

Topic Study Group 62

TSG-62: Popularization of Mathematics

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1. Theme and Description

The Popularization of Mathematics Study Group (TSG-62) gathered for the second time in ICME people using interesting and inspiring mathematics to motivate both young people and the general public.

Because of the pandemic situation, we have seen a surge in the use of digital media aimed at teaching mathematics. This technological shift had a profound impact on the way we teach and, because of the format, a lot of teachers have taught in a manner much akin to popularization. Many teachers have turned into directors of educational video clips and borrowed from the narrative springs of Youtubers. You don't teach the same way using the blackboard in the classroom and short videoclips on the internet. You cannot expect students to stay as calm and focused for an entire hour as in the classroom when you are competing with entertainment platforms with enormous means of attraction. You are compelled to be as appealing as possible and this had an impact on the math popularization scene. Teaching then reached almost the same goals as popularizing:

- Democratize mathematics;
- Set a healthier relationship with mathematics;
- Raise performance in math education;
- Share math beauty, power and pervasiveness;
- Justify taxpayer's money in research and education.

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² The organization Team of TSG-62:

Chair: Christian Mercat, Université Lyon 1, France.

Co-chair: Clara Grima, Universidad de Sevilla, Spain.

Members: Pan Liu, East China Normal University, China.

Abolfazl Refiepour, Shahid Behonar University of Kerman, Iran.

Patrick Vennebush, University of Maryland, USA.

2. Activity Overview

The Topic Study Group gathered 30 people, authors of 11 papers and 1 poster that were presented during three sessions (Tab. 1).

Tab. 1. The list of papers and poster presented

Paper and author(s)	
Session 1	
[1]	Students make interactive exhibition experimental mathematics for the museum of entertaining sciences. <i>Maria Shabanova and Mariia Pavlova</i> (Russia).
[2]	Mathcitymap — popularizing mathematics around the globe with maths trails and smartphone. <i>Iwan Gurjanow, Joerg Zender, and Matthias Ludwig</i> (Germany).
[3]	Beyond the classroom and curriculum: the annual maths camp at Bahir Dar University, Ethiopia 2013 – 2019. <i>Abdu Mohammed Seid, Yismaw Abera Wassie, Danny Parsons, Haile Yedeg, and Assaye Walelign</i> (Ethiopia).
[4]	Reconsidering the M in STEM: leaders' conceptions of mathematics to empower girls in gems clubs. <i>Rose Mbewe, Sue Ellen Richardson, and Lili Zhou</i> (USA).
Session 2	
[5]	Creating access to engaged views of mathematics and teaching through informal learning spaces. <i>Lynn Liao Hodge</i> (USA), <i>Shande King, and Qintong Hu</i> (China).
[6]	Increasing math appreciation using the upper levels of blooms taxonomy. <i>Manmohan Kaur</i> (USA).
[7]	Math + Origami + Puzzles + Magic → the odds are always in favor of fun. <i>Violeta Vasilevska</i> (USA).
Session 3	
[8]	Some suggestions on school-based curriculum construction of mathematics culture for middle school. <i>Junfeng Ma and Yaqiang Yan</i> (China).
[9]	Mathematical drama: a new form of popularization of mathematics at East China Normal University, China, 2012–2019. <i>Xinyu Liu, Pan Liu, and Jiachen Zou</i> (China).
[10]	Mutual role of mathematics and culture. <i>Abolfazl Rafiepour</i> (Iran).
[11]	Keeping Popularization of mathematics on track: formative assessment. <i>Elham Ebrahim Zadeh, Hasan Hoseinpoor, Einollah Shokrpourrodbari, and Younes Karimi Fardinpour</i> (Iran).
[12]	On the impact of popularization oriented assessment: creating excitement. <i>Younes Karimi Fardinpour, Akram Bagheri Gheibi, and Gahimeh Kolahdouz</i> (Iran).

In Session 1, Shabanova and Pavlova^[1] presented the Museum of Entertaining Sciences where students made interactive experimental mathematics exhibitions. Joerg Zender et al.^[2] introduced the concept of math trails using the MathcityMap system, a sort of mathematical tourism around the globe. Seid et al.^[3] presented their annual math camps since 2013. Zhou et al.^[4] empowered girls in STEM clubs with leaders' conceptions of mathematics.

In Session 2, Hodge et al.^[5] experimented Informal Learning Spaces, for families and novice teachers to engage with mathematics. Kaur^[6], from the Benedictine university, Vasilevska^[7] gave an overview of various hands-on outreach programs that demonstrate the fun of math with origami, puzzles and magic that reconcile students with their own abilities in math.

In Session 3, Yan and Ma^[8], investigated how culture in mathematics can be infused into math curriculum at the level of middle school. Liu et al.^[9] shared their experience of conducting theatrical popularization through grandiose mathematical drama. Abofazi Rafiepour^[10] described how Iranian craftsmanship shows the interrelation between mathematics and culture. Finally, formative assessment was promoted as a way to keep mathematics popular by Shokrpourrodbari et al.^[11] and exciting by Farinpour et al.^[12].

3. Future Directions and Suggestions

There are many different ways of expressions that fall within popularization of mathematics:

1. Art and science (theater, films, visual arts);
2. Fixed, itinerant, and virtual exhibitions for museums, science centers or non-dedicated spaces. Science or mathematical festival or forums;
3. Competitions in mathematics and computer science Mathematical camps;
4. Contact with research mathematics and mathematicians;
5. Inquiry/research-based projects;
6. Math circles/math clubs;
7. Recreational mathematics;
8. New technologies (apps, websites, ...);
9. International exchanges.

Popularization addresses different audiences and target groups tackling unequal access issues, talent, motivation, gender, social, financial or geographical differences, educational opportunities between countries. We witnessed some of this diversity in this Topic Study Group, but common theoretical grounds to unite all these different views into one perspective still needs some work to be done. Let's hope that next ICME will see such a vivid community share their enthusiasm for mathematics once again in the flesh.