

HANDS THAT SEE, HANDS THAT TALK: ENABLING THE MATHEMATICAL PRACTICES OF BLIND STUDENTS AND DEAF STUDENTS

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The inherent potential we have, as human beings, to transform sensations perceived by the sense organs into ideas and knowledge has been the source of many studies and much controversy over many centuries. Within the domain of mathematics education, the debate may have spanned only decades, but here too we can identify various different perspective as to the relationships between the concrete, between bodily experiences and activity and mathematical cognition. The centrality of perceptuo-motor activity in the learning of mathematics has come to the forefront in many researches in recent years (see, for example, Nemirovsky & Borba, 2004; Lakoff & Nunez, 2000; Arzarello & Robutti, 2004; Radford et al. 2005), with embodied approaches emphasising how even the most abstract of symbols have physical grounding or, as Radford et al. (2005) put it, that “sensorimotor activity is not merely a stage of development that fades away in more advanced stages, but rather is thoroughly present in thinking and conceptualizing.”

But if we accept that the physical senses play an important role in mathematics learning, a question that arises is how those without access to particular senses interpret the behaviour of mathematical objects – and how new mathematical learning situations might be molded to also take this into account. Learners with no access to the visual field or learners who communicate through sign rather than spoken language might be expected to become involved in rather different processes of physical grounding. Indeed, we already know that there are some important differences in the ways data is processed by those who lack access to the visual field (Fernandes and Healy, in press) or by those who cannot hear (Nunes, 2004), what we are less sure about is how these differences mediate the mathematical meanings they construct. In our poster presentation, we will describe our attempts over the last few years to design learning tools to support the mathematical activities and expression of deaf students and blind

students – these include materials enabling tactile explorations, along with digital tools which permit the presentation of mathematical activities in different forms as well as enabling the experience of the same mathematical objects through a variety of different senses (a calculator that “displays” numbers in both colourful and musical ways for example)¹.

One aspect of our work that we find particularly intriguing is the importance of movements of the hands in the activities of both blind learners and deaf learners. For those who are blind, hands are clearly central in the way they perceive the physical world, but for this poster we wish also to focus on the way in which both the deaf learners and blind learners make use of physical gestures to create signs to represent different mathematical objects – these gestures not only enable learners to communicate their mathematical ideas, they also seem to serve in the structuring of their mathematical cognition and the coordination of the physical with the semiotic.

Keywords: Blind learners, deaf learners, embodied cognition, gestures

Topic Study Group 7: [Activities and programs for students with special needs](#)

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