# Primary and Secondary Teacher Confidence in Teaching Mathematics Concepts

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This study examined differences in mathematics confidence between primary and secondary teachers. Survey data was collected from 225 Victorian teachers in the Momentum Schools program. Primary teachers reported highest confidence in foundational number concepts, while secondary teachers showed greater confidence in measurement and data concepts. Areas of low confidence, fractions for primary teachers, foundational concepts for secondary teachers, align with student achievement challenges. These findings will inform differentiated learning design and highlight the importance of role-specific pedagogical content knowledge in mathematics teaching reform.

## Introduction

Mathematics education across Australia is experiencing a significant shift toward explicit, evidence-based practices. This approach has gained momentum nationally, with the Australian Education Research Organisation (AERO) advocating for explicit instruction as central to effective mathematics teaching, particularly in foundational years (AERO, 2023a). Several state and territory systems have focussed on explicit teaching approaches in mathematics, aligning with suggestions from Grattan Institute (2025).

In Victoria, the implementation of the Victorian Curriculum 2.0 and the Victorian Teaching and Learning Model 2.0 (VTLM 2.0), prioritises explicit, sequential teaching approaches grounded in research on how students learn (Department of Education Victoria, 2024). The Victorian Curriculum 2.0, has streamlined mathematics content and clearer sequencing of mathematical concepts and proficiencies. The VTLM 2.0, released in 2022 for mandatory implementation from 2025-2027, positions explicit teaching as the core pedagogical approach. For successful implementation, strengthening teacher confidence in new pedagogical approaches will be essential (Gresham, 2008).

This shift toward explicit teaching reflects broader national curriculum reforms in response to Australian student performance in international mathematics assessments. While Year 4 Trends in International Mathematics and Science Study (TIMSS) results have improved from 495 in 1995 to 525 in 2023, Year 8 results have remained relatively stable, fluctuating between 496 and 517 over the same period (Australian Council for Educational Research [ACER], 2026a). More concerning are Programme for International Student Assessment (PISA) results for 15-year-olds, which declined by 37 points between 2003 and 2022, with mathematics achievement declining more sharply than reading and science (ACER, 2026b). These declining trends, coupled with concerns about teacher preparation identified in national reviews (Masters, 2016), have prompted significant reforms across both initial teacher education and school pedagogical practices in Australia.

## Teacher's Beliefs and Perceptions Regarding Mathematics Concepts

Teachers' beliefs about mathematics teaching fundamentally shape instructional practices. Understanding what teachers need to know to teach mathematics effectively begins with Shulman's (1987) foundational concept of pedagogical content knowledge (PCK). Shulman argued that effective instruction requires more than subject matter knowledge alone; teachers must transform content into forms accessible to learners. Building on this foundation, Ball et al., (2008) developed the Mathematical Knowledge for Teaching (MKT) framework,

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distinguishing common content knowledge (mathematical knowledge expected of educated adults), specialised content knowledge (knowledge unique to teaching, such as analysing errors or choosing representations), and knowledge of content and teaching (making mathematics comprehensible to learners). Research confirms that teachers' beliefs interact with their knowledge base to shape instructional practices. Studies demonstrate that beliefs and practices are interconnected, with alignment between them contributing to effective instruction (Aljaberi & Gheith, 2018; Muir, 2008).

Self-efficacy, defined by Bandura (1997) as beliefs about one's capability to organise and execute actions required for specific outcomes, provides a critical theoretical lens for understanding teacher confidence in mathematics instruction. In mathematics teaching contexts, self-efficacy is both task-specific and domain-specific (Hackett & Betz, 1989), meaning teachers' confidence varies across different mathematical concepts and pedagogical situations. Bandura identified four sources of self-efficacy: mastery experiences, vicarious experiences, verbal persuasion, and emotional states. More recently, McDaid (2024) developed the Building Teacher Self-Efficacy Framework specifically for Australian preservice teachers, identifying six interconnected factors: collaborative relationships, resources, teacher feedback, teaching practice, motivation and self-regulation, and reflection. Importantly, research demonstrates that self-efficacy is malleable, targeted professional development can strengthen mathematics teaching confidence (Gresham, 2008), particularly when addressing both content knowledge and pedagogical approaches. This is especially relevant as Victorian teachers implement explicit teaching frameworks through the VTLM 2.0, where confidence in new pedagogical approaches becomes essential for successful curriculum reform.

Central to the implementation of curriculum and pedagogical approaches, is understanding teacher confidence and perceptions regarding mathematics concepts. Research has established that teachers' mathematical knowledge, encompassing both subject matter knowledge and pedagogical content knowledge, positively impacts student mathematics achievement (Ball et al., 2008; Hill et al., 2005). However, possessing mathematical knowledge alone is insufficient; teachers must also have confidence in their ability to teach these concepts effectively.

The Victorian Curriculum: Mathematics 2.0 has refined content descriptions with clearer sequencing. These changes necessitate that teachers possess both strong mathematical content knowledge and confidence in implementing explicit teaching frameworks, which emphasise breaking down content into manageable chunks, providing clear explanations through modelling and demonstration, and using gradual release of responsibility approaches (AERO, 2023b).

The distinction between primary and secondary teachers' perceptions of mathematics concepts is particularly significant in this reform context. Primary teachers typically hold generalist qualifications and are expected to teach mathematics alongside other learning areas, while secondary mathematics teachers generally possess specialist mathematical training. This structural difference in teacher preparation may lead to variations in confidence levels across different mathematical concepts. Understanding these differences is essential for targeted professional learning and support as schools implement explicit teaching approaches, whether through Victoria's VTLM 2.0 and Lesson Plans, or similar initiatives in other jurisdictions.

This research examines teacher confidence in teaching various mathematics concepts prior to engaging in professional learning on evidence-based explicit teaching practices. By investigating the rank ordering of teacher confidence for specific mathematical concepts (such as addition and subtraction algorithms) and analysing the differences between primary and secondary teacher responses, this study aims to identify where professional learning support is most needed. The findings will have direct implications for the ongoing rollout of evidence-based pedagogical frameworks in Victoria and contribute to the broader national conversation about supporting teachers through major pedagogical transitions. As systems across Australia

commit to explicit teaching approaches, understanding teacher confidence becomes critical to ensuring reforms translate into improved classroom practice and student outcomes. Specifically, this study addresses the following research question: *What are the significant differences in confidence levels between primary and secondary teachers for specific mathematics concepts?*

## Research Design

The data presented in this paper originates from a broader Australian study examining teachers' knowledge and confidence in teaching literacy and mathematical concepts. The larger study employed a quantitative and qualitative survey design to investigate teachers' self-reported understanding and pedagogical confidence across various domains within schools participating in La Trobe's Momentum Schools program. This program aims to provide participating schools with guidance and support to transition to explicit teaching instruction, in line with VTLM2.0. Specifically, this paper focuses on the quantitative survey components related to primary and secondary teacher confidence in teaching mathematics concepts, examining patterns and differences across teaching levels. The baseline data findings presented in this paper are intended to inform the design of targeted interventions and support structures for mathematics teaching with participating schools.

### Research Setting

Staff from 64 schools across Victoria participated in this study. All participating schools were enrolled in La Trobe's Momentum Schools program.

### Participants

Staff from the participating schools responded to an initial survey to indicate their knowledge of and confidence teaching mathematical concepts. The survey had 225 respondents, of which 183 (81%) worked at government schools and 42 (19%) worked at independent schools. Of the respondents, 146 identified as primary teachers and 54 identified as secondary teachers. The remaining 25 respondents did not specify their teaching level.

Participants represented a range of teaching experience levels. Of the 223 teachers that answered the item on years of registration, 61 teachers reported having 0-5 years of experience, 54 teachers had 6-10 years of experience, 40 teachers had 11-15 years of experience, 25 teachers had 16-20 years of experience, and 43 teachers had more than 20 years of experience as registered teachers.

### Data Collection

All teachers were invited to complete the survey via a letter from the research team that was distributed to schools together with a Participant Information Statement and Consent form. Survey data were collected and managed using Research Electronic Data Capture (REDCap) electronic tools. The survey was distributed via an email containing a hyperlink to REDCap. REDCap is a secure, web-based application which has been designed to support data capture for research studies and has automated export procedures for data downloads to common statistical packages, such as SPSS (Harris et al., 2009).

The survey items were adapted from the SOLAR Lab Teacher Survey (Stark et al., 2016), designed to explore teachers' beliefs, confidence and experience with explicit and systematic reading instruction. Additional survey items were developed by the research team to explore teachers' confidence teaching mathematical concepts. The confidence items asked participants to rate their confidence to teach a mathematical concept on a scale from 0 to 100, with 0 representing very low confidence and 100 representing very high confidence. Background items collected demographic information, such as teacher specialisation, years of registration

and year levels taught. Multiple choice items were used to collect information on where teachers felt they obtained the majority of their pedagogical knowledge.

### Data Analysis

The survey data was downloaded to SPSS for descriptive statistical analysis and hypothesis testing. Normality testing was conducted using Shapiro-Wilk and Kolmogorov-Smirnov tests for the secondary and primary samples respectively.

## Results

Teachers reported obtaining knowledge of instructional practice from a variety of sources (Table 1). Professional development activities were the most frequently cited source, selected by 90% of primary and 83% of secondary teachers. Classroom teaching experience was similarly prominent (84% primary, 80% secondary). In contrast, fewer teachers attributed their knowledge to university study, with only 38% of primary and 46% of secondary teachers identifying pre-service teacher training as a source.

**Table 1**
*Main source of pedagogical knowledge – multiple selections permitted*

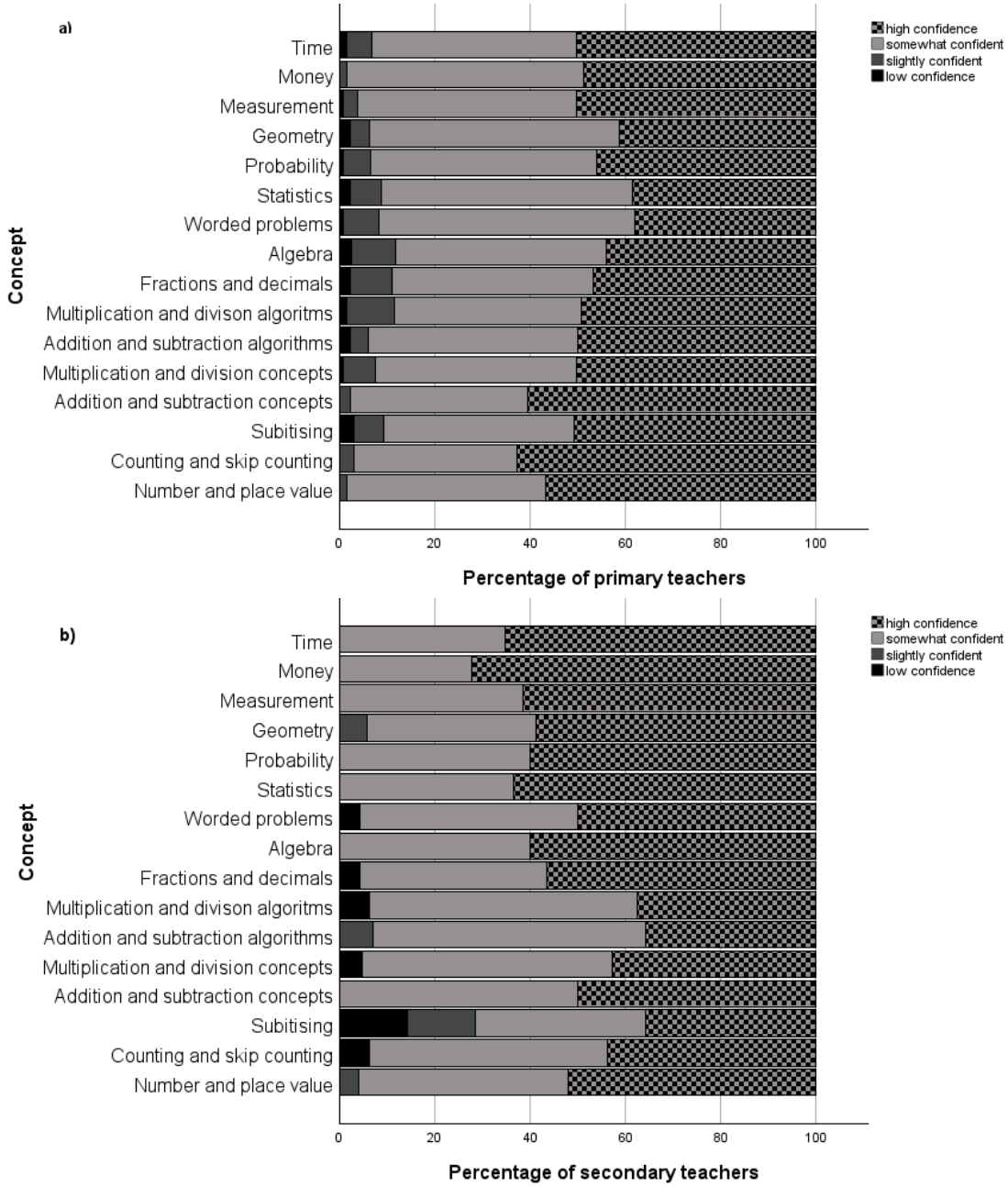
| Source | N primary | % primary | N secondary | % secondary |
|---|---|---|---|---|
| Professional development | 131 | 90% | 45 | 83% |
| Classroom teaching experience | 122 | 84% | 43 | 80% |
| Colleagues | 106 | 73% | 32 | 59% |
| Research and reading | 92 | 63% | 32 | 59% |
| University preservice teacher training | 55 | 38% | 25 | 46% |
| University postgraduate study | 31 | 21% | 20 | 37% |
| Their own school experience | 11 | 8% | 6 | 11% |

Teachers were asked to rank their confidence teaching a mathematics concept from 0 (low confidence) to 100 (high confidence). When all teachers were surveyed, the lowest average confidence was for the teaching of fractions and decimals (M=70.3, SD=20.7), followed by early algebra such as missing numbers and simple written algorithms (M=70.5, SD=19.6) and geometry (M=70.8, SD=17.0). The highest average confidence was for teaching addition and subtraction concepts (M=77.6, SD=13.8), counting and skip counting (M=76.9, SD=14.8) and money (M=76.1, SD=13.9)

However, confidence levels varied between the primary and secondary teachers surveyed. Figure 1 shows the self-rated teacher confidence from primary (Figure 1a) and secondary (Figure 1b) teachers. 63% of primary teachers were highly confident teaching counting and skip counting compared to 44% of secondary teachers (Figure 1). Conversely, 60% of secondary teachers were highly confident teaching early algebra concepts compared to 44% of primary teachers. The secondary teachers surveyed were from a range of specialisations, covering mathematics, science, humanities, English and health.

**Figure 1**

*Primary and secondary teacher confidence teaching a mathematical concept. Rankings < 25 were considered low confidence, ranking 25 to <50 were considered slightly confident, 50 to <75 somewhat confident, and 75 and above were considered high confidence.*




Through independent samples t-tests, statistically significant differences in the mean confidence were detected for:

- Counting and skip counting, with primary (M= 78.1, SD=14.0) and secondary teachers (M=68.8, SD=18.7). The primary respondents demonstrated significantly more confidence, $t(148)=2.427$ and $p = .016$.
- Subitising, with primary (M= 72.0, SD=18.7) and secondary teachers (M=58.1, SD= 26.4). The primary respondents demonstrated significantly more confidence, $t(140)=2.527$ and $p = .013$.
- Early algebra, with primary (M=69.1, SD=19.8) and secondary teachers (M=79.0,

SD=18.4). The secondary respondents demonstrated significantly more confidence, $t(138)= -2.089$ and $p = .039$.

When asked which concepts were not applicable to their role, 69% and 72% of secondary teachers deemed counting and skip counting and subitising as not relevant, respectively. 11% of primary teachers deemed early algebra as being not relevant to their role.

## Discussion

This paper addressed the question: *what are the significant differences in confidence levels between primary and secondary teachers for specific mathematics concepts?* The findings reveal distinct confidence profiles that reflect both the different pedagogical approaches of teaching levels and teachers' perceptions of role-relevant content. Primary teachers demonstrated highest confidence in foundational number concepts, with over 60% reporting high confidence teaching counting, skip counting, addition and subtraction concepts. Conversely, their lowest confidence areas included fractions, decimals, multiplication, division algorithms, and early algebra, with more than 10% expressing low or slight confidence in these domains. Secondary teachers' confidence patterns differed remarkedly, with over 60% reporting high confidence in the teaching of money, time, measurement, probability and statistics concepts (Figure 1), yet 29% indicating low confidence in teaching subitising. Statistical analysis confirmed significant differences between primary and secondary teacher groups.

These confidence patterns appear partially explained by teachers' perceptions of role relevance. While 72% of secondary teachers rated counting and skip counting and subitising as irrelevant to their role, only 11% of primary teachers considered early algebra irrelevant despite it being among their lowest confidence areas. This discrepancy is particularly noteworthy given that early algebra concepts form critical bridges between primary and secondary mathematics learning. The finding suggests that primary teachers recognise the curricular importance of algebraic thinking even when lacking confidence to teach it effectively, pointing to a gap between perceived responsibility and self-efficacy that professional learning interventions must address.

The confidence patterns emerging from these data align with Bandura's (1997) self-efficacy theory and Ball et al.'s (2008) Mathematical Knowledge for Teaching framework. Primary teachers' high confidence in foundational concepts likely reflects frequent mastery experiences, while lower confidence in fractions and early algebra suggests limited pedagogical content knowledge in these challenging areas. Secondary teachers' dismissal of foundational concepts as 'not applicable' may reflect insufficient understanding of how these underpin advanced mathematical thinking.

The implementation of VTLM 2.0 requires differentiated professional learning addressing these distinct profiles. Primary teachers need targeted support for fractions, multiplicative thinking, and early algebra concepts, where both teacher confidence and student achievement show persistent challenges. Secondary teachers require professional learning connecting foundational number concepts to their practice, demonstrating how gaps in counting strategies, subitising, and number sense impact student performance in advanced mathematics.

Only 38% of primary and 46% of secondary teachers identified initial teacher education as a main source of pedagogical knowledge. While requiring further investigation, this finding suggests potential misalignment between pre-service preparation and classroom realities, highlighting the critical role of ongoing professional learning in developing effective mathematics teaching practices.

## Conclusion

In conclusion, this study provides critical baseline data on mathematics teacher confidence across primary and secondary contexts within Victorian schools implementing the VTLM2.0 framework. The findings reveal distinct confidence profiles between teacher groups, with primary teachers demonstrating greater confidence in foundational concepts while secondary teachers show higher confidence in measurement and data-related concepts. The data from this study highlight the need for differentiated role-specific professional learning that addressed both the pedagogical content knowledge with a self-efficacy focus. As Victorian schools transition towards changes in teaching practices, understanding these confidence patterns enables more targeted and effective support for teachers at different year levels, and with different experience.

While these findings offer important insights, several limitations should be acknowledged. The number of secondary teachers was relatively small compared to the number of primary teachers, so caution should be exercised when generalising findings. Also, this study captures baseline confidence measures only and does not examine how professional learning interventions impact teacher confidence over time. Additionally, the reliance on self-reported confidence data means findings may not directly correspond to teachers' actual pedagogical content knowledge or classroom practice effectiveness. The sample was also limited to teachers in the Momentum Schools program; findings may not generalise to teachers in non-participating schools. Future research should track confidence changes following targeted interventions and explore relationships between teacher confidence, pedagogical practice, and student outcomes.

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