



# Mathematics Education Across Cultures

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## **Editors:**

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# MATHEMATICS EDUCATION ACROSS CULTURES

## *MATEMÁTICA EDUCATIVA ENTRE CULTURAS*

## *DIDACTIQUE DES MATHÉMATIQUES À TRAVERS LES CULTURES*

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## THE SEMIOSPHERE: A LENS TO LOOK AT LESSON STUDY PRACTICES IN THEIR CULTURAL CONTEXT

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Gallimore (1996) claims that changes in teaching and learning practices are challenging. He ascribes this resistance to change to the fact that “we are dealing with cultural matters”, and not just psychological and pedagogical issues (*ibid.*, p. 230). Cultural aspects have therefore become one of the focus of research attention in Mathematics Education in the last twenty years (Bartolini Bussi & Martignone, 2013). How cultural and social aspects affect teacher critical reflection during professional development experiences of in-service and prospective mathematics teachers? I address the issue of how to deepen culturally sensitive understandings of such processes. I am inspired by Lotman’s concept of Semiosphere (Lotman, 1990) that I identify and use to read the processes of teachers’ professional development experiences. Strengthened by the tradition of the Italian school in Research in Mathematics Education and rooted in it, which grants considerable importance to semiotic studies (Arzarello, 2006; Bartolini Bussi, 1996), I propose the Semiosphere as a theoretical lens that attempts to react to Skott and Møller’s call (2020) to look at the issues of policies and culture in the teachers’ local professional development setting, and to react to the need underlined by Yves Chevallard (1981) to take into account the codetermination of the various knowledge signs into the Noosphere.

In Italy, as a foreign cultural element, Lesson Study (LS) has been implemented in order to allow mathematics teachers and researchers to reflect on and thus to question their own didactic practices and intentionality (Bartolini Bussi & Ramploud, 2018; Mellone, Ramploud, Martignone & Di Paola, 2019). Designing, implementing and observing, and afterwards reviewing a one-hour lesson have been uncommon spaces for collaborative reflection of Italian mathematics teachers, because of their cultural tradition. Even critical reflection therefore becomes a cultural activity and, as such, pervasive and not easy to study. We need a culturally sensitive lens that can help us to identify and study reflection practices. Through the qualitative analysis of a LS experience, looking at the dialogues between teachers and their practices of shared critical reflection, I can state that the Semiosphere highlights the asymmetries between the systems of signs that exist in a culture, in a practice, in a methodology, in a professional development path, or in a lesson planning. It is in this space that the process of cultural transposition takes place. In fact, as pointed out by Vygotsky (1999) signs do not appear as *mediators* of activity, as is the case in other sociocultural approaches, but as an *integral part* of human thinking and human activity. The Semiosphere allows to keep identifying the constituent elements of a reality even from the identification of elements external to it. In fact, precisely because of its asymmetric and non-homogeneous character, based on dialogue, the Semiosphere creates not only its own internal organization, but also its own type of external disorganization. It defines what is not itself. The LS teachers’ meetings can be pictured as a multidimensional dialogue in the Semiosphere during which each choice of teaching/learning, in contact with another, can become “more aware” (Jullien, 2005). Here the critical dialogue and reflection of the teachers, if read from the point of view of the Semiosphere, do not lose contact with the reality in which they are born. So, the problem of possible integration between Lotman and Chevallard lenses according to the Networking of Theories approach (Radford, 2008) arises spontaneously. The analysis of the institutional aspects and the levels of co-determination seems enriched by a dynamic interchange perspective, and vice versa this can be integrated with the aspects

of power and the institutional constraints typical of a school system governed by laws. Future studies could tell us about the connection of the two theories as lenses for professional development practices.

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