

Investigations into interpreting and constructing lesson observations of PGCE primary mathematics specialists' lessons

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I am researching the discussions that primary mathematics specialist trainees have, about the teaching and learning of mathematics, with their school-based training mentors in their PGCE year. I see developing greater awareness of these conversations as important with the move towards PGCE courses that are predominantly school based. In studying lesson observation documents my findings indicate that greater attention is given to the general running of the lesson than the mathematical content. Given that lesson observations and subsequent feedback sessions provide an opportunity for mentors and trainees to discuss the teaching and learning of mathematics, the written documents suggest that talk about mathematical content may be limited. This paper may be helpful for others interested in changing their documentation of mathematics lessons in support of the development of primary mathematics specialists.

Keywords: primary mathematics specialists; school-based training mentors; lesson observations; practitioner researchers

Introduction

The key recommendation of the independent review of mathematics teaching in early years settings and primary schools commissioned by the Secretary of State for Education (Williams, 2008) was that every UK primary school should have at least one primary mathematics specialist teacher. Universities responded to this call with the introduction of primary mathematics specialist routes for pre-service teachers (Allen, 2010) and the Department for Education has offered bursaries, for those with stipulated academic qualifications who want to train as primary mathematics specialists in their PGCE year, since 2013 (DfE, 2013). A recent report by the Advisory Committee on Mathematics Education (ACME, 2015) looks at mathematics education in Initial Teacher Education (ITE) and the preparedness of pre-service teachers to teach this subject and again places primary mathematics specialism in the spotlight, highlighting 'an urgent need for further investment in and incentives for increased numbers of primary mathematics specialists' (p14). The underlying principle that primary mathematics specialists should develop a deeper subject knowledge of the subject, during their PGCE year and beyond, is expressed throughout the policy and guidance associated with this topic (ACME, 2015; AMET & NCETM, 2014; Williams, 2008).

Previously a classroom teacher and now a teacher educator on a primary PGCE mathematics course in the UK, part of my role entails working alongside pre-service teachers training as general primary practitioners with a mathematics specialism. I am also a novice researcher in the early stages of doctoral study and am investigating the development of primary mathematics specialists in their PGCE year and beyond. Earlier analysis of conversations with primary mathematics specialists in their PGCE year about their experiences in teaching and learning mathematics over

the year showed that there was very little talk about mathematical content (Ormesher, 2014). Our conversations instead tended to focus on the culture of learning in the classroom, affective associations with mathematics, degree of match between the primary mathematics specialists' views and their school-based training mentors' views and the challenges of teaching generally. These findings resonate with those of Brown & McNamara (2011, p. 25) in their work with general primary practitioners: 'students in our study generally seemed unable to articulate their understanding of mathematics except in affective terms... Mathematics did not acquire much of a subject identity in terms of its content'.

The policy context and awarenesses gained from my initial explorations have contributed to the formulation of four preliminary research questions:

- How is the subject knowledge of primary specialist mathematics teachers enacted and reported?
- What events do these teachers identify as important in the processes of developing their subject knowledge?
- What processes are involved in becoming a primary mathematics specialist?
- How can lesson observation and feedback sessions be designed to contribute to the professional development of primary mathematics specialists?

The purpose of this article is to explore what is recorded in lesson observation records and how these recordings might be developed.

Lesson observations

Ma (2010) identifies learning mathematics from colleagues as an essential element of teachers building their fundamental understanding of the subject. The most recent international survey of teaching and learning found that 'most teachers are still teaching largely in isolation' (OECD, 2013, p. 21), suggesting that opportunities to learn from each other may be somewhat limited. However, a PGCE year does provide opportunities for trainees to work alongside school-based mentors and so for regular dialogue about teaching and learning. One such opportunity is presented through the weekly lesson observation and feedback session that pre-service teachers and their school-based training mentors undertake over the duration of school-based placements as a requirement of the PGCE course. This is recognised as a well-established practice in teacher education and is seen as an opportunity for both the assessment of pre-service teachers and the development of their practice (O'Leary, 2012). Given that these interludes in the teaching week provide an opportunity for the discussion of teaching and learning, I was interested to look at what is discussed in relation to elements of my research questions. I turned to lesson observation documents to see if these gave me insight into the specialist knowledge that a primary mathematics specialist trainee might have and how this knowledge base might be being developed through dialogue with and feedback from school-based training mentors.

School-based training mentors observe PGCE trainees teach and write up their notes on a lesson observation sheet drawn up by the university. The sheet is sectioned into a sequence of boxes with headings indicating what is to be included in the observation. Headings are related to general administration (name, date, year group), the context of the lesson, the focus of the lesson observation related to the pre-service teacher's current targets, a box for observers to comment against each of the teacher standards, one for 'general comments' and then spaces for 'strengths' and 'areas for development'.

As lesson observation sheets of mathematics lessons came in over the year, I became aware that not only was I looking at them as a teacher educator but also as a researcher. I noticed that comments were often general in nature and connected to the overall running of lessons. While they gave me a feel for how the pre-service teacher was developing and a feel for how a particular lesson had gone, they did not give me a feel for how the pre-service teacher was developing as a primary mathematics specialist. If lesson observation comments were deliberately structured to support PGCE primary mathematics specialists in the development of their deep subject knowledge, what might these comments say? In order to explore this notion I brought, with permission from school-based training mentors and primary mathematics specialist trainees, a collection of six anonymised lesson observation sheets to BSRLM November 2015 and put the following two questions to workshop participants: if the observer were to record more information about the mathematical content of the lesson what might they include and if the observation acts as a scaffold for further discussion in the follow-up feedback session what do you consider as being important to talk about?

Workshop discussions

The workshop ran for half an hour and approximately 16 people attended. I gave a brief overview of my study and invited participants to read one or two of the lesson observation sheets and discuss in small groups their responses to the two questions above. I asked them to record their ideas by annotating the lesson observation sheets and after 15 minutes of group work took feedback, from each group, on their discussions. The chair of the session documented this feedback and using his handwritten notes and the annotated lesson observation sheets I subsequently collated the information which I summarise as lists of points in four key areas below.

Sheet design

The sheet could better support observers in focusing on mathematical content:

- the teacher standards could be rephrased with a closer regard for mathematical content
- the general comments section could come first with evidence for the standards lifted out of the general comments afterwards
- there could be a dedicated space for the recording of specific detail and examples of mathematical content and activity.

The bigger picture

More information about the lesson could be helpful:

- the lesson plan and an image of what was written on the board
- a transcript of the lesson feedback session
- notes on discussions with children and their mathematical activity
- a developmental target related to becoming a mathematics specialist

Being specific

Specific examples of mathematical content were seen as important:

- comments detailing exactly what gave, for example, a high level of challenge or provoked the higher level of engagement

- notes on significant mathematical moments such as points of confusion or events that stimulated greater discussion amongst children
- a narrative of what happened in the lesson
- strengths and areas for development related to mathematical concepts.

Practical and theoretical contexts

Such practice is situated in a wider context:

- the person observing should be a primary mathematics specialist as the observer's own areas of expertise will shape what is written
- to become a mathematics specialist a pre-service teacher would need to be mentored by one
- use of an established theoretical framework to shape observation feedback might be appropriate
- clarification of what good subject knowledge looks like in relation to the teacher standards would be helpful.

Changing practice

The workshop gave me food for thought. I mulled over our discussions wondering if I might be able to work on designing an observation sheet more conducive to documenting mathematical activity. Then I could try some different formats and ask the primary mathematics specialist trainees and their school-based training mentors which they found helpful as a developmental tool. I wondered how observations could be conducted by primary mathematics specialists when it is currently considered that there are not enough in school and while, as a third party reader of such observation schedules with a vested interest in the development of primary mathematics specialists, I considered that a greater focus on mathematical content was beneficial, school-based training mentors and primary mathematics specialist trainees might not agree. Perhaps most significantly I wondered if my research was set to become more about the mentoring of primary mathematics specialists than primary mathematics specialists themselves.

Four days later, I sat down in a Year 3/4 classroom with observation form in hand to observe a PGCE primary mathematics specialist teach a mathematics lesson and my teacher educator and researcher worlds collided. As per my usual routine I went straight to the general comments box but my focus was much more on the mathematics. I documented more of what was said verbatim and was alert to what felt like significant mathematical moments. Towards the end of the observation, I looked at the teacher standard boxes and completed them with comments that were directly related to mathematical content with specific examples lifted from my general comments. These shifts in attention came fairly fluently but as I turned to summarise the lesson by identifying key strengths and areas for development I found maintaining a focus on mathematical content more challenging with my attention drawn to other, more general elements of teaching practice. So it seemed that lesson observation records could, with some practise, reflect greater mathematical content of a lesson by completing them with new awarenesses; I now had a document that could support the discussion of the lesson with a focus on mathematical content.

Returning to my broader research interests of the development of primary mathematics specialists and the conversations about the teaching and learning of mathematics that they have with their school-based mentors this feels like a helpful starting point: here was a way of documenting and so potentially talking about

primary mathematics lessons differently. Perhaps primary teachers tend to talk about mathematics in general terms, as observed by Brown & McNamara (2011), as this is the way in which mathematics lessons are often talked about. By talking about mathematics lessons differently, with a greater focus on mathematical content, perhaps the specialist knowledge deemed to be important for primary mathematics specialists will become widely available for all.

Concluding remarks

The narrative and analysis offered raises avenues for further lines of enquiry. Earlier I observed that my research may become more about the mentoring of primary mathematics specialists than primary mathematics specialists themselves but while I underwent change in my practice, as a result of engaging with and pursuing a question of interest to me, will others who observe and feedback on primary mathematics lessons also find it helpful, or desirable, to shift their focus towards the mathematical content of lessons? I now also see that this current research activity is about issues related to being a practitioner researcher: as much as researching the processes involved in becoming a primary mathematics specialist, or mentoring one, I am researching the processes involved in becoming a researcher and in developing as a teacher educator and this has methodological implications for my work.

A central tenet of enactivist methodology is that everyone is a teacher, an observer, a researcher and that 'research about learning is a form of learning,' (Reid, 1996, p. 208). That there are 'shared meanings and understandings' and that 'the knower, the knowing and the known' emerge together is inherent (Begg, 1999, p. 73). This offers a helpful frame for my work as it allows for the multiple perspectives and constructs present in the living, dynamic settings and relationships in which I am positioned as a practitioner researcher. Moreover Brown (2015, p. 190) explains that a focus on process is fundamental to enactivist research 'in order to see how effective behaviours and new awarenesses develop in researchers and participants, so that others might try out the actions, see the effects and adapt in their own context.' It is this process of trying out and adapting that I experienced; while my initial focus was on what a completed lesson observation sheet could look like my findings were more about the processes an observer might go through in order to create a document which maintains a focus on mathematical content.

As a classroom teacher for 20 years I saw many approaches to teaching and learning advocated by different educational bodies come and go over time. I saw that teachers adopt, assimilate and alter these approaches, making them their own and embedding them in their practice in ways which are meaningful to them whether or not this is in the way that was anticipated by the designer of the original approach, scheme, framework or, lesson observation sheet. What is significant in changing practice is being involved in the process of change. I suggest that explorations of the type I have described may contribute to the development of more primary mathematics specialists in our schools and it seems clear that knowing about the processes by which a person becomes a primary mathematics specialist will be significant in achieving this aim. I also propose that there are many potential primary mathematics specialists in our schools already and that a greater emphasis on mathematical content and talk will support the process of their development.

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