

‘It’s been worth the effort’: Primary school teachers learning to teach mathematics remotely during the pandemic.

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We draw on Spring 2021 findings from a 2019-2022 study of impact and use of a ‘mastery’-oriented primary (ages 4-11) mathematics resource, ‘Power Maths’, in England. The study follows 40 classes of primary children and their teachers, in 20 schools, over two years. Our findings span the return into school from the early 2021 lockdown period, comparing and contrasting teachers’ approaches across the two pandemic-related lockdown periods, the first in March-June 2020. Most teachers developed a significantly wider range of, and confidence in, remote learning practices. They came to expect more, and active, new learning, rather than aiming just to consolidate prior knowledge. Many developed active selection of the most appropriate topics for home learning, substantially increased ‘live’ teaching, and found ways to more proactively monitor work. Despite this, some challenges persisted: providing effective formative assessment and insecure knowledge of parental support and of gaps in children’s learning.

Keywords: primary mathematics; remote learning; pandemic learning; learning loss

Introduction: The policy and pandemic contexts

Power Maths is designed as a coherent set of mathematics materials for use by teachers and children in years R-6 (age 4-11) in England. There have been two significant periods of sustained school closures in response to Covid-19 in the UK. March 2020 saw all schools closed to most children until the return of all pupils to schools in September 2020. Subsequently, from early January 2021 the English government imposed another lockdown, with most children learning from home until March 2021. We have relatively poor understanding of the long-term impacts of sustained school closures, although there is some evidence they can be significant, affecting mathematics learning particularly badly (Kuhfeld et al., 2020). Evidence of primary children’s age-related learning over the recent pandemic has certainly shown decreased levels of attainment, with mathematics again a curriculum area particularly affected (e.g. Juniper Education, 2021). This study provides not only subject-specific qualitative evidence of responses to, and impact on, mathematics teaching and learning but also, from our Spring 2021 and earlier data, the opportunity to track how primary teachers adapted to remote teaching and learning.

Research questions and theoretical frameworks

We draw on findings from the first two years of a three-year study (2019-2022) conducted by Pearson in collaboration with UCL. Field researchers are experienced subject- and phase-specialists independent of Pearson. We adopted an institutional ethnographic approach (Smith, 2005) in an effort to understand the lived experiences of teachers’ and children’s early use of Power Maths, first published in 2017, and the

impact on mathematics learning. Earlier phases of this research were able to evidence the mathematics provision during the March-June 2020 lockdown (Golding & Grima, 2020) as well as the approach to the reopening of schools in September 2020 (Barrow et al., 2021). Following closures of schools to most children again in January 2021, our questions in late Spring 2021 asked:

- *How did teachers set out to provide for children’s mathematics learning over recent home learning period(s)?*
- *What resources did they use, why, and what was the perceived impact of their approach?*
- *What were teachers’ mathematics plans and needs for Summer 2021?*

We focus here on high-level findings, contextualising those within earlier study data.

Methodology

As indicated in Table 1 which outlines data collection for the first full year of the study, each yearly cycle was planned to comprise three phases:

Table 1: Data collection for the first year of the study (2019-2020)

Phase 1: Autumn 2019	- Results from 40 classes of year 1, 3 or 5 baseline assessments - Transcriptions of interviews with 40 year 1, 3 or 5 (Y1,3,5) class teachers and 6 other school mathematics coordinators (MCs).
Phase 2: Spring 2020 (school visits, curtailed by pandemic)	- Plans and observation notes from 34 whole lesson observations - 34 post-observation class teacher and 2 other MC interview transcripts - 34 children’s post-observation focus group transcripts - 17 sets of visit notes
Phase 3: July 2020	- Completed surveys from 36 class teachers and 4 school mathematics coordinators - Transcripts of 17 school MC interviews

As a result of the pandemic, all data from March 2020 onward have been collected remotely, mirroring previous patterns but without any school visits, and for ethical reasons over this stressful period, not attempting to access children’s voices. To ease the burden on participating teachers, we offered a choice of telephone or similar interview, and survey. Following two withdrawals, data were from 18 schools:

Table 2: Spring 2021 data collection

Spring 2021	From 35 year 2, 4 or 6 teachers as well as 4 other school mathematics coordinators: - 27 teacher completed survey responses - Transcripts of 8 class teacher telephone interviews
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The school sample was representative in a number of characteristics known to affect teaching and learning (catchment type, socio-economic profile of pupils, previous attainment levels, inspection outcomes, governance). Standing alone, surveys are not ideal for institutional ethnographic purposes (Lefever et al., 2007) but we conjecture that well-established working relationships with teachers, following already longitudinal engagement with them, supported unusually rich and often extensive survey responses. All interviews were recorded and transcribed; all qualitative data were then iteratively analysed by research question and then using an open grounded

approach (Charmaz, 2006) to expose sub-themes. In parallel, documentary analysis of lesson plans, the Power Maths materials used, and other local documents were analysed in an attempt to understand enactment with an ‘institutional ethnographic’ lens (Smith, 2005): data could then be interpreted within a much wider grasp of schools’ personnel, and in-school and broader working context/constraints.

Findings

In Spring 2021 teachers reported significantly increased confidence with, and proactive addressing of, remote learning needs. This is in contrast to approaches in the first lockdown period from March 2020, when there had commonly been minimal live interaction with children, and provision in mathematics had widely been subservient to maintenance of reading and writing, with a mathematics focus on consolidation rather than any new learning. Teachers’ reported their 2021 approach to online learning more assured, flexible and confident, and planned lessons were often ‘more structured’ (School 7 Y2 Spring Survey), often as the result of deliberate preparation for a further lockdown during the Autumn term 2020. At least 16 of 34 other teachers provided similar comments, for example:

Our remote learning was far more successful this time round. We were able to ensure more children had access to our learning platform with the loan of IT equipment and extra data. Class teachers were able to teach daily lessons to their classes and involve TAs in the teaching, marking and assessment of work. Teachers were given visualisers to support their remote teaching sessions too - extremely effective for the modelling and use of concrete and pictorial representations - scaffolding learning for all. We were able to send packs of equipment to many children who we knew would benefit from the manipulatives (School 3 MC Spring survey).

It was evident from the Spring 2021 data that there was also much more of an emphasis on ‘live learning and progression’ during the recent home-learning period, a stark contrast to our findings from previous remote-learning periods where teachers largely focused on asynchronous consolidation rather than continuation of new learning, in mathematics: “This time for year twos, I’m pretty much online with kids all morning, every morning, and we’re keeping up well” (School 14 Y2 Spring interview). Approaches to remote learning even across a year group often varied by teacher, and respondents commented on positive aspects of that, such as the children-sensitive pace achievable; others had identified small learning points such as including thumbnails in the corner of videos to enhance the personal contact experienced by children, even if planned engagement was asynchronous. Teachers adopted a variety of approaches to the synchronous/asynchronous dilemma, often referring to the practical constraints felt by families – but also to the positive benefits of children being able to re-watch pre-recorded videos in their own time, and pause them to think about what was being presented:

It was useful having the online book this time... We sent workbooks home, but also having the online book meant you could mirror pages on our VLE and the textbook. And we had to do a lot more video lessons. Putting us in the top corner and giving almost a running commentary about what we were doing (School 10 Y2 Spring interview).

Continuation, rather than consolidation, appeared as a consistent theme through the Spring 2021 teacher feedback. There was clearly a desire to see as minimal disruption to the ‘normal’ way of learning in spite of the unusual circumstances: at least

23 of the 35 teachers reported having tried to keep their approach as normal as possible, continuing to primarily use Power Maths supplemented with other materials:

And so we were all actually following the Power Maths scheme continuously from home. And we actually haven't really fallen too far behind. We're just about to finish the algebra unit. To be honest I think we're only about one unit behind where we should normally be.... in terms of content, you really aren't far from where you would have been anyway, and that there's been some fantastic engagement, and the ability to really personalise for some children (School 8 Y6 Spring interview)

Similarly, many teachers also took a more proactive position in selecting the most appropriate topics for home learning, leaving other topics they felt were more essentially taught face to face in classrooms: "Basically we were going at the normal pace, but with some adjustment to focus on what works best at home and what's really critical in school – some of the key new number work, for instance" (School 3MC Spring interview).

However, use of manipulatives, and of representations, was constrained in both remote and face to face learning, and teachers were frustrated by limitations in close oversight of children's emerging written work. Understanding of pupil engagement, and especially analysis of their learning, during previous school closure periods had been difficult, and remained an issue, though Spring 2021 data showed teachers employing a range of means to monitor pupils' work more proactively. For example, one teacher described new approaches to assessment of written work:

I would use the workbook facility on the active page...what Google Classroom allowed us to do, is it allowed us to get the kids to turn in the work when we'd finished. And allowed us to use something called Mode, to voice record responses, so it's a way of us being able to personalise our responses to children... You could look at their work, and mark the work, and you had a minute and a half to talk to them. And you'd got marking done in that minute or so of recording your own voice (School 8 Y2 Spring interview).

Almost all teachers reported significant learning of their own – in terms of their confidence for using, and knowledge base of, a variety of digital tools to support remote learning, but also in terms of their subject and subject pedagogical development. This latter usually derived from revisiting Power Maths teacher support materials. At least 12 of 35 responding teachers reported having to rethink and readjust their pedagogical approach to the mathematics curriculum for remote or pandemic-constrained teaching: "It's certainly, from a professional point of view, helping me teach areas of maths that I hadn't given the time to enough before, to really think about how to deliver them" (School 10 Y6 Spring interview);

The teachers were saying how much they've gained from re-thinking their planning using Power Maths...: they've looked at things in new ways and had to sort out the main points, so they've now got a better structure, and better priorities, in their heads (School 3 MC Spring interview).

Despite evident areas of progression with teachers' adaptation to remote teaching, especially, there were still some persistent challenges. For example, teachers still widely struggled to achieve effective formative assessment. Non-issues in a classroom can become challenging to tackle in a remote learning environment:

When you're in your classroom, you can tackle a problem when a kid gets stuck. But my experience of home learning is that the things the children would, the hurdles children would get over easily in a classroom, certainly become this massive downward spiral at home, when they're trying to work from home (School 10 Y6 Spring interview).

Other factors such as ambiguities around “how much of what’s sent in is the parents’ work” (School 3 MC Spring interview) or barriers in noticing non-verbal cues of misconceptions also impacted teachers’ ability to formatively assess pupils:

What was difficult was, normally, in a classroom, I can read their body language. I can tell when they don’t understand something, even if they don’t ask a question... Whereas, on a screen, I couldn’t pick that up so well (School 14 Y6 Spring interview).

Additionally, emerging gaps in breadth and depth of many children’s mathematical progress were still a major concern for many teachers, including as a still-remaining legacy of missed work in Summer 2020:

In terms of their number skill, what we saw over the Autumn term, the gaps, they’re still presenting themselves now... We’ve got a lot of work to do. Their number bonds and their ability to put those together, and then applying them when it’s more than 20 or higher. And I suppose they missed that whole summer term last year (School 10 Y2 Spring interview).

At the stage of Spring 2021 data collection teachers were not in a position to be able to quantify extent of learning gaps, and indeed, some suggested that knowledge of those would only emerge over time, as children came to need to build on learning that had been intended over the pandemic period: “It is...a matter of support and time” (School 17 Y4 Spring survey).

While, undoubtedly, gaps in pupils’ mathematical knowledge were still a predominant concern, teachers also reported a minority of children thriving on the mathematics approaches adopted during this home learning period. There were reports also of families finding the mathematics planned for lockdown 2 more accessible and rewarding than previously, and in an interesting turnaround from reporting that parents were thought likely to find mathematics support daunting, at least six teachers suggested that in fact, for some parents, clear expectations and modelling in mathematics could leave parents more secure than for some other parts of the curriculum: “When it’s writing time, parents will say, let’s leave the writing. And the maths gets done because that’s got a right or wrong and a tick, and we can all manage that bit” (School 10 Y2 Spring interview).

Discussion

Key to our Spring 2021 findings is that sample teachers have showed great resilience in continuing to provide for children’s mathematics learning in new and creative ways that responded to the emerging constraints of remote or pandemic-affected classrooms – and had made significant professional learning gains in the process. Teachers had found ways to more proactively monitor remote, or constrained in-class, work, but still widely struggled to formatively assess much of children’s work effectively; ongoing approaches to both formative and summative assessment varied. Teachers widely described now more confidence in, and preparation for, teaching remotely, especially in comparison to earlier school closures. This appeared to result in a less traumatic teaching and learning transition for teachers, pupils and families than previously. Teachers had often been proactive and solution focused in coming to know and use a variety of digital tools and resources to support their teaching, and in doing so had often developed some ways of working, including, importantly, both subject-specific approaches and subject-specific knowledge and pedagogic knowledge, that they wanted build on.

Many examples were given, though, of barriers to effective remote teaching, such as ambiguity around parental involvement and difficulties in providing the support normally given in physical classrooms; however a few children had thrived on lockdown, appearing to have achieved both breadth and significant depth of learning, as well as greater mathematical confidence. Teachers were confident children would from March 2021 begin to recover target mathematical progress, barring further lockdowns, but were unsure how their learning would have developed by July 2021. Our Summer 2021, and 2021-22 data collection will offer medium-term evidence of the extent to which that recovery is being realised, and how curriculum resources are being harnessed to support that.

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