

## REFLECTING UPON DIFFERENT PERSPECTIVES ON SPECIALIZED ADVANCED MATHEMATICAL KNOWLEDGE FOR TEACHING

<sup>1</sup>Miguel Ribeiro, <sup>2</sup>Arne Jakobsen, <sup>3</sup>Alessandro Ribeiro, <sup>4</sup>Nick H. Wasserman, <sup>5</sup>José Carrillo,  
<sup>5</sup>Miguel Montes, <sup>6</sup>Ami Mamolo

<sup>1</sup>State University of Campinas – UNICAMP (Brazil); <sup>2</sup>University of Stavanger (Norway); <sup>3</sup>Federal University of ABC – UFABC (Brazil); <sup>4</sup>Teachers College, Columbia University (USA); <sup>5</sup>University of Huelva (Spain); <sup>6</sup>University of Ontario Institute of Technology (Canada)

### Short description of the workshop: aims and underlying ideas

*Teachers' knowledge assumes a major role in practice and in the students learning and achievement. In particular, the construct of horizon knowledge or, what can be termed specialized advanced mathematical knowledge for teaching (in order to capture the overall perspectives we are dealing with within this proposal) has been the focus of attention from some researchers with different foci of attack (e.g., Carrillo, Climent, Contreras, & Muñoz-Catalán, 2013; Jakobsen, Thames, Ribeiro, & Delaney, 2012; Wasserman & Stockton, 2013; Zazkis & Mamolo, 2011). In that sense, and aiming to deepen our understanding of such a construct, the aim of this working group is to discuss and reflect upon, different theoretical perspectives, methodological approaches and analytic methods used when focusing on such specialized advanced mathematical knowledge for teaching. In particular, we consider the activities of analysing and conceptualizing situations where access and development of such teachers' knowledge is of primary importance.*

### Planned structure:

For the work development in this Working Group three different work slots have been considered. The first one will have 15 minutes, the second one (small group work) 40 minutes and the last slot (all group discussion) 35 minutes. The last five minutes will be dedicated to synthesizing the work developed.

Planned timeline	Topic/work to be developed	Material / Working format / presenter
15'	Brief overview of the considered perspectives of Specialized Advanced Knowledge for Teaching	M. Ribeiro; Wasserman, Montes, Mamolo
40'	Commenting, solving, reflecting on, and discussing two situations designed to access and develop teachers' advanced mathematical knowledge linked with the tasks of teaching	Two situations will be presented and the participants will discuss them in small group work (Jakobsen, A.Ribeiro, Wasserman, Carrillo)
30'	Discussion and reflection on the work developed earlier in the smaller groups	Large group presentation (small group representatives)

5'	Final synthesis of the work developed	M. Ribeiro, Wasserman, Montes
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In the first slot, a brief overview of the different perspectives of conceptualizing the Specialized Advanced Knowledge for Teaching will be given by the proposed organizers, which assume four different perspectives, representing four different approaches and understandings of this construct (from one side, Ribeiro, Jakobsen and Ribeiro, then Wasserman followed by Carrillo and Montes, and finally, Mamolo).

Afterwards, in small groups the participants will be engaged in commenting, solving, reflecting on, and discussing two situations (one vignette and one episode) designed to access and develop teachers' advanced mathematical knowledge linked with the tasks of teaching. Such discussion will focus on participants' interpretations of the different aspects of advanced mathematical knowledge involved and which can (potentially) be explored by having the provided situations as a starting point – and in case of a need for changes in such situations what would be the focus of such changes. Also a discussion around different approaches for looking at the proposed situations grounded on the four initially presented perspectives will be proposed, focusing on the differences and similarities of such approaches. Along with such discussions, the tasks themselves will offer various foci of attention (e.g., conceptualization, nature and focus). For such small group work the participants will have 40 minutes.

In order to both synthesize and enhance the participants' views and understanding of the construct at hand, fostering a deeper core understanding on what such a construct comprises and the nature of the associated tasks for developing it (and its differences with other teachers' knowledge aspects), the last 30 minutes of the session will be devoted to a large group presentation, discussion and reflection on the work developed earlier in the smaller groups.

Based on the different perspectives of the construct and the subsequent analyses of the two explored situations, it is going to be proposed to the WG participants the possibility to collaborate on some papers/book chapters that would be an outcome of the group and would lead to a broader understanding of what comprises such construct of advanced mathematical knowledge for teaching, as well as their potential implications for future research in this area.

## References

- Carrillo, J., Climent, N., Contreras, L.C., & Muñoz-Catalán, M.C. (2013). Determining Specialised Knowledge for Mathematics Teaching. In B. Ubuz, C. Haser & M.A. Mariotti (Eds.), *Proceedings of CERME 8* (pp. 2985-2994). Antalya, Turkey: ERME.
- Jakobsen, A., Thames, M. H., Ribeiro, C. M. & Delaney, S. (2012). Using Practice to Define and Distinguish Horizon Content Knowledge. In ICME (Ed.), *12th International Congress in Mathematics Education (12<sup>th</sup> ICME)* (pp. 4635-4644). Seoul: ICME.
- Wasserman, N., & Stockton, J. (2013). Horizon content knowledge in the work of teaching: A focus on planning. *For the Learning of Mathematics*, 33(3), pp. 20-22.
- Zazkis, R., & Mamolo, A. (2011). Reconceptualizing knowledge at the mathematical horizon. *For the Learning of Mathematics*, 31(2), 8-13.