



TSG 57

DIVERSITY OF THEORIES IN MATHEMATICS EDUCATION

The Organizing Team

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A general introduction to the TSG

Mathematics education is a scientific field with many theory cultures. This diversity can be regarded as richness but it also challenges research as well as communication and cooperation in the field. This is specifically the case when different theories are to be included into research. How the scientific community can cope with this diversity with scientific integrity remains an open question, specifically when research results from different theory cultures are used. The networking of theories has started to investigate this question by conducting concrete research. The TSG 57 builds on previous lines of thought on the diversity of theories (e.g. ICME 12, ICME 13, CERME 6, 7, 8, 9, 10, 11) and wants to continue this discussion. It aims at exploring how the diversity of theories can be used in mathematics education, how this may influence research theoretically, methodologically and epistemologically and how the diversity of theories may impact the use of theories and results in school practice. We want to collect concrete research examples addressing a diversity of theories in order to obtain typical ‘argumentative grammars’ (structure of argumentation to substantiate evidence) for qualitative and theoretical research, research on technology-based teaching and learning, design research, research addressing different educational levels and networking of theories. But we welcome also further ideas going beyond the subthemes.

Reference: Bikner-Ahsbabs, A., & Prediger, S. (Eds.) (2014). *Networking of theories as a research practice*. New York: Springer.

List of subthemes for considering a diversity of theories

Subtheme 1: ... *in the digital era – using technology and other resources in teaching and learning*

(and beyond). Technology use often requires theorizing tools, instruments, hence semiotic resources in connection with theorizing teaching and learning mathematics, hence diversity of theories is an issue.

Subtheme 2: ... for design research: Steps in design research often require different kinds of theories, for example normative theories for justifying aims, descriptive or explaining theories for conducting design experiments and prescriptive theories for deciding about means for the design of instruction.

Subtheme 3: ... at different educational levels including teacher education: Different educational levels (e.g. pre-school vs. university and teacher education) may require the use of various theoretical perspectives to capture the complexity of its teaching and learning, for instance in the classrooms or professional development.

Subtheme 4: *The Networking of theories* may investigate the relationship and function of theory elements in concrete research cases focusing on specificities of the theories and their usages.

Papers submitted just need to address one of the subthemes. Subtheme 3 is more open for enabling the TSG to include a wider range of scientific presentations, theoretical as well as empirical, on the diversity of theories in the field of mathematics education. These papers may either include different levels of education or focus on a specific level of education from elementary towards tertiary education and the respective professional development. In addition, we also welcome proposals, which are a bit more open, but want to contribute to a discourse on the diversity of theories in the field. With ‘theories’ we do not only mean grand theories but also theory elements or theoretical models of a restricted scope addressing specific perspectives or phenomena.