



# Topic Study Group 1.4: Teaching and learning of geometry

## Strand B

## Team details\*

### Co-Chairs

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### Members

Alik Palatnik (The Hebrew University of Jerusalem, Israel)

### IPC Liaison

Jean-Luc Dorier (University of Geneva, Switzerland)

## Overview

This Topic Study Group provides a forum for researchers and educators interested in the teaching and learning of geometry for kindergarten, primary, secondary and tertiary education levels. It is an opportunity to share insights and progress on teaching and learning geometry through the submission of papers and posters, the discussion during the sessions, and the synthesis of a report.

Geometry is a key component of mathematics curriculum at all levels. As previous research has shown, of all the areas of knowledge in which students must enter mathematics, geometry is the one that requires the most complete activity, since it requires gesture, language and view (visualisation of mathematical objects). For example, when we submit the development of a square-based pyramid to students and ask them to anticipate whether it will form a pyramid by folding it, the task requires them to coordinate the image presented, its movement in space and the definition of this solid.

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Therefore, this working group will focus on the coordination, the articulation and the role of these different facets of teaching and learning geometry in mathematical class. Moreover, TSG 1.4 is interested in research dealing with this topic from different angles and according to different anchors (theoretical, empirical, practical, cultural, conceptual, historical, curricular, etc.).

Like all other branches of mathematics, geometry involves the development of mathematical reasoning or a way of thinking about them. This may be visible through the manipulations, explanations and traces left by the students, but what we see is only the tip of the iceberg. We will focus on the hidden sides of teaching and learning geometry that are often taken for granted in our respective mathematical training programs.

Teaching and learning of geometry can be considered in close relation to other fields of mathematics (arithmetic, probability, algebra, etc.) and with other disciplines such as science, technology, arts, language or even physical education. These perspectives may likewise represent avenues of discussion for this TSG.

Also, geometry is rich in problem solving and has a real-world connection that encourages student engagement through areas such as art, design, engineering, architecture, sports and games. Geometry is an important component of mathematics teacher education and undergraduate mathematics programs, as preparation for future careers.

In this study group, educators, scholars and practitioners are welcomed to participate in short presentations of and discussion in the recent trends and developments in research and practice of the teaching and learning of geometry.

## Areas of interest

This study group aims to bring together conference participants to share research results, research projects, new developments, and updates on ongoing projects concerning the teaching and learning of geometry at all levels. Here are the sets of questions that will guide this working group for submissions of papers and posters, presentations and possible discussion points:

1. What is the hidden side of the development of geometric thinking in the mathematical classroom? What are the mental reasonings involved in the teaching and learning of geometry? What is the contribution of spatial reasoning for geometry and vice versa? What framework or methodology can be used to analyse this hidden side of geometry?
2. How is geometry conveyed in different cultures? What cultural contributions can be explored in the teaching and learning of geometry? What framework or methodology can we use to explore these cultural differences?





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3. What links can we make between the teaching and learning of geometry and problem solving? And other mathematical subjects? And other disciplines? And different careers? How can research allow us to make these connections? How do these connections manifest themselves in the classroom?
4. How is the teaching and learning of geometry approached in our curricula? How are they similar or divergent? What are the advantages and limitations of these curricula? What are the foundations supporting ministerial choices? What are the new approaches to curriculum implementation in geometry?

These are the questions targeted a priori, but this TSG is open to all other avenues dealing with the teaching and learning of geometry. Scholars interested in participating in TSG 1.4 are invited to contact the TSG co-chairs. Details of submission procedure, and associated deadlines, are available on the ICME-15 website.

### **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](http://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.

