

# REPLICATION STUDIES IN MATHEMATICS EDUCATION

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*The aim of this working group is to examine the role quantitative replication studies may have in mathematics education research. The workshop aims to clarify when a study is considered a replication study, the potential impact and value of replication studies for the field, the way in which they are handled by journals, and the challenges researchers face in their execution and publication.*

Replication studies are a very important common practice in scientific research, recognized as a crucial method for validating empirical knowledge claims based on quantitative and experimental research. Methodological textbooks consistently highlight the necessity of ensuring research results are replicable (Newby, 2013). There has recently been a growing discussion about the role of replication studies in educational research. In 2018, the U.S. National Science Foundation (NSF) and the Institute of Educational Sciences (IES) stressed that advancing evidence-based decision making requires a more prominent role of reproducibility and replication research within the education community. Despite this emphasis, research indicates that fewer than 5% of studies in the field involve replication (Makel et al., 2012).

Replication studies in the field of mathematics education are rare (Cai et al., 2018). At PME42, a first working group was held on Replication Studies in Mathematics (Inglis et al., 2018). This workshop aimed to initiate the conversation surrounding replication studies in mathematics education, focusing on specific issues in replication. The current Working Group will focus on quantitative and experimental research within mathematics education, seeking a clear and detailed examination of what replication studies involve, their potential impact and value for the field, the way they are handled by journals, and the challenges researchers face both in execution and publication. The Working Group will consist of two 90-minute sessions. The First Session topic is Conceptualization, Rationale, Contribution, and Impact of Replication Studies, and Second Session topic is Challenges and Evaluation of Replication Studies.

## STRUCTURE OF THE WORKING GROUP

### **Session 1: Conceptualization and Rationale, Potential Impact and Contribution of Replication Studies**

In the first session, we will start with a welcome round and a brief exploration of the participants' interest in the topic as well as their experience with replication studies (15'). The organizers will then provide an introduction to the idea of replication and its relevance for mathematics education based on recent publications in the field (e.g., Cai

et al., 2018). Different dimensions and aspects of replication research will be presented as well as points of discussion and controversy (25').

Next, a small group discussion will be held (25'). Participants' own experiences and ideas can form the basis of the discussion but the organizers will provide concrete (anonymized) abstracts of empirical studies that may or may not be seen as replication studies that provide a valuable contribution to the field. The focus will be on *what* is replicated (e.g., a theoretical idea, a specific finding), what—if any—relevant *differences* are in the study (e.g., exact replication, another country, another mathematical topic), and what *reasons* there are to conduct a replication study.

The session will be concluded by a plenary summary and discussion (25').

## **Session 2: Evaluation of Replication Studies and Challenges in Execution**

The second session is divided into two parts. The first focuses on the way in which replication studies that are submitted to journals in mathematics education are evaluated by reviewers and handled by journal editors. We will provide input for the discussion based on a survey that we conducted among editors and former editors of major mathematics education journals. These will first be briefly presented (15') after which a small group discussion will focus on participants' own experiences and ideas about the results of the survey (30'). A brief plenary summary (10') concludes this half.

The second part focuses on the execution and challenges of replication studies. In small groups, participants will discuss (25') and make a list of challenges experienced. These may relate to several aspects, including the difficulty of finding sufficient information about the study to be replicated as well as difficulties in reporting the replication and in getting studies published. Again, a plenary summary will conclude this part (10').

## **References**

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