

Capturing Conceptual Changes with Dynamic Digital Representations

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In this presentation, we give an overview and rationale of the research design of a study that has commenced in 2023. The aim for this study is to explore what conceptual changes emerge while children in middle-primary grades engage with dynamic digital representations of decimal fractions. Unlike with static representations, students are able to actively interact with the mathematics content embedded in dynamic digital representations by making conjectures and testing them immediately to experience the concept from various perspectives and receive feedback on their thinking (Orrill & Polly, 2013).

This study will be conducted using a qualitative methodology, in which the researcher will use task-based interviews combined with microgenetic methods to collect and analyse data (Chinn & Sherin, 2014). Six participants in total from one Year 4 classroom (aged 9-10 years) in NSW will be invited to participate in this study. Data collection for this study will consist of three key phases; an initial task-based interview; four proceeding task-based interviews each focussing on a different dynamic digital representation that feature the three key concepts of decimals, *place value*, *decimal density* and *relative magnitude*, which are considered vital for consolidating number sense, since these properties unify all numbers (Siegler, Thompson & Schneider, 2011); and a final task-based interview. A synthesis of data across each task-based interview will occur, where the video-audio recordings and screen-captures are interpreted using a combination of inductive and deductive approaches to repeated viewings. The aim of the approach is to detect learning changes by determining what specific shifts in the learner's attention have occurred and how they have transpired (Voutsina, George & Jones, 2019). The method of investigating moment-to-moment processes of learning will allow inferences to be made, using the researcher-designed 'Framework for Analysis', about what features of each dynamic digital representation prompted attention shifts and how these translate to changes in conceptual understanding of decimal fractions.

References

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