Topic Study Group 3.4: Mathematical applications and modelling in mathematics education

Strand B

Team details

Co-Chairs

Gilbert Greefrath (Westfälische Wilhelms-Universität Münster, Germany; greefrath@wwu.de)

Gloria Stillman (Australian Catholic University, Australia; stillmanga@gmail.com)

Members

Jaime Huincahue Arcos (Universidad Católica del Maule, Chile)

Toshikazu Ikeda (Yokohama National University, Japan)

Xiaoli Lu (East China Normal University, China)

IPC Liaison

Frederick K.S. Leung (The University of Hong Kong, Hong Kong)

Overview

Mathematical applications and modelling have become the basis for a vibrant research sub-domain in mathematics education with outlets for publication of results diversifying in recent years. Several theoretical as well as empirical lines of inquiry are currently being pursued in various parts of the world. Mathematical applications are promoted by school curricula in an increasing number of educational systems and so is mathematical modelling, but to a lesser extent. Although existing research is flourishing, there are areas where research is sparse or where troubling questions still remain to be explored and resolved. Below we list possible questions that might be addressed in TSG 3.4. As well as a final report for ICME, a further outcome of the TSG will be an edited volume where

particularly innovative and productive lines of inquiry within our discussions will be addressed in a selection of extended papers.

- How can technological teaching/learning environments be exploited more to interest more students in mathematical applications and modelling?
- What impact does use of digital tools have on the scope and purpose of the modelling and the nature of mathematical performance that results when they are used productively?
- What examples are there of teacher-researcher teams working together to resolve some of the problems of teaching through modelling or teaching how to model?
- How can task design ensure that modelling tasks keep mathematical depth in any ensuing modelling that is engaged in whilst attempting to model the situations described in such tasks?
- How can young learners' mathematical modelling capabilities be recognised and capitalised on in the early years of schooling?
- What teaching practices support early mathematical modelling?
- Is mathematical modelling able to be leveraged to optimise STEM integration?
- How can teacher educators construct culturally relevant modelling tasks and learning experiences for pre-service teachers that demonstrate how modelling tasks should be grounded in the contexts and purposes that students find engaging?
- What are the current advances in metacognition and modelling?
- What is the relationship between mathematical literacy and modelling?
- What does current research say about affect and modelling?
- What roles do verification and validation play when students are learning to model?
- How can we assess any changes in students' conception of mathematics while experiencing and learning to mathematically model?
- What are the factors that teachers perceive as shaping their practices when teaching mathematical modelling?
- How would a systems approach to modelling be realisable in secondary classrooms?

How to make a submission to this Topic Study Group

Submissions for Topic Study Group Papers and proposals for Posters open 28 April 2023 via the official ICME-15 website, icme15.org. The website also contains a timeline of dates for the activity of the Topic Study Groups in the lead up to the Congress.

For questions about this TSG, please contact the Co-Chairs using the email addresses provided.