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VISUALIZATION IN MATHEMATICS EDUCATION: TOWARDS A FUTURE RESEARCH AGENDA

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This discussion group provides participants with the opportunity to consider how ideas of visualization have been used in mathematics education research to date and to discuss possible future research directions.

Session 1

A comprehensive survey of PME research on visualization in mathematics education is provided by Presmeg (2006). In this first session, key aspects of this survey are considered alongside a summary of definitions of visualization from the wider research community contained in Phillips, Norris and Macnab (2010). The distinctions that they make between *visualization objects*, *introspective visualization*, and *interpretive visualization* can be discussed in light of Gutiérrez' (1996) use of the terms *external representation*, *mental image*, and *process* (*of visualization*).

Session 2

In this session we consider how, or even if, the ways that visualization is conceptualized and studied changes when different theoretical framings are considered. We will consider visualization in light of the following, as well as being open to include theoretical perspectives offered by participants: Sfard's (2008) argument for a move from "learning-as-acquisition" to "learning-as-participation"; Lakoff & Johnson's (1999) embodied cognition that suggests that individuals' perceptions and interactions guide their conceptual and communication structures.

References

Gutiérrez, A. (1996). Visualization in 3-dimensional geometry: In search of a framework. In L. Puig & A. Gutiérrez (Eds.), *Proceedings of PME20*, (Vol. 1, pp. 3-19).

Lakoff, G. & Johnson, M. (1999). *Philosophy in the Flesh: The Embodied Mind and its Challenge to Western Thought*. New York: Basic Books.

Presmeg, N.C. (2006). Research on visualization in learning and teaching mathematics: Emergence from psychology. In A. Gutiérrez & P. Boero (Eds.), *Handbook of Research on the Psychology of Mathematics Education* (pp. 205–235). Rotterdam: Sense Publishers.

Phillips, L.M., Norris, S.P. & Macnab, J.S. (2010). *Visualization in Mathematics, Reading and Science Education*. Dordrecht: Springer.

Sfard, A. (2008). *Thinking as Communicating: Human Development, the Growth of Discourses, and Mathematizing*. Cambridge: Cambridge University Press.