



Mathematics Education Across Cultures

Proceedings

*42nd Meeting of the North American Chapter of the International Group
for the Psychology of Mathematics Education*

Editors:

Ana Isabel Sacristán, José Carlos Cortés-Zavala &
Perla Marysol Ruiz-Arias



MATHEMATICS EDUCATION ACROSS CULTURES

MATEMÁTICA EDUCATIVA ENTRE CULTURAS

DIDACTIQUE DES MATHÉMATIQUES À TRAVERS LES CULTURES

Proceedings of the Forty-Second Meeting of the North American Chapter of the
International Group for the Psychology of Mathematics Education,
Mexico*

*Scheduled originally to take place in Mazatlán, México, 14-18 October, 2020;
postponed, due to the COVID pandemic, to 27 May-6 June, 2021

<https://2020.pmena.org>

<https://pmena2020.cinvestav.mx>

Editors

Ana Isabel Sacristán

Centro de Investigación y de Estudios Avanzados del IPN (Cinvestav), México
asacrist@cinvestav.mx

José Carlos Cortés-Zavala,

Universidad Michoacana de San Nicolás de Hidalgo, México
jcortes@umich.mx

Perla Marysol Ruiz-Arias

Centro de Investigación y de Estudios Avanzados del IPN (Cinvestav), México
pmruiz@cinvestav.mx

Produced by

Cinvestav (Centro de Investigación y de Estudios Avanzados del IPN), México
AMIUTEM (Asociación Mexicana de Investigadores del Uso de Tecnología en Educación
Matemática, A.C.), México

Published by

PME-NA

(North American Chapter of the International Group for
the Psychology of Mathematics Education)

December, 2020

ISBN: 978-1-7348057-0-3

DOI: 10.51272/pmena.42.2020

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

Carola Manolino
University of Turin
carola.manolino@unito.it

Keywords: Teacher Education - Inservice / Professional Development; Cross-cultural Studies.

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.

References

- Arzarello, F. (2006). Semiosis as a multimodal process. *Revista Latinoamericana de Investigación en Matemática Educativa*, 9, 267–299.
- Bartolini Bussi, M. G. (1996). Mathematical discussion and perspective drawing in primary school. *Educational studies in mathematics*, 31(1-2), 11-41.
- Bartolini Bussi, M. G., & Martignone, F. (2013). Cultural issues in the communication of research on mathematics education. *For the Learning of Mathematics*, 33(1), 2–8.
- Bartolini Bussi, M. G., & Ramploud, A. (2018). *Il lesson study per la formazione degli insegnanti*. Roma: Carocci.
- Chevallard, Y. (1981). Pourquoi la transposition didactique. *Comunicação no Seminário de Didática e Pedagogia da Matemática IMAG, Universidade de Ciências e Medicina de Grenoble. Publicado no Proceedings do ano, 1982*, 167-194.
- Gallimore, R. (1996). *Classrooms are just another cultural activity. Research on classroom ecologies: Implications for inclusion of children with learning disabilities*, 229-250.
- Jullien, F. (2005). La decostruzione da fuori. Dalla Grecia alla Cina e ritorno. *Aut aut*, 328, 71–87.
- Lotman, J. M. (1990). *Universe of the Mind. A semiotic theory of culture*. London: IB Taurus.
- Mellone, M., Ramploud, A., Di Paola, B., & Martignone, F. (2019). Cultural transposition: Italian didactic experiences inspired by Chinese and Russian perspectives on whole number arithmetic. *ZDM*, 51(1), 199-212.
- Radford, L. (2008). Connecting theories in mathematics education: Challenges and possibilities. *ZDM*, 40(2), 317-327.
- Skott, C. K., & Møller, H. (2020). Adaptation of lesson study in a Danish context: Displacements of teachers' work and power relations. *Teaching and Teacher Education*, 87.
- Vygotsky, L. S. (1999). Signs and tool in the development of the child. In R. W. Rieber (Ed.). *The collected works of L. S. Vygotsky*. Vol VI (pp. 3-68). New York: Plenum Press. (Original work published in 1987).