

From Uncertainty to Enacted Agency: A Mother's Developing Agency in Supporting Mathematics Learning at Home

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This instrumental case study examines how a Queensland mother developed agency in supporting her Year 1 child's mathematics learning at home during COVID-19 school closures (2020–2021). Findings suggest one possible trajectory from constrained agency, through emerging agency shaped by relational recognition of what others could contribute (Edwards, 2010), to enacted pedagogical judgement that the relational process made possible. This trajectory indicates that parental agency in mathematics education is not acquired through knowledge alone but developed through relational conditions, with implications for how schools design support for families.

When schools closed during the COVID-19 pandemic, parents were unexpectedly required to take on sustained responsibility for their children's mathematics learning at home. How parents developed the capacity to do this and what relational conditions made it possible is not yet well understood.

Introduction

During COVID-19 lockdowns, educational institutions across the globe transitioned to emergency remote education, an unplanned, crisis-driven shift from face-to-face teaching and learning (Bond, 2020). In Australia, schools rapidly implemented remote teaching and learning approaches to maintain continuity of learning (Brown et al., 2020; Kalogeropoulos et al., 2021). In Queensland, Australia, school-aged children experienced several interruptions and learning@home (Queensland Department of Education, 2020) during 2020 and 2021. As a result, home became the central site of learning for many students. This shift raised urgent questions about parents' capacity for decision making and sense of agency when supporting their children's learning in unfamiliar and uncertain circumstances, particularly in mathematics, the subject that parents often find most difficult to support (Muir, 2018; Wadham et al., 2019).

Research has documented how parents experienced and navigated the challenge of supporting their children's mathematics learning at home during COVID-19 school closures (e.g., Darragh & Franke, 2022; Harper et al., 2021; Murphy et al., 2023). However, there is limited insight into how parents' agency in supporting their children's mathematics learning developed over time, or what relational conditions enabled that development.

Drawing on data from a larger qualitative doctoral research project conducted in Brisbane, Queensland, the study addresses the research question: How did a mother develop agency in supporting her child's mathematics learning at home during COVID-19 school closures?

Literature Review and Theoretical Framework

Although parental engagement is encouraged in children's learning, mathematics is widely considered the most challenging subject for parents to support at home (Muir, 2018; Wadham et al., 2019). Compared to reading, families engage less frequently in their children's mathematics learning at home (Muir, 2018; Sheldon et al., 2010). Reasons for this include unfamiliar pedagogical approaches that differ from how parents themselves learned

(2026). In N. Berger, M. Thompson, J. Ley & C. Wilsmore (Eds.), *Beyond boundaries: Strengthening futures in mathematics education. Proceedings of the 48th annual conference of the Mathematics Education Research Group of Australasia*, Sydney (pp. 321–328). MERGA.

mathematics (Bofferding et al., 2016; Jay et al., 2018; Palfy et al., 2020), mathematics anxiety or negative prior learning experiences (Jay et al., 2018), and challenges in recognising and enacting the mathematical potential of everyday home contexts (Metzger et al., 2019). The difficulty parents face in supporting mathematics learning at home became particularly visible during COVID-19 school closures, when parents were required to take on sustained responsibility for their children's mathematics learning in an emergency context for which most felt unprepared (Cahoon et al., 2021; Garbe et al., 2020).

A common response to these challenges has been to focus on building parental mathematical knowledge and competence, with evidence showing improved parental engagement and increased children's mathematics achievement (Knapp et al., 2017). Intervention-based initiatives such as Muir's (2018) take-home numeracy bags and maths club for parents, Daniel et al.'s (2022) take-home game kit, and Berkowitz et al.'s (2015) structured family mathematics interactions have shown positive impacts on supporting parental engagement and students' mathematics learning. However, less attention has been given to how parents develop the capacity to sustain mathematics engagement over time, particularly through the relational and contextual conditions that shape whether parents are able to act on whatever knowledge or resources they have access to.

Central to addressing this gap is a distinction between two different orientations to parental engagement. Goodall and Montgomery (2014) propose a parental engagement continuum that distinguishes between school-oriented involvement, where parents respond to school-defined activities, and learning-centred engagement, where parents exercise agency and make purposeful choices about their children's learning. Later, Goodall (2022) extends this by arguing that parental engagement is not a set of discrete activities but a relational phenomenon, shaped by ongoing interactions among parents, children, school staff, and the wider community, a process to be sustained over time rather than accomplished. However, neither framework fully addresses how parents develop this capacity to move towards learning-centred engagement, particularly in contexts of disruption and uncertainty.

Edwards' (2010) concept of relational agency addresses this directly. Grounded in both sociocultural and activity theory, Edwards (2010) conceptualises agency as relational: it emerges through interaction with others and the resources available in a complex activity system, rather than as a personal trait that individuals possess internally. The concept involves responding to a complex problem that cannot be solved alone, recognising the resources and motives that others contribute to that problem, and developing the capacity to align one's own responses to the expanded understandings that emerge from working with them. In this study, relational agency is not used to position the parent as a professional teacher, or to evaluate the quality of her instructional practices in supporting her child's mathematics learning at home. Rather, it provides a lens for understanding how the parent's agency was achieved through interaction with relational supports over time in a context of uncertainty, responsibility, and lack of formal expertise.

Research has documented what parental engagement in mathematics education at home during COVID-19 looks like. For example, in the United States, Harper et al. (2021) drew on social media data and parent surveys to show that parents reimagined the home as a site of mathematics learning by combining school-provided materials with curated digital resources and everyday activities, highlighting both the emergence of networked supports and parents' continued reliance on teachers as key relational partners. In New Zealand, Darragh and Franke (2022) found significant variability in parents' capacity to support mathematics learning at home, often depending on the support and resources provided by schools and teachers rather than parents alone, suggesting that parental agency is shaped by broader relational conditions. In Australia, Murphy et al. (2023) identified three types of parental engagement, namely monitors, facilitators, and enhancers, based on the roles parents assumed and the forms of

capital that they activated during school closures. Monitors completed school-set tasks with minimal personal involvement; facilitators worked alongside their children, adapting tasks to their circumstances; and enhancers drew on their confidence in mathematics to critique set tasks and source alternative learning experiences. These three categories suggest a progression along Goodall and Montgomery's (2014) parental engagement continuum from school-oriented involvement towards learning-centred engagement. What distinguished enhancers was not simply greater mathematical knowledge, but their capacity to recognise the resources and motives that others could contribute, which aligns with Edwards' (2010) relational agency.

Drawing on this body of work, the study conceptualises parental agency as having two interconnected dimensions. The first concerns what parental agency involves: the capacity to make purposeful choices and judgements about how to support children's mathematics learning, rather than simply complying with school-directed activities (Goodall & Montgomery, 2014). The second concerns how such agency is achieved: not as a fixed individual capacity acquired through knowledge alone, but through a growing ability to recognise what others contribute to the problem of supporting mathematics learning and to align one's own responses to the understandings that emerge from those interactions (Edwards, 2010).

Methodology

Research Design

This paper draws on data from a larger qualitative doctoral research project examining variation in parents' experiences of supporting their children's mathematics learning at home during COVID-19 school closures in Brisbane, Queensland, Australia. Fifteen parents of Preparatory (Prep) to Year 3 students were purposefully recruited using pre-interview criteria to represent variation in family contexts and home learning circumstances. For this paper, an instrumental case study design (Stake, 2003) was adopted, with one mother selected from this larger sample whose retrospective account provided sufficient detail over time to examine the processes through which parental agency develops.

Participant and Context

The participant, referred to throughout by the pseudonym Belinda, is a mother of three children. During the COVID-19 school closures, her eldest child was in Year 1 at a Brisbane Catholic primary school. She was a flight attendant on maternity leave at the time and also cared for a toddler and a newborn. Her husband was a Fly-In-Fly-Out (FIFO) worker on a "two-on, two-off" roster. Belinda's mother stayed with the family during the lockdown period, providing additional support. The family had access to digital devices and internet connections. The school provided structured learning tasks via an online platform, school-recommended YouTube educators, and scheduled regular online check-ins with students.

Data Collection and Analysis

A 45-minute face-to-face semi-structured interview was conducted with Belinda in May 2025. The interview invited Belinda to reflect on her experiences of supporting her child's mathematics learning at home during COVID-19 school closures, including challenges, strategies, sources of support, and changes over time. Although retrospective accounts over a five-year period carry inherent limitations in recall accuracy, they also provide valuable insight into how participants narrate their own development over time, which is central to this study's focus. To mitigate this, Belinda was encouraged to draw on digital artefacts such as email communications with her child's school and teacher, and photos of home learning setups.

Interview data were transcribed verbatim using an institutionally approved online transcription service and analysed iteratively using NVivo. Relational agency (Edwards, 2010)

informed the analysis as an interpretive lens, guiding attention towards how Belinda positioned herself and others in relation to the problem of supporting mathematics learning at home. Coding focused on passages in which Belinda described her role, her decision making, and the relational supports she drew upon, with attention to how these descriptions shifted across the timeline of her account. Coding and emerging interpretations were discussed with the supervisory team to support analytical rigour. The three phases reported here were not pre-determined but emerged inductively from qualitatively distinct shifts in Belinda's self-positioning and her recognition of relational others across her account.

Findings

Belinda's retrospective account is interpreted here as suggesting one possible trajectory, organised into three phases.

Phase 1 Constrained Agency: Replicating School

In the early stage of learning from home, Belinda described feelings of uncertainty and self-doubt about her capacity to support her child's mathematics learning alongside a fear of failing him. She expressed:

I hope he passes grade one...he's got me as his teacher. I was just worried that would I know how to teach him, would I be a good teacher for him... I'm not a teacher, so... the ways that I show him is that the correct way that they'd be taught in class.

Here Belinda framed mathematics teaching as requiring the expertise of a professional teacher. She articulated concerns about legitimacy ("I'm not a teacher"), pedagogical uncertainty about whether her methods aligned with school approaches, and anxiety about her child's school progress, a form of self-positioning documented in research on parents navigating home schooling during COVID-19 (Hoskins & Wainwright, 2025). Belinda also connected this anxiety explicitly to her own past experiences of learning mathematics: "Learning was hard for me when I was at school... it's my own learning insecurities coming out for my own child." Although relational resources such as family support, teacher communication, and access to the school's online platform were available, Belinda had not yet recognised the challenge of supporting mathematics learning at home as one that could be worked on through the resources and motives that others around her could contribute.

Phase 2 Emerging Agency: Recognising Relational Support

As learning from home continued, Belinda described a shift towards taking action despite her ongoing uncertainty, drawing on relational resources to make mathematics learning work for her child. She explained:

I tried to make maths learning fun. So, there were like colouring-ins... I laminated Post-it notes, counting 2, 4, 6, 8, 10, and I put them around, and then he had to go and like a hide and seek and find the numbers... We did lots of making shapes out of paper. We watched YouTube videos... I tried to do songs.

The activities of skip-counting and geometry construction, the use of school-recommended YouTube videos, and arithmetic songs were not random substitutes for schoolwork. Rather, they represented Belinda's own interpretations of the Year 1 mathematics curriculum, translated into forms that she considered workable and engaging at home. The shift from passive compliance with school-provided work to active, curriculum-aligned experimentation signalled the beginning of emerging agency expressed through pedagogical initiative.

Relational supports were central to sustaining this shift and Belinda's engagement with them reflected Edwards' (2010) relational agency: recognising the motives and resources that others could contribute to a complex problem, and working with these to expand what the problem is understood to require. Three instances of this are particularly significant. First,

Belinda described her mother as a “neutraliser” who intervened during moments of frustration in mathematics sessions:

When she could hear I was getting really frustrated, she would put out the candle like she was the neutraliser, OK, now it's a break time, we'll move on to the next topic, so she helped to keep us on track.

Belinda's mother contributed not mathematical knowledge but an emotional motive: to sustain the conditions under which learning could continue. By recognising and working with this, Belinda implicitly expanded her understanding of what supporting mathematics at home required. It was not only a pedagogical challenge but an emotional labour challenge that required relational management. Second, Belinda extended her network beyond the household, contacting a teacher friend who provided supplementary mathematics worksheets. What Belinda recognised here was a different kind of motive and resource: professional, curriculum-aligned knowledge, which expanded what mathematics engagement at home could include. Third, Belinda sought ongoing guidance from her child's classroom teacher, asking whether her instructional approaches were aligned with school methods: “I would have communication with his teacher... I would be asking her for guidance on, this is how he did this, this is how I showed him. Is that correct? She always replied to that.” By proactively seeking guidance, rather than waiting for the school or teacher to direct her, Belinda showed initiative and positioned the classroom teacher as a resource rather than a distant authority.

Phase 3 Enacted Agency: Acting with Pedagogical Judgement

The transition to enacted agency was marked not by teacher feedback or formal assessment, but by an unexpected moment at home. When her husband called during the lockdown period, Belinda overheard her child spontaneously recount their mathematics activities and demonstrate his mathematical understanding:

Little things like when Scott (pseudonym) would ring and he'd ask him, how was your day? What did you do? And I could hear him answer him with things that we had done... he had counted, odds or evens for Scott over the phone. I guess that made me feel a bit of relief. He got it.

This moment marked an important shift in how Belinda interpreted her child's learning. Her child was not responding to a direct mathematics question but answering “how was your day?” His spontaneous explanation of odd and even numbers indicated that the concept had been genuinely internalised, not simply completed as a task. Her response of “he got it” signalled the first moment in which she interpreted her child's learning as evidence that her own support was effective. This marked a critical shift, from seeking external verification to trusting her own judgement of the situation. Further validation came from hearing her child describe the home learning experience positively to his teacher:

I found it quite amazing hearing him talk so happily to his teacher about the at home learning experience... and I was worried, was I doing a good job? He has only positive memories of it...He just thought it was terrific.

Her earlier fear of having failed her child was directly contradicted by her child's positive recollection. These moments collectively shifted how Belinda evaluated her own capability from measuring herself against a professional teaching standard she felt she could not meet, to recognising her child's learning as a meaningful indicator of her own effectiveness.

By the end of the school closure, Belinda's account reflected enacted agency, where she made independent pedagogical decisions based on her own judgement of her child's learning needs without requiring school or teacher validation. The shift was captured in her reaction to the announcement that schools would reopen: “I was actually sad when Anastasia [Premier] announced that the kids were going back to school cos I thought, no, no, no, I've got it now. Like I'm not nervous and worried and I know how I can do this.” The phrase “I've got it now” is the direct inversion of Phase 1's central anxiety about whether she was doing it right. What

had changed was not her mathematical knowledge, but her capacity to act on her own judgement about what her child needed.

This enacted agency was evident in Belinda's pedagogical judgement. Rather than treating school-provided tasks as fixed scripts, she adapted them into contextualised learning experiences. For example, the school's "number of the day" task became an opportunity for hands-on mathematical reasoning. As Belinda explained, "he had to go around and find 20 of something... it could have been 20 pieces of Lego... then he had to draw it out in groups of five to make 20." This task engaged core Year 1 mathematics content such as grouping, early place-value ideas, and reasoning about numbers through counting and representation in a physical, contextualised form that Belinda judged appropriate for her child. More importantly, Belinda made this adaptation herself. The school provided the task structure, but she decided how to enact it. The Lego pieces functioned as a material resource through which an abstract number concept was made tangible. Belinda's capacity to make this kind of contextualised pedagogical decision was built on the expanded understanding of her child's learning that had developed through the relational interactions of Phase 2.

Phase 3 did not represent a departure from relational support but its consolidation. What changed was not that Belinda no longer needed others, but that she no longer needed school or teacher validation. This distinction was most clearly evidenced in her decision, immediately after schools reopened, to arrange weekly mathematics tutoring. Rather than feeling solely and anxiously responsible, she now understood herself as part of a purposefully constructed support network. She explained, "If I didn't have the time or I was unable to help him, I knew that she was. If he missed it in class, then I knew that she was able to fill in those gaps."

Five years after the school closures, the mathematically rich home environment Belinda has constructed and maintained reflects a further dimension of this transformed understanding:

On the stairs at home, I have the three times table and the four times table, so every time we walk up and down the stairs... we have to say three times one is three, three times two... I have the even numbers and the odd numbers on different sides of the hallway. We have maths tables as placemats. It might be accidental learning... it's all around our house, even to today.

The COVID experience transformed how Belinda understood her ongoing role in supporting her child's mathematics learning: not as a temporary emergency substitute for school, but as a sustained and purposeful dimension of family life.

Discussion

Belinda's trajectory was not triggered by formal parent training or increased mathematical content knowledge. Rather, her capacity to act with pedagogical judgement emerged through her growing ability, particularly through Phase 2, to recognise what others could contribute to the problem of supporting mathematics learning at home, and to align her own responses to the expanded understandings that emerged (Edwards, 2010).

Building on Murphy et al.'s (2023) typology, this study reveals that monitors, facilitators, and enhancers can be understood not only as co-existing patterns across a sample but as phases through which a single parent developed over time. Through the lens of relational agency (Edwards, 2010), the key turning points were not moments of knowledge acquisition but moments of relational recognition: her mother's emotional support enabled persistence; her teacher friend expanded her sense of what mathematics engagement could include; the classroom teacher's feedback provided pedagogical verification; and her child's spontaneous explanation of odd and even numbers confirmed evidence of learning. In doing so, this study responds to Murphy et al.'s (2023) call for further research to develop their typology, offering a relational account of how movement between engagement modes may be explained.

These findings are consistent with Darragh and Franke's (2022) argument that the success of mathematics home learning often depended on the support and resources available to families

rather than on parents alone. Belinda's case illustrates this structurally, and extends it: in Phase 1, the relational supports were present but she had not yet recognised them as resources for the problem of supporting mathematics learning. The shift that enabled her agency was not the arrival of new resources but a change in how she understood the problem as one to be worked on through others rather than solved alone. It suggests that what constrains parental agency in mathematics education may not always be a deficit of knowledge or resources, but the absence of relational conditions that enable parents to recognise and work with what is already available.

The implications for practice are therefore relational as well as instructional. Many initiatives designed to strengthen parental engagement in children's mathematics learning focus on building parents' mathematical content knowledge and pedagogical competence, with the aim of improving students' mathematics achievement (e.g., Knapp et al., 2017; Muir, 2018). If parental agency in supporting mathematics learning develops through relational conditions, then schools may need to do more than simply provide mathematical resources for families. They may also need to cultivate the relational conditions that enable parents to recognise and mobilise support, including accessible communication with teachers, peer networks beyond the school, and ongoing dialogue about mathematics learning. When such conditions are present, parents who do not see themselves as mathematically confident can still provide rich and sustained opportunities for mathematics learning at home. These findings suggest that the relational network surrounding a parent may matter as much as the mathematical knowledge they bring to the task.

This study draws on a single instrumental case and does not represent the experiences of all parents supporting mathematics learning at home during COVID-19 school closures. Instead, the value of the instrumental case study is analytical depth. It reveals a developmental process that studies focusing on patterns across a larger sample cannot easily capture. The findings rely on a retrospective account situated within the specific context of pandemic schooling in Brisbane, Queensland. It should be noted that Belinda's relational context was relatively well-resourced, including an extended family network, digital access, and a responsive classroom teacher. The developmental process identified here may operate differently where such conditions are absent.

Acknowledgments

Ethics approval 8277 was granted by Queensland University of Technology, and participants gave informed consent.

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