

## **Topic Study Group 47**

### **Mathematics Education in a Multilingual Environment**

T.S.G-47 Working Team<sup>1</sup>

#### **1. Introduction**

Around the world, mathematics education is taking place in multilingual environments, including classroom situations. The environments can be affected by historical and ethnic diversity, and by colonialism, migration, refugee contexts and/or globalization. Research on issues in such environments are growing, and the “problematique” arising is of wide relevance for teachers and students all over the world. The aim of TSG-47 was therefore to examine issues that arise in conducting research on mathematics education in multilingual environments. The following four themes were addressed:

1. Mathematics teaching strategies in multilingual classrooms;
2. Theoretical foundations for the notion of resource in multilingual classrooms;
3. Multilingual students’ agency in mathematics classrooms;
4. Design based research in multilingual mathematics settings.

The cooperation in the organizing team worked well over the years to prepare for the conference. We had a thorough review process and ended up with 16 long oral presentations, seven short orals and two posters. The presenters came from all over the world, showing that multilingual issues in mathematics classrooms are studied “everywhere”. Multilingualism is studied from different theoretical perspectives and methodologies, such as: semiotics (Raja and Pugalee, 2016), design research (Prediger and Uribe, 2021), code-switching (Hao and Yap, 2022), translanguaging (Ryan, Källberg and Boistrup, 2021), variation theory (Essien,2021).

#### **2. Sessions and papers presented**

The TSG met mainly on zoom, but there were Chinese participants on place in a lecture hall. The technique worked well except for a few of the presenters, they had problems

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getting access to the zoom platform. It didn't work to create zoom rooms, so, we had to do that our selves.

The time span from 2020–21, due to Covid-19, made presenters withdraw from the conference. At the time of the conference, a few of the papers presented had already been published, in longer more developed versions, elsewhere. The posters were not presented.

All the presentations are listed in Tab. 1, including two invited presenters: Susanne Prediger<sup>[6]</sup> and Richard Barwell<sup>[10]</sup>.

Tab. 1. Presentations in TSG-47

<b>Paper and author(s)</b>
<b>Session 1</b>
[1] Code-switching: proposing linguistic relativity as lens in multilingual mathematics education research. <b>Lester Cu Hao</b> (Philippines).
[2] Practices and functions of colloquial Arabic use to generalize patterns in multilingual classrooms. <b>Dibih El Mouhayar</b> (Lebanon).
[3] Localised instructional mathematics application programmes: providing access into mathematics in multilingual classrooms. <b>Evalisa Miriamu Katabua</b> (South Africa).
[4] Fostering mathematics teacher development through experiential learning in multilingual communities. <b>Catherine Paolucci</b> (USA).
[5] Study on difficulties of math word problems in English-international baccalaureate in Japanese high school. <b>Mitsuhiro Kimura</b> (Japan).
<b>Session 2</b>
[6] Activating multilingual resources in a superdiverse covariation classroom — a design research study. <b>Angela Uribe and Susanne Prediger</b> (Germany).
[7] Examining equitable participation and positioning in multilingual classrooms: tasks, language(s), and norms. <b>William Carl Zahner</b> (USA).
[8] The importance of students' first language as a sense-making resource in multilingual mathematics classrooms. <b>Sally-Ann Robertson</b> (South Africa).
[9] Exploring the enablement of mathematical proficiency in grade four English second language mathematics classrooms. <b>Faith Lindiwe Tshabalala</b> (South Africa).
<b>Session 3</b>
[10] Language positive classrooms: an example. <b>Richard Barwell</b> (Canada).
[11] Towards a framework for understanding the choice and use of examples in teacher education multilingual mathematics classrooms. <b>Anthony Essien</b> (South Africa).
[12] Impact of an online course of teaching mathematics to emergent bilinguals on teacher perspectives. <b>Ji Yeong I</b> (South Korea).
[13] Language-related barriers to mathematics learning: an alternative diagnosis. <b>Mun Yee Lai</b> (Australia).
[14] The problems of bilingual mathematical learners when using mathematics in Arabic. <b>Madiha Hassan Mohamed Abd El-Rahman</b> (Egypt).
[15] A student may speak with an accent, but no student thinks with an accent in mathematics. <b>Clarence Alan Zollman</b> (USA).

The organizing team shared the leading of our presentations. Session 1, chaired by Eva Norén, was held at 14:30–16:30 Beijing Time, July 13th; Session 2, chaired by Anthony Essien, was held at 19:30–21:00 Beijing time, July 14th; Session 3, chaired by Eva Norén, was held at 21:30-23:00 Beijing time, July 17th.

All sessions included discussions. The discussions were held in positive manners. The TSG ended with discussions on how to take results from studies further, and how we could cooperate in the future.

## References

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- B. L. C. Hao and R. A. S. Yap (2022). Code-Switching: Proposing Linguistic Relativity as Lens in Multilingual Mathematics Education Research. *Editorial board*, 13.
- C. S. Prediger and A. Uribe (2021). Exploiting the epistemic role of multilingual resources in superdiverse mathematics classrooms: Design principles and insights into students' learning processes. *Diversity dimensions in mathematics and language learning: perspectives on culture, education and multilingualism*. Berlin: De Gruyter/Mouton, 80–97.
- U. Ryan, P. S. Källberg, and L. B. Boistrup (2021). Language-as-resource in multilingual mathematics activities: an epistemological framework. *For the Learning of Mathematics*, 41(2), 8–13.
- S. Raja and D. Pugalee (2016, November). Connect and Prepare: The social and linguistic semiotics of mathematics in public schools. In *E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education* (pp. 1491–1495). Association for the Advancement of Computing in Education (AACE).