited lists of what a person should do to become healthy or fit, and frequently used the word 'don't' in this regard, e.g., 'Don't eat fat', 'Don't watch television'. Thus, many activities that young people enjoy were those seen as 'naughty' in relation to fitness and health.

### Significance for Teaching and Learning

- Although knowledge about 'health' and 'fitness' is changing rapidly, students regard routes towards achieving these states as fixed and certain. Students need to develop a critical capacity to evaluate the health and fitness messages they receive from media, school-based resources and government sources.
- Despite the emphases of the Health and Physical Education Curriculum, many students continue to understand health and fitness as matters primarily concerned with the 'physical body' rather than connected to culture, social environment, relatedness with others and so on.
- Outside-school resources like those offered by 'Life Education' and the 'Heart Foundation' seem to be influencing students' understandings about health and fitness. Given that these represent just one way of thinking about these concepts, students need exposure to alternative views about them.
- Students' equation of fitness with 'not being fat' is particularly worrying. Contemporary concerns about 'eating disorders', 'body image' and media advertising linking the 'good life' with 'being slim' make it imperative that students have opportunities to critically appraise the 'accepted' notion that 'health/fitness' means 'slimness'.





# STUDENTS' PERCEPTIONS OF TECHNOLOGY EDUCATION

Liz Eley

In 1993 technology education was introduced to the New Zealand National Curriculum as a learning area in its own right. New Zealand students' perceptions about technology have been described in previous research as both limited and limiting in the sense that a poor appreciation of the nature of technology results in limited understanding that in turn curtails technological practice. This study investigated this consideration further by focusing on conceptions of and attitudes towards technology (both in and out of school) held by students who participated in the 1996 NEMP assessment.

## Method

Approximately 460 Year 4 and Year 8 students completed a questionnaire in interviews conducted by NEMP teacher-administrators. The teachers read the open-ended questions (see next section) to the students and, if requested, recorded the responses. Students were encouraged to give as full an answer as possible and asked to clarify answers that were not clear. Responses were examined for differences between year levels and, for each year level, for differences according to gender and ethnicity (students identified on their school roll as Māori, and those identified as non-Māori).

## Main Findings

### *What do students think technology is?*

- Seven percent of Year 8 and 43% of Year 4 students said they did not know what technology was. Of those who did give a definition:
  - few gave responses that referred to a purposeful activity to meet societal needs;
  - many defined technology in terms of equipment, with a fifth of the sample referring to making and designing objects;
  - boys' definitions were more comprehensive than those of girls, and non-Māori students' definitions were more comprehensive than those of their Māori counterparts.

### *What do students think they do at school for technology?*

- Just over 20% of Year 4 and 4% of Year 8 students reported they did no technology at school.
- About a third of the students said they built or designed things in technology, with a further 36% of Year 8 students referring to workshop subjects.
- Over 40% of the students referred to using computers.

### *How much do students enjoy technology at school?*

- Most students gave a positive rating.
- Boys retained a high enjoyment of school technology between Years 4 and 8, but girls became less positive.
- Only 5% of students ranked technology as their favourite subject at school; 20% listed it as one of their three favourite subjects.

### *What technology activities do students do out of school?*

- Thirty-nine percent of students referred to construction activities and 27% to using computers.
- Boys and non-Māori students reported a wider range and higher frequency of technology activities for leisure.
- At both year levels, boys were twice as likely as girls to mention construction activities. At Year 8, girls were six times as likely as boys to refer to cooking or sewing.

## Significance for Teaching and Learning

Narrow conceptions of technology have three implications for teaching: students' lack of understanding can impair their learning; students' expectations for school technology may not be met by a curriculum that is based on different conceptions from theirs; and poor achievement in technology has been linked to poor conceptions of technology. To develop a broad conception of technology, students need opportunities to explore and articulate their understandings of this subject. Given that a high proportion of younger students did not identify the experiences they receive at school as technology, explicit identification of this subject in the class timetable could have a positive influence on students' perceptions of it.



## PROGRESSION IN LEARNING TECHNOLOGY AT YEARS 4 AND 8

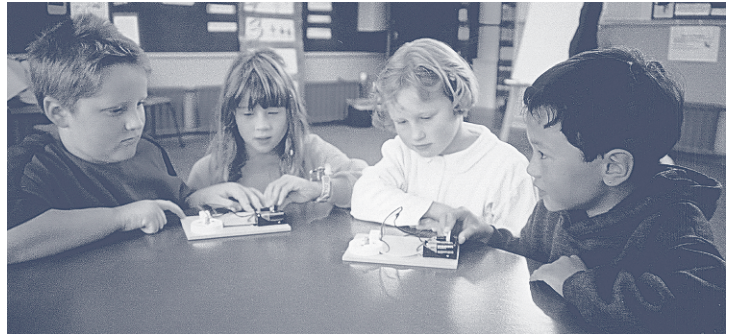
**Alister Jones, Ann Harlow, Louise Milne, Judy Moreland and Mike Forret**

In 1996 and 2000, NEMP studies of technology provided insights into students' understanding of and performance in technology tasks. These and classroom-based research over four years have allowed us to develop notions of how students progress in their technology learning. The in-depth study of students' performance on NEMP technology tasks reported here was undertaken to provide an even clearer picture of the ideas and skills that students bring to learning in technology and of the possible technology learning outcomes afforded by the NEMP tasks.

### Method

An in-depth analysis was conducted of student performance on each NEMP task. A sample of 30 student responses for each task was then considered in relation to the following:

- The value of the task in terms of its holistic aspects, generic and specific conceptual and procedural aspects, and its societal and technical aspects.
- Characteristics of students' existing knowledge and skills in terms of how many technology-related variables the students could identify, how they applied these variables (whether individually or in combination), what their technological understanding was, and how they handled conflicting demands in finding a solution to the task.
- The development of students' technology-related ideas.



### Main Findings

- The NEMP technology tasks appear to be a valid means of ascertaining aspects of students' technology-related knowledge and skills.
- The number and type of variables that students could identify and apply were the best indicators of performance across the tasks. Data for the two year groups (Years 4 and 8) revealed that Year 8 students were more likely than Year 4 to identify and consider a greater number and wider range of variables, the conflicting demands of these, and the relationships between them and the end user. They also were more proficient at using technological language.
- Higher performers at both year levels tended to consider more than two variables when comparing and contrasting technologies, to identify the strengths and weaknesses of given materials, and to consider functionality and the intended user.
- Students' drawings elicited more information than written answers about their technological ideas, including those relating to structural requirements and functionality.
- Students were often unaware of the planning that takes place before technological production or construction.
- When thinking about production and sales of a product, the majority of students gave little thought to issues impacting on its sale, health and hygiene-related considerations, the product preferences of consumers, point of sale considerations, and advertising.
- More able students considered a greater number of positive and negative effects of technology on a community, on the environment and the social structure than did less able students.

### Significance for Teaching and Learning

This increased understanding of the capabilities that students bring to tasks and the contexts in which they work on those tasks not only allows consideration to be given to fast-forwarding particular aspects of student learning but also assists in designing tasks that maximise student learning.

## CHILDREN'S ATTITUDES TO MUSIC: A BASELINE

Roger Buckton

In providing the first national survey of children's attitudes to and perceptions about music, the 1996 NEMP report on this area of the National Curriculum provided very valuable baseline data for music educators and researchers in New Zealand. It also included information about children's participation in music activities in and out of school. This probe study took a close look at all the music survey data obtained at the time of the NEMP music assessments, not just that data documented in the 1996 report.

### Method

During the 1996 NEMP assessment, 500 randomly selected students at Year 4 and Year 8 answered nine survey (Likert-type and open-ended) questions. These related to the following: students' attitudes to music inside and outside of school; the amount of time they devoted to various music activities, again inside and outside of school; their preferences for various types of music-related activities; and their perceptions of their own abilities in music.

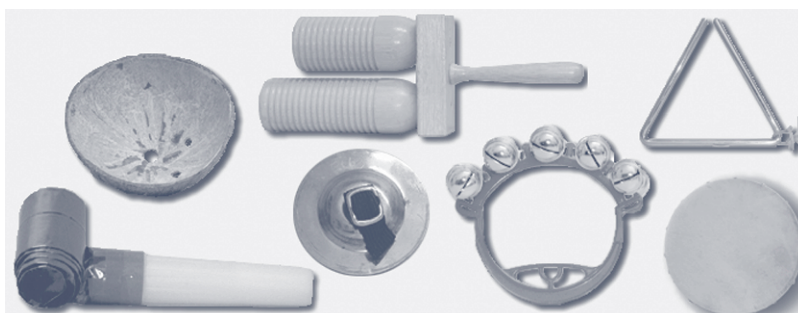
### Main Findings

- Music is a relatively popular school subject. Year 4 students ranked it as their fourth most preferred subject out of 11 and Year 8 students as their fifth.
- The vast majority (80–86%) of students said they enjoyed music.
- Year 4 students showed a stronger preference for a variety of musical activities (singing, playing and listening) than did Year 8 students.
- A majority of students, according to their own perceptions, experienced very little classroom music. For example, 63% of the Year 4 sample said their most preferred musical activity in the classroom would be to play an instrument, yet only 25% indicated that they did this 'lots' or 'quite often' at school.
- The students appeared to react very positively to music in their own time, and it was a significant activity for most of them, especially at Year 8 (88% versus 71% for Year 4).
- Enjoyment, talent, accessibility and practice were all identified as factors in the reasons children gave as to why they saw themselves as good at particular musical activities.



### Significance for Teaching and Learning

Given the evidence of an increase in musical interest outside of school, it is a concern that, in school, music loses popularity as students become older. If one believes that there is a significant element of 'enjoyment' in the aims of aesthetic subjects such as music, then popularity and enjoyment are important indicators of success. School music programmes need to cultivate positive attitudes towards music if music is to fulfil its purpose. Part of the solution may be for teachers to relate music experiences in school more to the culture of the children and to performers who are well known to them.





# THE ROLE OF GROUP DYNAMICS ON MUSIC TASK PERFORMANCE

Peh Siew Hoon

This study explored the extent to which various facets of group dynamics influenced student performance on the 1996 NEMP assessment music team tasks, in which groups of four students worked collaboratively to create music and respond to music.

## Method

Videotapes, randomly selected from the 1996 NEMP sampled population, were viewed. The tapes (68 for Year 4 and 67 for Year 8) were analysed using a structured checklist containing items pertaining to five factors deemed to affect the dynamics of the music groups: peers, gender, musical ability, the spatial arrangement of each group, and the influence of the teacher-administrator.



## Main Findings

- Overall, group dynamics played a significant part in determining the results of the NEMP music tasks. However, this influence varied from group to group and from task to task.
- Peers affected the actions and the musical responses of the group members. Most students tended to follow one another's movements in group tasks requiring them to respond to the music with physical movements (e.g., 'Musical Sticks' and 'Team Machine'). In team tasks involving percussion instruments, such as 'Animal Parade' and 'Beat and Rhythm', students were more intent on individually exploring the sounds produced by the percussion instruments than watching the actions of their peers.
- The extent to which the gender composition of a group influenced each child's task performance depended on the age of the child and the nature of the activity.
- Spatial factors, such as the number of students in a group or the seating arrangements, did affect the actions and musical responses of the group. Year 4 students were more likely than Year 8 students to sit in close proximity with group members with whom they felt comfortable.
- A leader emerged from most of the groups. Leaders were not always the most musical children but were almost always the most aggressive or charismatic. Some were good musical leaders and some were not.
- The teacher-administrator's attitudes and mannerisms, the level of help this person gave the students in the performance of their tasks, and his or her degree of adherence to task instructions also influenced group dynamics and, in turn, student performance.

## Significance for Teaching and Learning

- Some music tasks should perhaps be administered on an individual basis.
- Tasks need to be re-evaluated in terms of their appropriateness for each age group.
- When administering standardised tasks, it is important that teacher-administrators consciously strive to minimise the influence they can exert on group dynamics in general and individual student task performance in particular.
- Students need to be allowed to explore the full potential of their musicality and instruments. Appropriate lengths of time need to be determined for students to work out answers on their own before being given prompts or help.

# INFLUENCE OF TASK PRESENTATION ON PERFORMANCE OF ART TASKS

Roger Hardie and Rob McGregor

Student performance on two 'parallel' NEMP drawing tasks was perceptibly poorer in 1999 than in 1995. This investigation endeavoured to examine factors related to the presentation of the tasks that might have influenced this outcome. The tasks ('Fire Bird' in 1995 and 'Cave Bear' in 1999) were both introduced using a video with voice-over motivation. The students worked individually using crayons and pastels, within a 20-minute time limit.

## Method

This study had three stages. The first involved a survey of the reactions and opinions of 90 Year 4 and 90 Year 8 children in relation to the two video presentations. The second was a formal analysis of the presentations in terms of language used, the format of the motivation, and overall structure. Three new tasks were then developed that used a standardised presentation template and followed criteria that sought to overcome flaws indicated by the survey responses and the comparative analysis (see the findings section). The third stage attempted to validate the standardised template by trialling the new tasks with 74 children in eight widely representative schools. The trials simulated the conditions of the original task administration.

## Main Findings

### *The standardised template*

- This was based on the following criteria:
  - a topic that is positive, challenging and makes children want to draw it (i.e., has a readily identifiable object; is within the children's experience; possesses an overlay of magic; is preferably 'two-handed', e.g., 'fire-bird' rather than just 'bird'; suggests an action being performed, thus investing a dynamic quality);
  - language that appeals to young children (i.e., imaginative aspects described in simple language; poetic imagery; non-complex adjectives);
  - a simple, progressive structure (i.e., sequential building up of ideas; rhythmic patterning of words and images; active and lively—performing some action (even scary));
  - avoidance of subjects that are 'dirty' or 'mucky' (i.e., bossy characters; situations likely to recall stereotypical characters; complex environments; gender-sensitive subjects/interests).

### *Validating the template*

- The performance of the children on the tasks showed an adequate consistency in performance, with a satisfactory range of responses from low to high. Although the sample tested was small, it is believed that these responses validated the use of the standardised drawing task format and the criteria upon which it was based.
- The task presentation visually on video appeared helpful in holding student attention on the spoken motivation.
- Re-play of the motivational video after 10 minutes may have helped the children reflect and refocus on the task.



## Significance for Teaching and Learning

- The need for future NEMP drawing tasks to carefully follow a standardised format like that developed for this study was confirmed. Moreover, adherence to the criteria outlined is particularly important if valid comparisons are to be made between parallel tasks in successive NEMP cycles.
- The criteria identified show that quite subtle changes to task presentation can have a noticeable effect on children's performance on the task. Teachers with years of experience teaching children in these age groups may find such criteria self-evident (albeit reassuring). However, the presentation template also has potential for application to their general classroom practice. For example, replaying the video 10 minutes after students have started drawing simulates effective classroom practices that involve sustained teacher motivational support.



# CHILDREN'S RECOGNITION OF PITCH AND/OR RHYTHMIC SEQUENCE PATTERNS

David Sell

This study arose from an observation that a large number of the Year 4 and Year 8 children participating in the 1996 NEMP music assessment tasks 'Sing Song' and 'Keyboard' performed inaccurately yet were able to sing or play repeated musical patterns (in this case, pitch and/or rhythm). It was therefore decided to revisit these performances in order to examine these patterns more closely.

## Method

The data for this study were obtained from a random 10% sample of the children's video-taped performances.

For the 'Sing Song' tasks, pitch pattern was deemed present when one or more of these criteria were met:

- the pitch of the melody was sung accurately;
- the pitch was generally correct, but at the wrong tessitura;
- some notes were wrong, but a recognisable contour was present.

Rhythm pattern was deemed present when one of the following criteria was met:

- the rhythm was sung accurately;
- the rhythm was generally correct, but with some inaccuracy;
- the rhythm was wrong, but there was a consistent pitch pattern.

For the 'Keyboard' tasks, pitch pattern was considered present when one or more of these criteria were met:

- the pitch of the melody was played accurately;
- some notes were wrong, but a recognisable contour was present.

Rhythm pattern was considered present when one of these criteria was met:

- the rhythm was played accurately;
- the rhythm was generally correct, but with some inaccuracy;
- the rhythm was wrong, but there was a consistent pattern;
- a rhythm pattern was improvised.

## Main Findings

- Children at both Years 4 and 8 had a strong sense of musical patterning, especially rhythmic.
- Children who could not sing a melody as written seldom sang random notes but latched on to a pattern—pitch and/or rhythmic—and repeated it, usually at different pitches.
- Children performed poorly on the 'Keyboard' activities, mainly because few of them were familiar with music keyboards.
- That pitch fared better than rhythm in the 'Keyboard' items was probably due to some consistency between 'upness' and 'downness' in pitch and visually higher and lower in music notation, and in lateral direction on a music keyboard.
- When invited to make up or improvise a tune or rhythm, the children almost invariably caught on to an attractive pattern and repeated it with variations.
- Year 8 children asked to play anything they liked (Year 4 students were not asked to do this 'Keyboard' activity) were more able to demonstrate some feel for musical pattern than when playing an unfamiliar piece in an unfamiliar notation.

## Significance for Teaching and Learning

The 'teaching' of pitch and rhythm has little meaning outside the context of actual music. It is the shaped musical phrase that gives meaning to music, and that phrase almost always carries some recognisable musical pattern, whether pitch, rhythmic, or both. Teaching should therefore always be in phrase units, and preferably with some form of repeated patterning. A similar situation exists where the object of a lesson is to teach musical notation. A crotchet has no meaning apart from the notes on either side of it. The relation between a sound pattern and its visual equivalent is therefore most quickly learned through repeated hearings.



# CHILDREN'S ABILITY TO SIGHT-READ MUSIC

David Sell

The supposition that children cannot be expected to sight-read music unless they have a modicum of music-reading skill was put to the test in this study of children's sight-reading of music. The study focused in particular on Year 4 and Year 8 children's accuracy in pitch and rhythm while performing sight-singing tasks from the 1996 NEMP music assessment.

## Method

Ten percent of the total relevant video-taped performances were selected for analysis, and the original broad NEMP categories used to assess these performances of mostly/always accurate, moderately accurate, and inaccurate/not attempted were further broken down in this study, to make them more specific. For example, in 'Sing Song', the pitch element was broken down into pitch correct; pitch sharp; pitch flat; pitch correct, but with some wrong notes; and pitch unrecognisable, or spoken.



## Main Findings

- A large number of children 'spoke' the melody or, if they sang it, did so at a pitch that was almost unrecognisable. These children were usually from the same schools, suggesting a paucity of singing experience/models at home or school.
- Where a melody was recognisable, it was invariably sung flat. Sharp singing was virtually absent.
- Most of the sight-singing tasks were of melodies set to words. A majority of children could not cope with both reading the words and singing the tune, so abandoned one and tried to do the other, haltingly mumbling the words in a monotone and often eventually giving up altogether.
- Children were more likely to read rhythm accurately than pitch. However, it was the rhythm of the words rather than of the melody that led to these accurate readings.
- Those children who were accurate or near accurate in pitch were generally also accurate or near accurate in rhythm, suggesting that accuracy in one generates accuracy in the other.
- Many children settled on a pitch and/or rhythm pattern, though not necessarily the correct one, and repeated it throughout the melody.

## Significance for Teaching and Learning

The study confirmed that most children cannot readily sight-read music. Consequently, they do what they can and intone the words. Music sight-reading must be taught systematically, with music notation always taught in relation to the sound that it represents, and not as a musically barren theory. Thus:

- Words and music should initially be kept separate by focusing on practising sight-reading wordless melodies. Words have their own rhythm, and if children learn this type of rhythm first, they find it difficult to 'undo' when the rhythm of the tune and of the words differ.
- Given that most children have difficulty sight-reading rhythm and pitch at the same time, it is important to get the rhythm right first, by clapping, or singing on a single note, and then adding pitch to make the complete melody.
- A correct sight-read rhythm generates confidence, and is more likely to lead to a correctly sung pitch melody.
- Melody must be set at a reasonable (and not necessarily low) pitch level.
- Singing flat in most cases indicates feeling flat. A buoyant, positive atmosphere is more likely to facilitate in-tune sight-singing.
- Sight-singing should not be treated as a right or wrong task. Children given two or three tries on a task nearly always improved, and their confidence grew with each improved attempt.

## ARE OUR EXPECTATIONS OF STUDENTS REALISTIC?

Gwen Gawith

Throughout the two cycles of NEMP testing, teachers' frequent remarks about the difficulty many students experience completing certain tasks revealed an emerging pattern. This was that, irrespective of subject or skill area, students find it hard to perform well on tasks that are complex, cognitively challenging or multi-step, tasks requiring analysis, interpretation and inference, and tasks requiring the ability to apply knowledge with depth. This report outlines the first part of a two-phase probe study designed to confirm and explore this pattern, and to find ways of remedying it.

### Method

Comments made by teachers in the publication *NEMP Forum Comments* and other reports produced during the two NEMP cycles from 1995 to 2002 were analysed to determine the extent and nature of teachers' concerns about student performance on cognitively challenging tasks. In an attempt to make these cognitive skills explicit, overseas literature was used to inform the design of a comprehensive cognitive skills framework that will be used during the second phase of the study.

### Main Findings

- Teachers' remarks in the *Comments* and other reports confirmed their widespread concern about students' ability to process cognitively challenging tasks.
- Together, these comments produced a strong consensus observation that the pattern described above is pervasive.
- The skills framework analysis suggested that while some cognitive skills are being taught (and tested), other core cognitive skills are assumed rather than made explicit for students.
- Analysis of overseas literature indicated that teachers' stated expectation of more depth of learning and application of cognitive skills is realistic and achievable at both NEMP levels *but only if the skills required and the pedagogy needed to teach them are made explicit*.

### Significance for Teaching and Learning

Overseas literature suggests that a wide range of cognitive skills underpins 'depth' of learning at all ages and stages, and that these skills do not arise by 'osmosis'. They must be coached and practised regularly in curricular contexts. NEMP tasks have a key role to play in helping teachers teach, monitor and test the development of these skills. Accordingly, the second part of this study will use the cognitive skills framework to:

- i re-examine NEMP tasks used in 1997 so as to establish which tasks at both NEMP levels require which higher order/applied skills; and
- ii develop additional tasks, which have embedded within them appropriate pedagogy, as exemplars to help NEMP task-setters incorporate these skills in assessment activities, help NEMP markers assess them, and help teachers teach them.





## STUDENT PERFORMANCE ON ESSENTIAL SKILLS

### Gordon Knight

The New Zealand Curriculum Framework specifies eight essential skills that are developed across the curriculum. This study selected tasks from NEMP reports and examined student performance on them in relation to six of the skills—communication, numeracy, information, problem-solving, social and co-operative, and physical. (Management and competitive skills and work and study skills are not directly assessed in the NEMP tasks.)

#### Method

The NEMP reports provide two opportunities to examine the development of the essential skills: (i) performance of Year 4 and Year 8 students on common tasks within each cycle; and (ii) performance of these students on trend tasks that are common across the two assessment cycles. Neither of these comparisons was available in the reports concerning the achievement of Māori students, but all other reports from 1995 to 2000 were considered. Although some tasks involved more than one essential skill, 299 assessment items were identified that substantially assessed a single essential skill. The performance of students on these items formed the basis of this analysis.



#### Main Findings

- The NEMP assessments were shown to provide an extensive coverage of the performance of students on six of the eight essential skills in the New Zealand Curriculum Framework. Each of the skills is tested in a wide variety of contexts.
- Performance on tasks involving communication skills, problem-solving skills, and physical skills was relatively weak at both Years 4 and 8.
- The gain in student performance in problem-solving between Years 4 and 8 was lower in tasks involving creative thinking than in tasks involving reflective or logical thinking.
- Performance on tasks involving information skills and social and co-operative skills was relatively strong at both Years 4 and 8.
- The growth in performance from Years 4 to 8 was greater on tasks involving numeracy skills than for any of the other skills, possibly because a number of these skills are specifically taught over this period.
- There was no evidence of substantial changes in performance between cycles of assessment on trend tasks involving the essential skills.

#### Significance for Teaching and Learning

Perhaps the most significant feature of these results for teaching and learning is the identification of the relative weakness of performance at both Years 4 and 8 on those items relating to the two generic skills of communication and problem-solving. This finding is consistent with comments in many of the NEMP reports that thinking and explaining are particular areas of difficulty for students. The emphasis placed on knowledge in today's society as indicated by references to the 'knowledge economy' and to 'knowledge wave conferences' is one that perhaps should be questioned. A successful economy, or a successful life, does not depend principally on *what* people know, but on what people can *do* with what they know. Problem-solving and communication are *essential skills* in this context. Accordingly, those of us who are teachers need constantly to challenge our students to think and explain.

## ENSURING CONSISTENCY: THE NEMP PROCESS OF CROSS-MARKING

Nicole Brown

This report describes and reviews the cross-marking process developed by NEMP to score performance-based assessment tasks on a consistent basis. Cross-marking uses facilitated discussion on the part of markers to establish, apply and verify marking criteria. Random selections are made of the work of up to six students who have completed each set of NEMP tasks. All NEMP markers then grade this work at strategic points during the marking process so as to build and check consistency.

### Method

A group of markers independently graded one student performance, using the criteria given on the marking schedule. Markers were then asked, in a group session, to explain their scores. The goal was to clarify the choices and decision-making processes markers used and to obtain agreement on the grades to be assigned. The marking of each task involved three sessions—the beginning, middle and end of the marking. Two student performances were considered in each cross-marking session. To gauge the consistency of scoring overall, markers were asked not to change grades they assigned during the cross-marking sessions. All cross-marking grades were collated into a grid showing the pattern of scores awarded by each marker, then averaged to provide a final score for each ‘cross-marked’ student script. The cross-marking process was then observed with a view to identifying those factors that hindered or facilitated this process. The extent to which this process met consistency objectives was also considered.

### Main Findings

#### *The marking process*

- Collaboration and joint ownership help develop good performance assessment rubrics, and are of more value if they occur during the marking process.
- Markers need to share their collective experience of students’ responses *during* scoring and use it to adjust the rubrics where appropriate. Some rubrics designed using collaborative processes *before* the actual marking period were difficult to apply when used by a different group of markers during the actual marking period.
- An active facilitative approach is necessary. Markers may be uncomfortable about explaining their scoring decisions, so positive and sensitive facilitation skills are needed to encourage, acknowledge and consider different points of view. Once markers are comfortable about contributing to discussion, the facilitation process can focus on identifying key issues and resolving them through the flexibility of the marking schedule.

#### *Consistency*

- As tasks require greater professional judgement, the consistency of scoring decreases.



- Consistency in scoring is generally greatest when a student’s performance is considered particularly strong.
- Inconsistencies in scoring a student performance spreading across three different scores seemed to arise from most markers having a similar view of the performance but coming down on either side of a marking ‘boundary’.
- Teachers who awarded scores falling significantly outside the common range of agreement appeared to be influenced by whether they had independently marked a series of very good or very poor performances just before the cross-marking took place.

### Significance for Teaching and Learning

Collaborative discussions about the cross-marking process appear to have a strong influence on its validity and reliability. The essential principle of treating the scoring of student performance as a discussion process involving collaboration, joint ownership and facilitation is one that can easily be replicated in school settings.

# THE EFFECT OF TASK FORMAT ON STUDENT ACHIEVEMENT

Liz Eley and Robyn Caygill

Teachers acknowledge that the extensive information they gather on student achievement and progress is useful, but they often report that this activity limits teaching time. There is therefore a need to determine the most appropriate and effective formats for gathering comprehensive information on individual student progress, along with an understanding of when and how these should be applied. NEMP uses a variety of task formats to gather rich information on what students know and can do. This probe study endeavoured to determine the appropriateness and effectiveness of different task formats.

## Method

Twenty-seven NEMP mathematics and science tasks at the Year 8 level were selected for this study. Parallel versions of these tasks were then constructed in four different formats: multiple-choice, short answer, stations (working independently on tasks set up at stations around the room), and one-to-one interviews. Students were given equipment to use for the interview and stations tasks, but not for the short answer and multiple-choice formats. For interview tasks, the teachers read the questions and student responses were video-recorded. For stations tasks and the multiple-choice format, students read the questions and wrote their answers.

A total of 258 students took part in the study; each version of each task was completed by a minimum of 62 students. Tasks were grouped into four sets, with each set having a selection of assessment types. Students were assigned to four groups of equivalent ability (as rated by their classroom teacher).



## Significance for Teaching and Learning

By using a variety of assessment task formats, and achieving a closer match between the format used and the type of information required, teachers can improve the quality of information gathered. In some cases, an adequate picture of student progress can be obtained through checklists. In other cases, particularly when measuring the attainment of objectives reflecting higher order thinking skills, more complex assessment methods provide a more informative picture.

## Main Findings

- Students with lower reading abilities did not do as well in task formats requiring them to read and write. These students struggled to understand task requirements or to read task scripts. Reading load became a bigger issue when tasks were set in an everyday context.
- Conversely, there were times when needing to read the question assisted students. Complex questions, questions requiring involved or extended answers, and responses requiring a synthesis of information were answered better when presented in written form. The written format was more appropriate than the oral format because students could control the time they needed to re-read and process the information being presented.
- Oral answers were generally more extended than written answers. In many cases, minimal amounts of information were presented in written answers while spoken answers were extended (i.e., contained examples and comprehensive explanations). The use of technical terms was also greater, suggesting that students were reluctant to write down terms that they were unsure how to spell.
- In most cases, students performed better when equipment was available. Equipment seemed to help with understanding questions, support the thinking process and assist when demonstrating solutions.



## GENDER COMPOSITION OF GROUPS: STUDENTS' EXPERIENCES

Grace Grima

This study evaluated the extent to which groups with different gender compositions provided Year 4 and Year 8 boys and girls with a similarly productive and enjoyable experience during their engagement with one NEMP task from three different curriculum areas (language, science, technology).

### Method

There were five types of gender group, each of four members: four boys (4b), three boys, one girl (3b1g), two boys, two girls (2b2g), one boy, three girls (1b3g), and four girls (4g). The video analyses focused on the dependent variables of individual participation, group interaction, co-operation and conflict, and also group products. The independent variables were the five gender groupings, the two year levels and the three task types. A questionnaire was used to ask all the children how they felt about working in their group, and an interview was conducted with a small number to gain further insight into their perspectives on group work.



### Main Findings

- No group type exhibited consistently higher participation levels across the three tasks. There was no indication that girls were disadvantaged or that boys dominated in the mixed gender groups.
- Especially at Year 4, the minority student in the 3b1g and the 1b3g groups tended to participate less than the others in their group and/or to participate less than their same-gender peers in the other group compositions. However, the minority student tended to become highly involved in organising the group task.
- The students' levels of interaction, co-operation and conflict were relatively similar across the five types of groups.
- Achievement in the different groups appeared at times to be influenced by subject area, task content and age group. There was no discernible pattern between group achievement and interaction, co-operation and conflict.
- Boys and girls, at both ages, least liked the group placement where they were outnumbered. However, at Year 4, both boys and girls enjoyed working in same gender groups the most. At Year 8, boys and girls responded equally favourably to same gender and mixed gender groups with equal numbers of boys and girls. At both ages, girls were more positive than boys about working in the 2b2g groups.

### Significance for Teaching and Learning

- When children work together in a group on a task, the task goal may override and reduce the salience of the group's gender composition. Also, individual differences between children may be more important than gender in determining children's participation in group work.
- The ongoing claim that girls are disadvantaged in mixed gender groups needs to be questioned. Equal numbers of boys and girls in a group do not necessarily result in an equitable experience, nor does this structure protect group members from becoming sidelined in the activity. Furthermore, children's experiences in same gender groups are not necessarily more equitable or productive than in mixed gender groups.
- Although group gender composition seems to have little effect on children's behaviour and achievement in small groups, the questionnaire and interview data showed that many children at both age levels perceived the outnumbered student in a gender-imbalanced group to be disadvantaged. While teachers are advised to use such placements, these need to be complemented with experiences in other settings in which children initially feel more comfortable. Teachers also need to ensure that children have opportunities to develop positive attitudes towards all forms of group work and the necessary skills to function effectively in different group situations.

# KOHIĀ NGĀ TAIKĀKĀ

## ISSUES IN TRANSLATING NEMP TASKS INTO TE REO MĀORI

Joe Hunter and Liz Eley

Over the last few years, NEMP has been assessing students in te reo Māori, mainly using tasks originally developed to be administered in English. The transfer of assessment tasks to Māori has raised a number of issues, but it has not been possible to bring a blanket solution to some of these problems, as different concerns are evident in each curriculum area. This report presents an analysis of some of these issues.

### Method

Since 1999, at the Year 8 level only, a special sample of 120 students whose learning takes place in Māori immersion settings has participated in NEMP assessments conducted in te reo Māori. The achievement of these students has subsequently been compared with the achievement of Māori students in general education, with the results presented in a separate report each year.

### Main Findings

- Most students learning in the Māori immersion setting are being instructed in their second language. Therefore, a translated task may be equivalent in terms of the language used but students completing that task may not bring equivalent language skills to it.
- Second-language learners who have achieved conversational fluency in their new language can still struggle with the academic language they are required to use in a test situation. Rather than engage in the risk-taking behaviours required to use unfamiliar words, students tend to curb their responses by remaining within the range of well-known structures.
- Because many of the NEMP assessments occur in an interview situation, the oral presentation of assessment items may disadvantage students in the immersion setting. Unfamiliar words may be easier to decode from a written format than a spoken one.
- The transferral of tasks into Māori carries the underlying assumption that there is equivalent curriculum coverage in Māori immersion settings and general education settings. The main focus of instruction in kura kaupapa Māori is the acquisition of language and tikanga. As such, a similar curriculum coverage cannot be assumed.
- In the Pakeha system, the richness and diversity of Māori contexts are often watered down to manageable units that can reflect limited teacher knowledge. Similarly, the study of complex areas can be simplistically presented. This is not the lived experience of students located within the culture. When assessment items with a Māori context are developed with Pakeha students in mind, they can be asked as if there is a simple answer. This can be confusing for Māori students.



### Significance for Teaching and Learning

The issues raised in translating assessment tasks reflect issues facing the education system. It cannot be assumed that there is one way of meeting the diverse abilities, skills and experiences that each student brings to the learning situation. The challenge for educators lies in continually ‘seeking the heartwood’—stripping away encumbrances and finding the best way of meeting individual student needs. In the meantime, the procedures and practices used to transfer tasks for use in the immersion setting continue to be evaluated and refined.



# TRANSLATING PĀNGARAU (MATHS) NEMP TASKS INTO TE RE MĀORI

John Ohia

This study presents a critical evaluation of the NEMP Pāngarau (mathematics) assessment tasks written in te reo Māori for Year 8 students in Māori medium schools by a team of Māori Pāngarau teachers. In particular, it sought to identify difficulties, and possible solutions to these. The full probe study report contains suggested revised tasks/resources for teaching and learning Pāngarau in kura kaupapa Māori.

## Method

The evaluation was carried out by two fluent speakers of te reo Māori with extensive knowledge and experience in teaching mathematics in kura kaupapa Māori and English medium mathematics. These teachers were responsible for examining the scope, wording and meaning of the tasks against the achievement objectives of the Pāngarau curriculum document. Four focus areas were addressed in the probe study: (i) the relationship between the Pāngarau curriculum and the NEMP tasks; (ii) the adequacy of questions translated from English to Māori; (iii) ensuring that all aspects of mathematics were included; and (iv) noting any gaps, with suggestions for improvements. The researchers also checked the meaning of the te reo Māori versions of the tasks and referred to the English versions whenever clarification of either word(s), phrase(s) or a combination was required. If necessary, they rewrote the tasks.



## Main Findings

- Translations of NEMP tasks from English to te reo Māori 'word for word' and involving 'idioms' are problematic, as the te reo Māori version can become difficult to understand and grammatically incorrect.
- Tasks presented in te reo Māori need to accord with the spoken and written language used by the Māori community and kura kaupapa Māori.
- Special care needs to be taken to ensure that when translations are altered, the mathematical concept being tested is not modified.
- All aspects of the Pāngarau curriculum were well covered in the NEMP assessment programme, with the possible exception of traditional concepts of measurement (e.g., counting, time, length).

## Significance for Teaching and Learning

The Pāngarau NEMP assessment programme provides a very good model for assessment and learning of mathematics through the medium of Māori language. As such, it has considerable potential as a teaching and assessment resource for teachers. The study confirmed that translating NEMP tasks from English into te reo Māori needs to be done by teachers who are experienced teachers of mathematics in Māori medium schools. Also, further research is needed in the area of traditional mathematics in the Pāngarau curriculum to address problems of definition, curriculum planning and resource availability.

## MĀORI STUDENT ACHIEVEMENT IN NEMP, 1995–2000

**Terry Crooks, Katherine Hamilton and Robyn Caygill**

Many research reports and commentaries on education in New Zealand have claimed that Māori students are performing distinctly less well than their non-Māori classmates. Much of the evidence has been derived from multiple-choice tests in a narrow range of subjects, or from performance in examinations in the final years of secondary school. In this study, results for NEMP assessments of Māori and non-Māori students in Year 4 and Year 8 were compared.

### Method

The study focused on about 600 tasks, covering 15 different curriculum areas, administered to individual students between 1995 and 2000. For each task, an effect size was calculated by subtracting the mean score obtained by non-Māori students from the mean score obtained by Māori students and dividing the difference by the pooled standard deviation for the two groups of students. These effect sizes were then averaged for each subject and each year level. The average effect sizes were then converted to percentile ranks to describe how the average Māori student performed relative to the full range of non-Māori students. To examine the confounding effect of socioeconomic factors, the analyses were repeated using only data from students attending medium-decile schools.



### Main Findings

- For the Year 4 students, average Māori performance was above the 50th percentile of non-Māori students for one subject, between the 40th and 46th percentiles for six subjects, and between the 29th and 39th percentiles for eight subjects. Averaged across all subjects, an average Māori student was performing as well or better than 40 percent of non-Māori students. In regard to students in medium-decile schools, the average across all subjects rose to the 43rd percentile.
- At Year 8, average Māori performance was above the 50th percentile of non-Māori students for one subject, between the 40th and 43rd percentiles for five subjects, and between the 31st and 39th percentiles for nine subjects. The average across all subjects was the 40th percentile. For students in medium-decile schools, the average across all subjects rose to the 42nd percentile.
- Māori boys performed a little better than Māori girls on social studies, physical education and science tasks, and at Year 4 level on mathematics tasks. They performed quite badly relative to girls on writing. Other subjects generally showed no difference or a modest advantage for girls. The gender patterns for the Māori students and the total sample were very similar.

### Significance for Teaching and Learning

- While the overall picture shows Māori students performing less well than their non-Māori counterparts in most curriculum areas, the disparities varied considerably across the 15 curriculum areas assessed. Māori students performed better than non-Māori students in physical education, but substantially worse in reading, information skills and mathematics. The other 11 subjects fell in between.
- Comparisons of Māori and non-Māori student achievement can be misleading because the majority of Māori students attend lower decile schools than is typical for other students. When the comparisons are conducted on a more 'level playing field' (medium-decile schools), achievement disparities decrease markedly.
- Numerous explanations have been suggested for the lower performance of Māori students. There is a need to reassess these explanations to take into account the more varied patterns of achievement reported here and the confounding of ethnic and socioeconomic factors in most previous studies of Māori students' achievement.

## SCHOOL SIZE AND STUDENT ACHIEVEMENT

**Terry Crooks and Katherine Hamilton**

Because much of New Zealand is sparsely populated, it has a very high proportion of small schools. The Ministry of Education and the Education Review Office have suggested that very small schools face major challenges and often perform less well than their larger counterparts. These concerns have not been based on student achievement data. This study compared the achievement of students from schools of different size, using data from all NEMP assessment tasks (covering 15 curriculum areas) administered to Year 4 and Year 8 students between 1995 and 2000.

### Method

One-way analysis of variance was used to compare the students' task performance across the different school sizes. At Year 4, the NEMP definitions of school size were 'small' (4 to 19 Year 4 students), 'medium' (20 to 35), and 'large' (more than 35). There were 144 small schools, with a median total roll of 74 students. Twenty-six percent of these schools had fewer than 50 students. At Year 8, the NEMP definitions were 'small' (4 to 34 Year 8 students), 'medium' (35 to 150), and 'large' (more than 150). There were 209 small schools, with a median total roll of 138 students. Fifteen percent of these schools had fewer than 50 students.

A second stage of analysis used only students in the small schools, now subdivided into 'very small' and 'quite small'. At Year 4, very small schools had 4 to 12 Year 4 students and quite small schools had 13 to 19 Year 4 students. The median total roll for these schools was 51 students, with 25 percent of the schools having fewer than 40 students. At Year 8, very small schools had 4 to 16 Year 8 students and quite small schools had 17 to 34 such students. The median size for very small schools was 92 students, with 27 percent of these schools having fewer than 60 students.

### Main Findings

- Comparisons across the small, medium and large schools yielded significant performance differences on only 2% of the tasks at both year levels.
- At Year 4, students in very small schools performed better than students in quite small schools on 3% of the tasks, equally well on 91% and less well on 6%. On average, across all tasks, a median student in the very small schools performed as well as or better than 48% of the students attending quite small schools.
- At Year 8, students in very small schools performed better than students in quite small schools on 6% of the tasks, equally well on 91% and less well on 3%. On average, a median student in the very small schools performed as well as or better than 51% of the students attending quite small schools.

### Significance for Teaching and Learning

The results provide strong evidence that, within the range of school sizes explored, school size is not an important factor influencing student achievement at Years 4 and 8 in New Zealand schools. However, relatively few of the 'very small' schools were sole-charge schools, and a substantial proportion had three or more classes, so there is still a possibility that extremely small schools could produce weaker student achievement outcomes than larger schools. While the available research provides some legitimate arguments for closing or amalgamating very small schools, poor student achievement in such schools is not one of them.





## STUDENTS' ATTITUDES TO LEARNING, 1995–1998

Liz Eley

Many factors influence student achievement in a learning area, including a positive attitude, enjoyment of a subject, and opportunities to experience success. Between 1995 and 1998, surveys monitoring students' attitudes and motivations towards different learning areas were conducted in conjunction with the NEMP assessments in 12 such areas. This study examines some of the different patterns that emerged when student responses were analysed.

### Method

The learning areas surveyed over the four-year cycle were science, art, reading, speaking, technology, music, mathematics, library and research skills, social studies, writing, health, and physical education. For each of these surveys, about 460 students at each of the two year levels assessed (4 and 8) completed a questionnaire, but each student took part in a survey of one learning area only. Students completed their questionnaire privately, although a teacher was available to read the questions or record responses if required.

### Main Findings

- When asked to rank order their subjects in terms of preference, students gave as their 'favourites' art, physical education, and mathematics.
- Students gave very high ratings to almost all learning areas when asked how much they enjoyed them. In most cases, over 80% of students gave a positive response. Writing was the least popular area.
- Students gave positive enjoyment ratings responses for six learning areas in their own time. However, there was a substantial decrease in their enjoyment rating of writing and mathematics between Years 4 and 8.
- Students also responded very positively when asked how good they thought they were in different learning areas.
- Girls were more positive than boys in their responses in six learning areas: music, writing, reading, art, health, and speaking. Boys were more positive than girls in their responses in three learning areas: technology, physical education, and science. These differences were more pronounced at Year 8 than Year 4.
- Year 4 Māori students were more positive than non-Māori students in six learning areas, while non-Māori students were more positive about speaking. At Year 8, Māori students were more positive about art and music, with no significant differences in other learning areas. Despite the more positive disposition of Māori students, the achievement results of non-Māori students were higher in every area except physical education.
- Students from schools with low decile ratings were more positive than their counterparts from schools with middle and high decile ratings in seven learning areas, but this pattern was not reflected in the achievement results.



### Significance for Teaching and Learning

- The strong link between positive attitudes towards learning and subsequent achievement identified in the literature suggests teachers need to optimise learning opportunities for students by providing learning contexts and experiences that are motivational for the whole range of students.
- The generally highly positive attitude to learning shown by students at Years 4 and 8 is heartening. However, the findings that older students have less positive attitudes to learning than younger students, and that boys have less positive attitudes to learning than girls, suggest that the learning environment for older students and boys requires attention.
- Although Māori students and students from low decile schools tend not to achieve as well as their non-Māori and higher school decile peers, their very positive attitude to learning provides a good starting place for closing the achievement gap between the various subgroups.

## SHOULD CHILDREN WITH SPECIAL NEEDS PARTICIPATE IN NEMP?

Murray Overton

Each year, NEMP selects a random sample of students at Year 4 and Year 8 to participate in its assessment programme. The list of selected students is sent to each school to consider whether students should be excluded for particular reasons (e.g., severe disability, very limited English). This research looked at how schools decide whether to include or exclude special care/needs students. It also considered the role that NEMP plays in supporting this decision-making.

### Method

Data were gathered through phone interviews with seven Canterbury schools, all of which had excluded or included (or both) children with special needs in the 2001 NEMP process.

### Main Findings

- Schools used a clearly established consultative process to decide which children would participate in NEMP. Generally, this involved principals discussing the children individually with at least one other (and often more) staff members.
- Schools decided to include/exclude children with special needs on a case by case basis:
  - School B:* We chose to keep the child as part of the testing process. . . . His needs were physical and not intellectual, and he didn't need any extra assistance to complete tasks.
  - School F:* As a staff we sat down and discussed this decision. We decided, why put a child into a testing situation who would score all zeros and only have an attention span of about two minutes? The main reason was for the sake of the child.
- Schools' decision-making was influenced by their recognition of the importance of maintaining the random sample in the NEMP process:
  - School C:* We didn't consider recommending that any of the students be substituted or changed because it had been clearly stated that it was a random sample. Substituting children or asking for them to be replaced is not really an option. If you have special needs children on the list and they are being catered for in a mainstream setting, then why shouldn't they participate?
  - School E:* They [NEMP] say that if there are any special reasons for a child to be taken from the list because of special needs, then schools can. Obviously they [NEMP] are aiming to be inclusive and not pre-empt a child's participation.
- The support that NEMP gave schools was important in ensuring the success of the assessment process in general and the inclusion/exclusion decision-making in particular:
  - School C:* The whole thing was easy to do . . . and easy to run. . . . There were no problems, and we were absolutely happy with it.
  - School D:* We had close contact with NEMP before they came. . . . There was good consultation before, during and after the process. . . . They were in tune with what we needed and what we said. . . . We have been fully supported throughout the process.

### Significance for Teaching and Learning

All seven schools were making informed, collaborative decisions about including or excluding special needs students in the NEMP assessment process. In each case, ways of ensuring inclusion of these children without compromising them or the assessment process were considered. An awareness of the importance of a 'random' sample was also held in common by the seven schools. It is noteworthy that only five schools of the original 27 that participated in NEMP in Canterbury in 2001 excluded special needs children from their original random sample list. Support from NEMP appears to have played a vital role in these situations, with the procedures established by NEMP not only ensuring good communication and negotiation between NEMP and the schools and between staff in the schools, but also standardisation of the assessment process.

## A PROFILE OF STUDENTS READING BELOW EXPECTATION

Clare van Hasselt

The NEMP 2000 oral reading record task data provide videotaped performances of Year 4 and Year 8 students reading aloud at an instructionally appropriate level. Text passages were presented within authentic fiction, non-fiction, or non-book contexts, giving students opportunity to use context-based cues when deciphering unfamiliar words. This study looked at New Zealand primary school students reading below the level expected for their chronological age. The aim was to document and analyse the specific difficulties these students face, the strategies they commonly utilise and the work habits and personal characteristics they bring to the oral reading task.

### Method

Students reading 'below normal expectation' in the NEMP oral reading tasks formed 18.3% of the 2000 NEMP sample. Forty-five videotaped student performances were randomly selected from Year 4 and Year 8 samples reading below expectation. The proportion of students reading within each text type and at the target reading bands was retained. A framework for coding students' observable behaviours was developed to fully reflect student achievement and attributes. To achieve this, several innovative coding categories were developed. For example, actual strategies used by students pausing to decipher a text word were identified, regardless of whether the strategy led to a correct, incorrect or self-corrected response. Errors and strategies were analysed and identified as separate types and sub-types. Relevant work habits and personal characteristics were also identified.

### Main Findings

- Students tended to read very slowly, at a mean rate of approximately 57 words per minute.
- The error rate was just over 9%, of which substitutions were the most common error type.
- Students paused to employ a strategy for approximately one in every 10 words, of which 'context' cues were the most common strategy type.
- In regard to oral reading fluency, students generally spoke with 'little/no' expression, while exhibiting 'some' degree of clarity, clause and sentence structure, and breath control.
- Almost half the students moved closer to the text when reading, and nearly a quarter kept their place with their finger.
- Approximately half the students exhibited the sound work habits of 'independent' reading and remained predominantly 'still' during the task, while the majority 'successfully' followed instructions and applied 'concentrated effort'.
- The majority of students exhibited 'moderate' levels of such personal characteristics as 'sociability', 'confidence', 'risk-taking' and 'interest'.



### Significance for Teaching and Learning

- The students' tendency to rely on context cues may indicate the greater emphasis placed on use of these cues in New Zealand reading programmes and/or a lack of ability in the use of phonological decoding skills.
- Positive statistical relationships between reading rate and oral reading performance descriptors (expression, clarity of speech, clause structure and sentence structure) suggest that these behaviours are inter-related aspects of the general problem of reading difficulties.
- Students who place text close to their eyes and mark their reading place may be trying to improve their visual perception, eye-tracking or concentration.
- Although students reading below expectation do share some common learning difficulties, many exhibit sound work habits and a satisfactory range of personal characteristics in the NEMP one-on-one assessment setting.



## USING NEMP ASSESSMENT TASKS IN THE CLASSROOM: THE PROCESS

Rose Hague and Liz Eley

The assessment tasks included in each NEMP report provide a rich resource for use for school-wide or classroom-based assessment. The tasks, developed in consultation with curriculum experts and with New Zealand children and the New Zealand National Curriculum in mind, use a range of assessment formats, from performance-based 'hands-on' tasks, performed individually or in groups, to the more traditional paper-and-pencil test items. The multiple task formats and the richness of activities used in NEMP provide a substantial base for the development of classroom assessment activities that can meet multiple goals. This report documents the steps schools take when using NEMP assessment tasks in this manner.

### Method

Three schools wanting to use NEMP tasks for school-wide assessment participated in this study. Tasks were selected for each school and then modified to meet the school's individual requirements. In each case, the researchers worked with a key person within the school—the principal, a subject specialist teacher, or the teacher in charge of assessment. All teachers were involved in selecting and modifying the assessment tasks and in analysing the results.

### Main Findings

The following steps form the process that the schools used:

1. Identifying the purpose for the assessment.
2. Identifying and developing the specific learning outcome.
3. Selecting the assessment task that best fits that learning outcome from the NEMP report.
4. Checking the report to see how the task was administered for NEMP purposes.
5. Modifying the administration to meet school requirements.
6. Checking that the NEMP criteria given for marking the task reflect the specific learning outcome identified as the purpose for the task, and then modifying the criteria as necessary.
7. Using the information gathered, perhaps to provide feedback to students, to examine the effectiveness of teaching practices or classroom programmes, or to inform the school community of student achievement.



### Significance for Teaching and Learning

In each of the three schools, staff reported that the NEMP tasks could be readily adapted to suit their purpose using the steps described, were manageable within the restraints of a class programme, and were worth repeating. The teachers also found that the process of working through the activities and the discussion generated in utilising them was professionally rewarding.

## THE IMPACT OF NEMP ON TEACHERS' PROFESSIONAL DEVELOPMENT

Alison Gilmore

Each year NEMP engages approximately 100 teachers for six weeks to administer NEMP tasks. After one week of training, the teachers, working in pairs, administer the tasks to Year 4 and Year 8 children in five different schools. A further 150 teachers are engaged to mark those assessment tasks requiring professional expertise and judgement. They work in teams to clarify marking criteria and assess children's work that has been recorded on video and/or paper. This study focuses on the extent to which these activities enhanced teachers' professional development.

### Method

Participants were 272 teachers who had been engaged as administrators or markers between 1995 and 1997. Data were collected through a series of questionnaires, weekly diaries and case study interviews.

### Main Findings

- Administering and marking NEMP tasks provided teachers with very powerful learning experiences about assessment, children's patterns of learning, and their own teaching.
- Teachers found the experiences very rewarding—probably the best professional development of their careers.
- Teachers particularly enjoyed and learned from the close one-to-one interactions with children and the opportunities for interacting and sharing ideas with colleagues.
- Teachers gained many new ideas about teaching and assessment to use in their own classrooms.
- Teachers felt more confident and informed about assessment, questioning techniques and instructions, and marking criteria, and gained a greater appreciation of the importance of establishing rapport with children.
- Teachers felt a revived motivation for teaching and exploring new ways to assess their students.



These teachers' descriptions of their experiences were typical:

- ✓ *I did not view it as direct professional development but rather indirectly as a valuable experience in which I was exposed to different teachers and their views, methods, etc. I came away thinking that I was a reasonably open-minded, objectively oriented, child-minded teacher, who was reasonably up with the play—not the bottom of the heap or top of the scale, but O.K. (I was wondering, you see!) Also, that there were many aspects I could improve or be aware of and that I'd like some input into my school's assessment processes.*
- ✓ *The effect has been dramatic, and I believe it will be long lasting. After almost 20 years teaching and an endless list of forgettable courses, this came at a very good time. I had experienced two hard years and was feeling 'shell-shocked'. This gave me the boost I needed.*
- ✓ *Allowing children even more time for thinking seems the most significant idea this week. . . . Too often in normal classroom practice we are unable to give extended time for this purpose because of time constraints and the pressure of getting everything done. Perhaps this should be reconsidered.*
- ✓ *[I have] greater confidence in talking about 'assessment', having had this experience.*

### Significance for Teaching and Learning

NEMP is a very positive learning experience for teachers, contributing in significant ways to their professional development, notably opportunities for them to interact, discuss and share ideas with colleagues, to work with children, and to discuss children's work. The NEMP experience also has enormous potential value to the learning of students because it facilitates teachers' confidence and knowledge about assessment generally and NEMP tasks specifically, a situation that enables teachers to better understand the learning needs of their students and to design appropriate learning programmes.



## SONG FOR NEMP

Written (and performed) by Year 4 TAs (1997) under the creative leadership of 'Katherine'.  
(to the tune of the 'Beverley Hillbillies')

*At the end of the training week . . .*

We'll tell you a story about N-E-M-P,  
Directors were keen as keen could be,  
They organised a course for us all . . .  
And BOY oh BOY we had such a ball.  
**Great that is . . . LOTS of fun . . . met new friends.**

Stations, teamwork, 1 to 1,  
The kids in this programme will have such fun,  
Assessment need not be a drag,  
On behalf of this project we will all brag.  
**Skite that is . . . represent . . . advocate.**

Professional development was a key issue,  
*Ben e fits* will surely accrue,  
Sooner or later we'll each be a whiz,  
With the occasional . . . odd wee tizz.  
**Panic that is . . . lost forms . . . missing cards.**

Never fear, there's an 0800 number,  
Guaranteed to mask such a blunder,  
All we've got to do is just ring,  
The requested items someone will bring.  
**Security that is . . . back up . . . peace of mind.**

Remember administrators, not too much praise,  
Or the validity of the tasks we may erase,  
We don't want to make it hard to score,  
This advice of Lester's we mustn't ignore.  
**No more . . . GREAT! Right On! Excellent!**

Fed us scones, we loaded our plate,  
After a week we've all gained weight,  
Dates and cheese and sultanas too,  
A bit of butter and jam will do.  
**Hot that is . . . buttered fresh . . .  
CHOLESTEROL . . .**

The room at the top has a very nice view,  
The jokes and stories grew and grew,  
Janice laughed along with the rest,  
Numbering from the left we did our best.  
**Teams that is . . . A to C . . . 1 to 4.**

We all learnt to tweak while we were away,  
Lines and wrinkles kept at bay,  
You'd better be careful, not too tight,  
Or you'll grow a beard overnight.  
**Horror that is . . . bags . . . chin fluff!**

Now the week has come to an end,  
The purpose of monitoring we'll always defend,  
So get out the tape, wrap it up well,  
The funny stories are yet to tell.  
**Shuttle here . . . going home . . . see ya.**

*At the end of six weeks . . .*

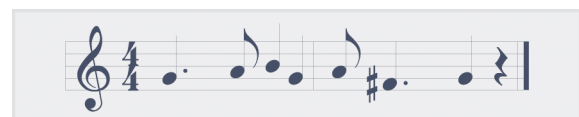
Year 4 administering has come to an end,  
Computer and cameras and boxes we'll send,  
Back to the NEMPLE for the markers to use,  
They'll get to see the smiles and the blues.  
**Answers that is . . . discussion . . . prompting.**

The video player will not go,  
Ring 0800 oh no, no, no!  
'Drop it,' said Terry, 'Never fear.'  
Just a glitch to drive you spare.  
**Drop it that is . . . fix it . . . Oooops . . .  
Never mind . . . repair bill.**

Supplies are a problem—listen to Liz,  
Ordered a bird book, oh what a tizz,  
Whitcoulls luckily eventually obliged,  
The kiwibird activity we now have tried.  
**Indexed that is . . . major cock up . . . re-order.**

Six weeks has passed and we've done the job,  
It's back to our school to teach the mob,  
Marking, duty and meetings galore,  
All those jobs that we . . . really abhor.  
**Stress that is . . . worry . . . responsibility . . .  
HOMEWORK.**

This job was great, the faxes we enjoyed,  
Thanks for seeing we were all employed,  
Countryside we saw, people we met,  
We leave our position...nothing to regret.  
**Bye for now, Haere ra, Ka kite ano . . .**



## THE QUALITY LEARNING CIRCLE: ENHANCING TEACHER LEARNING

Susan Lovett

This study tracked the learning journeys of eight teachers as they endeavoured to improve their assessment practices by studying NEMP reports (sent to all New Zealand schools) within the structure of a quality learning circle (QLC). The QLC provides teachers with opportunity to share professional conversations around a common theme and to work together to improve their work practices.

### Method

The eight teachers were selected for the study because they expressed interest in this in a questionnaire sent to schools in 1998 (repeated in 2000) to gauge the impact of NEMP reports in schools over a two-year period. The teachers, who between them taught Years 2 to 8 classes in different schools, came together fortnightly during 2000 for QLC meetings in school time to explore the NEMP reports, with payments made for their teacher release and travel over the year. Data sources included observations of QLC and school-based meetings, document analyses, and interviews with the teachers throughout the year. As a condition of participation in the study, the teachers reported during QLC meetings on their trials of NEMP assessment tasks in their classrooms. They also visited one another's classrooms as observers.

### Main Findings

- The teachers liked the regular opportunities to talk with one another about how they were using the NEMP assessment tasks.
- They appreciated spending time in one another's classrooms and sharing samples of children's work.
- They liked that the QLC provided dedicated time for professional development during the school day and were amazed at the difference this timing made to their energy and information-absorption levels.
- They welcomed the opportunity to teach each other and pass on their learning to other teachers at their schools and found classroom application helped them to become more enthusiastic learners.

*Diane said: 'I think being able to share with each other the things we were doing . . . has prodded us into, "Oh, that looks all right. Oh, I think I can handle that one," and I'll have a go at it.'*

*Mavis said: 'Here we are having to do an equal amount . . . because we are all helping each other...I think the QLC is good in that . . . we have some sort of ownership in it.'*

*Katrina said: 'When you know you have another meeting coming, you think, "Oh I must remember to do something for that," so you get the books out . . . It's not fair [to the group] unless I have done preparation or follow up.'*

### Significance for Teaching and Learning

The study showed that teachers relish opportunities to focus together on issues of classroom practice within a small, collegial group in school time. According to the teachers, when learning is structured in this way and is accompanied with visits to colleagues' classrooms, it is more effective than learning undertaken during conventional whole-staff professional development sessions.

The experience of the eight QLC teachers also suggests a need to divert energies away from issues of content and coverage during professional development and to concentrate on how teachers can establish effective reciprocal learning relationships with their colleagues. While such learning takes time and deserves meeting time with paid teacher release within the school day, teachers' learning is too important to keep in the 'tired slots' at the end of the day. If teachers are to be active and effective learners, then schools must provide the conditions to make this a reality. The QLC provides them with one possible way of doing so.



## RESEARCHERS' CONTACT DETAILS AND REFERENCES

This section provides the authors' contact details and references to fuller accounts of the NEMP probe studies (shaded) and other publications. Details are ordered alphabetically by author surname. Multi-author reports are ordered by surname of the first author, and for some of these reports, contact details relate to the first author only. Full reports of each probe study will be available late 2003 on the NEMP website < <http://nemp.otago.ac.nz/> > or can be obtained from USEE.

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### Unit for Studies in Educational Evaluation (USEE)

Copies of the full NEMP probe study reports are available through the Unit for Studies in Educational Evaluation. Extra copies of the 'NEMP Curriculum Map' can be purchased at \$3 per copy. Details of the NEMP probe study and research programme are available from USEE, and we welcome feedback from teachers and schools regarding the 'NEMP Curriculum Map', the 'Teachers' Choice of NEMP Tasks' kit, and the 'NEMP Probe Study Findings'. Please contact us with any comments or suggestions regarding the usefulness of these resources.

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Details of the NEMP probe study and research programme are available on the NEMP website <<http://nemp.otago.ac.nz>>. NEMP probe study reports will be added in late 2003.

### New Zealand Council for Educational Research (NZCER)

Extra copies of the 'Teachers' Choice of NEMP Tasks' kit are available for purchase through the New Zealand Council for Educational Research for \$27 each.

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The 'NEMP Curriculum Map' may be accessed through the Ministry of Education website <[http://www.tki.org.nz/r/assessment/two/tools\\_e.php](http://www.tki.org.nz/r/assessment/two/tools_e.php)>.