

The impact of the facilitator

All of the teachers interviewed commented positively on the impact the facilitator had made in helping them implement the programme. The many ways in which the facilitator supported and guided the teachers in the Year 4–6 Numeracy Exploratory Study fall under two key categories: firstly, guidance on general pedagogical issues and secondly, the development of the teachers' content knowledge and pedagogical content knowledge. The guidance included the facilitator discussing each of the teacher's classroom programmes with him or her, providing resources and activities to use, and showing and discussing videos. The two aspects that appeared to have the most impact were modelling classroom instruction, and explaining mathematical concepts and guiding the teachers through aspects of the programme. Each of the facilitators discussed below is one out of a possible three who were each working in a different region at the time of this evaluation.

The facilitator as a model of practice

The facilitator's been into my classroom and done demo lessons and all sorts of things like that and it's very much [of a] practical nature and you can take heaps away from it. He models the stuff very well and it's easy to follow. He's a very good maths teacher, yes, definitely, and I think that's what helps. Everyone can go away with something practical out of it.

Erica at Numerate School, Second Interview

The practical nature of the demonstration of what Erica regards as good mathematics teaching provided her with a useful model. Other modelling took place in staff meetings, where the facilitator might demonstrate teaching and assessment approaches with children, or by using the teachers involved in the teacher development programme as pupils.

Modelling and discussion of such general teaching strategies as questioning was an opportunity for the facilitator to develop teachers' pedagogical content knowledge of number ideas. Barbara explains how this happened for her:

I was just wondering about questioning skills ... the facilitator was asking basic questions, he built up the confidence first, and then the questions got a bit hard. ... it was just interesting listening to him talking to the children, same question, but ... it was the way he said it. He's got a good way of questioning anyway, put it that way. I thought, gosh, if I could do the things he can do, it would make it so much easier in my room, but I don't have those skills behind me ... Can't think off the top of my head as well as he can.

Barbara at Numerate School, Second Interview

Questioning that provides an opportunity for children to explain their mathematical thinking is an important way of developing children's strategic thinking. This is in contrast to questioning that elicits a brief response. Barbara's observation of the facilitator's questioning has provided her with a model for further development of her own questioning skills.

Many of the teachers mentioned the ways in which the facilitator had modelled a range of strategies that might be used to solve problems. Rachel explains how such guidance was introduced in a staff meeting:

We had a staff session with the whole school on looking at the number framework and talked about all the different strategies ... what to look for and how to deal with it, and I think that has been particularly useful.

Rachel at Even School, Second Interview

Such a session to provide teachers with an overview of the different strategies and their relative importance is likely to be taken before the facilitator works with individual teachers in their classrooms. In these staff sessions, the facilitator also uses video footage to illustrate the ways in which children's strategic thinking develops.

Watching the video ... [of] the year 1s, 2s, and 3s, giving them the same equation and just actually looking at the different levels where they'd be ... you've got ones that count on from fingers, you've got ones that will ... 23 and 10, they will round up - 27 and 29 they would round the 2, round it just visually - I can't remember what it is called. They can do it without their fingers kind of thing. But just looking at all the different children, they don't even have the concepts which you think would be the easiest way to deal with a sum, they would do it the longest or most difficult way because they haven't been open towards, exposed towards, the different ways that you could do it. I was just interested ... the tens [various combinations of numbers that make up 10] are a really big focus and ... it doesn't really hit you until you are actually told.

Marcy at Ratio School, First Interview

From the video images, the teachers are able to build up a picture of the different strategies, as well as develop an understanding of the problems that might arise for children who continue to use inefficient strategies. The importance of ten as a benchmark is highlighted for Marcy. The emphasis on mental strategies stands in contrast to the more usual emphasis on the written algorithm. Both Roger and Erica comment on this:

The facilitator's been hot on the thing of being able to do a lot of things mentally and being able to understand. See, that gives [the students] a really good understanding whereas, if they are going to do it the algorithm way, a lot of what we teach them is just a method and so they do not necessarily have a great understanding.

Roger at Unit School, Second Interview

I think, for little kids, it's probably really important not to introduce the algorithms until you're sure they've really got it because it's an easy way of working the answer out without actually understanding how the heck you got that answer.

Erica at Numerate School, Second Interview

These comments raise the issue of learning with understanding. It is not a matter of *whether* the written algorithm will be introduced – the written algorithm is, after all, a strategy for solving a problem. The important point is *when* it is introduced. This should be after the students are “able to do a lot of things mentally” (in Roger’s words), with the aim of building up the children’s understanding of how numbers work.

In order for teachers to develop children’s understanding of how numbers work, the teachers need to have a detailed knowledge of mental strategies. Cate explains how the facilitator has helped her to recognise and further develop the strategies used by children in her class:

Actually, that's where the facilitator comes in handy, because I see [the students] doing the finger counting, that's one thing I've learned from him. I see them doing the finger counting and then I can see the others that have formed patterns ... I can see some children turning to a partner and doing that ... I get them to put up their hands and say how they worked it out and share [how they did it] and that definitely came from him. I used to say to the children: “Oh, I used to have trouble with this one, I can remember this, and this is how I did it” ... I'm more aware of the different strategies now because [the facilitator] has shown me. ... counting on, just counting on, grouping numbers like your 8 and 8 and seeing it as a set ... I would always go two eights are 16, but the children will go 4 and 4 and 4 and 4 ... just different ways of hauling out the numbers ... there are just different ways of grouping. ... How you can just go 10, 20 ... Yeah, we talked about that.

Cate at Even School, First Interview

Cate is able to identify a range of strategies such as finger counting and using known facts, for example, $8 + 8$, in working out other number problems. She talks about the different ways you might partition 16 and count in tens. From this start, she has the basis to further develop her knowledge. She suggests that this has resulted from working with the facilitator. Other teachers related similar experiences:

The facilitator used an example in the classroom. He was doing doubles ... he said to a boy “ $8 + 7$ ” ... [the boy] started from 8 and [counted on] ... [the facilitator said]

“If you knew your doubles, then why did you have to use your fingers to count on for me. [If] $7 + 7$ is 14 ... why couldn't you go, I know, that's 15, because 7 and 7 is 14”. Simple things like that. If he knows that he knows his doubles – it's just I've got to keep bringing them back to the simple things like that because fingers start going under the table. So, yeah, use what they already know to teach them what they don't know.

Barbara at Numerate School, Second Interview

Barbara is able to use the facilitator's demonstration of the strategy of doubling to extend her own practice. She is able to explain how known facts such as doubles and near doubles can be used to derive facts.

The facilitator does it so simply. He says “Now I want you to imagine it”. [He] gets them to imagine it. So they are practising and then they are using the knowledge they have and applying it ... he always relates it to life situations straightaway. “Mr X has got 9 bags of lollies, 3 in each bag, now what equation is that?” He would answer them ... which I guess you do anyway, but it makes you aware.

Annette at Multiple School, Second Interview

The facilitator's demonstration helped Annette become aware of different aspects of teaching mathematics through having the opportunity to observe someone else's teaching. The emphasis the facilitator placed on imaging is important to the development of children's mental strategies. As Anita says:

I keep on going back to the strategies and getting them to add and read big numbers – that was something that the facilitator taught us, getting the kids to read really big numbers. ... And it's just amazing. I mean, sometimes even [for] me as a teacher, there was this 7 million, 8 thousand something number, it took me a while too – but now, just put your lines through straightaway and the kids just read it like that. It makes it so much easier for me, something I picked up from him, he's so good.

Anita at Ratio School, Second Interview

Anita is able to replicate the facilitator's strategy for reading big numbers from his demonstration. From this she is able to build it into her practice.

The number line was one type of equipment that facilitators modelled for teachers. As Roger comments:

I think they [the children] are getting the idea ... that we are trying to find a number between those two for a difference. ... That was a direct lesson, an observed lesson, that I watched. [The facilitator] came in and took a group of six or eight kids and [the children got the idea] directly as a result of that. And I'm not the only one. I know there's three or four of us in our syndicate of six that are using [the number line].

Roger at Unit School, Second Interview

This single lesson had a substantial impact on the syndicate. The idea of using the number line to show subtraction as the difference between two numbers stands in contrast to the idea of “taking away” as it is often taught through the written algorithm.

Both Cate and Anita used the number line for different purposes. Cate used it for exploring more and less, something her students needed help with.

We used a number line because that's how the facilitator did it. I just put a peg on it because [the facilitator] said that was a flea, or something, and so that worked really well and I said "If the flea jumps to here, how many has he moved on?" ... my children had a huge problem with less or more, so I'll say "How many more has the flea jumped on?"

Cate at Even School, First Interview

The number line was useful for helping the students "build to ten". This was something that all the facilitators illustrated to the teachers.

The facilitator has shown us the big number line ruler and the kids actually see there's something there to look at [for] rounding off ... seeing the numbers on the line and going to the nearest 10 is so much easier ... it's actually teaching the children, showing them the strategies, and talking about it has been the big thing ... I think that's what we haven't been doing.

Anita at Ratio School, Second Interview

Facilitators also provided advice and guidance on planning mathematics programmes to provide an emphasis on number.

I know, having spoken for half an hour to the facilitator, and he asked what I was doing next and [I] said, well, I'm going to do this and that. He went and changed my whole long-term plan for term 3 and I was rapt because I could see why – I'm going for decimals now and then go[ing] straight into money ...

Now, when I think of it, I can see the natural progression. Teach decimals and then we come to money – decimals. Something like that would help but, in the past, we've had a sheet and it's got the whole year's plan for maths, say, four weeks for statistics, because that's supposedly a weakness, a smattering of number here and there, and maybe two weeks of algebra ... but it sort of made sense when he put it on paper for me. Why wasn't I always doing that?

Barbara at Numerate School, First Interview

The changes the facilitator suggested made sense to Barbara as she could see the links between the topics. The facilitator helped Marcy to make links in her planning between addition and subtraction.

I happened to focus more on the addition to begin with but I thought the subtraction might throw them a little bit. I had a talk to the facilitator and he said it was best to put them hand in hand, all the time. So I might try that next time.

Marcy at Ratio School, Second Interview

Support from school management underpins the facilitators' work in schools. This support includes the participation of principals and senior staff in staff meetings, as well as their willingness to budget for extra resources and to provide classroom release for teachers from time to time.

Many of the teachers participating in this study commented on the support they had received and how it had enhanced this teacher development project. Erica, Deirdre, and Cate sum up:

And because our school is wholly behind it, I mean our management staff thinks it's fabulous, they've been to all parts of the course, they know, they understand what it's about themselves. It does require a lot of reading and working in your own time.
Erica at Numerate School, Second Interview

I think a lot to do with the principal, I would imagine. We get a lot of support from the board of trustees and they've put a lot of money into our professional development over the years. It helps, because it makes you more focused professionally, anyway.
Deirdre at Multiple School, First Interview

I feel ... I've learned more than I have in my first two years at my other school because professional development is ... ongoing here and the staff meetings are just so good, so active.
Cate at Even School, First Interview