# INVESTIGATING BLIND LEARNERS' INTERACTIONS WITH MATHEMATICAL MICROWORLDS

Solange Hassan Ahmad Ali Fernandes — Colégio Nossa Senhora do Rosário

Lulu Healy — Universidade Bandeirante de São Paulo

Within the domain of mathematics education, the search to understand the potential we have, as human beings, to transform sensations perceived by the sense organs into mathematical knowledge has always been centre stage. Those interested in technology and mathematics education have been particularly active within this debate, challenging the dichotomy abstract-concrete and calling for reconsiderations of the very grounds for cognition: instead of formal operations on abstract symbols, increasingly it is the situated and embodied nature of cognition that is emphasised and under attention. Embodied approaches posit that even the most abstract of symbols have physical grounding and it would seem that the dynamic mathematical representations that digital technologies afford have a role in magnifying the lens onto the ways in which mathematical meanings come about as a result of this grounding process. Yet, perhaps somewhat surprisingly, one set of questions that has not received much attention concerns learners with restricted, or no, access to particular sensory fields. How do these learners engage in the process of building meanings for mathematical objects? What are the groundings by which they make sense of the mathematical activities in which they participate? And how might new mathematical infrastructures be moulded to take these factors into account?

In this poster, we intend to present our attempts to build features designed to support the mathematical activities of students who are blind into mathematical microworlds – accessible and evocative computational worlds, which embed a mathematics that is not only formal but also related to learners' sense of themselves. Many mathematical microworlds exploit computational opportunities to build motion and other visual means of illuminating mathematical structure. Our approach in working with blind students has been to seek alternative media by which to express mathematics in dynamic forms, and especially how sound, coupled usually with tactile explorations, might be employed to model the properties of mathematical objects. We will present two examples of the microworlds we have been working with during projects supported by the Brazilian research foundatio FAPESP (Projects 2004/15109-9 and 2005/60655-4). The poster will also focus on how, by considering the particularities of blind students' interactions with the different mediation systems, we might begin to understand better the learning trajectories they follow and the mathematical narratives they construct as they bring to life the computational agents they encounter.

2008. In Figueras, O. & Sepúlveda, A. (Eds.). *Proceedings of the Joint Meeting of the 32nd Conference of the International Group for the Psychology of Mathematics Education,* and the XX North American Chapter Vol. 1, pp. XXX-YYY. Morelia, Michoacán, México: PME. 