Topic Study Group 2.2: Research on mathematical promise and giftedness

Strand A

Team details

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Overview

Following previous discussions on mathematics education for gifted children by TSGs at previous ICMEs', as well as during International Conferences on Mathematical Creativity and Giftedness, we will continue the international exchange of ideas related to research on identification of mathematical talent, didactics of teaching highly able students, as well as the promotion of mathematical challenge and enrichment for all. In their ICME-13 Topical Survey on Research On and Activities For Mathematically Gifted Students, Singer et al. (2016) have explored "whether our gifted mathematics students around the world are closer to realizing their full potential and suggested strategies and needed research to make that happen" (p. 1). Among others, the authors have highlighted a complexity to define the conception of giftedness while emphasizing a fertility of the term

mathematically promising introduced by the NCTM Task Force in the mid-90s that seems to be "the most appropriate to grasp the complexity of the topic in its largest and broader sense". This view is also reflected in the title of our Topic Study Group.

Along with the nature of mathematical giftedness and mathematical promise Singer et al. (2016) have also reviewed different opportunities for the development of full potential of these students who appear to be "most neglected" in mathematics classrooms. Among practices that could best encourage mathematical promise, problem solving and problem posing, discourse and questioning, creativity and innovation, challenging mathematical tasks, curriculum and textbooks, in-school programs and activities (with reference to ability grouping, self-contained classes and specialized schools, acceleration and grade skipping), and extra-curricular programs and activities (with reference to recreational mathematics and competitions) were mentioned (Singer et al., 2016, p. 34).

Hence, the aim of TSG 2.2 is to involve educational researchers, research mathematicians, mathematics teachers, teacher educators, curriculum designers, doctoral students, and others in a forum for exchanging insights related to the research on mathematical promise and giftedness. The focal topics will include empirical, theoretical and methodological issues related to the themes below to reflect the importance of the topic and its "strong social impact" (Singer et al. 2016). Current and historical research and suggestions for new research paths might be included in each category.

Areas of interest

The papers and posters discussed during the TSG sessions will focus on (while not limited to) the following four topics and subsequent questions:

Nature of Promise and Giftedness

- What do we know and need to know about mathematical giftedness?
- What theoretical frameworks and methodologies help identify, create, value, and educate mathematically gifted students in different contexts/ societies?

Students

- How does research in cognitive science and neuroscience further understanding of the development of mathematical talent in students of all ages and backgrounds, and how can we better capture this diversity?
- How are cognitive, social, and affective aspects connected in gifted and promising students?

- How can mathematically gifted students be discovered, and fostered?
- How are mathematical creativity and giftedness connected?
- What thinking patterns are evident in highly able mathematics students during open learning tasks? (e.g., speed, depth, style, type, mode)
- How do high-ability students make meaning of challenging mathematical tasks?
- What are student perceptions of mathematical giftedness?

The Classroom

- Which practices encourage quality engagement in the mathematics classroom? (e.g., cognitive, emotional, behavioural, and agentic engagement)
- How can classrooms offer equitable differentiation to develop mathematical giftedness in diverse populations?

Pedagogy/Programs/Teachers/Teacher Education/Community involvement

- What role do parents, teachers, and mentors play in supporting the development of mathematical talent?
- What beliefs do teachers hold about mathematical giftedness and how does this influence the identification and nurturing of mathematical talent?
- How could teaching best encourage, promote, and develop mathematical talents (catch, sustain and support interest, enrich classroom interactions, discourse, reasoning, and diversify teaching strategies)?
- What environments, curricula, resources, special schools and activities might lead students to discover and realize their mathematical promise and talents? (broad range of curriculum and pedagogic options)
- What impact has the COVID-19 pandemic had on fostering processes?
- What types of mathematics and pedagogy are suitable for educating preservice and in-service teachers for promising and gifted mathematicians?

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.