

WHAT DO TEACHERS GET OUT OF IN-CLASS MODELLING?¹

Joanna Higgins ■ Wellington College of Education
Te Whānau O Ako Pai Ki Te Upoko O Te Ika

Recent government initiatives in literacy and numeracy aim to raise student achievement through developing professional capability. The Numeracy Project currently being implemented in New Zealand schools is one of these government initiatives (see Young-Loveridge, this issue). The Advanced Numeracy Project (ANP), on which this article is based, focuses on students in Years 4 to 6. In 2001, it included approximately 500 teachers and 11,500 children. The ANP:

...presented teachers with a framework of broad stages of students' mathematical thinking in which the different stages are characterised by the range of strategies that students use to solve problems. A key part ... involved the teachers in using a diagnostic interview to assess the stages of their students' thinking. On the basis of this interview, their students were then grouped for instructional purposes. [The Project] also introduced the teachers to problem-solving strategies and the activities to develop them. The overall aim ... was to develop the teachers' knowledge of number concepts, student strategies, and instructional practice in order to improve student achievement in years 4 to 6. (Higgins, 2001, p.iii)

In a policy paper addressing the improvement of teacher capability through professional development, Parsons (2001) stated that "implementation strategies need to support teacher learning. Successful, sustained change at the classroom level is the result of teachers who are confident and committed to an ongoing concept of professional development" (p.2).

How do teachers learn about new practices in mathematics, and what are the best ways of supporting them in doing this? This question raises the challenges of establishing the most effective form of facilitation of professional development for teachers. The evidence drawn for this article was gathered from interviews with teachers and facilitators at the beginning and end of the professional development

programme in 2001. Four facilitators and eight teachers in four regions were interviewed at the beginning and end of the year. Three of the participants (one facilitator, and two teachers with whom they were working) were from the Auckland area; three were from the Hawke's Bay area; three were from the Wellington area; and three were from the Christchurch area.

Facilitators with recent knowledge and experience of classroom teaching frequently delivered teacher professional development accompanying the introduction of the New Zealand curriculum in the 1990s (Gilmore, 1994). The preference for facilitators with such a background has been seen as a means of ensuring that the professional development acknowledges the realities of classroom life, and therefore increases the likelihood of greater credibility with classroom teachers, and greater uptake of the new ideas. Through using facilitators with a recent classroom background, it was hoped that the contextual factors shaping classroom processes would be addressed.

Such teacher development programmes have typically been activity-based, with teachers trying out student activities in small groups, followed by wider group discussion of the general pedagogical principles underpinning the effective implementation of the new ideas. Preparation for the facilitation of this type of programme has typically focused on ensuring that facilitators have group management skills that will lead to high levels of interaction between participants.

The facilitator's role was seen as one of managing discussion between groups of teachers as they learn about new curriculum. Within primary teaching, this led to facilitation skills being defined in a generic rather than subject-specific way. Such preparation was likely to place greater emphasis on facilitation skills in presenting the classroom activities, and less emphasis on developing understanding of the complex subject matter underlying the activities.

Schifter and Lester (2002) term this "passive facilitation". In their study, they reported that

the neophyte facilitators "started out by telling themselves that their role was 'merely' to facilitate" and explained their task as "to bring teachers together, set up the activities, and then let discussion go where it would" (p.4). They pointed out that this could lead to facilitators sticking with a set agenda, at the expense of working with teachers to develop their understanding. The emphasis on the smooth running of the programmes could be at the expense of attention to the substance of discussion. What could be lost was greater understanding of the teaching and learning of mathematical ideas.

Recent research suggests that teachers learn best when a facilitator works actively with them in reviewing their classroom practice. Teachers' knowledge develops in context (Fennema and Franke, 1992) and is likely to increase when the facilitator is able to work with the teacher in the context of their classroom. Fennema and Franke suggest that context is "the structure that defines the components of knowledge and belief that come into play" (p.162). Teacher knowledge is interactive and dynamic in nature, and consists of "teacher knowledge of the content of mathematics, knowledge of pedagogy, knowledge of students' cognitions, and teacher beliefs" (p.162). They argue that "within a given context, teachers' knowledge of content interacts with knowledge of pedagogy and students' cognitions and combines with beliefs to create a unique set of knowledge that drives classroom behaviour" (p.162). Focusing on any one of these components in isolation will not be as effective as helping the teacher to understand how they all need to fit together.

Such an approach necessarily involves the facilitator as an active participant in the school community. It is useful for the facilitator to understand the dynamics of different school communities and the ways in which such a community takes on board new practices. Remillard and Rickard's (2001) work highlighted the community as central to the context of practice. They suggested that

"learning to teach mathematics differently involves repositioning one's self with respect to one's own knowledge and how it is learned" (p.2).

Facilitation in the Numeracy Project

There are two important differences in the facilitation of professional development in the Numeracy Project. One is the active role of the facilitator in building teachers' knowledge of the mathematical ideas underlying classroom activities and assessment. The second is the way in which the professional development is made relevant to an individual teacher's context of practice, through in-class modelling of strategies by the facilitator and the linking of these strategies to the framework. Both the active building of knowledge and the contextualising of the professional development over a period of time contribute to the likelihood of fundamental changes to teachers' practice.

In-class modelling

In-class modelling has been used extensively in the Numeracy Project, with the facilitator attempting to show the teacher how to move towards new practices. Through working in a teacher's classroom, the facilitator is able to highlight new ways of introducing key mathematical ideas to children, and demonstrate how to build connections with related mathematical ideas. Working in teachers' own classrooms is an effective way of developing teacher knowledge. It increases the likelihood of "teacher buy-in" through teachers being able to apply the new knowledge to their classrooms.

Rachel, one of the facilitators, saw the work in teachers' classroom as countering what she described as a common teacher comment of "Oh, that's all very well, you know, for you to say that, but in my classroom I've got special needs, 32 children...". She thought that it was valuable to work "one-on-one with teachers in the classrooms ...because it's actually only when you walk into the classroom that you really get a feel for what's happening":

... When you are removed from the classroom and talking with teachers about maths ... it's almost what they know you want to hear, what they know is best practice kind of knowledge, their knowledge of it, rather than what they are actually doing necessarily.

Key to a successful working relationship between teachers and facilitators in teachers' classrooms is the way in which facilitators establish their role. Emma explained how she did this:

To say to the teachers I am here to teach you, I am using your children to teach you, I'm not here to teach your kids ...There is a very strong message for teachers that they are the ones who are supposed to be learning out of this.

What do teachers get out of in-class modelling?

Teachers in the Project have valued the opportunity to observe their own children being taught. The facilitators explained.

It takes time and a most effective thing that this contract has done is to be in [the teacher's] classroom with their children modelling what it looks like and what's possible. We model with their kids and they say "I never knew that kid knew that" or "this is where this is coming from". [Emma]

I continually have teachers saying, "This is so useful to me because I can actually sit back first of all and step outside and watch from the outside". This is hard to do sometimes when you are with your own students. [Kay]

So for the teacher, not only to see and be exposed to the theory and the new ideas but also to show them how to put that in place in their classroom. And then you can identify ... and work with the teacher on any key issues. [Rachel]

The facilitators' modelling of activities is a powerful mechanism for demonstrating how new teaching approaches enable children to solve problems in more sophisticated ways. Part of this power arises from the knowledge and beliefs held by the teacher about the children being taught. Along with the diagnostic interview, the facilitators' work with children may reveal different strengths in children that are contrary to those the teacher would identify. Kay explained that teachers can:

...suddenly see the knowledge and strategy gaps opening right in front of them with a group of eight children that they thought were at the same strategy level. Suddenly it's like someone comes with a knife and cleaves them in half and they see, oh, my gosh, those are advanced counters on one side, and those are early part /whole thinkers on the other side.

Comments from two teachers also referred to these differences.

This is the first time I have really appreciated the variety of strategies that children can use and use effectively. Many children are very good at explaining how they know something.

The many different ways that children came to the answer was a surprise –and provided lots of discussion –now several different ways are incorporated into problem solving activities.

These comments illustrate Fennema and Franke's (1992) argument that the interaction between teachers' knowledge of content, pedagogy, and student thinking, combined with their set of beliefs about teaching and learning, drives their work in a classroom. Fundamental to the in-class modelling is the opportunity to enhance teachers' understanding of any, or all, of these components, with resulting changes to their classroom practice. A principal likened the refinement of practice through the Numeracy Project to "blowing apart" some long-held beliefs that had been part of [teachers'] "teaching armoury".

In-class modelling allows the facilitator to take an active role in demonstrating to teachers how to, as Kay described it, "push at the edge of where their students are" or as a teacher said, how to "actually take kids that step further". These are moments where the facilitator can demonstrate how a teacher can extend the children's understanding of number, using the framework as a benchmark against which to judge the sophistication and efficiency of strategies used. Emma commented on this:

I think the effective thing has been being in there facing their classroom and the fact that you keep on coming back. ...you are able to talk with the teacher ...not just show what the activity is but talk about underlying concepts, because we still have a lot of teachers teaching an activity without any concept, and to model the pedagogy of good questioning and good classroom management, so a teacher gives me a group or something, just give me one of your groups and I will now show you this activity and I will raise it up or down depending on where the children are at, and modelling things as basic in pedagogy as giving the kids three or four minutes to orient themselves with the equipment. If they are using the beans for the first time, let them play with them

–let them stack, how do they fit together before you do that? ...modelling the good questioning, lots of effective questioning. ...We are modelling the mathematical questions, “so how do you know that?” and “what were you thinking?” and “I can hear Jo that you know those doubles but how did you know that double became that bit of the fraction?”

She highlights the moments in which she can build teacher knowledge. She mentions the opportunities to talk about management of the learning, and in particular the questioning that can be used to, as Kay put it, “push at the edge”. An interview with the teacher confirmed that Emma’s demonstration had been effective in showing teachers how to build children’s understanding through appropriate questions.

I’ve been watching Emma take lessons. ...Like they give her an answer but she’ll always come back and ask them that extra step and I think that’s what made teachers realise that we never get to extend the kids to where they’re actually at. I think without watching Emma in action like that, that would have been hopeless. I think people would have carried on the same way and hope that new concepts would have gone in. ...you then start realising what your own kids are capable of. If I was watching in another school or another class, I think people would automatically say “my kids can’t do that or my kids are actually a step further so that doesn’t really mean much...” Once again, just questioning and questioning of us as well. I mean through the kids “but how did you get there?” I mean every time she asked a kid a question, we did it ourselves. I mean we were answering those same sorts of questions. But what we learnt from her was the questioning techniques of how to get kids onto that next bit of how to actually understand. So I think what we’ve learnt is how to question to get kids’ mathematical learning out in the open. So, therefore we were stopping children [before] because I think we were afraid that our own knowledge wouldn’t go that far. And we’re now listening ...I think that’s what’s probably been a teaching issue, is that we’re now prepared to listen to a variety of ways and in our own mathematical knowledge we’ve had to learn this variety of ways as well.

Making links between teachers’ previous

practices and the new approaches is important. Kay explained how she saw this.

This is not telling you to throw out everything you know about teaching. You already did good things in your teaching. This is adding to your tool-box of information and adding to your knowledge as a professional. And with that you now can look at your learners and identify in very specific ways what each of those kids needs. And that if you can keep your sights on the framework, [you should have] a clear sense of those progressions embedded in your head. It doesn’t matter what resources you particularly have in front of you or don’t [have]. You can make do with a few things and you have got then the sense of where your children are and where you will be too, and so that’s really what I have been trying to get teachers to see as the aims of this project.

Schifter and Lester (2002) commented that “without a facilitator who acts with determination – to draw teachers’ attention to what they otherwise would not see – teachers are unlikely to commit to fundamentally change their practice” (p.20). An indication of fundamental changes to teachers’ practice is, as Emma explained, about being able to articulate their practice.

It’s about confidence and a change in their articulating from “What do I do next with this bit?” to the kinds of things that they say about why they had done the things. The kinds of things they say about why they have changed, why they have chosen particular activities, about why they abandoned particular activities and said “I won’t do that because that, that, that and that didn’t work” and why I have gone back to doing this or that.

Concluding comments

In-class support by facilitators was an effective way of helping teachers to learn about new practices in mathematics. Contextualising the support in the teachers’ own classrooms enabled teachers to see how the new practices could grow and develop from their existing practice. This approach to teacher learning recognises the interactive and dynamic nature of teacher knowledge and learning, and has obvious implications for the best ways of providing effective professional development for teachers.

References

- Fennema, E. & Franke, M. (1992). Teachers’ knowledge and its impact. In D. Grouws (ed.), *Handbook of research on mathematics teaching and learning*. New York: Macmillan, pp.147-164.
- Gilmore, A. (1994). *Evaluation of the teacher development programmes: Mathematics and science in the National Curriculum*. Christchurch: Education Department, University of Canterbury.
- Higgins, J. (2001). *An evaluation of the Year 4 – 6 Numeracy Exploratory Study*. Exploring Issues in Mathematics Education. Wellington: Learning Media.
- Parsons, R. (2001). Professional development: Improving teaching capability. Paper presented to Numeracy Hui, Auckland College of Education, Auckland, 5-7 December.
- Remillard, J., & Rickard, C. (2001). Teacher learning and the practice of inquiry. Paper presented to the Annual Meeting of the American Educational Research Association, Seattle, 10-14 April.
- Schifter, D. & Lester, J. (2002). Active facilitation: What do facilitators need to know and how might they learn it? Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, Louisiana, 4 April.

Notes

- 1 This evaluation of the Advanced Numeracy Project was funded by the Ministry of Education as part of the Government’s Literacy and Numeracy Strategy. The views expressed in this article do not necessarily represent those of either the Ministry of Education or Wellington College of Education.

JOANNA HIGGINS is Manager, Research and Development and Principal Lecturer, Mathematics Education at Wellington College of Education. Her current research interests include investigating classroom mathematics programmes, and the work of facilitators. She has specific interests in group work, and teacher and student explanations of mathematical ideas. Email: joanna.higgins@wce.ac.nz