

## TSG Agenda

### TSG 34: Affect, beliefs, and identity of mathematics teachers

#### Session 1 [19:30-21:00 Beijing time, July 13<sup>th</sup>]

1. Time: 19:30-19:35 Introduction to the TSG34
2. Time: 19:35-19:50

Title of the Paper: Examining teachers' emotional experiences through the process of mathematics instructional change.

Authors: **Dionne Cross Francis**, Ji Hong, Jinqing Liu, Ayfer Eker, Pavneet Kaur Bharaj, MiHyun Jeon.

Institutions: Indiana University, US; University of Oklahoma, US; Giresun University (Turkey).

Short abstract of the paper: *In this study we explored changes in teachers' emotional experiences in relation to teaching math over the course of a year-long professional development program involving coaching, the fluctuations in emotions over five coached lessons, and the relationship between the emotion and instructional quality. Results show that teachers feel varied emotions about teaching mathematics and that high-quality teaching was enacted when positive, negative and a mix of both were experienced. Ways in which these results align and deviate from existing research are discussed.*

3. Time: 19:50-20:05

Title of the Paper: Investigating changes in attitudes toward calculus of pre-service mathematics teachers enrolled in a pedagogy course

Author: **Wilfred W.F. Lau**

Institution: The Chinese University of Hong Kong

Short abstract of the paper: *This study examined how pre-service mathematics teachers' (PMTs') attitudes toward calculus changed after they participated in a relevant pedagogy course. Thirteen final year PMTs in Hong Kong voluntarily took part in this study and completed the Attitude Toward Calculus Inventory (Huang & Lin, 2015) before and after the course. The results indicated significant changes in some dimensions of attitudes but not in others among PMTs. More studies should be conducted to understand why this occurs and more importantly, how teacher educators may design professional learning experiences for PMTs to promote their positive attitudes toward calculus.*

4. Time: 20:05-20:10

Title of the Paper: Comparing espoused values in mathematics teaching between novice and experience primary teachers: a case study in Mainland China

Authors: **Hui Min Chia**, Xuanzhu, Jin, Qiaoping Zhang

Institutions: The Education University of Hong Kong

Short abstract of the paper: *Different mathematics teachers may value different characteristics in mathematics teaching. This paper aims to compare what a novice and an experienced teacher value as important in mathematics teaching in Mainland China by using case study. By using classroom observations and in - depth semi-structured interviews, teachers' espoused values in mathematics teaching were identified. These values are triangulated with pupils' espoused values through group interviews. The findings show that both teachers valued the interactions between pupils and between pupils and their teacher, and achievement orientation as important factors in mathematics teaching. Nevertheless, the novice teacher espoused more values on the teacher's aspects compare to the experienced teacher who values more on pupils' aspects. The result suggests that teaching experience years shape the teachers' values and influence the teachers' values more than the teacher educational background.*

5. Time: 20:10-20:15

Title of the Paper: Mathematics student Teachers' Self-Efficacy Beliefs on teaching

Authors: **Kanita Pamuta**<sup>1</sup>, Narumon Changsri<sup>1,2</sup>, Maitree Inprasitha<sup>1</sup>

Institutions: <sup>1</sup>Mathematics Education Program, Faculty of Education, KKU; <sup>2</sup>Center for Research in Mathematics Education, KKU

Short abstract of the paper: *This study aimed to explore student teachers' self-efficacy beliefs in teaching. The target group included 25 people. They were on one-year training and teaching practices. Data were collected by using questionnaire, interview student teachers and their mentors. Data were analyzed by mean ( $\bar{X}$ ), standard deviation (SD) and protocol analysis. The finding revealed that the pre-beliefs about teaching mathematic was talking and describing to their learners. In contrast, after they had studied in this curriculum, they found teaching mathematics was participating in mathematical activity. These affect the teaching self-efficacy beliefs. 1) Self-efficacy beliefs about personal mathematics teaching, they believe that they can patiently wait for the students' answers on students' mathematical problems ( $\bar{X}$  =3.85, SD=0.71). 2) Self-efficacy beliefs about mathematics teaching outcome expectancy, the belief on student's learning evaluation score had improved when teachers had discovered more effective teaching methods ( $\bar{X}$ =3.77, SD= 0.57).*

6. Time: 20:15-20:20

Title of the paper: Teacher's and students' beliefs concerning higher order thinking in mathematics: Are they on the same page?

Authors: **Elizar Elizar** and Cut Khairunnisak

Institutions: Universitas Syiah Kuala (ID)

Short abstract of the paper: *Teacher beliefs play a fundamental role in mathematics teaching and learning, as they will ultimately influence the teacher's classroom practices. Student beliefs on a subject matter also hold equal importance as they will also be reflected in how the students*

*approach the learning and related issues to the subject. The importance of research on teacher's beliefs stems from the possible relationship between teacher beliefs and student beliefs. The purpose of this descriptive quantitative study was to measure the degree of conformity between teacher and student beliefs concerning mathematics related to Higher Order Thinking (HOT) and Lower Order Thinking (LOT). The finding of this study revealed that teacher beliefs concerning mathematics related to HOT were highly positive (83%). While the percentage of students who hold highly positive beliefs concerning mathematics related to HOT was just over 50%, indicating the discrepancy between teacher and student beliefs. However, in term of the beliefs concerning mathematics related to LOT, teacher and student beliefs was conformed, they had somewhat positive beliefs (68% and 71.30% respectively).*

7. Time: 20:20-20:30 Discussion on the short papers 4, 5, 6

8. Time: 20:30-20:35

Title of the paper: What kind of students should deserve challenging, laboratory and inquiry-based mathematical activities?

Author: **Gabriella Pocalana**

Institution: Università degli Studi di Torino, Italy

Short abstract of the paper: *The present paper investigates the beliefs of a group of lower secondary school mathematics teachers, involved in a professional development course, due to the participation of their schools in an experimental project in collaboration with the University of Turin. In particular, this study focuses on the relationship that these teachers describe between the didactical approach needed during their everyday lessons and the laboratory, inquiry-based approach proposed during the course, centered on challenging mathematics activities. They seem to have two different belief clusters, related to these two different contexts. The experimental project, indeed, involves only the students who voluntarily decide to participate in supplementary mathematics classes, after the approval of the teacher.*

9. Time: 20:35-20:40

Title of the paper: Understanding Open exploration in a classroom

Authors: **Harita Raval**, Aaloka Kanhere

Institution: Homi Bhabha Centre for Science Education, TIFR

Short abstract of the paper: *In the present paper, we have focused on the 'pedagogical openness' of an activity that has a large number of possibilities and enables applications of a wide range of mathematical concepts. Apart from that the 'openness' also allows teachers to design the course of the activity depending on their own beliefs of mathematics and mathematics teaching. The approaches that two teachers took were very different with respect to the mathematical processes encouraged in their classrooms. In one classroom, the teacher had an approach which encouraged the processes of proving the patterns that the students had found and in the other classroom teacher encouraged the students to make more*

*and more conjectures. Open exploration tasks offer an openness in the class where the classroom discourse depends on student-teacher relations, student preparation and interests and teachers' own beliefs about mathematics and mathematics teaching.*

10. Time: 20:40-20:45

Title of the paper: A study on conceptions of trainers of mathematics teachers in pedagogical superior educational institutes of Peru in relation to mathematics and their teaching

Authors: **Candy Clara Ordoñez Montañez\***, Gina Patricia Paz Huamán\*\*

Institutions: \*Peruvian Research Association in Mathematical Education, \*\*Ministry of Education

Short abstract of the paper: *This research is part of a quantitative and qualitative study, conducted in 47 Institutes of Higher Pedagogical Education (IESP by its acronym in Spanish), public and private, from the different regions of Peru that are revalidated to offer the professional career of Secondary Education teacher in the Specialty of Mathematics. In this work, the conceptions about mathematics and the teaching that mathematics teachers teach in the IESP of Peru are presented in the framework of the classification proposed by Lisbon (2012).*

11. Time: 20:45-21:00 Discussion on the papers 8, 9, 10

## **Session 2 [21:30-23:00 Beijing time, July 16<sup>th</sup>]**

12. Time: 21:30-21:35 Introduction

13. Time: 21:35-21:50

Title of the paper: 'There are so many ways to fail': pre-service elementary school teachers define failure in mathematics

Authors: **Sonja Lutovac** and Raimo Kaasila

Institution: Faculty of Education, University of Oulu

Short abstract of the paper: *Failure is a common phenomenon, and mathematics context is no exception; however, little is known about how students understand and define their own failures. In this study, we asked pre-service elementary school teachers to reflect on the experiences they would label as failure and then to conceptualize what failure is in their views. We analysed categorically 40 narratives that defined failure and present here five categories of these definitions. We provide a discussion of how deeper understanding of subjective experiences of failure can inform research on affect, beliefs and identity as well as teacher education practices.*

14. Time: 21:50-22:05

Title of the paper: Teacher's identity negotiation while presenting themselves on video in a professional development setting.

Authors: **Einat Heyd-Metzuyanin** and Talli Nachlieli

Institution: Technion – Israel Institute of Technology

*Short abstract of the paper: Teachers' reflections on their own videos has been signaled as a useful tool for teacher learning in professional development settings. However, such presentations of self-as-teacher carry with them multiple sources for face-threatening acts and put the teacher in a vulnerable situation. In this paper, we examine an episode in which a middle-school teacher presents a video of herself teaching implementing a cognitively demanding task to low-achieving group. Data is taken from a two-years long study of teachers in the TEAMS (Teaching Exploratively for All Mathematics Students) professional development program. We examine the identity-authoring processes that take place in this episode on multiple channels: the teacher vis-à-vis her students in the video, the teacher vis-à-vis her fellow teachers in the PD setting, and the PD instructors vis-à-vis the teacher. Our analysis reveals the complex identity work that all participants need to engage in, which are necessary for the teacher to be learning useful new practices.*

15. Time: 22:05-22:20

Title of the paper: The changing professional identities of mathematics teachers within Further Education in England

Authors: **Diane Dalby** and Andrew Noyes

Institution: University of Nottingham, UK

*Short abstract of the paper: Professional identity may be considered as an aspect of identity that explains the way an individual relates to communities with similar professional or occupational practices. This can include relationships to public perceptions of the profession, local communities with the workplace, or those with shared personal values. The aims of this study of mathematics teachers in England's Further Education colleges are to explore any changes in the professional identities of these teachers over time and the factors that have contributed, by comparing interview and survey data from case studies carried out six years apart. Based on a theoretical view of identity as a transient construct, uniquely constructed within discourse, the interviews are analysed with particular attention to critical personal experiences, narrative identity and working identity. Changes in working identity are evident from the study that are linked to new national policies, market forces and college structures, but there still is much diversity in the workforce and little evidence of any common professional identity.*

16. Time: 22:20-22:25

Title of the paper: Identity construction of female mathematics teachers in professional life: a narrative inquiry

Author: **Tara Paudel**

Institution: Department of Mathematics Education, Tribhuvan University, Mahendraratna Campus, Tahachal, Nepal

Short abstract of the paper: *This study is concerned with the professional identity construction of female mathematics teachers at the university level in Nepal. Female participation in teaching profession at University is less compared to that of male in Nepal. Females have also been struggling to construct their identity in the field of mathematics. In this scenario, I have attempted to explore how females have been able to gain their professional identity and the barriers they cope up with while making their career. Vygotsky's Cultural- Historical Activity Theory was utilized as a theoretical lens. Narrative Inquiry was adopted as a research methodology to generate information from four participants about their professional experiences. The result revealed that female mathematics teachers struggled with discrimination in the process of constructing their professional identity after which they expanded the horizon of their knowledge, skills, and performance for identity sustenance. This research encourages, motivates, and empowers female teachers who wish to build their professional identity as a mathematics teacher.*

17. Time: 22:25-22:30

Title of the paper: Learning and developing as a mathematics teacher educator

Authors: **Forster D. Ntow**<sup>1</sup> and Jill Adler<sup>2</sup>

Institutions: <sup>1</sup>University of Cape Coast (Ghana), <sup>2</sup>University of the Witwatersrand (South Africa)

Short abstract of the paper: *Although there is a paucity of research on mathematics teacher educators (MTEs) learning, the few studies cited suggests that their learning is also influenced by a number of contexts in which they participate (Tzur, 1999). Working with critical events in each of these contexts we describe and reflect on an MTE's learning and development trajectory in terms of the ideas about mathematics teaching and learning offered (Nasir & Cooks, 2009). We envisage that our story will illuminate how participation with a specific practice-linked identity resource (ideational) in various socio-cultural-political contexts support (or not) the learning of an MTE.*

18. Time: 22:30-22:35

Title of the paper: Understanding South Korean elementary mathematics teachers' identities in relation to their professional development

Authors: Jukyung Park\*, Youngyoul Oh\*\*

Institutions: \*Graduate School of Education, Seoul National University of Education, Korea; \*\*Seoul National University of Education, Korea

19. Time: 22:35-22:50 Discussion on the papers 16, 17, 18

20. Time: 22:50-23:00 Discussion

### Session 3 [14:30-16:30 Beijing time, July 17<sup>th</sup>]

20. Time: 14:30-14:35 Introduction

21. Time: 14:35-14:50

Title of the paper: Shame: a significant emotion influencing pre-service primary school teachers' Mathematics education

Authors: **Lars Jenßen**, Regina Möller, Bettina Roesken-Winter

Institution: Humboldt-Universität zu Berlin (Germany)

Short abstract of the paper: *Besides positive emotions, such as enjoyment, negative emotions seem to occur frequently in mathematics classes. Teachers also report of negative feelings such as anxiety, when doing or teaching mathematics. Although mathematics anxiety is a crucial factor for learning and teaching, shame can be assumed being a much more significant negative emotion in teachers, possibly influencing their professional identity. Recent studies reveal, that pre-service primary school teachers experience shame in mathematics in particular, because for a variety of reasons (e.g., training as generalists, deficient mathematics knowledge). However, research on the frequency and intensity of primary school teachers' shame experiences in mathematics do not exist. More than n=300 pre-service primary school teachers were asked about their shame experiences in mathematics education with a standardized questionnaire. Results indicate that shame is a less frequent but quite intense emotion in mathematics education. It can be assumed as a math-specific emotion during pre-service primary school teachers' former schooling. The paper also highlights reasons for its experience in mathematics.*

23. Time: 14:50-15:05

Title of the paper: Prospective teachers' attitude towards mathematics and its teaching: stories of development

Authors: Annalisa Cusi\*, Francesca Morselli\*\*

Institutions: \*University of Rome "La Sapienza", \*\*University of Genoa (Italy)

Short abstract of the paper: *In this contribution we adopt the theoretical lens of identity to study the evolution of prospective teachers' attitude by means of their participation to the activities of a teacher education course and the guided reflections that they performed after each session.*

24. Time: 15:05-15:20

Title of the paper: Affect in Mathematics Curriculum in mainland China: a review of seventy years in compulsory education

Authors: Qiaoping Zhang, **Xuanzhu Jin**, Hui Min Chia

Institution: Department of Mathematics and Information Technology, The Education University of Hong Kong

Short abstract of the paper: *The affective factors like students' positive attitudes and values have been regarded as important educational goals in school education for a long time. Recently with the competency-based education reform in Mainland China, these factors are integrated into one crucial component of students' competency. This study systematically reviewed and analysed the evolution of affective related-contents in mathematics curriculum syllabus or standards across different periods in Mainland China. Results showed that over the past 70 years, the contents could be categorized into five stages and the theme was constantly changed with the development of the Chinese society. It was not until the new curriculum reform in 2001 that the role and contents of affective domain in mathematics education was heightened clearly. The analysis and discussion also provide advice for nurturing students affects in the classroom practice.*

25. Time: 15:20-15:35

Title of the paper: Using A quantitative approach to explore teachers' identity in mathematics

Author: Wanda Masondo

Institution: University of the Witwatersrand, Johannesburg (South Africa)

Short abstract of the paper: *The notion of identity in mathematics education has largely been researched using qualitative approaches. However, when using closed-ended questions, there is value in exploring the extent of participants' shared experiences towards the learning and teaching of mathematics. To illustrate the value of using a quantitative approach, I utilised a Likert-scale questionnaire to collect data from teachers who had participated in a professional development course. Thereafter, the questionnaire data was subjected to Exploratory Factor Analysis. From the analysis, the extent of teachers' identity emerged to be closely connected to understanding mathematics for teachers who are confident in the learning and teaching of the subject.*

26. Time: 15:35-15:40

Title of the paper: Mathematics teacher emotions during classroom practice: A case study in Mainland China

The University of Hong Kong, Shenzhen High School of Science

Authors: **Zheng Jiang**<sup>1</sup>, Ida Ah Chee Mok<sup>1</sup>, Jinbo Tang<sup>2</sup>

Institutions: <sup>1</sup>The University of Hong Kong, <sup>2</sup>Shenzhen High School of Science

Short abstract of the paper: *Although teacher emotions have increasingly attracted the interest of educational researchers, the nature of teacher emotions has not been fully elaborated, especially during mathematics classroom practice. In order to facilitate better understanding of teacher emotions, this paper examined the emotional experiences of a high*

*school mathematics teacher during classroom practice. Seven consecutive mathematics lessons of the teacher were observed and videotaped, and three video-stimulated teacher interviews were conducted after three lessons, respectively. The results showed that the mathematics teacher experienced various emotions during teaching. The teacher's emotional process was mainly stimulated by her teaching and/or students' reactions and determined by her teaching experiences, belief of mathematics teaching and learning, pedagogical mathematics knowledge, and value. Furthermore, the teacher's emotional experience was a continuous, cumulative, and hierarchical process, changing with classroom practice and her appraisals.*

27. Time: 15:40-15:45

Title: Touching the untouchables: promoting non/linear mathematics pedagogy

Authors: **Indra Mani Shrestha**, Bal Chandra Luitel, Binod Prasad Pant

Institution: School of Education, Kathmandu University, Nepal

Short abstract of the paper: *In what ways can we as teachers touch the untouchables (beliefs, values, attitudes and emotions of students) so as to promote non/linear mathematics pedagogy? Subscribing to this issue based on MPhil research carried out by the first author using writing narratives as a method of inquiry within an arts-based auto/ethnography as a research methodology, we present the narratives experienced by the first author as a teacher-researcher while teaching school mathematics in Nepal, dealing with the student's affective domain, thereby exploring the possible ways of establishing a dialectical relationship between cognition and affection for the purpose of promoting non/linear mathematics pedagogy. The research study has shown that not only the cognition but also affection plays a key role in the learning of mathematics.*

28. Time: 15:45-15.55 Discussion on the papers 26,27

29. Time: 15.55-16:00

Title: Excited but sceptical: examining teachers' motivational aspects for a professional development project

Author: Hanna Viitala

Institution: University of Helsinki, Finland, Luleå University of Technology, Sweden

Short abstract of the paper: *While earlier problem-solving interventions have had only moderate short-term influences to Finnish pupils' low affect and descending performance in mathematics, more profound changes are needed in Finnish mathematics classroom to stop the alarming development and to achieve sustained results. In addition to effective teaching methods, the change requires motivated teachers who are willing to radically change their classrooms practices. In this paper, five teachers' motivational aspects are examined at the beginning of a professional development project. The results suggest that positive (group) emotions towards a professional development project and high self-efficacy beliefs in adapting new methods into teaching are the most common motivational aspects that drive teachers to engage in a radical problem-solving intervention.*

30. Time: 16:00 -16:05

Author: David Tannor

Title: Two-Year College: Teacher Self-Efficacy and knowledge Levels for Effective Mathematics Instruction

Institution: Kellogg Community College (US)

Short abstract of the paper: *In this paper are results from a 2017 mixed methods study that examined two-year college mathematics instructors' knowledge and self-efficacy for effective mathematics instruction.*

31. Time: 16:05-16:15 Discussion on the papers 29,30

32. Time: 16:15-16:30 Final discussion