I recently found myself in school with a group of trainee primary mathematics teachers from Shanghai. As I attempted to provide a whispered commentary at the back of the classroom about what the host teacher was doing, I found myself reflecting on and questioning the justification for practice I was providing, a familiar sensation in situations like this.

Thrown into relief by the relative clarity of purpose of my guests, the bewildering array of guidance and prescription faced by today’s primary mathematics teachers in England was especially striking. The very presence of these Chinese teachers in that mathematics lesson hints at one facet of this. As the last school year drew to a close, there was an announcement that additional funding for training in mastery techniques would be released (BBC, 2016). Meanwhile, much attention has been focused on the use of textbooks, heavily promoted by schools’ minister Nick Gibb (Gibb, 2015) and a now-postponed times tables text was mooted (DfE, 2016a), all initiatives inspired by education in the Far East. Just as a previous generation of teachers came to terms with the National Numeracy Strategy, newcomers to the profession in 2016 need to make sense of a multitude of influences, now frequently stimulated by international comparisons.

In seeking to rationalise and articulate current primary mathematics practice, my thoughts were drawn back to the Cambridge Primary Review, widely lauded upon publication as a well-informed vision for primary education. At the heart of this review was the idea that the truly professional teacher, like a doctor, would have command of evidence and principles underpinning practice:

The test of this alternative view of professionalism is that teachers should be able to give a coherent justification for their plans and decisions citing (i) evidence, (ii) pedagogical principle, (iii) educational aims, rather than offering the unsafe defence of compliance with what others expect. Anything less is educationally unsound. (Alexander, 2010, p.496)

This idea of a theoretical grounding for practice is a feature of many definitions of professional practice. How, I wondered, are today’s non-specialist primary mathematics teachers to retain a sense of autonomy and avoid Alexander’s charge of mere compliance? As a starting point, I would suggest a professional stance, based on a number of inter-connected practices, depicted in Figure 1.

Exercising judgment

Seeking collaboration

Navigating the subject

Theorising practice

Figure 1: Professional practices of the primary mathematics teacher.

In seeking to explain each of these terms, I will draw on the example of responding to current initiatives concerning pedagogical practices related to mastery and textbooks. This is not because these are inherently problematic but simply because of their current high profile.

Exercising judgement

In MT251, the National Association of Mathematics Advisors (NAMA, 2016) wrote helpfully about the ways in which teachers can take ownership of many aspects of a mastery approach, challenging some beliefs about a need for conformity. Similarly, I recently interviewed a mathematics co-ordinator about her introduction of textbooks into a primary school. She described a collegiate process of trial and discussion through which teachers came to understand how textbooks might work in their school and with particular classes. Far from being a uniform and blunt instrument, textbooks had come to be used with discretion as a useful source of overall structure or conceptual progression.

David Tripp memorably defined teacher expertise as the ability to exercise professional judgement under uncertainty (Tripp, 2011). These teachers, while drawing on established resources and training, had nevertheless begun by asking what these practices could offer to their existing notions of good teaching. How might we develop this further?
Possible actions:

- Lesson study or other peer observation to investigate an aspect of the pupil experience of mastery teaching, such as how pupils with different levels of prior attainment fare with an increased emphasis on whole-class teaching.
- Video analysis of one’s own teaching to create what Tripp characterised as “critical incidents”: perhaps something as apparently trivial as a brief comment or gesture, otherwise overlooked, that may be indicative of a more substantial issue.

Practical theorising

As interest in a ‘what works’ agenda intensifies and mastery itself is evaluated by the Education Endowment Foundation, with a moderately positive outcome (EEF, 2016), there may be an increasing temptation simply to try and apply theory derived from research into practice. Translating educational theory into practice is notoriously problematic and a more empowering response, alongside this, is to turn the process on its head and theorise one’s own practice. Student teachers we work with are frequently asked to re-interpret practice through a theoretical lens and this stance could be retained as a practitioner. The pedagogical choices made in a mastery style lesson may be based on a combination of a teacher’s experience, or ‘practical wisdom’, and recent training on new approaches. Articulating and unpicking these professional decisions as a form of personal theory is a first step. Subsequently wider knowledge can be brought to bear, what light do social constructivist ideas (see, for example, Bruner, 1966), such as language as a tool for thinking and learning from a more knowledgeable other, shed on this? Perhaps this line of thought and research, would lead to a greater focus, when teaching for mastery, on the flexible and contingent nature of scaffolding and how this might be manifested in such lessons.

Possible actions:

- Small-scale teacher inquiry might follow from such insights, as new approaches are implemented and then evaluated in an ongoing, cyclical process.
- Dissemination of the refinements to practice could take several forms, from publications such as this one to school blogs and the increasing number of teacher-oriented research communities.

Navigating the subject

The importance of subject knowledge within mathematics is clear and has been strongly reasserted in recent government publications such as the 2016 white paper (DfE, 2016b). For the non-specialist primary practitioner, developing the requisite pedagogical content knowledge presents a particularly difficult challenge. One response is to capitulate and retreat into the safety of the textbook or the published scheme of work. While some such materials, such as the planning emerging from maths hubs, are extremely valuable tools, I would argue for going further.

I recently found myself revisiting the work of Bruner (1977) and Shulman (1986). Bruner wrote about the importance of developing an understanding, less of a multitude of isolated facts and techniques, but rather of fundamental ideas and concepts within a subject, while Shulman emphasised syntactical knowledge, understanding the ‘rules’ of a subject or, in our case, how a mathematician actually works. I have referred to this as ‘navigating the subject’ to reflect a focus on knowing one’s way around the structure of mathematics. In the case of mastery, this would support a teacher in devising effective conceptual progression and depth within a topic. Much of this has to do with understanding the connections within a subject, moving away from the National Curriculum’s discrete categories to consider, for example, how the representation of a multiplication such as $24 \times 6$ as an array opens the way for both partitioning and the calculation of area. Working recently with a group of experienced teachers, I was struck by their debate around tailoring mathematical knowledge to their own contexts. There was an evident tension between universal coverage and local adaptation and ownership. Perhaps an attempt at school level to map mathematics in a locally meaningful way offers a balance.

Possible actions:

- Documenting and collecting brief anecdotes or ‘cases’ that exemplify the conceptual progression within the teaching of a particular big idea, with all the attendant misconceptions. This may then be used as the basis for discussions based on the exercise of professional judgment.
- Mapping mathematical concepts visually to explore interrelated ideas can be very powerful and may create a useful planning resource that moves away from linear or fragmented thinking about content. Through this process, primary teachers may also establish cross-curricular links, creating a bespoke vision of mathematical knowledge for their setting.
Seeking collaboration

Central to my model and relating to all three elements is collaborative practice and this seems to be to be the essence of professional autonomy. I have used the term ‘seeking’ to suggest the need for teachers to take the initiative in this respect. Membership of subject associations such as the ATM is at the heart of this and the Maths Hubs nationwide, with their growing network of mastery specialists provide a powerful example of collaboration at a regional level. In addition to this, I would make a case for fostering connections with universities’ schools of education. As teacher education becomes increasingly school-based and the demarcation between the roles of university tutor and school mentor becomes somewhat blurred, there may well be a greater appetite than ever for working together. University colleagues may be able to act as critical friends or bring some expertise in research to bear on a small-scale investigation within school. Often, the involvement of an outside partner allows that all-important opportunity to step back from the everyday and question assumptions in a safe space.

Fundamentally, however, collaboration needs to begin at a school level. Without the departmental structure of a secondary school, primary teachers arguably need to work harder to establish this culture. In one of the NCETM’s mastery videos, a subject leader emphasises the importance of incidental, informal discussion (NCETM, 2016) and this seems to me to be key. Moving beyond merely cascading new initiatives and implementing the latest pedagogical approach towards engaging colleagues in an ongoing debate about a problem to be solved may be a fruitful way of thinking about this. To return to my earlier comments on professional judgment, Tripp (2011) urges us to go beyond what he terms the “practical problematic”, or an automatic focus on merely making things work better, to question assumptions in a more challenging way. What would be the effect, I wonder, of posing (and displaying) questions in the staffroom for informal, ongoing consideration? For example, in response to mastery initiatives we might ask:

- What is it like to be a learner in a ‘mastery’ mathematics lesson? How do we know?
- Are textbooks for pupils, for teachers, or both?
- Do we now think differently about any particular mathematical concepts?
- What do we already do well in mathematics and how can we develop this further?
- What new demands does this style of teaching make on our subject knowledge?

What are the potential advantages of being a non-specialist teacher of mathematics? None of these questions sets out to undermine, or suggest cynicism towards, a mastery approach, but they may open up important, constructive debates that get colleagues talking and thinking. As I cast my mind back to those guests from China, I cannot help wondering how coherent and convincing they found my classroom commentaries and what they made of us as primary practitioners.

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References


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