TSG 17 Teaching and learning of discrete mathematics (including logic, game theory and algorithms)

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Discrete mathematics is a comparatively young branch of mathematics with no agreed-upon definition but with old roots and emblematic problems. It is a robust field with applications to a variety of real world situations, and as such takes on growing importance in contemporary society.

We take discrete mathematics to include a wide range of topics, including logic, game theory, algorithms, graph theory, discrete geometry, number theory, discrete dynamical systems, fair division, cryptography, coding theory, and counting. Cross-cutting themes include discrete mathematical modelling, algorithmic problem solving, optimization, combinatorial reasoning, and recursive thinking.

Discrete mathematics is not always clearly delimited in curricula and can be diffuse. In fact, two separated but linked perspectives for educational research emerge: the study of teaching and learning discrete mathematics content and the study of teaching and learning skills of mathematical practice through discrete mathematics problems, both general skills, such as reasoning and modelling, and skills particular to discrete mathematics, such as algorithmic and recursive thinking. Thus, discrete mathematics provides a useful setting in which to pursue the ongoing problem in mathematics education of the didactic transposition of content knowledge and process skill, and it provides an opportunity to develop and refine models for teaching and learning that develop both. For example, writing and speaking about the use of discrete techniques to analyze a contextual problem is a powerful way for students to learn the mathematical content and develop critical thinking skills.

The main goal of the TSG is to discuss and extend the state-of-the-art about teaching and learning discrete mathematics. The broad focus areas related to this goal are teaching and learning at all grade levels, curriculum development, professional development of teachers, and curricular implementation of discrete mathematics, including policy and standards.

We encourage papers that address the goal, focus areas, mathematical topics, themes, and research perspectives above. Topics for papers may include but are not limited to:

- Interesting discrete mathematics problems and situations, discussed and analyzed from mathematical and didactical points of view;
- Research on teaching and learning discrete mathematics;
- Classroom implementation of discrete mathematics (generally or examples);
- Pre-service or in-service teacher training in the area of discrete mathematics (generally or examples);
- Pedagogical content analysis of targeted discrete mathematics topics;
- Ways of thinking (habits of mind) in discrete mathematics, such as discrete mathematical modelling, algorithmic problem solving, combinatorial reasoning, and recursive thinking;
- Developing skills of mathematical practice through teaching and learning discrete mathematics content;
- Discrete mathematics as a setting in which to investigate the didactic transposition of content knowledge and process skill;
- Writing and speaking about the use of discrete techniques to analyze a contextual problem as a means for students to learn the mathematical content and develop critical thinking skills;
- Curriculum and educational policy issues and analyses related to discrete mathematics.

Papers will be presented during regular sessions of TSG 17 (four 90-minutes sessions), or in Oral Communications sessions attached to TSG 17. Posters will be presented in evening poster sessions attached to TSG 17.

Based on submissions and acceptances, the activities of TSG 17 will include:
- Major presentations (30 minutes)
- Short presentations (15 minutes)
- Panel discussions and debates, on topics, themes, and issues
- Working sessions in which contributed papers are analyzed, connected, and extended
- Posters