TSG 15
TEACHING AND LEARNING OF DISCRETE MATHEMATICS

The Organizing Team

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Discrete mathematics is the study of discrete (as opposed to continuous) structures. It has many applications in a variety of fields, and it often exists at the interface of several disciplines, making it increasingly relevant in our digital world. Discrete mathematics offers many accessible points of entry for students to engage in rich mathematical thinking, as students can interact with ideas and reason about problems without requiring considerable prior knowledge of mathematical content. Further, its accessible nature makes it an excellent context in which students can engage in important mathematical practices such as conjecturing, generalizing, justifying, and proving. For these reasons, we view discrete mathematics as an indispensable part of mathematics education that deserves attention at all levels of education.

Aims and Scope: The main goal of this session is for researchers and educators to share current developments in the teaching and learning of discrete mathematics at all levels, ranging from elementary through postsecondary school. We seek to extend previous work on the teaching and learning of discrete mathematics by sharing new research and pedagogical innovations about a variety of topics related to discrete mathematics. We are particularly interested in identifying and exploring the variety of ways in which discrete mathematics is studied and taught across the world. We acknowledge that the teaching and learning of discrete mathematics may involve investigations into both mathematical content (particular mathematical topics within discrete mathematics and other disciplines) and mathematical practices (more general mathematical approaches or habits of mind), and that it may be a setting in which to explore other relevant issues in mathematics education. In terms of content, in this TSG we characterize discrete mathematics broadly as consisting of a variety of topics. This includes topics traditionally associated with discrete mathematics (such as algorithms,

coding theory, combinatorics, cryptography, graph theory, languages and automata, logic, number theory, recursion, and set theory), as well as topics that might be considered relatively new (such as complexity theory, existence and constructability, and computational number theory, algebra, and group theory). In addition, there are a number of mathematical practices that could be related to discrete mathematics, including problem solving, conjecturing, justifying, generalizing, proving, and more. We also acknowledge that there may also be additional topics in mathematics education that might particularly be emphasized – these might include, for example, issues of affect and beliefs, equity and inclusion, classroom discourse, pre-service teacher preparation, or in-service teacher training.

We envision that this TSG will include presentations of papers on any of the wide range of topics discussed above, focusing on any level of school. We welcome papers that are related to the teaching and learning of discrete mathematics, which may include, but are not limited to:

- research on student thinking about relevant concepts in discrete mathematics
- research demonstrating effective instructional strategies in teaching discrete mathematics
- research-based ideas for innovative activities and pedagogical interventions in classrooms at a variety of age levels
- research-based ideas of incorporating technology into the discrete mathematics classroom
- explorations of discrete mathematics as a setting in which to investigate mathematical practices
- explorations of discrete mathematics as a setting in which to investigate other relevant issues in mathematics education
- ways of thinking (or habits of mind) that may be productive in discrete mathematics, such as combinatorial reasoning, algorithmic or computational approaches, or recursive thinking
- curriculum and educational policy issues related to discrete mathematics