

## How do teachers of mathematics understand ‘effective’ CPD?

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One of the aims of the Researching Effective CPD in Mathematics Education (RECME) project is to investigate factors contributing to ‘effective’ CPD. This paper is concerned with understanding the idea of ‘effective’ in relation to CPD for teachers of mathematics. It draws mainly on questionnaire data from 82 teachers who said their CPD was effective, exploring the responses teachers gave when asked to explain **why** their CPD was effective. Interview data provides further detail.

### Introduction and theoretical framing

This paper reports on preliminary results from the Researching Effective CPD in Mathematics Education (RECME) project, which aims, amongst other things, to investigate factors contributing to ‘effective’ CPD. The starting point for this investigation is to establish what we mean by effective.

One approach to understanding ‘effective’ in relation to CPD is to suggest characteristics of CPD initiatives that seem to lead to teacher learning. For example, Joubert and Sutherland (2008), in a review of the literature, drew out the following characteristics of ‘effective’ CPD:

- both institutions and teachers are committed to the enterprise
- the CPD initiative encourages purposeful networking amongst teachers
- the CPD is grounded in classroom practice and based on sound educational practice, building on what teachers already know, taking into account the voice of the teacher and avoiding adopting a 'deficit model' of teacher knowledge and practice. The programme is explicit about ‘what change counts as improvement’.
- the focus of the CPD is on ‘mathematics for teaching’
- the CPD centres around activities that reveal aspects of 1) teachers’ awareness, beliefs, and knowledge 2) teachers’ practice and 3) students’ learning and supports the development and evaluation of classroom-based activities.
- the CPD supports reflection and inquiry by teachers on both their own learning and their own classroom practice
- the CPD supports the development and evaluation of classroom-based activities.

Other literature ‘evaluates’ CPD in terms of ‘outcomes’. Guskey, (2000) for example, developed a hierarchical five-level model of evaluation:

1. participants’ reactions to CPD events
2. participants’ learning
3. organisational change
4. participants’ use of new knowledge and skills (changes in classroom practice)
5. student learning.

Guskey (2002) argues that, although student learning is ‘farthest away’ from the CPD, it is the most important level to consider and should provide the starting point for those developing CPD.

Garet et al (2001), in a study of over a thousand teachers taking part in a wide variety of initiatives of professional development, asked teachers to report on their own experiences and behaviours related to the professional development activity. They were also asked to report on changes in their knowledge and skills and changes in their teaching practice. An analysis of the responses led to the development of a model of the statistical relationships between the characteristics of CPD and teacher learning and changes in classroom practice.

It seems to us, however, that the teacher voice is not heard clearly enough in these sorts of studies; the question for us is what counts as ‘effective’ from the perspective of the teachers? What do they choose to tell us when we ask them what makes their CPD effective? We take this approach because RECME has, from the start, been interested not only in the ‘big picture’ of the CPD landscape, but also in the views of the teachers taking part in the CPD.

## **Methods**

RECME investigated thirty initiatives of professional development for teachers of mathematics across all educational sectors (apart from higher education). The full data set included an online questionnaire, which was completed by 92 teachers. It also included interviews with 51 teachers. This paper draws on data from the questionnaires and teacher interviews to explore teachers’ notions of ‘effective’ CPD.

In the questionnaire teachers were asked if they thought the CPD initiative in which they were currently involved was effective and were given a choice of three responses: yes, no and partly. Of the 92 respondents, 82 responded in the affirmative and nine said it was partly effective, providing reasons ranging from ‘I don’t feel ready to make the judgement’ to comments that the content covered was too advanced. The one who said ‘no’ provided commented that they were unclear about what is meant by CPD.

Here our concern is with those who said their CPD was effective; a follow-up open question asked them to explain **why** it was effective. An initial trawl through these responses revealed that, to a large extent, they fitted with the first four of Guskey’s five levels (above). However, there were no direct comments related to improved student learning (the fifth level) as an explanation for the effectiveness of teachers’ CPD (although we suggest that improved student learning is implied in comments about teacher change, and its importance to teachers is evident in interviews and classroom observations).

We used the four levels to frame the analysis in this paper; participants’ reactions, participants’ learning, organisational change and participants’ use of new knowledge and skills. The questionnaire data was supplemented with interview data to provide rich detail and explanatory examples.

## **Emerging findings**

### ***Level 1: Participants’ reactions***

The responses in this section fall into a number of areas: how practical and relevant the CPD is, how stimulating and enjoyable the CPD is, leadership of the CPD and the value of networking and sharing.

Teachers reported that they valued practical experiences, which were relevant to classroom practice. They suggested that the CPD was effective because it was 'practical and involved hands on explanations', 'very practical and topic based', 'very practical and informative'. One teacher stated that:

I am greedy for knowledge if it helps in the classroom and this CPD was classroom based.

A second set of comments about why teachers thought their CPD was effective relates to stimulation and enjoyment. Comments ranged from 'fun' and 'exciting' to 'stimulating' and 'challenging'. One teacher explained why she thought the CPD was 'fun':

Fun ... enjoyable, entertaining, thought provoking. I like the mechanics behind a lesson, I love seeing some bits that go together. It makes me think, seeing what underpins other bits in a lesson plan. I like the working with the other people aspect of this CPD, and I do not feel threatened by this way of working together, of sharing practice. ... This is what I call 'fun': the thinking of how you can make it work, the fitting things together.

Another teacher commented that 'It has been very interesting to work with a different group of mathematics teachers' and another suggested that 'the actual preparing of the lesson for the project is also interesting seeing how it evolves and develops.'

Teachers also reported that they found CPD effective because they were intellectually challenged by it. One teacher said that 'Other recent CPD has not really challenged my thinking, this one does'. Other teachers said they thought the CPD was effective because it was stimulating. One teacher said that sometimes she doesn't understand the mathematics covered in the CPD but she enjoys this challenge, as it makes her develop her own A Level Mathematics skills at home. 'I am interested in maths at all levels; even though I don't teach at that level; I am still keen to learn.'

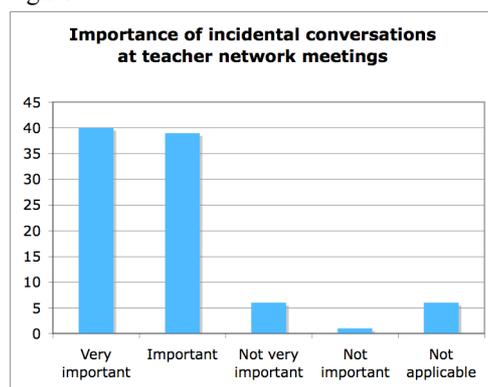
In some cases, responses from teachers involved in courses 'led' by teacher-educators suggested that the 'leadership' of the course was what made it effective.

The source of the majority of my CPD is planned and overseen and delivered by professionals with a wide knowledge and current practice experience.

Other teachers reported that their CPD was effective because, for example, it had a 'good' or 'brilliant' leader, and others pointed out the importance of the leader. One teacher, when interviewed, explained that she benefited so much from the course because the two main leaders complemented each other so well. She explained that one of them supported her well because she understood 'what it is like trying to fit in study with a full time job' and the other 'providing a safe environment where we can say what difficulties we have with maths. It's important because we are adults and teachers and we are supposed to know the maths. He doesn't make me feel silly when I ask questions'.

Many teachers reported that they thought the CPD was effective because it provided them with opportunities to meet with, and talk to, other teachers. They also suggested that the informal learning opportunities provided by incidental conversations were important, as Figure 1 below demonstrates.

Figure 1



It is perhaps important to understand what it is about these incidental conversations that is valuable to teachers. Our data suggests that, for many teachers, there is value in sharing the day-to-day concerns of their professional lives. One teacher, for example, remarked that ‘It is effective because we are all practising teachers who are coming together to talk about real dilemmas we are faced with and to come up with ways of solving these together.’ Another teacher, from a primary school, reported that she benefits from ‘brain storming with other teachers, teaching the same year’. This may be important; in many primary schools there is only one teacher per year group and it seems that this teacher valued the opportunity to discuss issues related to this year group with another teacher in the same situation. There were similar comments from teachers in FE who mentioned the importance of meeting up with other numeracy teachers to ‘discuss the issues raised in delivering numeracy’.

## ***Level 2: Participants’ learning***

### *Changes in knowledge and beliefs*

This subsection includes teacher learning in terms of ‘informational outcomes’ (Harland & Kinder, 1997), changes in awareness and gaining new knowledge and skills.

Some teachers said their CPD was effective because they had been given information that they had not previously been aware of. For example:

Through attending this I have found out about and hope to do my Level 5 Numeracy Diploma later this year.

The course has greatly developed my understanding of the new mathematics framework

The teachers reported the effectiveness of their CPD in terms of their altered awareness of the processes of teaching and learning mathematics. Once again, some of their comments were fairly general:

Inspires you to think about the way you teach mathematics

It makes me question what I am doing

Other comments were much more specific and suggest ways in which the activities of the CPD in which they are involved had raised their awareness of their own practice.

Lesson study is fascinating - a very rich source of material for reflection - immediately and longer-term, from the minutiae of teaching to the big picture of whole-school teaching and learning - and everything in-between.

It's like a zoom lens that is based around everyday practice and involves observations and recording that I would do in any case. It has stimulated my own thoughts re practice.

Looking at one particular aspect of algebra in detail has also made us reconsider the way in which we tackle related techniques.

Many teachers related the effectiveness of their CPD to the knowledge and skills that they felt they had gained.

Sometimes they commented in general terms referring to 'extending' or 'topping up' knowledge and 'learning a lot'. However many were much more specific saying, for example, 'learning new technology' and 'it has taught me a lot about how to question children'. These more specific comments included some about learning about mathematics, learning about teaching mathematics and learning about students' and children's understanding of mathematics.

### *Changes in attitudes*

Teachers reported that their CPD was effective because it had given them confidence. Some comments related to confidence to try out new things. For example, one teacher said that 'it has built my confidence in using handheld technology within the classroom' and another that she felt confident to try out new things. Other teachers said that they had become more confident with mathematics and others talked more generally about confidence:

I am getting more confident to voice my passion about maths – being part of the network has made me fight harder.

Some teachers related the effectiveness of their CPD to motivation, feeling inspired, challenged and refreshed, with comments such as

Re-motivates you

I enjoy teaching mathematics anyway so I have found this course refreshing.

### ***Level 3: Organisational change***

There were a few comments explaining the effectiveness of CPD in terms of departmental and school change. However, there were not many of these because, we suggest, organisational change was not an aim of the majority of the initiatives. However, there were teachers who reported that their CPD was effective, for example, because it 'motivated my department into using new and innovative methods in their teaching' or because 'we're already seeing whole-school improvements as a result'.

### ***Level 4: Participants' use of new knowledge and skills (changes in practice)***

Some teachers explained that their CPD was effective in terms of changes in practice:

- changes in teaching strategies and techniques that had already taken place and
- more short term changes in practice that involved trying things out (with no indication as to whether the trying out leads to longer term changes in practice).

The teachers described changes in classroom practice on a general level. For example, one teacher said that 'I have been able to use the knowledge to improve my teaching'. A large number of teachers referred to changes in teaching techniques mentioning that their teaching styles had changed:

It changed my teaching styles dramatically and helped me to develop new skills.

Some were more specific, describing more flexible approaches, such as putting the learner at the centre or letting go of control:

I have learnt to let go of control and to let all the students have a voice. I never used to, but now I let the students come up to the board and make contributions.

A number of respondents reported that the CPD was effective because they had experimented or tried out new ideas in the classroom.

I always go back to work with a new idea to try with my learners that I have got from either the facilitators of the meetings or other colleagues.

With some courses it is easy to put the papers on the shelf and then not get around to trying things out but with this one there were so many practical ideas that you could try out.

Helping me to use IWB in a useful way within a new teaching style

Trialling resources in the classroom.

### **Concluding comments**

This paper has taken the voice of the teacher to develop an understanding of what 'effective' CPD means for teachers of mathematics in terms of their reactions to the CPD events they attend, their learning, departmental and school change and teachers' changes in practice. The range of different kinds of responses demonstrates a wide range of interpretations of the word 'effective' in relation to CPD and suggests that, in addressing questions about what is effective, we need to adopt a multi-layered approach.

The paper set out to investigate what the teachers used as explanations of effectiveness taken from the questionnaire responses and teacher interviews.. We have achieved that, but would like to signal once again the issue of student learning, which is crucially important in any consideration of what teachers see as effective as pointed out by Joubert and Sutherland (2008) in their review of the research literature.

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