FOR THE SAKE OF THE CHILDREN: MAINTAINING THE MOMENTUM OF PROFESSIONAL DEVELOPMENT

Janette Bobis

University of Sydney, Australia

This paper reports the survey findings from a study designed to evaluate the impact of a large-scale professional development program for primary mathematics teachers. While a number of aspects of the program were considered potential agents for promoting on-going learning in teachers, others emerged as significant barriers to its maintenance. What seems to emerge as a driving force of the program was the perception by teachers that it would ultimately benefit the children.

There is now an extensive body of research-based literature concerned with what makes professional development of teachers effective. This literature provides guidance for the establishment of good quality professional development (Loucks-Horsley, Hewson, Love, & Styles, 1998). Key concerns for teacher professional development programs have also been identified. These include the desire for sustained teacher change and on-going learning. Despite the extent of the literature and the identification of such key concerns, there is relatively little systematic research concerned with what ongoing teacher learning looks like and how it can be achieved (Garet, Porter, Desmimone, Birman & Yoon, 2001). Some of these concerns have started to be addressed by a growing body of literature surrounding the Australian numeracy project, Count Me In Too (e.g. Bobis & Gould, 2000, Mitchelmore & White, 2003, Wright & Gould, 2002). The identification of factors responsible for maintaining the momentum of this large-scale professional development program for primary mathematics teachers was an overarching concern of the study reported here.

BACKGROUND AND KEY FEATURES OF COUNT ME IN TOO

> What is happening in mathematics teaching in New South Wales' public schools is truly exciting. New South Wales is an international leader in its widespread translation of mathematics education research into practice.
>
> (Cobb, 2001)

Count Me In Too (CMIT) is a research-based professional development initiative of the government school system in the state of New South Wales (NSW), Australia. This large school system provides for a population of about seven million people, including approximately 1,700 primary schools. CMIT was piloted in 1996 in just 12 schools across the state under the name 'Count Me In', and has progressively grown in reputation and implementation with over 1600 primary schools having implemented the program by 2003. It has also been extremely influential on

Proceedings of the 28th Conference of the International Group for the Psychology of Mathematics Education, 2004 Vol 2 pp 143–150

numeracy programs of other states in Australia and has been adopted nationally in New Zealand (Thomas & Ward, 2001).

From its conception, CMIT has involved the collaboration of government school system leaders and university-based researchers in mathematics education. The two main aims of the program are to professionally develop teachers so that they better understand young children's mathematical development (Stewart, Wright & Gould, 1998), and the enhancement of the mathematical achievement of young children. The emphasis of CMIT is on the advancement of children's mathematical solution strategies.

The CMIT model of professional development emphases long-term classroom-based learning and aims to establish a community of learners among four linked groups—"academic facilitators, consultants, teachers and students" (NSW Department of Education and Training, 2003, p. 2). To achieve this, 40 mathematics consultants working in designated school districts across the state, work with a group of teachers from a small number of schools over an extended period of time—normally 10 to 20 weeks. During this period, consultants support teachers to acquire skills in diagnostic interviewing, and develop their understanding of a research-based Learning Framework in Number (henceforth referred to as the *Framework*) (Wright, 1998). The *Framework* is used by teachers to not only identify the level of development each child has attained but provides instructional guidance as to what each student needs to work towards. Further details about the *Framework* and the diagnostic interview can be obtained from Wright (1998).

AIM OF THE CURRENT STUDY

Initially, number knowledge in the first three years of school (Kindergarten to Year 2) was the main focus of CMIT and systematic research-based evaluations have indicated that the program has been successful (e.g. Bobis, 2001; Mitchelmore & White, 2003). However, as the program moved into the subsequent years of schooling (Years 3 and 4), the nature of support provided by consultants changed and government administrators showed concern for sustaining the changes to classroom practice that had occurred and for maintaining the momentum of the program's implementation. The major aim of the study reported here was to evaluate the program's implementation in Year 3 and 4 classrooms.

METHOD

The study gathered data from two different sources, namely the mathematics consultants and Year 3 and 4 teachers who had been involved in the CMIT program. Information was collected via a teacher survey, interviews and informal discussions with teachers and mathematics consultants. Teacher interviews and informal discussions were conducted as a result of three schools being selected for case study. Only data from the teacher surveys will be referred to in this paper.

Materials and procedures

The prime purpose of the teacher survey was to gain information about the perceived strengths and weaknesses of CMIT from a range of Year 3 and 4 teachers. It was a 3-page document comprising two main parts. Part A contained 8 questions designed to gain information about each respondent's school context and individual teaching background. Part B contained 15 questions designed to elicit individual teacher's reactions to various aspects of the CMIT program. Each question in Part B required an open-ended response. For example, Question 16 requested information about the barriers or challenges teachers perceived they would face when implementing CMIT in their classrooms in the future.

Surveys were distributed to teachers eligible to participate in the evaluation by their respective district mathematics consultant. Teachers were eligible to receive the survey if they (a) had completed the initial diagnostic testing of their students, and (b) had implemented CMIT lessons for at least five weeks. One hundred surveys were distributed.

Data from each survey were transferred to a text file. Each text file was then transported into a qualitative data analysis computer program, QSR NUD*IST (1997), to assist with analysis. Contextual and biographical data from Part A of the survey were collated using text searches. Open-ended responses to items in Part B of the survey were categorised into major themes and then coded for analysis.

RESULTS AND DISCUSSION

Despite 100 surveys being distributed, 108 were returned with representations from 20 of the 40 school districts across NSW. The extra surveys were the result of teachers copying and distributing it to colleagues. Due to either missing data or the lateness with which a number of the surveys were returned, only 95 were included in the final analysis.

Contextual and biographical data from Part A of the survey will be reported briefly so as to provide an indication of the nature of the sample. Open-ended responses to items in Part B of the survey will be reported using the major themes identified for each item. Given limitations of length, the discussion will focus mainly on what respondents perceived to be the most effective aspects of the program and the barriers to its successful implementation.

Contextual and biographical information

The sample of Year 3 and 4 teachers who responded to the survey was fairly representative of the general primary school teacher population in NSW, namely, the majority were female (83%) in the 41 to 50 age range (63%) with more than 21 years teaching experience (59%). Seventy-two percent of teachers who responded to the survey had been teaching Year 3 and/or 4 for more than 4 years and 37% of these had been teaching the same grade for more than 7 years. This indicates that the teachers

who completed the survey were an extremely experienced group, and particularly experienced at teaching Year 3 and 4 students.

The majority of teachers (71.6%) who responded to the survey had been implementing CMIT in their classrooms for only one year or less. Only 11.6% of teachers had implemented the program for two or three years. Hence, while experienced teachers, their experience with the CMIT program was still very limited.

Open-ended responses

Generally, teachers' responses to CMIT were very positive. Only 2 respondents indicated that, if the decision to implement CMIT were their own, they would select not to continue with it.

While commenting on the impact of the program, 69.5% of teachers considered their attitude to mathematics and the teaching of mathematics had improved as a result of their involvement in CMIT. Many teachers attributed the change to seeing the "children improve their skills" and "understanding the reason behind what we do". Others considered their attitudes had changed towards the "use of textbooks", "written algorithms" versus mental computation and "allowing games in the classroom". Nearly every teacher who considered their attitude toward mathematics had not changed as a result of their involvement in CMIT (14.7%) thought that the program merely confirmed their prior beliefs about mathematics and supported methods of teaching that they had always used.

Content knowledge in a variety of areas was considered to have increased by 48.3% of respondents. Some teachers considered that the "deeper understanding of the philosophy" surrounding CMIT gave them greater "ownership" and "understanding" of a broad range of content leading "to a greater interest" in mathematics. However, the majority of teachers highlighted an increased knowledge in specific aspects of mathematic content. For example, teachers mentioned their new knowledge about the importance of "arrays to teach multiplication and division", the "better understanding of place value" and how it "is integral to all number understanding". The most frequently mentioned area of content knowledge to improve related to mental computation. Many teachers considered that "it has affected the way I mentally compute now and I pass this on to the children" or that they were now "aware of the value of mental computation skills" and so emphasised this more in their classrooms. Other teachers considered that their knowledge "of what to teach had not changed, just how to teach it".

The majority of teachers considered that their understanding of how children learn mathematics (71.6%) and the way they taught mathematics (77.9%) had changed the most as a result of their involvement in CMIT. One teacher commented that "it's scary what I didn't know" about how children learn mathematics. The majority of responses made reference to a "better understanding of the developmental stages in children's thinking" and knowing "how to move them onto the next stage". This "better understanding" or "insight as to how children learn" and the "different

strategies children use" was usually a result of the diagnostic interview or their understanding of the *Framework*.

Reported changes to the way teachers taught mathematics varied enormously. However, there were 4 aspects that were mentioned more frequently. Foremost among them was the use of "more hands-on, fun games" that were selected on the basis of children's "strategy development". A second aspect mentioned regularly concerned the emphasis on thinking strategies. In particular, the use of multiple methods for mental computation was highlighted by teachers. For example:

> Now I ask them instead of telling them. I give them time to think and we have a very enjoyable and productive environment. (There is) much more sequential development of teaching number with a greater commitment to using a variety of strategies to encourage thinking mathematically.

The majority of teachers indicated that they considered CMIT to be "worthwhile" and therefore willing to continue with the program, but only 25.3% of teachers indicated that they were entirely satisfied with either their initial training or the follow-up support they received to implement the program. Fifteen percent of teachers considered their training ineffective with the remaining respondents indicating that they were only partially satisfied with the effectiveness of their initial training and support to implement CMIT. Teachers who indicated most satisfaction with their training and the manner in which they were implementing the program were those who had received considerable in-school support in the form of classroom visits from their district mathematics consultant.

When asked to comment on the most helpful aspects of their training, teachers identified 5 crucial features—the practical resources and activities, the assessment process, classroom support, the influence of significant people and the opportunity to share ideas. Practical resources and activities were highlighted by 38.9% of respondents as being extremely helpful during the program "as I could go straight back to my classroom and do them (even though I was still struggling with the conceptual framework)". The second most frequently cited aspect of the training considered helpful by teachers, was the assessment (diagnostic interview). While a number of respondents thought the main aim of the program was to introduce the assessment interview, 29.5% indicated that "learning how to assess" was the "most useful" aspect of their training. For example:

> …to find out how a child thinks and where they are up to. Then to teach to that, and assess again later. This helped me to become very familiar with the learning framework and the range (of abilities) in my classroom.

Another frequently cited aspect of the program considered to be most helpful to teachers was classroom support (22.1%). Classroom-based support in the form of demonstration lessons and class visits by consultants was only provided to a small number of Year 3 and 4 teachers during the introduction of the program. Despite this limitation, its effectiveness was acknowledged by the majority of those who received

it. Teachers considered the classroom support "brought the nuts and bolts (of the program) to life".

Aspects of the CMIT training considered ineffective or "least helpful" by teachers included "the overload of information" (13.7%). Teachers referred to the initial training days as "daunting", "crash courses" where they were "bombarded with paper and activities". Many teachers considered their training to be "too much to cope with at once" with "too little follow-up support". While some teachers indicated that they "struggled at first", they "eventually worked it out" but it was "stressful and time consuming" when they "did not know what it looked like to implement". Another aspect of the initial training that received heavy criticism from 27.4% of teachers was the lack of a "systematically organised folder of activities and resources". Teachers "felt overwhelmed" by the need and "time required to make so many resources". While the practical ideas and resources introduced during initial training days were perceived to be a positive aspect of the training by 38.9% of teachers, the initial production and implementation of them was perceived negatively by an equal number of respondents.

When considering the challenges or barriers to the implementation of CMIT in their classrooms, 45.3% of teachers referred to issues of "time". This is consistent with previous evaluations of CMIT (Bobis, 1996; 2000), where the problem of *not enough time* is regularly raised by teachers. In the current study, teachers considered there to be a lack of time "to meet" with other teachers "to gain new ideas", to "complete the testing", "to make the resources", "to think of different ways to utilise the same resources", "to do the grouping", "to teach the activities", "to maintain and organise the resources", or "time to feel comfortable with the program and feel a sense of direction". While *lack of time* was the most commonly cited challenge to the implementation of CMIT, a number of teachers acknowledged that their concerns would be reduced in subsequent years of its implementation once the initial resources were made and they had become more familiar with the assessment procedures.

The second most frequently cited challenge facing teachers related to resources (31.6%). While some of the problems concerned the "time" for making and maintaining them, other issues included: "becoming familiar with all the materials available", "having easy access to resources", "having enough funds to purchase the necessary resources", "having enough resources for each teacher to avoid sharing", "having enough activities for all the children" so they "don't get bored with the same ones", and "getting the resources organised".

Class management issues were mentioned by 25.3% of teachers as presenting a challenge to their implementation of CMIT. They included problems associated with "not knowing what it looked like in the classroom", "ensuring that all children are learning from the group activities and not letting others do the thinking for them", the increased "noise" level due to group work and "management of multiple levels/games in the class". In addition, a number of teachers considered large class

sizes and lack of space to do group work a barrier to their implementation of the program.

SUMMARY AND CONCLUSION

The reporting of results in this paper have focussed on what respondents perceived to be the most effective aspects of a large-scale professional development program for primary mathematics teachers and the barriers to its successful implementation. While aspects of CMIT considered most effective included the practical resources and activities, the assessment process, the influence of significant people, classroom support and the opportunity to share ideas, a number of factors emerged as significant barriers to teachers' implementation of the program. These factors predominantly related to issues of time, resources, class management and information overload.

Inherent in the reporting of these findings is the concern for the identification of factors likely to maintain the momentum of the CMIT program. What factors are more likely to sustain teacher change and promote on-going learning? A number of CMIT features are potential agents for such growth in teachers. For instance, one respondent commented:

> What a change—a program which supports students and teachers at the same time—that's how we create life-long learning.

A number of teachers volunteered concluding comments regarding their overall opinion of CMIT at the end of the survey. Despite a high proportion of teachers indicating some significant issues with the implementation of the program, 30% of teachers communicated their intentions to continue with its implementation mainly because they considered it would ultimately benefit their students. This sentiment is characterised by one teacher's comments:

> It is taking time for some teachers to change habits and attitudes of 20 years—but they are willing to have-a-go as long as there is support and they can see it benefits their students.

Hence, the factor that seems to emerge as assuming greater significance than concerns surrounding issues of time, resources and the like, is teachers' inherent perception of the program's worth for children.

References

Bobis, J. (1996). *Report of the evaluation of the Count Me In Project.* Sydney: NSW Department of Education and Training. http//www.currriculumsupport.nsw.edu.au/maths

Bobis, J. (2000). *Count Me In Too Report: A Case study of implementation*. Sydney: NSW Department of Education and Training. http//www.currriculumsupport.nsw.edu.au/maths

Bobis, J. (2001). *The effect of CMIT on Year 3 Basic Skills Test results*. Sydney: NSW Department of Education and Training. http//www.currriculumsupport.nsw.edu.au/maths

Bobis, J. & Gould, P. (2000) Changing the professional knowledge of teachers. In J. Bana & A. Chapman (Eds.), *Mathematics Education Beyond 2000 (Proceedings of the 23rd Annual Conference of the Mathematics Education Research Group of Australasia Inc. p. 47-54)*, Freemantle: MERGA.

Cobb, P. (2001). Keynote address at Beyond the Boundaries—Numeracy conference held at the University of Sydney, July 2001.

Garet, M., Porter, D., Desimone, L., Birman, B., & Yeon, K. (2001). What makes professional development effective: Results from a national sample of teachers. *American Educational Research Journal, 38* (40), 915-945.

Loucks-Horsley, S., Hewson, P., Love, N., & Stiles, K. (1998). Designing Professional Development for teachers of science and mathematics. Thousand Oaks: Corwin Press, Inc.

Mitchelmore, M. & White, P, (2003). Count Me In Too and the Basic Skills Test in New South Wales. In L. Bragg, C. Campbell, G. Herbert, & J. Mousley (Eds.), *MERINO—Mathematics education research: Innovation, networking, opportunity 2003 (Proceedings of the 26th Annual Conference of the Mathematics Education Research Group of Australasia Inc. p. 515-522)*, Geelong: MERGA.

NSW Department of Education and Training, (2003) *Count Me In Too Professional Development Package*, Sydney: DET.

QSR NUD*IST (1997). *Qualitative Data Analysis Solutions Program*, Bundoora: Qualitative Solutions and Research Pty Ltd.

Stewart, R., Wright, B., & Gould, P. (1998). Kindergarten students' progress in the Count Me In Too project. In C. Kanes, M. Goos & E. Warren (Eds.), *Teaching mathematics in new times* (pp.556-563). Brisbane: Mathematics Education Research Group of Australasia Incorporated.

Thomas, G. & Ward, J. (2001). *An evaluation of the Count Me In Too Pilot Project*. Wellington, New Zealand: Ministry of Education.

Wright, R. (1998). An overview of a research-based framework for assessment and teaching early number. In C. Kanes, M. Goos, & E. Warren (Ed.), *Teaching mathematics in new times: Proceedings of the 21st Annual Conference of the Mathematics Education Research Group of Australasia, (pp. 701-708)*. Brisbane: MERGA.

Wright, R. & Gould, P. (2002). Mapping overlapping waves of strategies used with arithmetical problems. In A. Cockburn & E. Nardi (Eds.), *Proceedings of the 26th Conference of the International Group for the Psychology of Mathematics Education (pp. 418-425)*, Norwich: PME.

The research reported in this paper was supported by the NSW Department of Education and Training.