Working On and With Verbal, Visual and Gestured Confluences in Mathematical Meaning-making

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At the start of our research journey our focus was clear: teachers' use of language in supporting learners' developing mathematical understandings. This was in contexts where English was the official language of learning and teaching, albeit that the majority of the learners we worked with were isiXhosa speakers. isiXhosa is the first language for close on 80% of people in our Eastern Cape Province. Learner talk, as we had observed in the classrooms and after-school mathematics clubs, was limited, highly formulaic, and lacking in the exploratory talk likely to conduce to learners engaging in productive "interthinking" (Mercer, 2000) about mathematical ideas.

Awareness of the severe constraints faced both by teachers and by learners in situations where there is limited proficiency in the language of learning and teaching moved our research journey to the point where we recognised the need to give more explicit and systematic attention to the multimodal aspects of communication of mathematical ideas. While not the focus of this presentation, our work unfolds alongside our commitment to advocating for increased bi-/multi-lingualism for South Africa's mathematics classrooms.

In our presentation we will share research insights from our analyses of multimodality at work in two separate fora. In both fora the second author has been involved in the design of activities and support materials, though the attention to multimodal forms of communication has been somewhat intuitive, rather than an explicit goal. In the presentation we intend focusing on a retrospective analysis of confluences of multimodal forms of communication in supporting mathematical sense-making. We also demonstrate the power, for both teaching and learning, of key representations such as the empty number line. We will begin with brief mention of our analysis of video material from an after-school mathematics club session. We will show how the club facilitator (thinking on her feet and in response to limited verbal responses from learners) scaffolded club members' mathematical understanding through the communicative power of physical objects, visual representations, inscriptions, and gesturing. Insights from this club session analysis led us further on our multimodal journey. Recently we began analysis of the synergistic power of scripted lesson plans alongside video-recordings (accessed through QR codes) for modelling mental mathematics strategies. We will discuss a brief (< 2 minutes) videorecording of a facilitator's hand, drawing and gesturing a "mental maths" problem (35 + 16) on an empty number line using "bridging through ten" and "jump" strategy. These materials form part of the South African Mental Starters Assessment Project currently being rolled out by the Department of Basic Education across public schools, and now being extended also to teacher education institutions (Graven & Venkat, 2021).

References

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