Count Me In Too™

The Impact of Count Me In Too on Year 3 Basic Skills Test numeracy scores

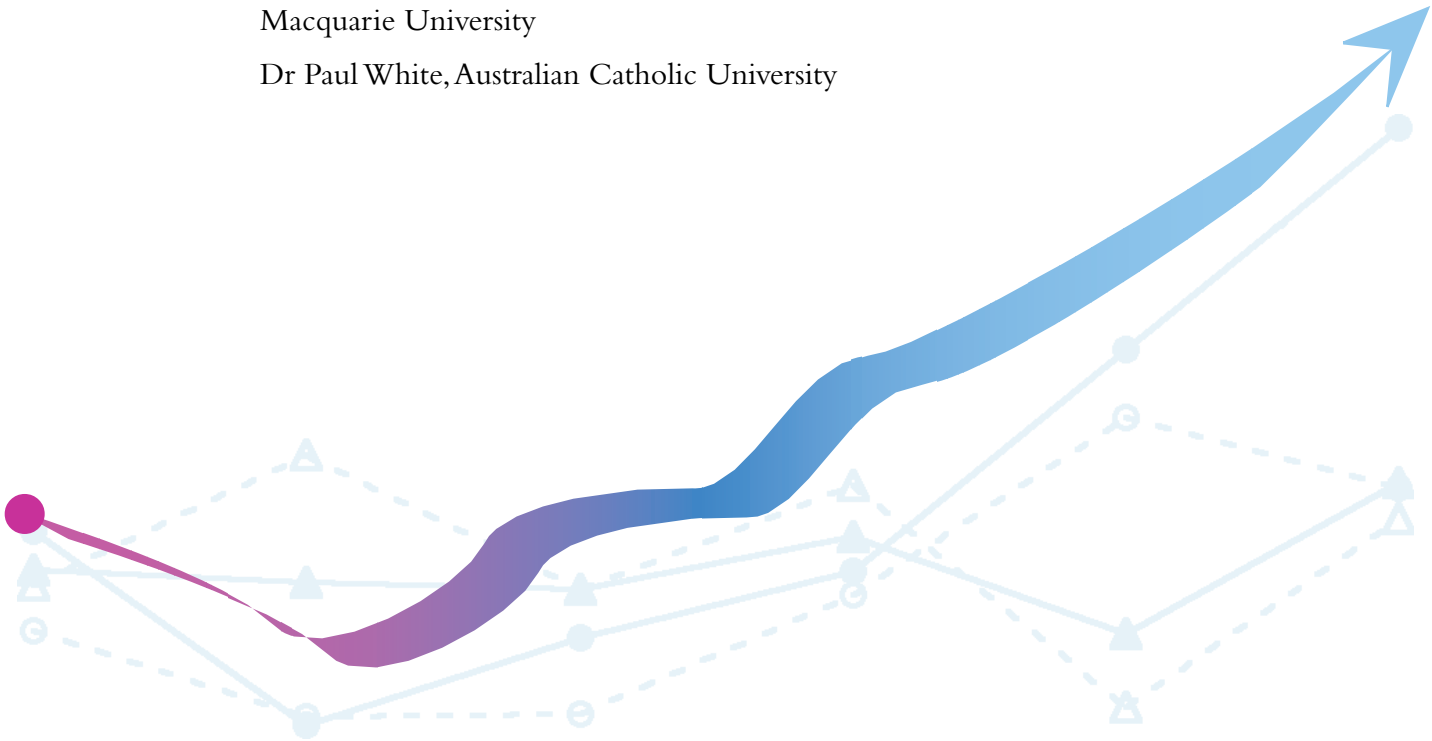
2001–2002 follow-up report

A report prepared for the New South Wales Department of Education and Training

by

Associate Professor Michael Mitchelmore, Macquarie University

Dr Paul White, Australian Catholic University



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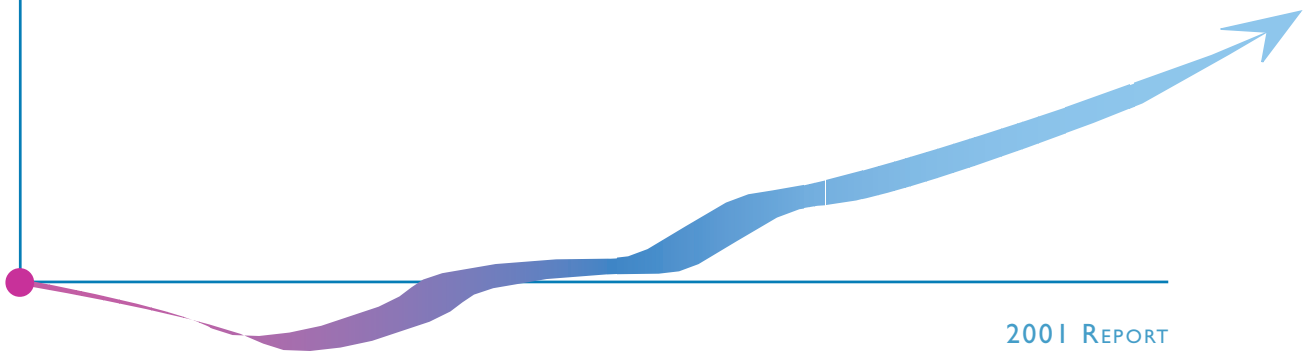

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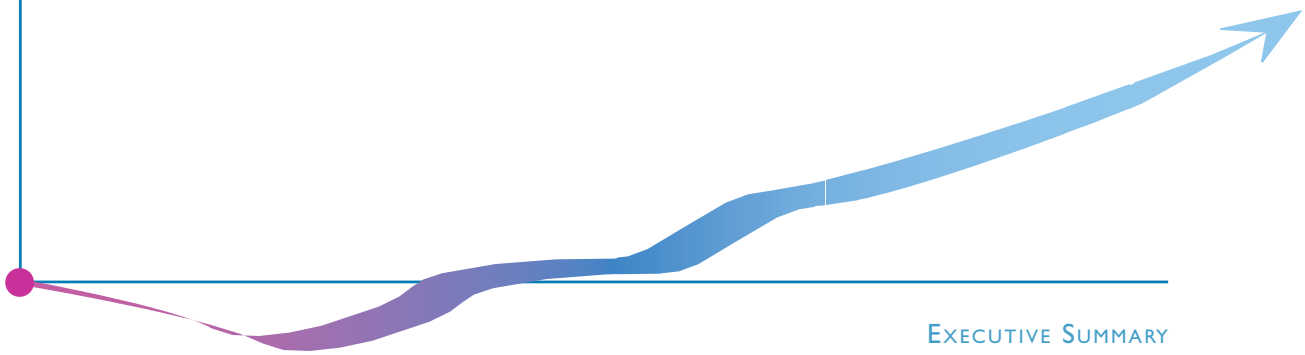
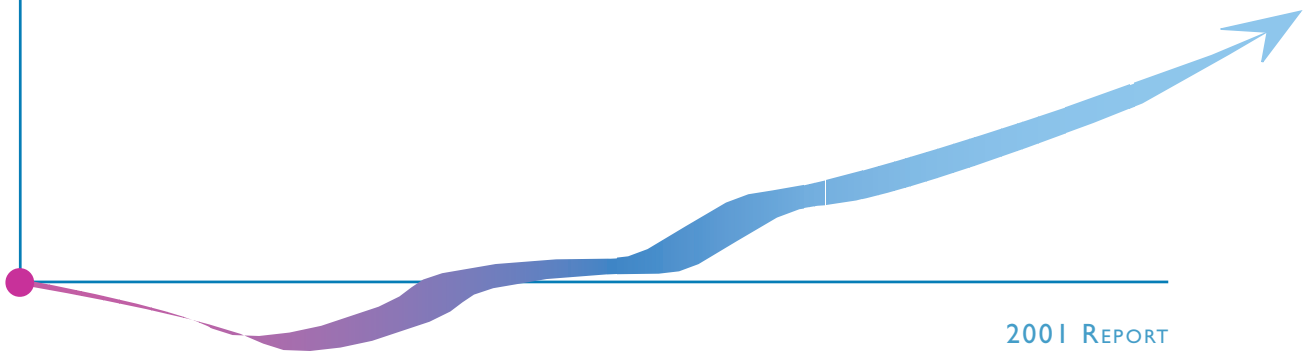




Executive Summary

This report presents the findings of an investigation into the *Count Me In Too* (CMIT) project operating in Department of Education and Training primary school across New South Wales. The investigation reported here was conducted in Term 4, 2001, in 71 schools from the 40 school districts. All of these schools had implemented CMIT consistently in all their K-2 classes for at least two years, using the CMIT Learning Framework in Number, to guide instruction in the Number strand of the mathematics syllabus.

The aims of the study were as follows:

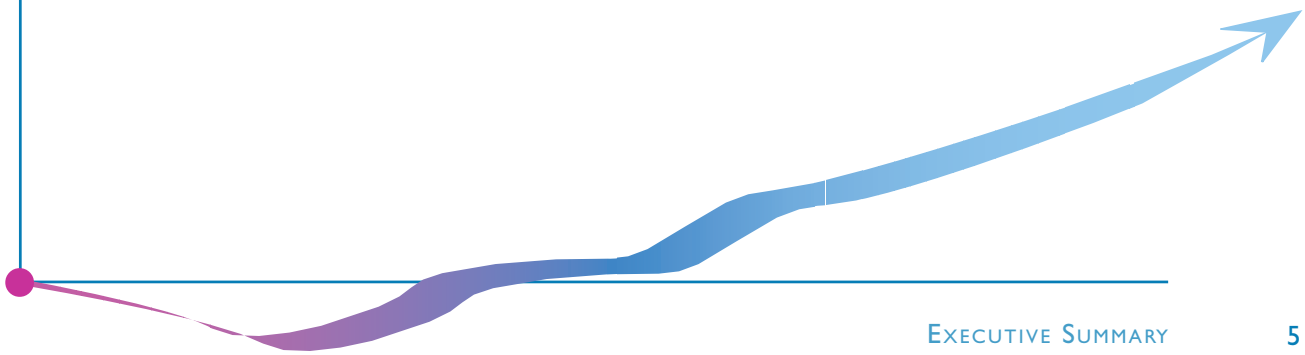
- to analyse trends in Year 3 Basic Skills Test (BST) numeracy scores over the period 1996–2001 in a statewide sample of CMIT schools
- to attempt to identify school factors related to improvement in BST results.

The initial investigation recommended that additional data be collected in 2002 to measure whether the gains in BST scores continued and the additional information is contained within the epilogue to the report.

Procedures

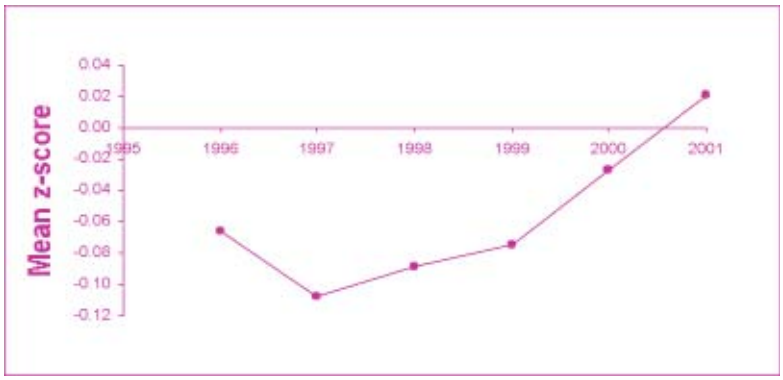
Consultants in each of the 40 districts in New South Wales nominated up to four schools which had implemented CMIT. The investigators then chose up to two representative schools in each district, giving a total of 71 schools. BST scores (Year 3 and 5, numeracy and literacy) were provided by DET for 1966–2001 for all these schools. The scores were provided in the form of z-scores, which give a measure of the mean score in each school relative to the mean in all DET schools in that year.

An appraisal instrument was also developed by the investigators. It comprised one section concerning background information about the school and sections devoted to the perceptions about CMIT of the principal, the CMIT co-ordinator, and the school staff involved in CMIT. The instrument was administered by the consultants.



Results

1. Mean Year 3 BST numeracy scores in the 71 schools increased steadily during the period from 1997 to 2001, as shown in the following graph. Over the same period, the schools in the sample were progressively implementing CMIT.



The increase in mean Year 3 BST numeracy scores from 1997 to 2001 (0.13) is about one-third of the variation between schools within each year. Statistically, the probability of such an increase occurring by chance is less than 5%, a standard benchmark for statistical significance. In comparison, the Year 3 literacy scores 1996–2000 showed an increase similar to the Year 3 numeracy scores; but, in 2001, where as the numeracy scores increased by 0.05 the literacy fell by 0.02. The Year 5 BST scores showed no discernible pattern in the period under review.

A supplementary analysis of the 2002 BST results showed that the improvement in Year 3 numeracy results, both absolutely and relative to the literacy scores, was maintained.

It seems reasonable to conclude that, on the average, implementation of CMIT in NSW public schools has caused a definite improvement in Year 3 BST numeracy performance.

2. The effect of CMIT on Year 3 BST numeracy scores was not even. The majority of schools showed an improvement after implementation, but several schools showed a poorer performance and of those who initially improved, not all sustained that improvement. Only four factors which might moderate the impact of CMIT could be identified in the present study:

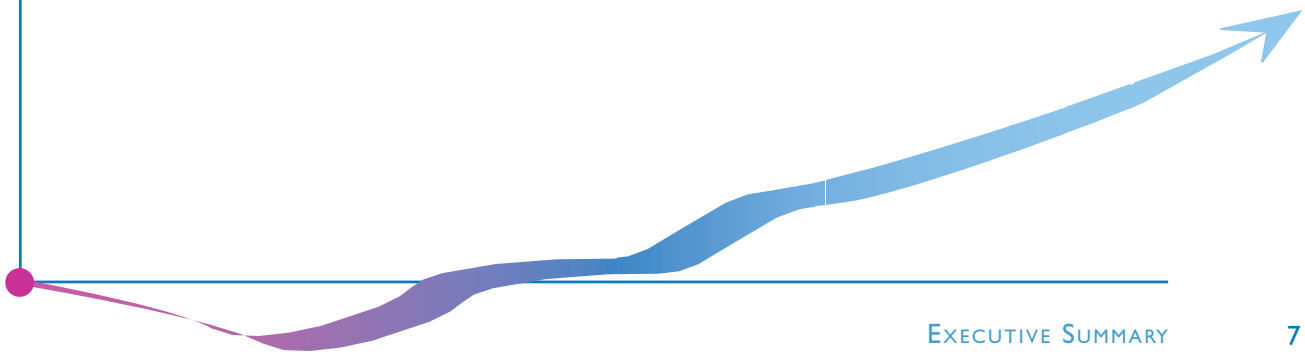
   - The teachers in schools which showed a substantial and sustained gain in Year 3 BST numeracy scores tended to focus less on resource development than did teachers in schools which showed no or only a temporary improvement.
   - The schools which showed a substantial and sustained gain in mean Year 3 BST numeracy scores had a previous history of poor BST numeracy performance.

- Schools with a large proportion of Aboriginal students tended to make higher than average gains even though schools with low Aboriginal enrolments, on average, performed consistently better in the BST.
- Schools with a small proportion of NESB students in this sample tended to make higher than average gains even though schools with high NESB enrolments, on average, performed consistently better in the BST.

3. A large proportion of CMIT teachers indicated that the most helpful aspect of CMIT has been the professional development they had received.

Conclusions

1. Year 3 BST numeracy performance has improved in schools in which CMIT has been implemented whereas these same schools have not shown any such increase in other BST results. However, not all schools implementing CMIT have improved their BST Year 3 numeracy results.
2. The most positive aspect of CMIT appears to be the professional development program. Implementation of CMIT often leads to a whole-school focus on numeracy, with accompanying structural changes that support numeracy teaching throughout the lower primary school. Schools where teachers focus on children's learning and appropriate strategies rather than on resources appear to have greater success in terms of BST scores. In short, the teacher is still the key to success in children's learning.
3. There is a strong suggestion that implementation of CMIT has coincided with substantial numeracy gains among some Aboriginal students. Perhaps the focus of CMIT on teacher understanding of individual children's learning, together with greater access to assistance from support staff, is providing a more appropriate teaching environment for these students. A more in-depth investigation is needed to follow up this conjecture.
4. Further study is also needed to compare the implementation of CMIT in schools with high and low proportions of NESB students. Has the CMIT program helped the English speaking background student "catch up" with the NESB student?



The Impact of *Count Me In Too* on Year 3 Basic Skills Test Numeracy Scores

Introduction

This report presents the findings of an investigation into the effectiveness of the *Count Me In Too* (CMIT) project operating in Department of Education and Training (DET) primary schools across New South Wales. The investigation reported here was conducted in Term 4, 2001, in 71 CMIT schools covering all but one of the 40 school districts. The aims of the study were to look at how these schools had performed in the Year 3 Basic Skills Test (BST) in numeracy before and after their implementation of CMIT and then to attempt to identify school factors which related to an improvement in their Year 3 BST numeracy results.

Background

Count Me In Too is an early number project initially designed by DET in 1996. CMIT is essentially a professional development program, not a direct provider of teaching strategies or materials. It aims to assist teachers better understand how children learn arithmetic by focusing on "children's mathematical strategies and their development from less sophisticated to more sophisticated" (Stewart, Wright, & Gould, 1998, p. 557). Teachers then make use of their increased awareness of how children learn to develop their own teaching strategies and materials.

Bobis and Gould (1999) found a positive impact of CMIT on the mathematical achievement of Kindergarten and Year 1 students. Bobis (2001) extended the 1999 study to explore the effect of CMIT in three schools whose BST results had undergone significant improvement subsequent to its implementation. The executive and staff at these three schools agreed that the improved BST results could be attributed to a myriad of factors which had helped build a positive school climate. Crucial factors critical to the effectiveness of CMIT were a whole-school focus on numeracy, on-going professional development, a supportive leadership team, and structural changes designed to assist implementation of the program.

Aim

The aim of the current study was to extend Bobis's evaluation to schools in all districts throughout New South Wales by:

- analysing trends in Year 3 BST performance numeracy scores over the period 1996–2001 of a statewide sample of CMIT schools, and
- identifying school contextual factors possibly related to an improvement in BST results.

Procedures

Overview

BST results in literacy and numeracy were collated for 71 schools involved in CMIT across New South Wales. In conjunction, consultants administered an appraisal instrument which provided information about the school's demographics and the staff's perceptions of the most important contextual factors which supported the implementation of CMIT. The investigators then analysed both sets of data.

Sample selection

Mathematics consultants in each of the 40 districts in New South Wales were asked to nominate up to four schools which had implemented CMIT, where "implemented" meant that:

- CMIT had been implemented consistently in K-2 classes since at least 1999
- all classes in these grades had worked with CMIT, and
- teachers had used the CMIT Learning Framework in Number to guide instruction in the Number strand of the mathematics syllabus.

From the responses submitted, we then chose up to two schools in each district in order to form what we believe is a representative sample of CMIT schools. In order to include all the districts that had submitted responses, the sampling restrictions were extended to include schools which had first implemented CMIT in 2000. Our sample selection procedure gave a total of 71 schools.

BST scores

Mean BST scores for each year in the period 1966-2001 (Year 3 and 5, numeracy and literacy) were provided by DET for all 71 schools in the sample. To compensate for variation in BST performance from year to year, the scores were provided in the form of z-scores. A z-score, a measure of relative performance, is a score expressed as the number of standard deviations from the State mean for that year. For example, a score of 0.50 is always 0.50 standard deviations above the State mean, regardless of what the mean and the standard deviation are in that year. In the chosen sample, school mean z-scores ranged from –1.2 to +1.4.

School Appraisal Instrument

A school appraisal instrument was drafted by the investigators, trialled by the DET, and then revised by the investigators. This instrument comprised one section concerning background information about the school and sections devoted to the perceptions about CMIT of the principal, the CMIT co-ordinator, and the school staff currently involved in CMIT.

The background information section was mailed to principals for completion. The remainder of the instrument was administered by the district consultants during visits to the schools we had selected from their district. Of the 71 schools in the sample, 65 submitted responses within the required timeframe.

Results

Overview

The BST data for the 71 schools were analysed to investigate:

- overall trends in BST numeracy and literacy in Years 3 and 5 between 1996 and 2001
- the relation between changes in the Year 3 BST numeracy results and the year of implementation of CMIT
- patterns of variation in the Year 3 BST numeracy results, and
- school factors which coincided with improved Year 3 BST results.

Overall BST trends

In the 71 schools, the school mean scores on the four BST scales (Years 3 and 5, numeracy and literacy) over the period 1996–2001 varied from -1.21 to 1.38 and the average annual standard deviation was 0.36, with little variation from year to year or across the four scales.

Figure 1 shows the overall mean scores on each scale from 1996–2001. The points on the graph represent the mean z-score of the 71 schools in the sample for each year.

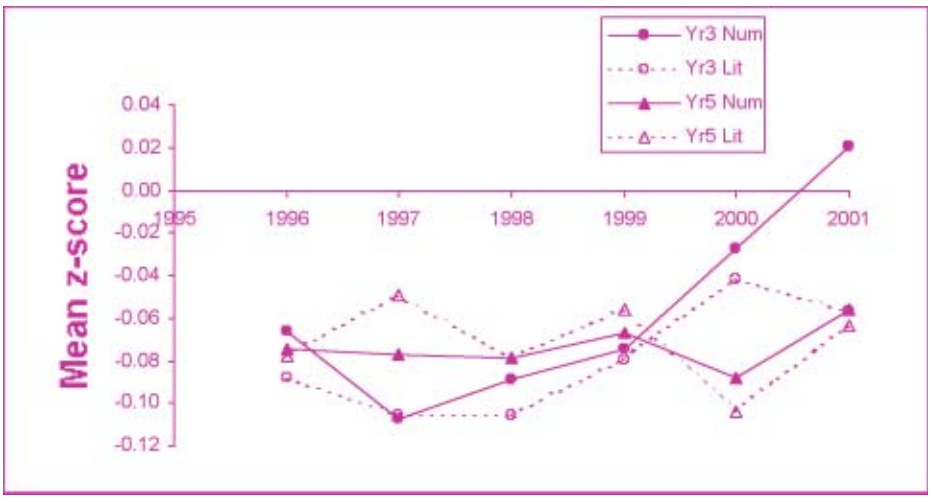


Figure 1: Mean BST scores 1996–2001 in sample schools

The graph shows that schools in this sample performed, on average, below the State mean throughout the period. For example, in 1996 only 26 of the 71 schools scored above the State mean for Year 3 numeracy. There was only one exception: the Year 3 numeracy score in 2001. In fact, the Year 3 numeracy score increased steadily from 1997 to 2001, with a particularly dramatic increase between 1999 and 2001. The size of this increase (0.13) is large in relation to the average standard deviation in the Year 3 numeracy scores in each of the years 1997–2001 (0.39). Statistically, the probability of such an increase occurring by chance in a sample of 71 schools is less than 5%, a standard benchmark for statistical significance. In comparison, the Year 3 literacy scores 1996–2000 showed an increase similar to the Year 3 numeracy scores; but, in 2001, whereas the numeracy scores increased by 0.05 the literacy scores fell by 0.02. The Year 5 BST scores showed no discernible pattern in the period under review.

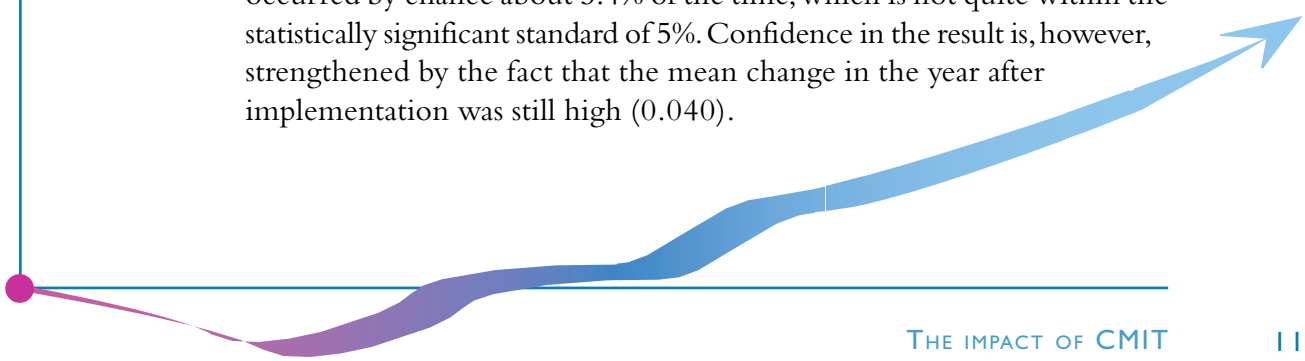
The period 1997–2001 coincides with the time the 71 schools were progressively implementing CMIT: 3 schools in 1997, 23 in 1998, 35 in 1999, and 10 in 2000. It seems reasonable to conclude that the improvement in Year 3 BST numeracy scores have, on average, increased substantially in CMIT schools in New South Wales as a whole.

For the remainder of this paper, the terms "BST score", "BST performance", and "BST results" refer only to the Year 3 numeracy score.

BST Results and the Implementation of CMIT

In order to investigate the relationship between trends in BST performance and the implementation of CMIT, we first need to find when, in relation to the year CMIT was introduced, the greatest change in BST scores took place. Accordingly, annual changes in BST scores within each school were calculated for a variety of dates: the year when CMIT was first introduced for all classes in at least one year, the year CMIT was first implemented in all classes in Years K–2, the year the first CMIT students took the Year 3 BST, the year CMIT was first implemented in Year 3, the year after each of these events, and so on. Mean change scores for each of these dates across all schools were then examined.

The major change was found to occur in the first year of CMIT implementation—either in all the classes in at least one year or fully in Years K–2. The mean change was an increase of 0.057. By contrast, the increase in the first year that Years K–2 CMIT students sat for the BST was much lower (0.030). There was even a small mean decrease (-0.014) in the year CMIT was first introduced in Year 3 (not all schools). Note that even a mean change of 0.057 or larger could have occurred by chance about 5.4% of the time, which is not quite within the statistically significant standard of 5%. Confidence in the result is, however, strengthened by the fact that the mean change in the year after implementation was still high (0.040).



Based on these calculations, changes in BST scores will be assessed over the first and second years of CMIT implementation.

Patterns of Change in BST Scores

Although Figure 1 indicates a steady increase in Year 3 BST numeracy scores between 1997 and 2001, it does not show how individual schools performed. The annual change in this score varied wildly from school to school, ranging from a decrease of 0.79 to an increase of 1.01. The standard deviation of the change scores in each year averaged 0.30, so we decided to use this figure as a benchmark for above-average change. An increase or decrease of more than 0.30 in a school's BST scores between any two years was regarded as indicating an educationally significant improvement or deterioration in that school's numeracy performance.

It would be expected that schools would show a jump in BST score at the time of CMIT implementation, from a generally low level before implementation to a generally higher level after implementation. In fact, very few schools showed this pattern. We were, however, able to identify three groups of schools that showed a significant change in BST score at or about the time of CMIT implementation and a clear pattern of scores before and after that time:

Group A: Sustained improvement

These schools showed an increase of at least 0.30 in the year of implementation or over that year and the following year, and this gain was sustained at or above the new level over the next two or three years.

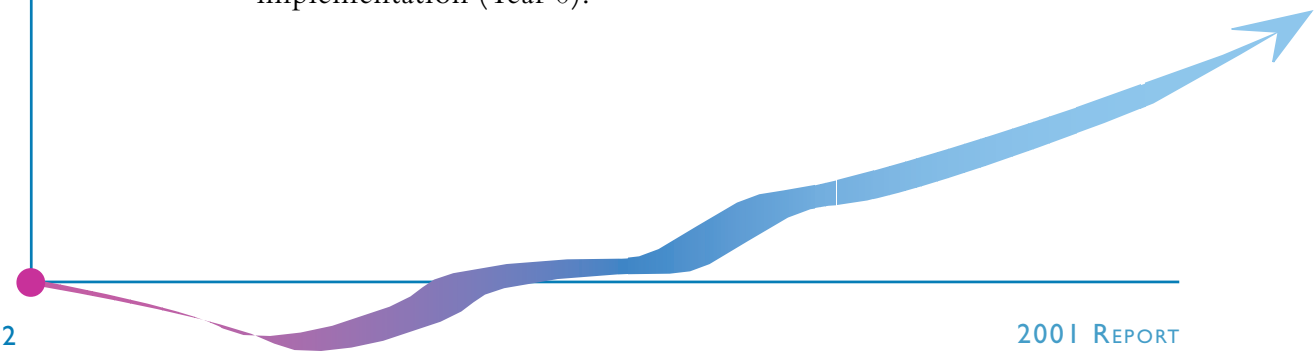
Group B: Unsustained improvement

These schools showed an increase of at least 0.30 in the year of implementation or over that year and the following year, but fell back to the old level over the next two or three years.

Group C: Deterioration

These schools showed a decrease of at least 0.30 in the year of implementation or over that year and the following year, and remained below the old level over the next two or three years.

Each of these three groups contained five schools. Their mean scores relative to the year of implementation are shown in Figure 2. It will be seen that all three groups showed a significant change in BST score between the year before implementation (Year -1) and the year of implementation (Year 0).



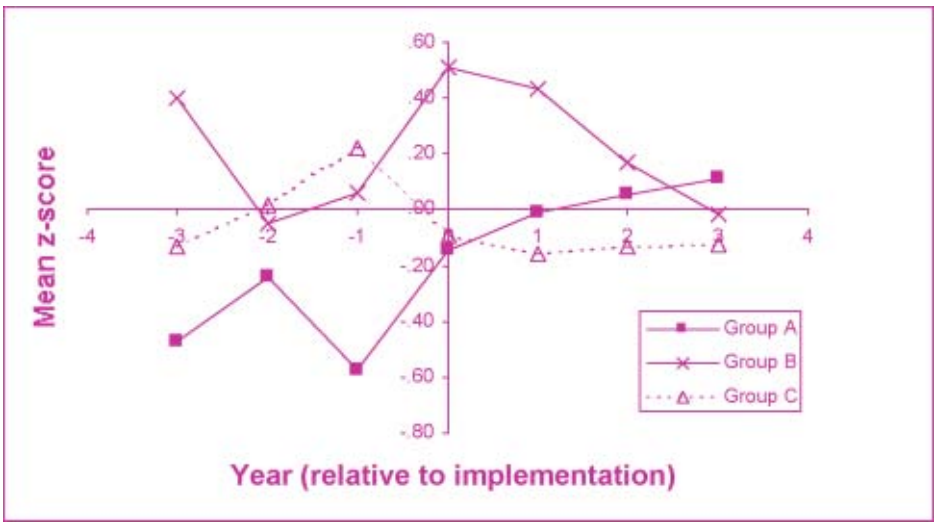


Figure 2: Mean scores of Groups A, B, and C relative to the year of implementation

School Factors Related to BST Changes

In order to investigate school factors which might be related to changes in BST scores at or about the time of CMIT implementation, it was decided to restrict the initial analysis of responses to the School Appraisal Instrument to the fifteen schools where a pattern of change could be clearly discerned.

In the fifteen schools, the principal, the CMIT coordinator, and a total of 67 CMIT teachers (19 from Group A, 22 from Group B and 26 from Group C) responded to the appraisal instrument.

Staff perceptions (internal factors)

The teachers in all fifteen schools were consistent in their identification of the most important factors that had assisted them in implementing CMIT. The three main factors selected were:

- professional development (72%);
- more explicitly focused teaching (65%);
- better understanding of how children learn mathematics (63%).

The last two points are closely related, several respondents indicating that their more focussed teaching stemmed from their better understanding of children's learning. For example:

> It has given me a better understanding of how children learn maths and my teaching focus has become more explicit.

Professional development was also mentioned by 79% of the principals and 100% of the coordinators as one of the three main processes they went through in implementing CMIT.

There were some differences between the three groups of schools in their judgements as to the main processes followed in implementing CMIT:

- *Organisational change* was mentioned more often by the school principals in Groups A and B (7 out of 9 responses) than in Group C (1 out of 5). However, almost all CMIT coordinators in all three groups mentioned organisational change (as did the coordinators in most of the schools not in these three groups). The respondents felt that organisational change was a natural consequence of a total school focus on numeracy and went hand in hand with an increased emphasis on professional development. For example:

  > The changes in maths teaching since the introduction of CMIT have been supported because of the time given to plan collaboratively and to take part in professional development.

- *Resource development* was mentioned less often by the CMIT coordinators in Groups A and B (5 out of 10) than in Group C (4 out of 5). A similar difference was found in teacher comments (25% of teachers in each of Groups A and B, compared to 70% in Group C). Many teachers from schools not in Groups A, B or C also indicated a stronger emphasis on resource development than teachers from Group A schools. Examples of Group A responses are:

  > Children have more group work and less textbook orientated maths.
  >
  > CMIT has been a breath of fresh air for the children and the staff. We are developing mathematical thinking rather than rote learning.
  >
  > I've been working with CMIT for five years and so it's hard to tell what I've incorporated from CMIT and what I've always done.

  Examples of responses from other schools are:

  > CMIT is a great program which needs to be supported by the Department through in-servicing and resources.
  >
  > It is a challenge for our school to embrace the CMIT approach rather than view it as a "one off" project. Unfortunately, many of our teachers rely heavily on textbooks.
  >
  > A main benefit is the establishment of resources which can be accessed quickly.

- *Provision of release time* (particularly for student assessment) and general assistance from support staff was mentioned more

often by the teachers in Group A (30%) than in Groups B and C (10%). For example:

> Support staff to work with a group was a great help.
>
> Being released for testing made a big difference.

These results may be regarded as speculative because they are primarily based on the responses from a small number of schools. However, the response rate of 4.5 teachers per school, the fact that the fifteen schools comprise a mixture of schools with differing degrees of success in the BST, and the fact that comments from across the whole sample support the results suggest that the results are reliable. In particular, they indicate the value placed by:

- all staff on professional development and understanding children's learning
- Group A teachers on the provision of release time and the assistance of support staff, and
- resource development by teachers not in Group A.

Implications of these results will be discussed below.

Background (external) factors

From the BST results and responses to the Background Questionnaire, five factors were identified which seemed to differentiate the three groups of schools.

- *Initial scores.* The BST score in the year before CMIT implementation was generally lower in Group A (mean -0.57) than in Groups B (mean 0.06) and Group C (mean 0.22).
- *Disadvantage.* Four out of the five schools in Group A were disadvantaged, compared to only three out of ten in Groups B and C combined.
- *Percentage of Aboriginal students.* The average percentage of Aboriginal students in Group A was 20%, compared to 2% in Group B and 4% in Group C.
- *Percentage of NESB students.* The average percentage of NESB students was 4% in Group A, compared to 20% in Group B and 38% in Group C.
- *Teacher turnover.* Teacher turnover in Years K-3 since the first implementation of CMIT was lower in Group A (35%) than in Group B (40%) and Group C (50%). However, there were no differences in school size or student turnover.

Again, the small numbers of schools involved (less than a quarter of our sample) render these findings speculative. To validate them, an analysis of these background factors within the entire sample was undertaken.

Further Analysis of Background Factors

For the whole-sample analysis, we used the change in BST score from the year before first implementation to the year after first implementation (i.e., over the first two years of implementation) as our measure of BST change coinciding with CMIT. We shall refer to this two-year change as a school's *implementation gain*. Unlike the previous analysis, we shall now ignore the question of whether any change at the time of implementation was sustained in subsequent years.

The implementation gain in the 71 schools ranged from -0.66 to 1.02, with a mean of 0.10; 22 schools showed a significant increase (> 0.30) and 11 showed a significant decrease (< -0.30). The mean gain of 0.10 is consistent with the increase of 0.13 in Year 3 BST numeracy scores between 1997 and 2001, as shown in the graph in Figure 1. Note, however, that the gain of 0.10 cannot be determined from Figure 1. The graph shows BST scores for each calendar year, whereas the implementation gain occurs in years which vary from school to school.

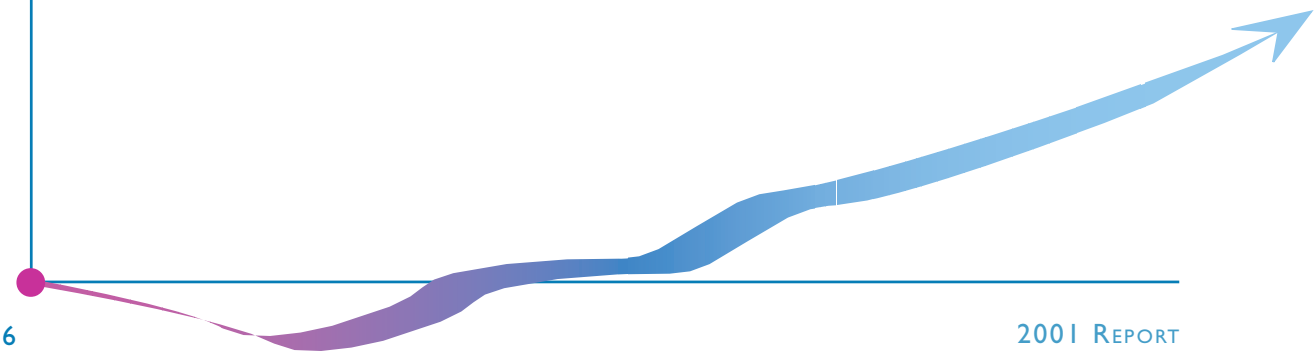
Data on background factors was only available for 65 of the 71 schools in the sample.

Initial scores

We have seen that Group A schools had very low BST scores before CMIT implementation. Their better performance in comparison to Group B and Group C schools could therefore have been a form of regression to the mean. Group A schools may have improved because they were weak to start with, not because CMIT was more effective in those schools.

To investigate this possibility, we found every school's BST mean score in 1996–1997 (before most schools had started to implement CMIT). We then formed a further group (called Group X) consisting of the five lowest schools not already included in groups A, B, or C. The 1996–1997 mean score was -0.64 in Group X compared to -0.57 in Group A, confirming that these two groups of schools were initially very similar in terms of BST scores. However, the mean implementation gain was much greater in Group A: 0.56 compared to -0.02 (a small decrease) in Group X.

This result shows that not all schools with initial low BST scores improved and that the improvement observed in Group A schools was more than just a regression to the mean. Lower initial scores may still be a factor in a school's improvement in BST performance, but this factor must be viewed in conjunction with other influences.



Disadvantage

In the sample, 25 of the schools were disadvantaged and 40 were not. The mean implementation gain was 0.11 in the disadvantaged schools and 0.10 in the others. We can reasonably conclude that, contrary to first indications, disadvantaged CMIT schools did not, on average, show a greater improvement in BST results than schools which were not disadvantaged.

Percentage of Aboriginal students

The relation between implementation gain and the percentage of Aboriginal students in a school is shown in Figure 3.

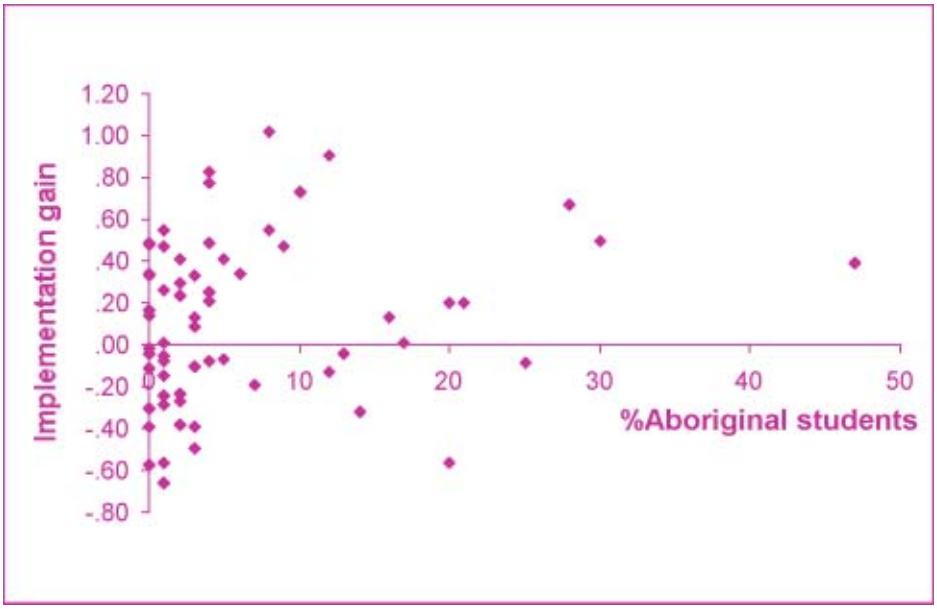


Figure 3: Relation between implementation gain and percentage of Aboriginal students

In schools with a low percentage of Aboriginal students (5% or less), the implementation gains were scattered on both sides of zero. Some schools showing substantial increases and others showing substantial decreases. The remaining schools show a strange pattern. Schools with 8–14% Aboriginal students tended to have above-average gains, as did those with more than 25% Aboriginal students; but gains in schools with a 16–25% Aboriginal enrolment were scattered on both sides of zero.

Taking 5% as the cut-off between low and high Aboriginal enrolment, we obtain the comparison shown in Table 1. The mean implementation gain in schools with a high Aboriginal enrolment was four times that of schools with a low Aboriginal enrolment, and double that of the entire sample. The probability of such a difference occurring by chance is less than 3% (statistically significant).

Aboriginal enrolment	N	Mean gain	Significance
Low	46	0.05	
			0.028
High	19	0.20	

Table 1: Mean implementation gain as a function of Aboriginal enrolment

The above results provide information about the gains made by the two groups, but do not show anything about the actual relative performance in the BST of each group. Figure 4 shows the comparison of the mean z-scores for sample schools with low and high Aboriginal enrolments.

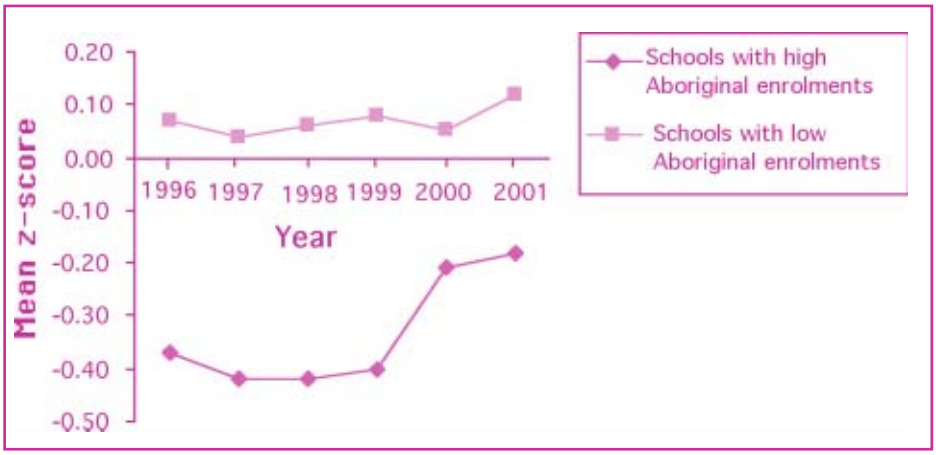


Figure 4: Mean BST scores 1996-2001 in sample schools with high and low Aboriginal enrolments

This graph shows that the sample schools with low Aboriginal enrolments performed consistently higher in the BST, but that since 1999 the schools with higher Aboriginal enrolments have closed the gap. This result is consistent with the higher implementation gain for the latter group.

These results strongly suggest that, on average, CMIT schools with high Aboriginal enrolments have improved their BST results much more than schools with low Aboriginal enrolments, even though the latter group have maintained higher scores. We shall discuss below some possible explanations of this result.

Percentage of NESB students

The relation between implementation gain and the percentage of NESB students in a school is shown in Figure 5.

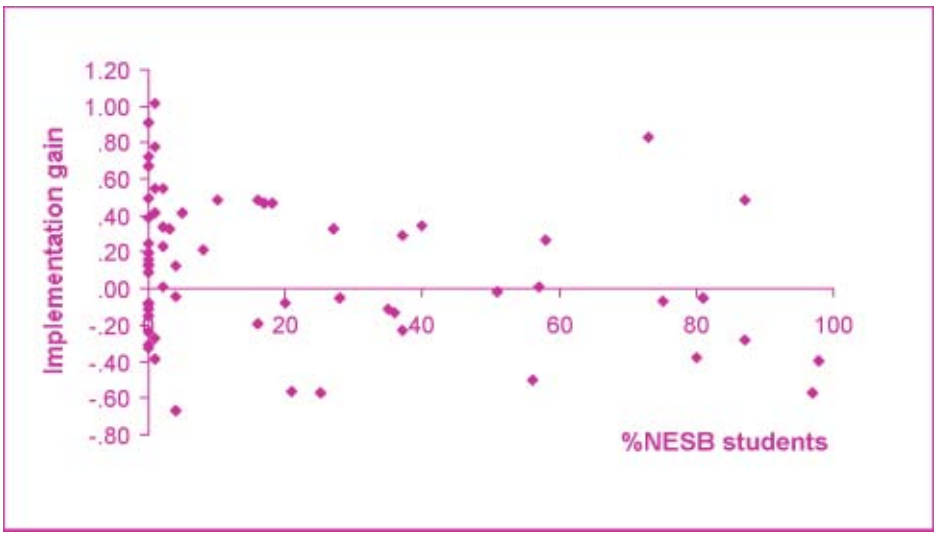


Figure 5: Relation between implementation gain and percentage of NESB students

A clear downward trend is visible in Figure 5: With a few exceptions, the higher the percentage of NESB students, the lower the implementation gain. Using 5% as the cut-off between low and high NESB enrolment, we obtain the comparison shown in Table 2.

Table 2 shows that the mean implementation gain in low-NESB schools was much greater than that in high-NESB schools, and nearly double the mean implementation gain in the entire sample. By contrast, the implementation gain for high-NESB schools was close to zero. The probability of such a difference occurring by chance is about 5% (just significant).

NESB enrolment	N	Mean gain	Significance
Low	36	0.18	
			0.050
High	29	0.02	

Table 2: Mean implementation gain as a function of NESB enrolment

The above results provide information about the gains made by the two groups, but do not show anything about the actual relative performance in the BST of each group. Figure 6 shows the comparison of the mean z-scores for sample schools with low and high NESB enrolments.

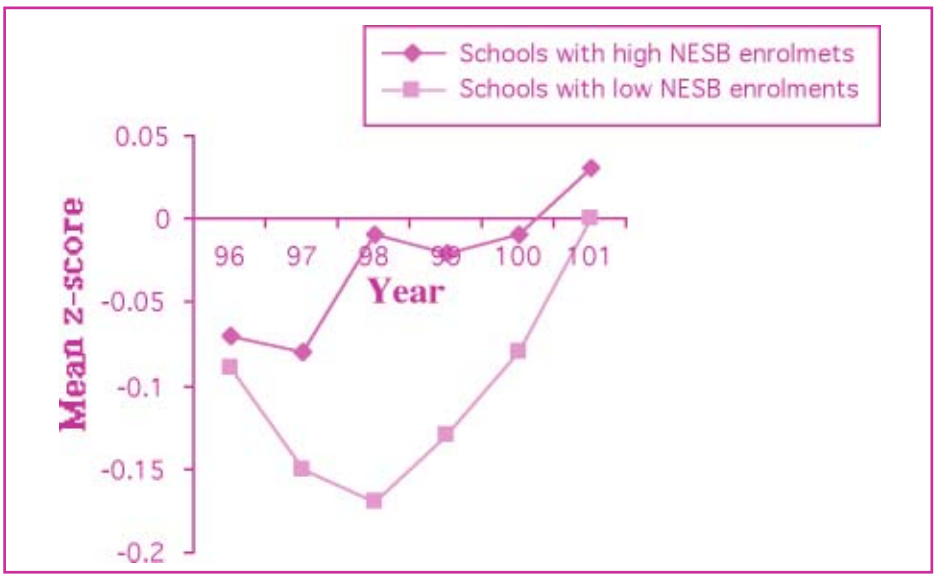


Figure 6: Mean BST scores 1996-2001 in sample schools with high and low NESB enrolments

This graph shows that the sample schools with high NESB populations performed consistently higher in the BST, but that since 1998 the schools with low NESB populations have closed the gap to almost parity. This result is consistent with the higher implementation gain for the latter group.

These results suggest that, on average, CMIT schools with low NESB enrolments have improved their BST results much more than schools with high NESB enrolments, even though the latter group has also improved and maintained higher scores. We shall discuss below some possible explanations of this result.

Teacher turnover

The relation between the implementation gain in a school and the percentage of K-3 teachers who had left the school since the first implementation of CMIT is shown in Figure 7.

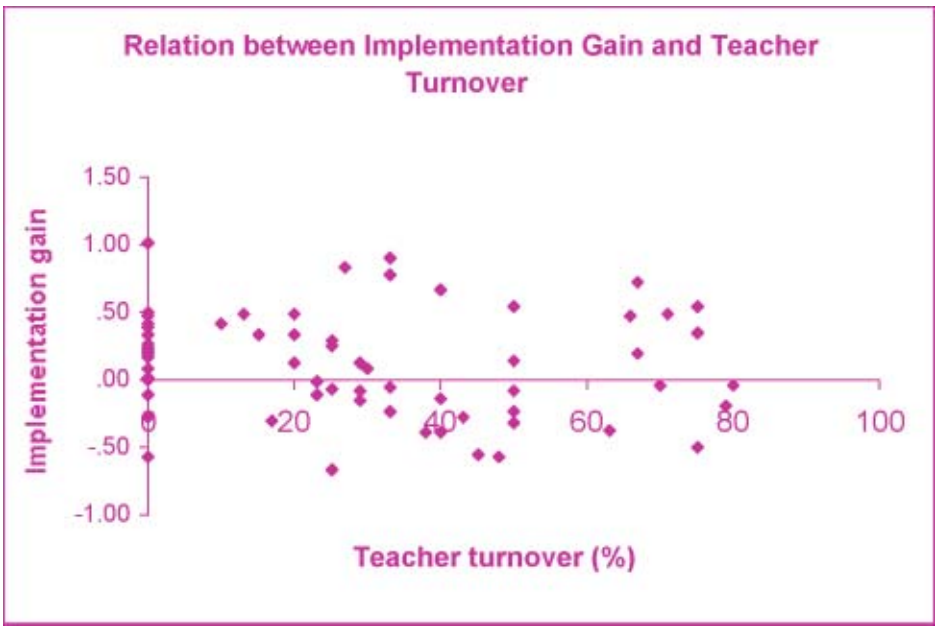


Figure 7: Relation between implementation gain and teacher turnover

As can be seen from Figure 7, the implementation gain was positive in most of the schools where all the teachers who had implemented CMIT were still at the school. In the other schools, positive and negative gains were more evenly distributed. A statistical comparison between these two types of school is reported in Table 3.

Teacher turnover	N	Mean gain	Significance
Zero	18	0.18	
			0.180
10% or more	47	0.08	

Table 3: Mean gain for schools depending on percentage of teacher turnover

Table 3 shows that the mean implementation gain in the schools with no teacher turnover was much higher than in the other schools and almost double the mean implementation gain in the entire sample. However, the probability of such a difference occurring by chance is 18% (not statistically significant). In other words, the difference observed in the present sample does not constitute convincing evidence that a similar difference would be found across all CMIT schools.

Discussion

The results of this evaluation show that, overall, CMIT has coincided with a definite improvement in Year 3 BST numeracy scores (Figure 1). By comparison, the Year 3 literacy scores showed an increase comparable to that of the numeracy scores up to 2000 but then diverged markedly in 2001. It should be noted that the increase in BST numeracy scores from 1997 to 2001 was not huge: For a student near the middle of the range, it corresponds to an increase in percentile rank of about 5%.

The most positive aspect of CMIT appears to be the emphasis on professional development provided to help teachers better understand how children learn mathematics, rather than on the more traditional idea of providing a teaching package. The fact that the program also often leads to a whole school focus on numeracy and accompanying structural changes which support numeracy teaching is highly valued. The significance of a professional development focus, as opposed to the mere development of teaching resources, is supported by two findings:

- The main gains in BST scores occur at or soon after implementation and not when the students reach Year 3. The CMIT effect seems to be on the teaching of numeracy in the lower primary school as a whole and not only on students exposed to CMIT.
- Teachers in the most successful schools tend to focus less on resource development as one of the most important parts of the program than do those teachers in less successful schools.

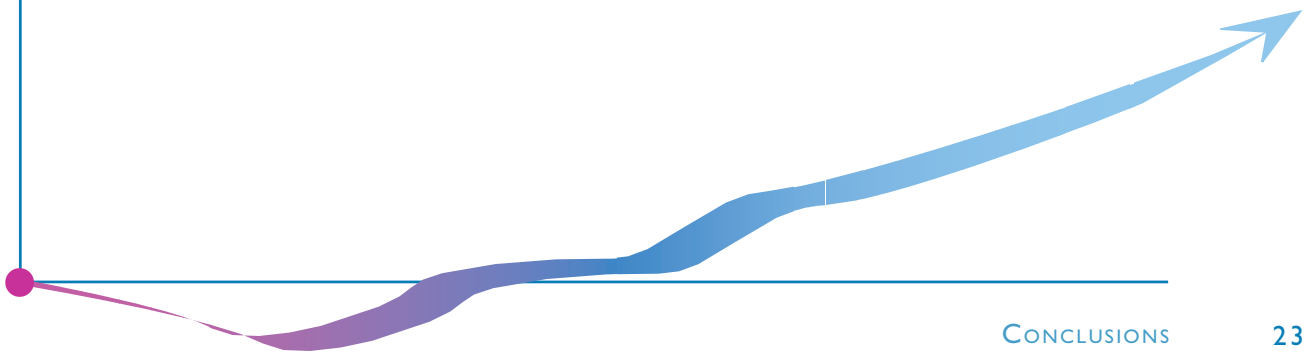
The improvement in Year 3 BST numeracy scores in CMIT schools was not even. The majority of schools showed an improvement after implementation, but several schools showed a poorer performance and of those who initially improved, not all sustained that improvement. Hence, as Bobis (2001) noted, there must be a variety of factors that affect how CMIT is implemented and thus moderate its impact on BST results. In this study, we have been unable to identify any specific within-school contextual factors related to how a school implements CMIT. However, we have identified three background factors which do appear to play a role:

- There is a potential for schools with a poor history of BST performance to improve their results substantially. However, CMIT is no automatic guarantee of such improvement. The school must also provide the appropriate environment to support its effective implementation.
- CMIT has coincided with a significant improvement of BST results in some schools in the sample with a high proportion of Aboriginal students. The reasons for this improvement are not clear and must be moderated by the fact that schools with low Aboriginal enrolments still performed better in the BST. Perhaps the improvement for schools with a high proportion of Aboriginal students is related to greater access to assistance from support staff,

together with the focus of CMIT on teacher understanding of individual children's learning, has led to a more appropriate teaching environment for Aboriginal students. In traditional whole-group teaching, their individual needs may not have been so well addressed.

- Schools with a small proportion of NESB students tended to make higher gains than average on the BST even though schools with high NESB enrolments performed, on average, consistently better. Has the CMIT program helped the English speaking background student "catch up" with the NESB student?

Although disadvantaged schools frequently have a history of poor BST performance or large proportions of Aboriginal or NESB students, economic disadvantage of itself was not a factor in BST result changes in CMIT schools.



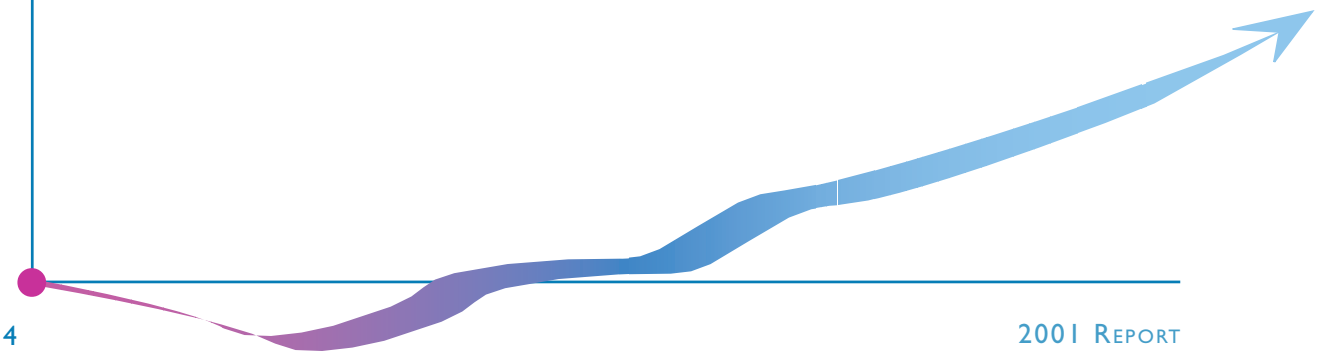
Conclusions

CMIT aims to assist teachers to focus their teaching so that students better understand mathematics. It does not aim specifically to improve students' performance on written tests such as BST numeracy test. However, the average gains in Year 3 BST numeracy scores recorded in 1997–2001 suggest that CMIT is indeed having an effect on BST performance and also arguably on students' understanding. The analysis of BST scores carried out for this study should be repeated to ascertain whether this effect continues or even strengthens as CMIT is introduced into more and more schools and into the upper primary school.

The finding that many, but by no means all, schools with substantial Aboriginal enrolments appear to benefit from CMIT is noteworthy. Qualitative case studies of both successful and unsuccessful CMIT schools with higher Aboriginal enrolments (similar to that conducted by Bobis, 2001) are needed to provide more in-depth information about the specific school factors which may be responsible for the positive effects of CMIT on some Aboriginal students.

CMIT schools with high NESB enrolments have not, on average, improved as much on the BST as CMIT schools with low NESB enrolments. The reason for this result is not clear. It could be that NESB students are doing well anyway and continuing to do so, while the CMIT program is assisting English speaking background students to improve their performance in the BST exam. Qualitative case studies in both improving and non-improving schools with high NESB enrolments could be most valuable in identifying factors which moderate the effectiveness of CMIT with NESB students.

This study has confirmed that introducing CMIT does not automatically guarantee improved BST results. The manner in which the whole school embraces the program and focuses on children's learning and appropriate teaching strategies rather than on resources, appears to be a key factor in bringing about success. In short, the teacher is still the key to success in children's learning.



Epilogue

Since the above report was written, data on the 2002 BST results have become available. Two aspects of these results were analysed to determine whether the trends identified in this report were maintained: the change in Year 3 numeracy scores and the comparison with Year 3 literacy scores. Table 4 shows the corresponding z-scores for the years 2000-2002 for the 71 CMIT schools in the sample.

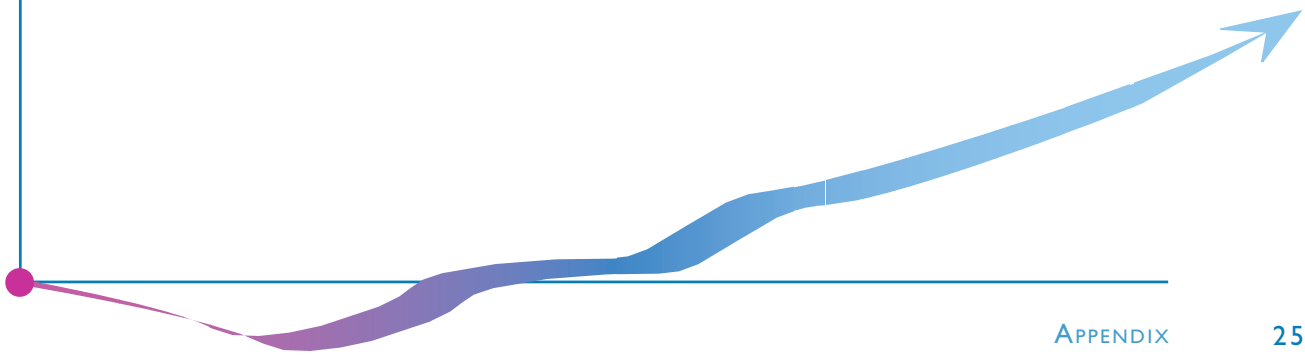
	2000	2001	2002
Year 3 numeracy score	-0.026	0.024	-0.015
Year 3 literacy score	-0.038	-0.055	-0.085
Significance of difference	0.630	0.001	0.002

Table 4: School mean Year 3 BST z-scores

The 2002 Year 3 numeracy score was 0.039 below its 2001 level, but this was still above the 2000 level. However, some variation is to be expected from year to year, and the variation in this case is similar to the general pattern of variation in BST results (see Figure 1). The data are consistent with the 71 schools having reached, on average, a stable level of achievement roughly equivalent to the State average.

Variations from year to year arise because the data come from different cohorts of students. A more reliable measure of the changes in the Year 3 numeracy score may be obtained by comparing them to the Year 3 literacy scores, which were obtained from the same cohorts. Table 4 indicates that the substantial growth of the numeracy score relative to the literacy score in 2000-2001 was maintained in 2002, and that the difference was significant.

We conclude that the 71 schools in the sample maintained in 2002 the higher level of Year 3 BST numeracy scores which followed their implementation of CMIT. The inference is that CMIT is having a positive effect on Year 3 BST numeracy performance in New South Wales.



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