

Abstract WERA/TERA 2026

Title

Why developmental alignment matters? Analysis of alignment between assessment and instruction in Year 7 Online One-to-One Mathematics Tutoring

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Keywords

Developmental alignment; diagnostic assessment; *micro-progressions*; curriculum alignment; mathematics instruction.

Research Overview (English – 50 words)

This study examines how diagnostic assessment evidence informs instructional sequencing in Year 7 online one-to-one mathematics tutoring. Using a Mixed Methods design (Creswell & Plano Clark, 2017), this study re interprets curriculum alignment as *developmental alignment* enacted through *micro-progressions*, instructional sequencing coherent with students' level of knowledge.

Purpose of Study

The purpose of this study was to investigate how alignment between assessment and instruction is enacted in Year 7 online one-to-one mathematics tutoring. Specifically, the study examined how the Number Interview, a diagnostic assessment emphasising students' mathematical thinking, informed instructional sequencing coherent with students' level of knowledge. The study responded to a persistent tension in curriculum alignment research: traditional alignment frameworks privilege alignment to age-based curriculum expectations, often overlooking how instruction is developmentally sequenced for students performing below age-based expectations. Grounded in developmental models of learning (Griffin, 2018; Pearn & Ziebell, 2021; Ziebell & Clarke, 2018, Hoad et. al., 2005), this research sought to re interpreting curriculum alignment as *developmental alignment*, the coherence between diagnostic assessment evidence and

instructional actions that are deliberately sequenced within students' Zones of Proximal Development (ZPD).

A central analytic focus was the role of *micro-progressions*, defined as instructional sequencing coherent with students' level of knowledge, to connect students' current understandings to their next conceptual shift. The study aimed to explain how *micro-progressions* function as the mechanism through which diagnostic evidence from assessment is translated into instruction, and how this process supports equitable continuity of learning in mathematics.

Research Methods

The study employed a Sequential Explanatory Mixed Methods design (Creswell & Plano Clark, 2017), integrating quantitative and qualitative data to construct a theoretically grounded meta-inference (Schoonenboom, 2022) about alignment. Phase 1 involved quantitative document analysis of the Number Interview and analysis of observed instructional sessions using curriculum alignment indices (Porter, 2002) to examine content coverage and cognitive demand. These analyses focused on multiplication and division content (Australian Curriculum, Assessment and Reporting Authority (ACARA), 2022) and associated performance types (Ziebell & Clarke, 2018).

Phase 2 consisted of qualitative semi-structured interviews with tutors, exploring how assessment evidence was interpreted and enacted to inform instructional decision-making. Tutor accounts provided insight into the interpretive processes, contextual conditions, and professional judgements underpinning instructional sequencing.

Integration occurred through successive integration of claims (Schoonenboom, 2022) rather than merging datasets. Quantitative findings established patterns of correspondence and divergence between assessment and instruction, while qualitative findings explained how and why these patterns emerged in practice. Developmental models of learning (Griffin, 2018), including Zone of actual and proximal development (ZAD/ZPD) (Vygotsky, 1978), developmental continua (Hoad et. al., 2005), performance maps (Pearn & Ziebell, 2021), and *micro-progressions*, provided a shared analytic frame supporting commensurability across methods.

Results and Discussion

The integrated findings demonstrate that alignment between the Number Interview and enacted instruction is best understood as *developmental alignment*, rather than age-based curriculum correspondence of content coverage or cognitive demand with the Australian Curriculum: Mathematics (ACARA, 2022). Quantitative analyses showed strong content alignment between the Number Interview and the Australian Curriculum: Mathematics, alongside a deliberate elevation of the *Communicating* performance type to elicit students' reasoning, with alignment Index: 0.58 (Scale 0-1). Observed instruction, however, concentrated cognitive demand at *Knowing* and *Performing* and moved flexibly across curriculum levels, producing alignment indices of 0.37 for Case 1 and 0.40 for Case 2 (Scale 0-1).

Interpreted through a developmental lens (Griffin, 2018), alignment between assessment and instruction reflected principled instructional staging rather than misalignment. Although students were enrolled in Year 7, they were performing at Year 3, as identified on the Number Interview. Tutors attended to students' level of knowledge, starting instruction at year 3 moving along up to year 5 content.

The Number Interview functioned diagnostically by revealing students' mathematical thinking, strategy use, and ZAD/ZPD boundaries. Instruction did not replicate the assessment's cognitive-demand profile; instead, tutors translated diagnostic evidence into developmentally coherent instructional sequences.

Tutor interviews revealed that this translation occurred through the systematic use of *micro-progressions*. Tutors adjusted representations, number choices, task complexity, and instructional prompts in small steps that maintained developmental coherence. *Micro-progressions* enabled tutors to stabilise foundational strategies, avoid premature abstraction, and extend cognitive demand only when evidence of readiness to learn emerged. Although tutors did not explicitly use this terminology, their practices consistently reflected *micro-progression* logic.

Integration of quantitative patterns and qualitative explanations produced a meta-inference that reframes alignment as the coherence between diagnostic evidence and instructional sequencing within learners' ZPDs. Concentration of instruction at foundational cognitive demand, justified step-backs to earlier curriculum content, and delayed introduction of higher-order cognitive demands emerged as developmentally

appropriate responses for students performing below year-level expectations. The one-to-one online tutoring context further enabled developmental alignment by amplifying the visibility of students' mathematical thinking and supporting real-time instructional calibration.

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