Breaking the anxiety spiral: what can ITT providers do?

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There is considerable evidence that many primary teacher trainees come to their PGCE year with significant levels of anxiety about mathematics. Unless these anxieties are addressed, trainees may fail to remedy gaps in their subject knowledge, may fail to learn the required pedagogical skills and may pass their anxieties on to the children they teach. The fact that trainees' attitudes to mathematics change considerably during their PGCE year represents an opportunity for training providers to reduce anxiety levels. This study tracked the attitudes towards mathematics of a cohort of primary teacher trainees throughout their PGCE year and used small group interviews to explore the reasons for the trainees' changing attitudes. The findings revealed some unexpected factors, which may help providers of ITT to reduce trainees' anxiety about mathematics in the future.

Literature

There is considerable research evidence to suggest that people entering the teaching profession come with strong feelings about mathematics (Hogden and Askew, 2007) often as a result of their experiences as learners of mathematics (Unglaub, 1997). For primary teacher trainees, anxiety about mathematics is especially important as there is evidence to suggest that teachers pass their anxiety on to the children they teach (Burnett and Wichmann, 1997). There is a weight of evidence to suggest that anxiety about mathematics disrupts cognition (e.g. Ashcraft, 2002), thus hampering trainees' ability to learn the associated mathematical pedagogical skills. Trainees with less secure subject knowledge, a possible consequence of high anxiety levels, have been shown to have less effective planning and teaching of mathematics lessons (Goulding et al., 2002).

Research also suggests, however, that prospective teachers' attitudes towards mathematics can and do change significantly during the course of their training (Brown et al., 1999). This represents an opportunity for providers of initial teacher training to alleviate anxiety. Little is known at present about the factors during initial teacher training that might help alleviate anxiety levels in trainees and therefore the ways in which providers can make their provision more effective for such trainees.

Data collection

Here we report a study that sought to answer a number of important questions:

- What attitudes and anxieties do primary teacher trainees bring to their training course and where have these come from?
- How do these attitudes change during their training?
- What are the important factors that lead to these changes?

The study used questionnaires administered at three time points to explore the changing attitudes towards mathematics of a cohort of primary teacher trainees

throughout their teacher training year. The questionnaires examined the trainees' anxiety levels through a shortened version of the Maths Anxiety Rating Scale (MARS, Suinn and Richardson, 1972) and contained measures of the trainees' perceptions of themselves as mathematicians and as teachers of mathematics. Data about the trainees' highest mathematical examination pass and their prior experiences of working in primary classrooms were also collected in the initial questionnaire. The factors influencing attitudinal changes were explored through group interviews with some of the trainees.

Findings

The questionnaire data indicated that trainees come to their teacher training year with widely differing levels of anxiety about mathematics, with about 15% showing anxiety levels greater that 1 standard deviation above the mean. However, during the interviews, the majority of trainees indicated some level of anxiety about mathematics, almost always as a result of their own experiences as learners of mathematics. This was interesting, as all the trainees had a minimum of a GCSE Grade C, which would make them all relatively successful learners of mathematics. However, a large number of them were aware that they had learned mathematics in a highly instrumental way, knowing 'tricks and recipes' to get to the right answer, without any real understanding of the mathematics involved.

Trainees' anxiety levels correlated significantly with their views of themselves as a mathematician and as a teacher of mathematics. Initially, their views of themselves as a mathematics teacher also correlated significantly with their level of classroom experience. However, as expected, this relationship became non-significant by the end of their PGCE year. Stepwise regression with self perception as a teacher of mathematics as the dependent variable showed that anxiety levels, prior experience in the classroom and self-perception as a mathematician contributed unique variance on entry. By the end of the course, only perception of self as a mathematician contributed unique variance.

During the year the trainees' anxiety about mathematics reduced significantly. There were statistically significant drops in anxiety levels between September and December and between December and April. The group of trainees who had significantly high levels of anxiety on entry also showed significant reductions in anxiety levels over the course of the year. However, this group of trainees were still significantly more anxious than their peers by the end of the course. Their anxiety levels did not seem to have dropped any more than those of trainees who less anxious at the beginning of the course.

The group interviews provided some interesting illumination of the statistical data. Trainees come to their PGCE year with ideas about mathematics and mathematics teaching. Those who have had a negative experience as learners of mathematics do not necessarily come determined not to repeat the mistakes of their own mathematics teachers. For many, they do not realise that mathematics can be taught in ways that are not negative.

Less anxious trainees were content to be 'taught' some subject knowledge and simply to refresh mathematics that they had not used for some time. The more anxious trainees saw the opportunity to do some mathematics as extremely valuable. They needed more than simply to be reminded how to do something.

> "I have this problem of, if someone explains it to me I understand it, but then when I go away, like on a test and I have to do it for myself, or apply it to different numbers I'm like whoooooaaahhhhh."

> "We were shown how to do that and I got it, but having the chance to actually do it, that really helped."

This suggests that providers of initial teacher training need to do more than offer a 'one-size-fits-all' subject knowledge provision. The element of choice as to the level of subject knowledge provision offered seemed to be particularly important to the most anxious trainees. Their being grouped with other trainees who were anxious about and less confident with mathematics enabled them to engage more with the teaching, to ask questions and to 'have a go' without the feeling that their more confident peers were judging them. The freedom to 'have a go' and not to be worried about making mistakes was identified as particularly important by the more anxious trainees.

Given this, the approachability of tutors was identified as being important as was the fact that tutors had a sense of humour and did not reinforce a pre-conceived notion of mathematics as a dull and dry subject. Students' confidence in mathematics was increased by feeling able to approach tutors to ask questions, to make suggestions in teaching sessions and to have a go at problems without the feeling that the tutors would become impatient or dismissive. Patience was identified as an important trait in a tutor.

> "They all work to your level. If you don't get something right, it doesn't matter. They are willing to work through it with you until you do understand it."

There was a complex relationship between the trainees' level of anxiety, their subject knowledge and their understanding of pedagogy. Pedagogy sessions, although not designed specifically to address subject knowledge, were places where trainees had made significant advances in their mathematical understanding. For many trainees, being shown ways of explaining a particular mathematical concept to primary school children acted as a trigger for making leaps in their own conceptual understanding, which in turn led to much greater confidence with their own mathematics.

Pedagogy sessions also served to change trainees' views of mathematics itself. There was an emerging sense that the tutors themselves were acting as ambassadors for mathematics. The fact that tutors had a sense of humour and were seen as being very approachable and meant that the trainees' perception of mathematics itself was changed. For example, in one session on problem solving, the trainees were asked to think about ways of finding the weight of a (very lively) cat that wouldn't sit on a pair of scales long enough to be weighed. The tutors acted out weighing a person and then that person holding the cat. Surprisingly, trainees commented that seeing tutors acting in this way served to change perceptions about mathematics being a dry and humourless subject.

> "Using physical examples of people standing on chairs and tables has proven that you can enjoy maths, it doesn't have to be dull."

Not all the trainees lost their anxiety about mathematics during the year. Those who remained anxious rationalised their anxiety by realising that it put them in a better position to understand those children who do not find mathematics an easy subject.

The findings provide a rich insight into the thinking of primary teacher trainees as they grapple with mathematical subject knowledge, pedagogy and their

own feelings during their training year. They represent an excellent source of ideas for providers of initial teacher education to develop and adapt their courses so as to make better provision for anxious trainees and help to break the chain of mathematics anxiety.

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