

Topic Study Group 34

Affect, Beliefs, and Identity of Mathematics Teachers

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ABSTRACT We present the organization of Topic Study Group 34 and summarize the main themes that were discussed during the session. Finally, we outline direction for further research on the topic, as emerged during the TSG work and discussions.

Keywords: Affect; Beliefs; Identity; Teachers.

1. Aims of the TSG

In TSG-34 we addressed the themes of affect, beliefs and identity in mathematics education, with a special focus on mathematics pre-service and in-service teachers.

Following Hannula (2012), we conceptualize theories related to affect into three dimensions. The first dimension describes three different types of affect: cognitive (e.g. beliefs), motivational (e.g. value, motivation), and emotional (e.g., emotion, engagement). The second dimension concerns stable aspects of affect (i.e. traits) versus dynamically changing aspects of affect (i.e. states). The third dimension concerns the different research traditions for theorizing affect: physiological theories, psychological theories, and socio-cultural theories.

Research on affect-related theme is indeed traditionally rich and diverse and such a diversity and richness was evident in the contributions to the TSG-34.

The starting point for the work of the Topic Study Group was the previous work in ICME-13 (Hannula et al., 2019) that led us to outline a list of relevant themes:

- Theoretical and methodological issues concerning research on teacher's affect and identity.
- The analysis of the mutual relationship between affective constructs.

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- The connection of affective constructs to cognition and other constructs studied in mathematics education.
- The design and implementation of teacher education programs for promoting aspects of affect and identity.
- The domain (mathematics) specific research on affect and identity (i.e. in which ways research and results take into account the specificity of mathematics teaching and learning?).

1.1. Submission

We initially received 32 submissions, that underwent a first round of review and were accepted as papers (13), short papers (16), and posters (3).

Because of the pandemic there were some withdrawals and some new submissions, so that finally we had 24 submissions, from 16 countries. Of those 24 submissions, 8 were long oral presentations (LO), 15 short oral presentations (SO), and 1 poster.

1.2. TSG sessions

The accepted papers were presented during the three TSG online sessions. In order to improve the quality of communication during the online sessions, presenters were asked to prepare a video presentation in advance (5 minutes presentation for short papers, 8 minutes communication for long papers). Such presentations were shown during the session. There were discussions after each long paper presentation and after the presentation of a group of short papers.

Forty minutes of the last session were devoted to a general discussion on the emerging themes and directions for further research.

Moreover, participants could write their comments and questions to the presenters in a shared virtual board (Padlet), so that the discussion could be carried out also in an asynchronous way.

1.3. Presented papers

A list of the accepted papers (in order of appearance) and authors is presented in Tab. 1 (on the next page).

2. TSG Themes

As evidenced by the titles in Tab. 1, the presentations during the sessions addressed a wide range of themes and issues, with a variety of research methods, including surveys, interviews, observations and focus groups. Analytical methods varied from statistical inferences, to thematic analysis, narrative inquiry and more. The focus varied from studies on teachers' affect and identity to studies on professional development interventions to make teachers reflect on their affect and identity and possibly promote

Tab. 1. List of presented papers

Paper and author(s): long presentation (LO) and short presentation (SO)	
[1]	Examining teachers' emotional experiences through the process of mathematics instructional change. Dionne Cross Francis (USA), Ji Hong (USA), Jinqing Liu (USA), Ayfer Eker (Turkey), Pavneet Kaur Bharaj , and MiHyun Jeon (USA). (LO)
[2]	Investigating changes in attitudes toward calculus of pre-service mathematics teachers enrolled in a pedagogy course. Wilfred W.F. Lau (Hong Kong SAR, China). (LO)
[3]	Comparing espoused values in mathematics teaching between novice and experience primary teachers: a case study in Mainland China. Hui Min Chia , Xuanzhu Jin , and Qiaoping Zhang (Hong Kong SAR, China). (LO)
[4]	Mathematics student Teachers' Self-Efficacy Beliefs on teaching. Kanita Pamuta , Narumon Changsri , and Maitree Inprasitha (Thailand). (SO)
[5]	PTeacher's and students' beliefs concerning higher order thinking in mathematics: are they on the same page? Elizar Elizar and Cut Khairunnisak (Indonesia). (SO)
[6]	What kind of students should deserve challenging, laboratory and inquiry-based mathematical activities? Gabriella Pocalana (Italy). (SO)
[7]	Understanding open exploration in a classroom. Harita Raval and Aaloka Kanhere (India). (SO)
[8]	A study on conceptions of trainers of mathematics teachers in pedagogical superior educational institutes of Peru in relation to mathematics and their teaching. Candy Clara Ordoñez Montañez and Gina Patricia Paz Huamán (Peru). (SO)
[9]	'There are so many ways to fail': pre-service elementary school teachers define failure in mathematics. Sonja Lutovac and Raimo Kaasila (Finland). (LO)
[10]	Teacher's identity negotiation while presenting themselves on video in a professional development setting. Einat Heyd-Metzuyanin and Talli Nachlieli (Israel). (LO)
[11]	The changing professional identities of mathematics teachers within further education in England. Diane Dalby and Andrew Noyes (UK). (LO)
[12]	Identity construction of female mathematics teachers in professional life: a narrative inquiry. Tara Paudel (Nepal). (SO)
[13]	Learning and developing as a mathematics teacher educator. Forster D. Ntow (Ghana) and Jill Adler (South Africa). (SO)
[14]	Two-year college: teacher self-efficacy and knowledge levels for effective mathematics instruction. David Tannor (USA). (SO)
[15]	Shame: a significant emotion influencing pre-service primary school teachers' mathematics education. Lars Jenßen , Regina Möller , and Bettina Roesken-Winter (Germany). (LO)
[16]	Prospective teachers' attitude towards mathematics and its teaching: stories of development. Annalisa Cusi and Francesca Morselli (Italy). (LO)
[17]	Using A quantitative approach to explore teachers' identity in mathematics. Wanda Mosondo (South Africa). (LO)
[18]	Mathematics teacher emotions during classroom practice: A case study in Mainland China. Zheng Jiang , Ida Ah Chee Mok (Hong Kong SAR, China) and Jinbo Tang (China). (SO)
[19]	Touching the untouchables: promoting non/linear mathematics pedagogy. Indra Mani Shrestha , Bal Chandra Luitel , and Binod Prasad Pant (Nepal). (SO)

through that professional development. Both pre-service and in-service teachers were taken into account.

Besides the main theoretical constructs, such as emotions, beliefs, attitudes, identity, the authors often introduced other affect-related constructs such as curiosity, failure, shame, challenge. The issue of teacher change was often referred to.

We may note that for the first time in ICME, Topic study Group on affect and identity was divided into two strands: student dimension and teacher dimension. This was due to the growing amount of research on the field. Such an organization was efficient in order to address more in detail teachers' affect and identity, even if all the participants recognized that teachers' affect and identity are strictly linked to students' ones.

Participants also noted that, even if there is mutual relationship, focusing on teachers entails focusing on their professional learning and not (only) on their mathematical learning. However, the division between the two TSGs (one on students' the other on teachers') may have left those researchers whose research focuses on relationships between students and teachers without a "home".

3. Directions for Further Research

During the last session the participants were engaged in a discussion on directions for further research in the field.

A general reflection concerns the emerging role of the context (cultural, institutional), that should be considered in an even more explicit way in studies on affect and identity.

The contributions showed a transition in research from focusing on "describing" affect to "intervening" with affect. Further research is needed in the design of "interventions", and it is important to reflect on a reliable methodology to study such interventions.

The issue of teacher change was deeply addressed in the contributions. It would be interesting to go on in this direction, carrying out long-term studies on affect and identity development as part of professional development.

From a methodological point of view, it was noted that small-scale studies are prevailing. Further research should take the challenge of large-scale studies.

Despite the organization of the TSGs in two separate strands, there is the need for studies that take into account both students and teachers' dimensions, and the relations between them. For instance, it is important to realize classroom experiments in order to study how teachers' teaching practice may impact on students' affect.

References

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