

Hello from the other side: Teaching for mastery and the reception teacher

Catherine Gripton¹, Andrew Clapham¹ and Matt Woodford²

¹Nottingham Trent University, ²University of Nottingham

Teaching for Mastery (TfM) is a high profile pedagogical and policy narrative in mathematics education in England. In schools developing a TfM approach with 5-11 year old children, the pedagogical position for teaching mathematics to children of 4-5 years of age can be ambiguous. This paper focuses upon a Reception class teacher, and her class, from a primary school in the East Midlands of England. Drawing on Panopticism (Foucault), and performativity (Lyotard), the paper examines the development of TfM for this teacher as she struggles with the demands of an increasingly neo-liberal, marketised, education system. Through thematic analysis, the paper demonstrates how ‘Horizon Content Knowledge’ (HCK) - allied to the prevalent performative zeitgeist - frames the intersection between TfM pedagogy and mathematics policy. The paper concludes by suggesting, that the class teacher illustrates the complexities of mathematics education located on the ‘other side’ of the TfM policy agenda.

Early years, mastery, policy

Introduction

Mastery is a contested term in mathematics education and the current education debate in England. Indeed, even attempting to use a universal term for mastery is problematic. Here, we adopt the term Teaching for Mastery (TfM) - see Askew et al. (2015) -, which distinguishes TfM from other mastery nomenclatures such as ‘mastery curriculum’ or ‘mastery approach’. This case study explored how TfM was realised for one Reception class of 4-5 year old children in their first year of statutory schooling and their teacher Shelley, in a school in the East Midlands of England. Shelley was in her fourth year of teaching and had a strong mathematics background in terms of her own qualifications. Shelly’s school had seven classes, and hers was the only early years class following the statutory framework for Early Years in England, the *Early Years Foundation Stage* (EYFS). This paper explores the intersection between TfM policy and Early Years pedagogy. In doing so, it illustrates how Shelley negotiated contrasting high-stakes policy, political and pedagogical considerations. Shelley was a teacher starkly aware of the developing TfM pedagogy in the rest of school. In an effort to reconcile competing Reception and Year 1 requirements, Shelley embarked upon participatory action research to develop a TfM approach in her Reception classroom - a journey which illustrates not just some of the challenges Shelly faced but also across the sector in general.

Policy Landscape

The monitoring of education standards through the *Office for Standards in Education* (Ofsted) is high stakes in England. Education standards used by Ofsted are measures

of performance and driven by international performance comparisons such as the *Organisation for Economic Co-operation and Development (OECD) Programme for International Student Assessment (PISA)*. In 2016, PISA ranked English students' mathematics performance 26th in the world. This ranking - allied to underperformance in previous PISA rankings - led to the then government investing in TfM in English schools. Through a process of 'policy borrowing' (see Clapham & Vickers, in press) TfM was highlighted as an effective model of mathematics education based upon the 'high performing' (DfE 2012) - in PISA terms - education systems of Shanghai and Singapore.

The PISA model of high-stakes regulation based upon performance metrics illustrates powerfully what Lyotard (1979) calls performativity. Allied to performativity, is Michel Foucault's (1977) analysis of disciplinary and punishment structures such as the Panopticon, and the role of inspection and surveillance technologies in mediating these structures. Shelly's position within this performative and panoptic landscape resulted in significant challenges for her. Shelly attempted to simultaneously meet the performative demands of EYFS as well as the TfM driven pedagogical imperatives of subsequent educational phases.

Teacher Knowledge

Multiple frameworks exist for describing teachers' mathematical knowledge. Shulman's (1987) seven categories of teachers' mathematical knowledge include pedagogical content knowledge. Shulman (1986) also stresses that teachers require 'vertical knowledge' of curriculum in order to know what children experience post and prior to the current learning stage. Ball, Thames and Phelps (2008) expand Shulman's work and suggest that additional to knowledge of curriculum is the role of knowledge beyond the teaching range of the current class – what they described as 'horizon content knowledge' (p.403). These authors also identify 'knowledge at the mathematical horizon' (p.70) as part of content knowledge and is essential mathematical knowledge for teaching.

Although useful, Ball et al.'s categories do not fully capture knowledge of specific didactical decisions or approaches used in the future (or indeed past) school years. Whilst seemingly part of pedagogical content knowledge, it is a very particular knowledge formed through an awareness of pedagogical approaches used in mathematics teaching in other age phases. Whilst the teacher is at liberty to accept or reject these didactical decisions, this rejection becomes more difficult in a context surrounded by a dominant and prevailing performative zeitgeist - a zeitgeist which stresses that children must be well-prepared for their educational future. Drawing on Ball et al.'s work, we suggest that there remains the lack of a term to adequately describe knowledge of the subject-specific pedagogy that the children will experience in their future schooling - a term we theorise as 'Horizon Pedagogical Knowledge' (HPK). We propose that Shelley enacted and developed her HPK of TfM approaches in her school within this study.

Teaching for Mastery

TfM employs pedagogical practices that support whole class working, on the same topic, over an extended timeframe (NCETM, 2016). NCETM (2017a) describes TfM as 'the range of elements of classroom practice and school organisation that combine to give pupils the best chances of mastering mathematics'. They suggest that TfM pedagogy for primary (5-11 years) relies upon 'five big ideas':

- (i) coherence
- (ii) representation and structure
- (iii) variation
- (iv) fluency
- (v) mathematical thinking.

As part of supporting TfM, a network of ‘maths hubs’ and the training TfM specialists was rolled out across England. Engagement with these hubs makes schools eligible for subsidies to purchase government approved textbooks.

Methodology

Employing participatory action research (see Kemmis 2009), Shelley set out to develop her TfM practice. Methodological literature, which positions early education research as research ‘with’ rather than ‘on’ children (Harcourt & Einarsdóttir, 2011), informed Shelly’s research. Shelly mobilised a theoretical approach, which followed praxeological research (see Pascal and Bertram, 2012). A praxeological approach acknowledges that research is ethical praxis with a concern for power and ethics within an ethics and epistemology nexus (Guba, Lynham & Lincoln, 2011). Here, ethics *is* epistemology where the research process moves towards a more valuing and human understanding of the world. Consequently, Shelley reported she was able to take greater control of her practice - whilst addressing potential powerlessness within the performative policy environment - despite her position as an outsider to TfM policy intended for the mathematics education of children 5-11 years old and beyond.

Within a two-stage data analysis process, Shelley analysed her classroom data (field notes, photographs and children’s work) and took professional action within a participatory action research approach. Stage 2 analysis was conducted by the research team, which included Shelley’s analysed classroom data and an interview with Shelley about her practice. Within stage 2, data underwent an initial grounded analysis followed by a thematic analysis using the five big ideas from the TfM policy.

Findings and Discussion

Shelley was keen for her class not be isolated from the rest of the school and attentive to the need for her learners to experience a smooth transition from EYFS to the next educational phase (at the end of the academic year). As Shelley explained:

I wanted to make sure what we were doing in foundation led nicely into Year 1. It wasn't totally different but that foundation was the beginning point, not Year 1.

Shelley’s developing TfM practice had six main aspects:

- (i) small steps
- (ii) progression
- (iii) concrete-pictorial-abstract representation
- (iv) mathematical relationships
- (v) depth of understanding
- (vi) differentiation and TfM resources

From analysis, the two key aspects that appeared to be most important to Shelly were (i) children using multiple representations and (ii) small steps progression within her planning.

Multiple Representations

Shelley recognised the mathematical structures underlying multiple representations. She also acknowledged the opportunities for seeing composition that each representation afforded. However, Shelly was less sure about how to select representations and seemed to feel that multiple (or many) was most successful in supporting students' obtaining depth of understanding. Shelly was also aware of some specific TfM representations, which she associated with TfM from her discussions with school colleagues. Shelly was happy to explore what, and how, her Year 1 colleagues were teaching and to adapt resources for the younger children. For example, when children struggled with part-part-whole 'cherry diagram' model (NCETM 2017b), she added a + sign and moved her fingers to suggest addition - an approach which actually reduced and obscured the flexibility of the model intended to show composition relationships.

Shelly highlighted the children's high levels of motivation and confidence with multiple representations and collected examples of children using representations in their play. The children chose to play with, and independently explore, representations they had experienced in Shelly's short mathematics lessons in their child-initiated time. The children often adapted the models provided which demonstrated their confidence, but also led to some misappropriation of representations. Shelley explained:

I think I just did as many (representations) as I could think of. So we've done dice, dominoes... just because they look different.

She seemed clear that multiple representations meant 'many' and focused upon children using many, rather than specific, representations.

Small Steps

The second key aspect of TfM that Shelley identified was 'small steps' progression. Shelly's planning had changed and had become more closely linked to learners' progression within and across adult-led mathematics sessions:

Planning out these journeys makes so much sense. Previously my maths planning would have been, right we're doing double this week, so we'll do this double game and that double game, and it was a bit more like sporadic I suppose, rather than thinking through a sequence.

Shelley explained that this new way of planning with a focus upon small steps progression helped to reduce misconceptions from forming. Small steps had seemingly led to a reduction in her assumptions about the connections children were making. This planning was, however, reliant upon Shelley's knowledge of typical developmental steps within the mathematics. Some steps, which she deemed to be 'small', were perhaps larger than she recognised:

But it's very small steps, so I spent a whole lesson, I've got this big ladybird with spots on it, you just put a quantity on one side, double it, it's got to be the same again. It's quite repetitive, but it ingrains it in to them, and then we'd move on to doing that again but with some different

apparatus. But all through that week it was about that they have to be the same again. So kind of just picking out small bits, it's not even like, it's the concept double, it was the concept of doing the same again to find double.

Shelly appears to equate small steps with spending a longer time repeating concepts - possibly just using different materials. Without age-range specific planning or assessment frameworks to support her in identifying appropriate small steps, she found that she was reliant upon her own research and intuition. As Shelly explained:

I feel like I've had to make it up as I go along quite a bit...[as]...there's really not a lot out there for foundation at the moment.

Conclusion

From examining Shelly's experiences, we argue that conflicting early years and TfM policy narratives increasingly influence the Reception teacher's work. We also argue that future research into HPK might help develop existing models of teacher knowledge trying to find a space within these contrasting and conflicting narratives. We suggest that this conflict requires greater consideration in both TfM policy development and interpretation of practice in Reception classes. Reports such as Ofsted's 'Bold Beginnings' (Ofsted, 2017) interpret practice in Reception classes with little consideration for the tensions between conflicting policies. Nor does Bold Beginnings acknowledge the challenges facing Reception teachers seeking to navigate this volatile and contentious policy landscape as outsiders. What Shelly's experiences tell us, is that Reception teachers are having to make sense of TfM in the absence of guidance or support. Moreover, Early Years teachers are facing increasingly significant pressures to 'perform' in relation to performative targets such as the Early Learning Goals for EYFS.

Shelly's experiences highlight how early years practitioners need investment in research-informed pedagogic subject knowledge development. Such development needs to run alongside greater recognition and amelioration of the pedagogical transitions between EYFS and National Curriculum in England. Such amelioration would lead to teachers' horizon knowledge informing - and being shaped by - developmentally appropriate pedagogy and prevent 'cliff-edge' type changes in children's experiences of mathematics pedagogy.

The research for this paper was funded by the East Midlands East Maths Hub.

References

- Askew, M., Bishop, S., Christie, C., Eaton, S., Griffin, P., & Morgan, D. (2015). *Teaching for mastery: Questions, tasks and activities to support assessment, year one*. Oxford: Oxford University Press.
- Ball, D.L., Thames, M.H., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? *Journal of Teacher Education*, 59 (5), 389-407.
- Clapham, A., & R. Vickers. (in press) Neither a lender nor a borrower be? Exploring mathematics 'mastery' policy borrowing. *Oxford Review of Education*.
- Department for Education (2012). *Review of the national curriculum in England: What can we learn from the English, mathematics and science curricula of high performing jurisdictions?* Retrieved from

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/184064/DFE-RR178.pdf

- Foucault, M. (1977). *Discipline and punish: The birth of the prison*. London: Penguin.
- Guba, E. G., Lynham, S. A., & Lincoln, Y., S. (2011). Paradigmatic controversies, contradictions, and emerging confluences, revisited. In N. Denzin K., & Y. S. Lincoln (Eds.), *The Sage handbook of qualitative research* (4th ed., pp. 97-128). London: Sage.
- Harcourt, D. & Einarsdóttir, J. (2011). Introducing children's perspectives and participation in research. *European Early Childhood Education Research Journal*, 19(3), 301-307.
- Kemmis, S. (2009). Action research as a practice-based practice. *Educational Action Research*, 17(3), 463-474.
- Lyotard, J. (1979). *The postmodern condition: A report on knowledge* (G. Bennington and B. Massumi, Trans.). Manchester: Manchester University Press.
- National Centre for Excellence in the Teaching of Mathematics (2016). *The essence of maths teaching for mastery*. Retrieved from <https://www.ncetm.org.uk/resources/49450>
- National Centre for Excellence in the Teaching of Mathematics (2017a). *Five big ideas in teaching for mastery*. Retrieved from <https://www.ncetm.org.uk/resources/50042>
- National Centre for Excellence in the Teaching of Mathematics (2017b). *Introducing 'whole' and 'parts': part-part-whole*. Retrieved from <https://www.ncetm.org.uk/resources/50719>.
- Ofsted (2017). *Bold beginnings: The reception curriculum in a sample of good and outstanding primary schools*. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/663560/28933_ofsted_-_early_years_curriculum_report_-_accessible.pdf
- Pascal, C., & Bertram, T. (2012). Praxis, ethics and power: Developing praxeology as a participatory paradigm for early childhood research. *European Early Childhood Education Research Journal*, 20(4), 477-492.
- Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15, 4-14.
- Shulman, L.S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57(1), 1-23.