

# The absent voice of (primary)

The maths teaching debate – Sean Delaney says we have a lot to contribute

**D**uring recent media debates about Leaving and Junior Certificate results in mathematics, two things struck me as odd. The first is that in discussions about improving achievement in maths, teachers' views were rarely sought. In contrast, engineers, employers and politicians had plenty to say on the subject. Don't get me wrong. These stakeholders are entitled to express views on the teaching of maths. But surely the authoritative voice on mathematics teaching should come from teachers who after all teach maths daily and who know a thing or two about how youngsters learn.

The other aspect of the discussions that seemed strange was that few references were made to the importance of early mathematical experiences on children's later proficiency in maths. Even fewer references were made to the range of teaching experience required and acquired when introducing children to mathematics. Adding primary teachers' experience and expertise to discussions about raising mathematics achievement has the potential to enrich the debate.

It's one thing to complain that primary teachers have not been part of the media discussions about improving maths results. It's another to come up with what we would say on the topic. Our traditional response has been that we need smaller classes, more learning support teachers for mathematics, and better resources. Of course, all of these would help; but let's face it, we're not likely to see much of them for the next few years.

Beyond class size, learning support, and materials, what can primary teachers do to make learners more mathematically proficient? What would you say if asked how mathematics education could be improved? I'd begin with five points:

- 1 acknowledge the problem;
- 2 show that teaching maths is challenging work (which requires substantial training);
- 3 be clear about what we want learners to do in maths: practise thinking and understanding as well as memorising;
- 4 address parental expectations; and
- 5 demand better textbooks.

## Acknowledge the problem

Many school leavers are mathematically competent and could hold their own with students from any country around the world. They're not the children we're concerned about. But we must acknowledge that many others leave school unable to do basic calculations or solve relatively straightforward problems. Apart from our experience in classrooms, we know this from studies and reports such as *The 2004 National Assessment of Mathematics Achievement and Literacy and Numeracy in Disadvantaged Schools*. Many teachers are frustrated that despite their best efforts, some children still struggle with mathematics. Acknowledging a problem with mathematics achievement is just a first step. What can we do about it?

## Show that teaching maths is challenging work

Having acknowledged that too many children achieve poorly in maths, teachers could collect and share examples which show that teaching mathematics is challenging work. You can probably come up with some examples straight away. Some challenges arise from children's unexpected questions, claims or ideas that require substantial mathematical knowledge and confidence to respond to them. For instance, I heard one fourth class child asking if the number '0' is odd or even. In another classroom a senior infant child pointed out that a square has four corners and four sides, and a triangle has three corners and three sides. The child then asked 'how many sides has a circle?' Another example familiar to teachers is that many children believe that  $\frac{1}{2} + \frac{1}{4} = \frac{2}{6}$ . As well as responding to unexpected comments, teachers sometimes draw diagrams to help children understand ideas such as the product of  $\frac{1}{3} \times \frac{3}{4}$ .

Such questions and tasks are not exceptional and responding to them requires knowledge of mathematics that is far from trivial. This is not something you learn in Leaving Certificate mathematics but is a specific type of mathematical knowledge, uniquely required by teachers. Despite the complexity of teaching maths, many teachers are inadequately prepared for the work. Although pre-service teachers in Ireland are required to study maths methods, they are not required to take courses to develop their own mathemati-

cal knowledge, although some do.

I have met a few teachers who are so concerned about their own mathematical knowledge that they will not teach a class higher than second. But even teaching younger children makes substantial demands on a teacher's knowledge. One problem is that teachers who want to improve their own mathematical knowledge have few options. Professional development courses in mathematics knowledge (as opposed to methods) are rarely, if ever, offered to teachers. Such courses would help. Some schools may be able to maximise the mathematical experience of their staff and students by inviting a teacher who knows a good deal of mathematics to swap with another teacher and teach maths to one or two classes other than their own.

## Practise thinking and understanding as well as memorising

A lot of mathematics teaching seems to focus on getting children to remember things rather than to understand them. Memorising is important of course. As children get older they need to know automatically their number facts and common fraction-decimal-percentage equivalences. The problem is that we now have too much emphasis on memorising and not enough on understanding. According to Professor Constance Kamii – a former student of renowned psychologist Jean Piaget – many children in second or third class give up thinking mathematically for themselves because their ideas seem not to be valued in maths. We need to give children opportunities to practise thinking about mathematical ideas.

One problem with moving towards getting children to reason more and engage in more challenging problem solving, is that many of us have come through a system where maths was all about memorisation and rarely about understanding. The absence of alternative images of mathematics and mathematics teaching makes changing what we do difficult. I remember being shocked the first time I heard Constance Kamii speak about how she got children to invent their own algorithms (methods) for doing addition and subtraction. None of my mathematical experiences to that point would have led me to believe that children could do that. But Kamii provided evidence of children

# teachers

devising their own approaches and excelling in their mathematical understanding. It's like as if when learning to teach we adopt a particular way of teaching maths, based on various constraints and circumstances, and changing this way afterwards is difficult, even if what we are doing is working only for some learners.

Observing other teachers teaching – live or on video – offers one means of seeing different kinds of mathematics teaching. This could be done in different ways such as offering courses where children are taught maths and observed by practising teachers. Alternatively, video recordings of maths lessons could be discussed in courses for teachers. The idea of lesson study, which originated in Japan, could also be used more. This is where several teachers plan a lesson and one teaches it while being observed by others. Subsequently the observers and the teacher analyse the teaching.

## Address parental expectations

I remember as a beginning teacher feeling under a bit of pressure when a pupil or a parent told me about a cousin in the same class in another school who was ten or more pages further on in the textbook than my class. Textbooks offer one way for parents to evaluate a teacher and to gauge how well their son or daughter is doing. Yet, teachers know that just 'covering' a page in a textbook is no guarantee that children have learned the content. Therefore communication with parents, locally and nationally, is needed if parents are to understand and accept changes in how mathematics is taught to their children. Parents need to know generally what the teacher and the school is trying to achieve in mathematics teaching and to receive regular, frank feedback about how their son or daughter is doing. Local and national parents' organisations have an important leadership role to play here.

## Demand better textbooks

Textbooks offer an important source of tasks for teachers and learners to use. But unlike textbooks in some other countries, Irish textbooks rarely require children to explain or justify their answers. Children here are typically presented with routine and unchallenging tasks. Textbooks with problems that prompt children to think and to explain their answers could

## Constance Kamii to visit Dublin

Coláiste Mhuire, Marino Institute of Education is delighted to announce the visit of Early Childhood Education Professor Constance Kamii. A former student of Jean Piaget, Kamii is an expert on mathematics teaching. On her last visit to Ireland Kamii was enthusiastically received for her thought provoking and stimulating ideas on mathematics teaching. She has presented and written about such topics as using mathematical games

with young children, measurement, single digit addition and subtraction, and fractions.

- ✦ **Venue** Coláiste Mhuire, Marino Institute of Education, Dublin 9.
- ✦ **When** Saturday, 27 November 2010.
- ✦ **Time** 9:30 am to 12:30 pm.
- ✦ **Cost** €10 (including tea, coffee and pastry).

To book please email [valerie.odowd@mie.ie](mailto:valerie.odowd@mie.ie)

prompt children to think more about how they approach mathematics problems and then prepare them for solving problems generally in unpredictable situations. If teachers demand better textbooks, the onus will be on publishers to respond.

## In conclusion

Would these steps work? I can't be sure, but I do believe that they would help us improve what we are currently doing. By acknowledging that things can be better, we become open to searching for and finding ways of raising achievement. When we accept that teaching maths is challenging work, we can have confidence in what we currently do, while seeking opportunities for professional development. By listening to children's mathematical ideas we can build on what they know and challenge their misconceptions. If parents are reassured that 'covering' a textbook is not the same as being proficient at maths, teachers can be confident that they can support learners when they need supporting rather than feeling obliged to race ahead in the textbook. Better textbooks can support children and teachers in developing and expressing mathematical ideas.

What's more important than the specific steps outlined here is that teachers, including primary teachers, add their voice to discussions about mathematics teaching and raising student achievement. My hope is that the ideas included here will stimulate a discussion among teachers

about how mathematics teaching can be improved. What's at stake is too important to be left to people who do not have our knowledge or experience in teaching mathematics.

Finally, we need to resist the allure of the suggestion that we have fallen from some kind of national paradise of mathematics achievement that existed in the past. This idea is often raised by media commentators. If indeed achievement was higher in the past, it was because fewer subjects were taught, the primary cert exam dictated much of the content of senior classes and expectations in maths were narrower. Society's needs and expectations for mathematics achievement today are different. Of course we want people who can calculate proficiently but we also need people who can reason and flexibly solve problems that they have not encountered before. Maths, well taught, can deliver such graduates.

**By Seán Delaney, Coláiste Mhuire, Marino Institute of Education.**

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