



TSG 52 Empirical methods and methodologies

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Overview

Research in mathematics education employs an extensive range of Methods, Methodologies, and Paradigms (M/M/Ps) in the service of key goals. But which M/M/P combinations help us understand which phenomena, in robust and reliable ways? TSG 52 is organised around a set of diverse goals central to ongoing research in mathematics education. Consider the following goals:

- Improving Mathematics Instruction (instructional materials, strategies, organisation, assessment)
- Understanding the Learning of Mathematics
- Understanding the Teaching of Mathematics (teacher beliefs, knowledge, decision-making and professional development)
- Classroom Processes and Interactions
- Mathematics Education and Social Justice
- Understanding the Role of Culture and Language in Shaping the Teaching and Learning of Mathematics

Each goal might be addressed using research designs that integrate different M/M/P combinations. For each goal, one might be ask: "Suppose you have an hypothesis about this goal. How do you set about evaluating it?" Alternatively, "Suppose you are trying to explain some aspect of individual or group behavior relevant to that goal. How would you characterize and then theorize that behavior?" Or, "What contribution do cultural, historical and political perspectives make to your understanding of the contingencies related to realizing this particular goal?"

The opening session will focus on each goal as a means of illustrating one distinctive M/M/P combination. The middle sessions will involve working groups addressing each goal (through posters, short oral presentations, and discussion) to identify a suite of research design prototypes (M/M/P bundles) relevant to that goal.

In the concluding, combined session, each working group will address the questions: (i) What M/M/Ps characterise current research on its goal? (ii) How have existing approaches proved to be productive/unproductive in addressing it? (iii) What M/M/Ps (research designs) hold out significant potential for progress in relation to it? Similarities, differences, synergies and silences will be discussed.

Advice to those interested in participating

This TSG is specifically focused on the empirical research methods and methodologies employed to address the six broad goals of research in mathematics education identified above. For our work to be coherent and allow for comparability, each presentation/paper should identify the specific goal(s) being explored, identify the theoretical frame on which the research design is predicated, and address the question of how effectively the research design (M/M/P bundle) addresses the designated goal(s).

More specifically, presentations and papers are expected to:

- A. Specify the methodology and methods that constitute the research design and identify the particular goal/s that are the focus of the reported research study;
- B. Specify the theoretical frame or rationale by which the selection of methodology and methods can be justified, discussing advantages and limitations of methodological choices re the identified research goal(s);
- C. Further address the appropriateness of the chosen methods in terms of the robustness of the findings generated, their generality or specific domain of relevance, and their capacity to describe, explain or predict phenomena of importance to the field of mathematics education.

Following the Congress, the TSG organisers will compile selected conference papers into a thematic volume, in which the TSG's collective contributions to the field's evolving understanding of contemporary choices and utilisation of research methodologies and methods are discussed. Central to this publication will be the identification of principles for effective methodological choices in relation to the identified research goals and remaining issues and challenges for future research in mathematics education.