Primary Teacher Confidence as a Mediating Factor in Content-Specific Mathematics Resource Selection

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This study examines how Queensland primary school teachers select mathematics curriculum resources for specific mathematical content. Through semi-structured interviews with eight primary teachers, we explored resource choices across primary mathematics curriculum. Teacher confidence emerged as the most significant mediating factor, shaped by three patterns: prior success with familiar resources, avoidance of resources teachers felt unable to use authentically, and conservative choices among teachers working alone at a year level. These findings highlight confidence as a key affective factor in primary mathematics teachers' resource practice.

Introduction

Curriculum resource selection is a well-established field of inquiry in mathematics education research. Mathematics teachers do not simply implement curriculum materials as written, they interpret, adapt, and are in turn shaped by the resources they use and how they use them (Adler, 2000; Remillard, 2005). Research has examined the qualities of specific resource types across mathematical content areas, including physical manipulatives, digital tools, and textbooks (Pepin et al., 2013). Yet less attention has been paid to the affective factors that shape why teachers choose particular resources for particular mathematical concepts. When those decisions are driven by familiarity rather than conceptual fit, students miss opportunities for the rich mathematical experiences that conceptual understanding requires, given that the cognitive demand of the tasks and resources teachers select is directly linked to students' capacity for mathematical thinking and reasoning (Sullivan et al., 2013b).

Research has established which resources best support particular mathematical concepts. For example, place value instruction benefits from structured physical representations, where meta-analytic evidence confirms significant learning advantages over abstract instruction alone, geometric reasoning develops through dynamic spatial tools (Lowrie et al., 2017) and probability concepts become more accessible through physical randomisation devices and data collection activities (Jones et al., 2007). However, knowing which representation best supports a given concept is insufficient if teachers lack the confidence to enact unfamiliar approaches in their classrooms.

Teacher confidence and self-efficacy in mathematics education have been studied primarily in relation to subject matter knowledge (Goos, 2013) and pedagogical approaches (Sullivan et al., 2013b). While self-concept reflects people's beliefs and attitudes which often arises from their different experiences (often social ones), self-efficacy and self-confidence are closely linked with both generally reflecting how one feels about themselves (Sander & Sanders, 2006). Teacher self-efficacy (Bandura, 1997) is a generalised belief in one's capability to execute the actions required to produce a specific outcome, and has been extensively studied in mathematics education, primarily through instruments measuring teachers' beliefs about their capacity to teach mathematics effectively (Bates et al., 2011; Enochs et al., 2000). This body of research treats self-efficacy as a relatively stable, domain-level judgement about general mathematics teaching capability. In this study the term confidence is used and is conceptualised more broadly as 'assurance'. Specifically, confidence is investigated in respect of resources, that is how assured a teacher feels using a particular resource for a particular mathematical concept.

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Teachers' confidence with some resources and uncertainty with others, even in the same subject, is something general self-efficacy measures do not capture (Pajares, 1996).

A teacher may report high general mathematics teaching self-efficacy while experiencing genuine uncertainty about whether they can use a virtual manipulative authentically to develop students' probabilistic reasoning. It is this resource-specific confidence and its consequences for the representational experiences available to students that this study investigates. Considerably less research has examined confidence as it specifically relates to content-specific resource knowledge, that is, teachers' confidence in selecting and using particular resources for particular mathematical concepts. Where this gap has been acknowledged, Gueudet and Trouche (2009) demonstrate that teachers' documentary work with resources is deeply shaped by their prior resource experiences, forming stable schemes of utilisation that guide future selection. When those schemes are based on a limited set of familiar resources, teachers may be constrained in their capacity to provide the diverse and conceptually rich representational experiences that primary mathematics learning requires.

This study examines content-specific resource selection among Queensland primary teachers implementing the Australian Curriculum: Mathematics (ACARA, 2023), with particular attention to how teacher confidence mediates those decisions. Two research questions guide the inquiry:

1. How do mathematical content demands and curriculum expectations shape primary teachers' resource selection across different mathematical areas?
2. How does teacher confidence mediate content-specific resource decisions, and with what implications for primary mathematics instruction?

In addressing these questions, the study moves beyond descriptive accounts of which curriculum resources teachers use toward an explanatory account of the affective factors that constrain or enable their choices highlighting the role of confidence in shaping primary mathematics teachers' everyday resource practice.

Theoretical Framework

We draw on two interconnected frameworks from mathematics education research. The first is Remillard's (2005, 2018) conceptualisation of the teacher-curriculum relationship, which considers resource use as an active, design-oriented practice rather than passive implementation. Remillard's later construct of pedagogical design capacity (PDC) captures teachers' ability to perceive and mobilise the affordances of curriculum resources in the service of instructional goals (Remillard, 2018). Crucially, PDC is not solely a cognitive capacity; it is shaped by teachers' orientations, their beliefs, dispositions, and affective responses to materials (Remillard & Kim, 2020). We extend this framework by theorising teacher confidence as an affective dimension of PDC that operates with particular force in content-specific resource decisions. A teacher may possess the curriculum knowledge to identify an appropriate resource yet lack the confidence to enact it, a gap that PDC alone does not fully theorise.

The second framework is Gueudet and Trouche's (2009) documentational approach, which argues that, through repeated resource use, teachers develop documents, stable combinations of resources, and schemes of utilisation that guide future selection and enactment. In the primary mathematics context of this study, these schemes tend toward efficiency over flexibility: they reproduce what has worked before, and unfamiliar materials do not easily displace them. This tendency is consequential because the range and quality of mathematical representations students encounter shapes not only their conceptual understanding but also their affective dispositions toward mathematics, beliefs, attitudes, and emotions that, once formed, are resistant to change (Grootenboer & Marshman, 2016). Teacher confidence, operating through schemes of utilisation, thus functions as a structural constraint on the representational diet available to students. Together, these two frameworks illuminate how confidence becomes embedded in teachers' resource practices and why disrupting that embedding requires deliberate professional intervention rather than simply exposure to new materials.

Methodology

This qualitative study employed semi-structured interviews consistent with established practice in mathematics education research (Bobis et al., 2021; Sullivan et al., 2013a). Eight primary teachers were recruited through purposive sampling (Patton, 2015), prioritising diversity in teaching experience (1–31 years), year level (Prep–Year 5), and school context (suburban state, rural-urban state, and independent schools). This sample size is consistent with qualitative interview research in mathematics education where the aim is analytical depth rather than statistical generalisation (Creswell & Poth, 2018). Participants included Peter (first year, Year 5), Amy (fourth year, Year 4), Marilyn (31 years, Year 5), John (seven years, Year 3), Joanna (eight years, Year 5), Clare (seven years, Year 5), Nick (fifth year, Prep), and Andrea (fourth year, Year 3).

Interviews of 45–60 minutes were conducted between October 2024 and January 2025. The protocol asked teachers to describe resources used for recently taught mathematical topics, their selection rationale, integration strategies, and challenges. Teacher confidence was not initially a focus but emerged inductively from participants' accounts, a finding that arose from the data rather than being assumed by the research design. All interviews were video recorded with participant consent and fully transcribed. Analysis followed Braun and Clarke's (2006) reflexive thematic analysis, with initial inductive coding identifying resource types and selection factors, and second-cycle coding organising themes by mathematical content area.

The two theoretical frameworks shaped analysis in distinct ways. Remillard's (2005, 2018) theorisation of the teacher-curriculum relationship directed attention to teachers' orientations toward materials, their affective responses and confidence, not merely their cognitive knowledge of resources, and guided coding of moments where affective stance shaped selection. Gueudet and Trouche's (2009) documentational approach informed the second-cycle coding, which examined whether teachers' accounts revealed stable schemes of utilisation: recurrent patterns of resource selection tied to prior experience. Together, these frameworks allowed the analysis to move from descriptive coding of resource choices to an explanatory account of the affective and structural factors shaping those choices. Pseudonyms protect confidentiality throughout.

Findings

Content Demands and Resource Selection Across Mathematical Strands

Across the six strands of the Australian Curriculum: Mathematics (ACARA, 2023), teachers' resource selections were broadly appropriate to content demands. For Number and Algebra, teachers used physical manipulatives such as MAB blocks and colour-coded connecting blocks alongside digital tools including Polypad for virtual representations of place value and division. For Space and Measurement, spatial and interactive tools predominated - angle creation tools on interactive televisions, Scratch programming for coordinate concepts, and iPads for photographing and manipulating geometric transformations. For Statistics and Probability, randomisation devices made abstract chance concepts observable: online spinners, dice-rolling games, paddle pop stick draws, and structured tally-to-graph data collection activities. This alignment was largely tacit: teachers could not consistently articulate why a resource suited a concept, but their choices reflected accumulated professional knowledge consistent with the research literature on effective representational practice (Clements & Sarama, 2011; Jones et al., 2007; Lowrie et al., 2017). What varied substantially was not the appropriateness of their selections but the confidence with which those selections were made and whether teachers felt equipped to consider alternatives.

The most analytically instructive example from this strand came from Andrea, who was the most deliberate in her sequencing: she began with hands-on materials, transitioned to digital tools, and used the shift itself as a diagnostic — students who struggled to manage the transition were identified as needing to return to physical materials. This represents a high-confidence enactment of the concrete-representational-abstract progression, providing a useful contrast with the confidence-constrained practices examined in the section that follows.

Teacher Confidence as a Mediating Factor in Resource Selection

Across all three content areas, teacher confidence emerged as the study's most analytically significant finding: a mediating factor that shaped not simply which resources were selected, but whether teachers felt able to experiment with unfamiliar alternatives. This finding extends mathematics education research on teacher beliefs and resource use (Remillard & Kim, 2020) by demonstrating that confidence operates with content specificity. Teachers could feel confident using connecting blocks for place value while feeling deeply uncertain about resources for probability or measurement. Three patterns structured the data.

Pattern 1: Confidence built on prior success with familiar resources

For many participants, confidence was a product of longevity and the repeated observation of a resource's efficacy. This familiarity created a professional safety zone, a tested repertoire teachers could draw on without deliberation:

> [I feel] more confident when I've used it before... the ones that are kind of well known... I can see it real clearly and I'm confident that they're going to feel better using that. (Peter)
>
> Because I've been teaching for so long... I'm all good. (Marilyn)
>
> [Basic manipulatives are] just something I've learned over time that this is what's gonna help kids. (Joanna)
>
> [I] often [return] to the usual that you know that works. (Joanna)

The contrast between these positions is analytically instructive. Peter's confidence is resource-specific and grounded in enacted success with a particular tool for a particular concept. Marilyn's is an experience-based general confidence that, on closer inspection, may reflect a settled repertoire rather than broad flexibility. Joanna describes familiarity with basic manipulatives as accumulated professional wisdom, 'learned over time', while also acknowledging that time pressure drives her back to the known.

In each case, the outcome is a narrower representational exposure for students than the research literature would support (Mainali, 2020): familiar materials are reproduced and alternatives are not seriously considered. Familiarity-driven selection, in this study, operates not as pedagogical wisdom but as a structural constraint on students' representational experiences. This operates as a structural constraint in which schemes of resource utilisation, once formed, actively resist disruption (Gueudet & Trouche, 2009). The structural conditions sustaining this pattern centre on time. As Joanna acknowledged:

> The curriculum is so jam packed that you really only get to do a surface level… you don't really get to delve into things. (Joanna)

It is worth noting that Joanna's comment reflects a general curriculum-management anxiety rather than a resource-specific judgement. However, this broader pressure affects resource confidence directly: the conditions needed to develop familiarity with new materials are precisely what a packed curriculum rules out. Time pressure does not merely limit planning; it actively eliminates representational diversity, narrowing the mathematics students encounter (Bobis et al., 2021; Pepin et al., 2013). The cost-benefit calculation of trialling an unfamiliar resource, with limited preparation time, in a packed curriculum, with real consequences if it goes wrong, consistently favours what is already known to work.

Pattern 2: Avoidance of resources teachers felt unable to use authentically

A distinct and more critical form of confidence constraint emerged when teachers identified gaps in their own content-specific resource knowledge. The concern was not simply unfamiliarity with a tool but a deeper worry: that using a resource without truly understanding it would produce hollow or misleading instruction. Andrea articulated this most directly:

> My confidence is definitely increasing. I am... a bit of a way to go still... I might possibly not even know how to use some of these things to teach... in the most authentic way. (Andrea)

> If I'm kind of floating through, then they're [the students] probably just going to float through too. (Andrea)

The metaphor of "floating through" is precise: Andrea was not describing ignorance of content but a felt mismatch between her grasp of a resource and the mathematical depth she believed the concept deserved. Without genuine resource confidence, instruction risks becoming procedural in spite of itself, a dynamic directly linked to the quality of mathematical discourse teachers generate with students (Goos, 2013).

Nick, in his early career at Prep level, noted that "early on it is a bit tricky to find out what is needed", illustrating how content-specific resource knowledge develops unevenly and with effort. Peter, already resourceful and reflective, articulated an aspiration that implied a felt gap in his own content-specific resource knowledge:

> [I] would like to probably have a broader range of knowledge around what's available.

His use of ChatGPT to generate extension tasks in unfamiliar contexts reflected both resourcefulness and an honest awareness of his own knowledge limits. AI tools are increasingly being recruited to fill gaps in content-specific pedagogical knowledge. Amy introduced a time-based dimension. Her uncertainty was not about a resource currently in use but about pedagogical choices made in previous years and their consequences:

> I think I failed those students by not doing the rote learning enough [referring to multiplication facts]... I really needed to spend more time on that... It's those kinds of things that I still have a lot of uncertainty around—what kind of time do you allocate to [rote facts]. (Amy)

Amy's reflection reveals the longitudinal weight of resource decisions: the awareness of how early pedagogical choices play out across students' subsequent learning carries a form of professional guilt that shapes present-day uncertainty (Ma, 2020). This affective dimension of resource confidence has received little attention in the existing literature.

Pattern 3: Conservative resource choices among teachers working alone at a year level

A third pattern concerned the amplifying effect of professional isolation on the stakes of resource decisions. Where teachers were the sole practitioner at a year level, selection carried a qualitatively different weight—no colleague to debrief with, no one to validate an experiment, no shared practice to fall back on. John described this directly:

> Being the only year 3 teacher here... [it is] a big weight to get right or as perfect as you can be. (John)

> It is a big weight... you can be a little bit more reserved with what you're picking and choosing. (John)

The word "reserved" is significant. John was not describing paralysis but a deliberate, self-protective conservatism, a calculated reduction in risk because the consequences of a lesson that did not work fell on him alone. Professional isolation amplifies accountability risk in a specific way: the absence of collegial debriefing raises the personal cost of failure, producing a conservatism that narrows the range of resources students encounter (Sullivan et al., 2013a).

Clare described a related but distinct affective experience, the moment when a resource choice goes wrong in real time, and the teacher internalises the consequences:

> There'll be times where you'll be like, Oh my God, this is not working... you start... taking it on yourself sometimes. (Clare)

This "taking it on yourself" is not simply professional discomfort. It describes an internalisation of failure that shapes future risk-taking. A teacher who has experienced what Clare describes will think twice before trialling something unfamiliar again, not because they lack knowledge, but because the emotional cost of a public failure with a new resource is remembered and avoided. This is the affective mechanism through which confidence constraints self-perpetuate and utilisation schemes become more rigid over time.

An instructive contrast emerged in integrated STEM units. When designing inquiry-based projects, several teachers reported increased confidence and creative agency. Integrated STEM units appear to function as low-stakes rehearsal spaces for resource experimentation, a mechanism not previously identified in studies of teacher confidence in resource selection. John, ordinarily reliant on textbooks, described finding "freedom" and his "personality coming out" in STEM contexts. Clare drew on a school "Recycle shed" for open-ended design challenges. Andrea designed activities where students built structures using specified geometric shapes. Resources became tools for inquiry and mathematical modelling rather than vehicles for demonstration. Integrated STEM units are typically inquiry-based, cross-disciplinary contexts where teachers are not accountable to discrete content descriptors on a lesson-by-lesson basis, which reduces the specific accountability stakes around any single resource choice. Where that pressure is lower, there is more room to try something new, a finding with direct implications for how professional learning contexts might be structured to support resource experimentation.

Discussion

The findings contribute to mathematics education research in two interconnected ways. First, they provide empirical evidence that teacher confidence, as an affective dimension of pedagogical design capacity (Remillard, 2018) functions as a mediating variable in content-specific mathematics curriculum resource selection. Resource decision-making is not solely a function of curriculum alignment (ACARA, 2023) or knowledge of available materials. It is shaped by the affective confidence that emerges, or fails to emerge, from prior successful implementation of resources for specific mathematical concepts.

Second, the findings illuminate a problematic feedback loop: teachers tend to favour resources they have used successfully, which limits exposure to alternative approaches, which maintains confidence gaps around unfamiliar materials. This loop is consistent with Gueudet and Trouche's (2009) account of scheme formation in teachers' documentary work, but our findings add an affective specificity the documentational approach does not foreground. For mathematics education, the loop has representational consequences: students may consistently encounter a narrower range of mathematical representations than their learning requires, given that the ability to move between and connect multiple representations is a defining condition for conceptual understanding in mathematics (Duval, 2006; Kilpatrick et al., 2001).

The three confidence patterns identified, familiarity-based safety zones, fear of unauthentic teaching, and the amplifying effect of professional isolation are analytically distinct and suggest different professional learning responses. Marilyn's settled repertoire calls for structured exposure to a wider range of content-specific materials. Joanna's time-driven conservatism calls for protected curriculum space and structures that make experimentation feasible. Andrea's and Nick's concerns about authenticity call for deeper content-specific pedagogical development, not simply access to more resources. Clare's experience of internalising public failure and John's professional isolation both point to the importance of collegial collaboration structures around resource use, whether teachers can share, debrief, and trial together matters as much as individual knowledge.

Joanna's return to "the usual that you know that works" under time pressure is a rational, self-protective response to accountability demands, not pedagogical conservatism in any simple sense (Sullivan et al., 2013a). Understanding this mechanism is important for professional learning design. Providing access to new resources is insufficient unless accompanied by structured, low-stakes opportunities to develop confidence through guided implementation.

Integrated contexts appear to reduce teachers' confidence-related inhibitions around resource use (English, 2016). If integrated STEM contexts genuinely produce greater resource confidence, they may function not only as curriculum delivery modes but as opportunities for primary mathematics teachers' professional development, a possibility that warrants direct empirical investigation.

The study's limitations include its sample size and geographic concentration within Queensland. Findings reflect the reported practices of eight teachers rather than observed instruction. The study also did not examine the origins of teachers' initial resource schemes, whether shaped by initial teacher education, professional learning workshops, or early career experience. Future research employing classroom observation alongside interviews, tracing how resource confidence develops across career stages and teacher education programs, and examining the specific role of professional learning would extend these findings.

Conclusion

This study demonstrates that teacher confidence is a significant and under-examined mediating factor in content-specific mathematics resource selection. Teachers do not simply identify the best resource for a mathematical concept and deploy it. They navigate between what they know to be effective and what they feel confident enacting, and the latter exerts substantial weight in decision making. Where confidence is rooted in a narrow set of familiar resources, students may be systematically disadvantaged in the representational richness and mathematical quality of their learning experiences. Research consistently demonstrates that encountering and connecting mathematical ideas across multiple representations is a defining feature of conceptual understanding and mathematical proficiency (Kilpatrick et al., 2001).

For school leaders, the findings suggest that effective support for primary mathematics teaching must go beyond resource provision. Structured, collaborative resource review processes, drawing on models such as mathematics lesson study (Takahashi & McDougal, 2016), could create professional communities in which teachers share, trial, and build confidence with content-specific materials across year levels. Targeted professional learning that explicitly connects mathematical concepts to appropriate representational tools, and provides supported implementation opportunities, may interrupt the familiarity-dependency loop identified in this study. Further research directions include longitudinal studies tracking how content-specific resource confidence develops across career stages, and classroom-based studies directly connecting teacher resource confidence to students' representational fluency and conceptual understanding in primary mathematics.

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