Introduction to the papers of TWG11: Comparative studies in mathematics education

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As with earlier CERMEs, TWG11 adopted an eclectic perspective in its interpretation of comparison as referring to any study that documents, analyses, contrasts or juxtaposes cross-cultural or cross-contextual similarities and differences across all aspects and levels of mathematics education. In this way, the TWG aimed to encourage critical but supportive discussion that would enable colleagues to:

- share findings and outcomes of empirical studies that adopt a comparative approach;
- outline the delineation of comparative and non-comparative research;
- develop and refine research methodologies specific to comparative studies;
- explore the interaction of macro-level survey studies and micro-level case studies;
- understand how various theoretical approaches and conceptual frameworks shape the goals and the design of comparative research;
- understand how comparative studies can inform teaching and learning practices;
- understand the role of culture in the construction of mathematics teaching and learning

A recurrent but very productive aspect of this working group has been the relatively small number of paper presentations. This year thirteen papers created space not only for colleagues to share their research in some detail but allowed participants to engage in lengthy and inclusive discussions on the nature of comparative mathematics education research and the means by which it can be meaningfully and rigorously undertaken. The papers, along with two posters, were themed in various ways, highlighting significant substantive and methodological variation. However, two theoretical papers provided an interesting and provocative introduction and conclusion to the sequence of papers. The introduction being Jablonka's "rationales for comparative classroom studies in Mathematics education" and the conclusion being Clarke's examination of "the role of comparison in the construction and deconstruction of boundaries". Between these bookends five themes were examined by means of papers and posters authored by colleagues, due to their nationality or current professional location, representing Australia, Austria, China, Cyprus, England, Finland, Germany, Ghana, Greece, Hungary, Italy, Japan, Kosovo, Poland, South Africa, Spain and Sweden.

Firstly, three papers offered differently conceptualised perspectives on how the intended curriculum is reified in official documents and school textbooks, particularly in contexts where the latter are regulated by the curriculum authorities. These were Vula and colleagues' analysis of the treatment of fractions in Kosovan and Albanian mathematics textbooks, Xenofontos and Papadopoulos' study of the ways in which the history of mathematics is incorporated into the lower secondary textbooks of Cyprus and Greece and Gosztonyi's comparison of the ways in which the "new math" permeated Hungarian and French mathematics education discourses.

Secondly, two papers and two posters confirmed that mathematics and the manner of its assessment is a cultural construction. The papers were Peng and col-

leagues' comparison of Swedish and Chinese teachers' perspectives on what constitute good national mathematics test tasks, Branchetti and colleagues' longitudinal analysis of the Italian national standardized mathematics tests. The posters, which were also discussed, were Lemmo's comparison of paper and pencil and computer based mathematics assessments and Bauer and colleagues' provocative appeal for teachers to unite in addressing the expectations of PISA.

Thirdly, two papers, investigating different aspects of mathematics affect, highlighted the paucity of research undertaken in African contexts and the frequent inappropriateness for use in those contexts of tools developed in the West. These were Bofah's demonstration of a reciprocal determinism between students' mathematics self-concept and achievement in five culturally diverse African contexts and Joubert's use of social media to examine the perceived causes of mathematics problems in England and South Africa.

Fourthly, two papers framed a discussion on the processes of mathematics. These were Saeki and colleagues' comparison of how Japanese and Australian students responded to a mathematical modelling intervention and Sajka and Rosiek's use of eye tracking technology to examine differences between different ability groups' approaches to mathematical problem solving.

Finally, two papers offered different methodological perspectives on the use of classroom video-recordings in comparative mathematics education research. These were Andrews and colleagues' exploitation of a foundational number sense framework to analyse learning opportunities for grade one students in Poland and Russia and Hommel and Clarke's analysis of how teachers, in four different cultural contexts, use questions to encourage students to reflect on their learning of mathematics.

In sum, the papers presented to the group reflected not only cultural diversity but also methodological pluralism, allowing a number of commonalities to emerge. Most presented studies aspired to data flexibility, with few being constrained by a priori theoretical assertions. Classroom processes have both form and function and a comparative study of one may transform the other. In comparative research the responsibility on the researcher to define adequately one's concepts and constructs is of great significance, particularly with respect to large scale tests of educational achievement. Lastly, in undertaking comparative research one should be mindful of the possibility of misapplying a set of culturally informed values.