

Topic Study Group

A Topic Study Group (TSG) is designed to gather a group of Congress participants who are interested in a particular topic in mathematics education. TSGs will promote the discussion of a variety of perspectives on the theme of the group. A TSG will serve as a mini-conference and display the progress of the discussion in the intervening years, which will consist of high-standard discussions enabling the newcomer to get a broad overview on the state-of-the-art and allowing the experts to lead discussions at a high level. The team will provide participants of their TSG not with a nationally framed insight into the strands of the discussion of the theme, but with an overall overview on the international discussion as broad as possible and allowing for insight into less well-known strands of the discussion from underrepresented countries.

As like previous ICMEs, in ICME-14, the TSG is the major arena for participation. There are 62 TSGs designed and divided into two classes, odd TSG numbers (TSG 1, TSG 3, ...) in Class A, and even ones (TSG 2, TSG 4, ...) in Class B, to run in different sets of timeslots. Every TSG should have three sessions with 300 minutes in total, while the number of sessions in some groups was modified according to specific circumstances. There are also two additional 60-minutes' timeslots for posters, shared by all TSGs.

A General View

Remark: T—Tian Building; W—Wenshi Building

TSG series number	Theme	July 13th 14:30-16:30	July 13th 19:30-21:00	July 14th 19:30-21:00	July 16th 21:30-23:00	July 17th 14:30-16:30	July 17th 21:30-23:00
TSG 1	Mathematics education at preschool level	W201		W201			W201
TSG 2	Mathematics education at tertiary level		T116	T226	T116	T116	
TSG 3	Mathematics education for gifted students	W211		W211			W211
TSG 4	Mathematics education for students with special needs		T218	T218	T218	T218	
TSG 5	Teaching and learning of number and arithmetic	T218	T230	T230			T218
TSG 6	Teaching and learning of algebra at primary level		W301		W301	W301	
TSG 7	Teaching and learning of algebra at secondary level	T120		T120			T120
TSG 8	Teaching and learning of geometry at primary level		T120		T120	T120	
TSG 9	Teaching and learning of geometry at secondary level	T523	T234	T523			T523
TSG 10	Teaching and learning of measurement		W107		W107	W107	
TSG 11	Teaching and learning of probability	W203		W203			W203
TSG 12	Teaching and learning of statistics		T423	T234	T423	T423	
TSG 13	Teaching and learning of calculus	W215		W215			W215
TSG 14	Teaching and learning of programming and algorithms		T124		T124	T124	
TSG 15	Teaching and learning of discrete mathematics	W107		W107			W107
TSG 16	Reasoning, argumentation and proof in mathematics education		T223	T219	T223	T223	
TSG 17	Problem posing and solving in mathematics education	T225		T225		T234	T225
TSG 18	Students' identity, motivation and attitudes towards mathematics and its study	T230	T225		T225	T225	
TSG 19	Mathematical literacy, numeracy and competency in mathematics education	W303		W303			W303
TSG 20	Learning and cognition in mathematics (including the learning sciences)		W315		W315	W315	
TSG 21	Neuro science and mathematics education/Cognitive Science			T206			T206
TSG 22	Mathematical applications and modelling in mathematics education	T219	T219		T219	T219	

TSG

TSG series number	Theme	July 13th 14:30-16:30	July 13th 19:30-21:00	July 14th 19:30-21:00	July 16th 21:30-23:00	July 17th 14:30-16:30	July 17th 21:30-23:00
TSG 23	Visualization in the teaching and learning of mathematics	T418	T226	T418			T418
TSG 24	The role and the use of technology in the teaching and learning of mathematics at primary level		W111		W111	W111	
TSG 25	The role and the use of technology in the teaching and learning of mathematics at lower secondary level	T223		T223	T226		T223
TSG 26	The role and the use of technology in the teaching and learning of mathematics at upper secondary level		T316		T316	T316	
TSG 27	The role of the history of mathematics in mathematics education	T423		T423	T230		T423
TSG 28	Preservice mathematical teacher education at primary level	T226	T319		T319	T319	
TSG 29	Preservice mathematical teacher education at secondary level	W301		W301			W301
TSG 30	In-service mathematical teacher education and mathematical teacher professional development at primary level		T418		T418	T418	
TSG 31	In-service mathematical teacher education and mathematical teacher professional development at secondary level	T116		T116	T132		T116
TSG 32	Knowledge in/for teaching mathematics at primary level		W303		W303	W303	
TSG 33	Knowledge in/for teaching mathematics at secondary level	T323		T323		T226	T323
TSG 34	Affect, beliefs, and identity of mathematics teachers		T519		T519	T519	
TSG 35	Knowledge and practice of mathematics teacher educator	T316		T316	T234		T316
TSG 36	Research on classroom practice at primary level		W201		W201	W201	
TSG 37	Research on classroom practice at secondary level	T419		T419		T230	T419
TSG 38	Task design and analysis		T419		T419	T419	T219
TSG 39	Language and communication in the mathematics classroom	W313		W313			W313
TSG 40	Research and development on mathematics curriculum		W313		W313	W313	
TSG 41	Research and development on textbooks and resources for learning and teaching mathematics	W315		W315			W315
TSG 42	Research and development in assessment in mathematics education		W215		W215	W215	
TSG 43	Research and development in testing (national and international) in mathematics education			T213			T213
TSG 44	Mathematics and interdisciplinary education		W211		W211	W211	
TSG 45	Mathematics for non-specialist/mathematics as a service subject at tertiary level	T205		T205			T205
TSG 46	Mathematical competitions and other challenging activities		W101		W101	W101	
TSG 47	Mathematics education in a multilingual environment	W101		W101			W101
TSG 48	Mathematics education in a multicultural environment				T209	T209	
TSG 49	Distance learning, e-learning, and blended learning of mathematics	T124		T124		T222	T124
TSG 50	Mathematics education in and for work; continuous mathematics education including adult education		T213		T213	T213	
TSG 51	Mathematics education for ethnic minorities	T209		T209			T209
TSG 52	Ethno-mathematics		T523		T523	T523	
TSG 53	Equity in mathematics education	T222		T222	T222		T222

TSG series number	Theme	July 13th 14:30-16:30	July 13th 19:30-21:00	July 14th 19:30-21:00	July 16th 21:30-23:00	July 17th 14:30-16:30	July 17th 21:30-23:00
TSG 54	Social and political dimensions of mathematics education		T323		T323	T323	
TSG 55	The history of the teaching and the learning of mathematics	T319		T319			T319
TSG 56	Philosophy of mathematics and mathematics education		W203		W203	W203	
TSG 57	Diversity of theories in mathematics education	T128		T128			T128
TSG 58	Empirical methods and methodologies in mathematics education		T128		T128	T128	
TSG 59	Mathematics and creativity	T519		T519		T132	T519
TSG 60	Semiotics in mathematics education		T205		T205	T205	
TSG 61	International education cooperation	W111		W111			W111
TSG 62	Popularization of mathematics		T206		T206	T206	

TSG1: Mathematics Education at Preschool Level

Chair: Marja van den Heuvel–Panhuizen (Utrecht University, Netherlands; Nord University, Norway)

Co-chair: Angelika Kullberg (Gothenburg University, Sweden)

Team members: Ineta Helmane (University of Latvia, Latvia), Xin Zhou (East China Normal University, China)

IPC Liaison Person: Marta Civil (USA)

Session I

July 13, 14:30–16:30

Location: W201

14:30–14:35 Welcome

14:35–14:45 **Xiaoting ZHAO**, Xiaohui XU (Capital Normal University, Beijing, China)
[Application of Number Line Estimation Strategy for 5–6 Years Old Children: Effect of Reference Point Marking](#)

14:45–14:55 **Marja van den Heuvel–Panhuizen**¹, Iliada Elia² (¹Utrecht University, the Netherlands, Nord University, Norway; ²University of Cyprus, Cyprus)
[Unraveling the Quantitative Competence of Kindergartners](#)

14:55–15:05 **Yuly Vanegas**¹, Carla Rosell¹, Joaquin Giménez³ (¹Universitat de Lleida, Spain; ²Universitat de Barcelona, Spain)
[Insights about Constructing Symmetry with 5–year–old Children in an Artistic Context](#)

15:05–15:15 Break

15:15–15:25 **Joanne Mulligan**, Gabrielle Oslington (Macquarie University, Sydney, Australia)
[Kindergartners' Use of Symmetry and Mathematical Structure in Representing Self-portraits](#)

15:25–15:35 **Nicole Fletcher**¹, Diego Luna Bazaldúa², Herbert P. Ginsburg³ (¹Fairfield University, CT, USA; ²The World Bank Group, Washington D.C., USA; ³Teachers College, Columbia University, USA)
[Investigating Evidence of Girls' and Boys' Early Symmetry Knowledge through Multiple Modes of Assessment](#)

15:35–15:45 **Fang Tian**, Jin Huang (Faculty of Education, East China Normal University, Shanghai, China)
[4–year–olds Children's Understanding of Repeating Patterns: A Report from China](#)

15:45–15:55 Break

TSG

15:55–16:05 **Insook Chung** (Saint Mary’s College, Notre Dame, IN, USA)
Investigating How Kindergartners Represent Data with Early Numeracy and Literacy Skills through a Performance Task

16:05–16:30 **Discussion**

Session II

July 14, 19:30–21:00

Location: W201

19:30–19:35 **Welcome Session 2**

19:35–19:45 Dina Tirosh¹, Pessia Tsamir¹, **Ruthi Barkai**^{1,2}, Esther S. Levenson¹ (¹Tel Aviv University, Israel; ²Kibbutzim College of Education, Tel Aviv, Israel)
Counting Activities for Young Children: Adults’ Perspectives

19:45–19:55 **Miriam M. Lüken**, Anna Lehmann (Bielefeld University, Germany)
Asking Early Childhood Teachers about Their Use of Finger Patterns

19:55–20:05 **Catherine Walter–Laager**¹, **Manfred R. Piffner**², Xin Zhou³, Douglas H. Clements⁴, Julie Sarama⁴, Linh Nguyen Ngocs⁵, Lars Eichen¹ & Karoline Rettenbacher¹ (¹Karl–Franzens University of Graz, Graz, Austria, ²Zurich University of Teacher Education, Zurich, Switzerland, ³East China Normal University, Shanghai, China, ⁴University of Denver, Denver CO, USA, ⁵National College for Education, Hanoi, Vietnam)
Performance Expectations in the Area of “Shapes and Spaces” of Early Childhood Educators in an International Comparison

20:05–20:15 **Break**

20:15–20:25 **Ronald Keijzer**¹, Marjolijn Peltenburg², Martine van Schaik², Annerieke Boland¹, Eefje van der Zalm² (¹Hogeschool iPabo, Amsterdam, the Netherlands; ²Hogeschool Marnix Academy, Utrecht, the Netherlands)
Mathematics in Play

20:25–20:35 **Oliver Thiel** (Queen Maud University College, Trondheim, Norway)
Does Preservice Teacher Training Change Prospective Preschool Teachers’ Emotions about Mathematics?

20:35–21:00 **Discussion**

Session III

July 17, 21:30–23:00

Location: W201

21:30–21:35 **Welcome Session 3**

21:35–21:45 **Audrey Cooke**, Jenny Jay (Curtin University, Australia)
Bishop’s (1988, 1991) Mathematical Activities Reframed for Pre–Verbal Young Children’s Actions

21:45–21:55 **Jianqing Wen** (Shanghai Jing’an Anqing Kindergarten, China)
When Math Meets Games—The Active Construction of Children’s Core Mathematics Experience in Games

21:55–22:05 **Birgitte Henriksen** (Aarhus University, Denmark)
Analysing a Danish Kindergarten Class Teacher’s Instructional Support in Mathematics with the Tool Class

22:05–22:15 **Break**

22:15–22:25 **Øyvind Jacobsen Bjørkås**, Dag Oskar Madsen, Anne Grethe Baustad, Elisabeth Bjørnstad (Nord University, Bodø, Norway)
Mathematical Learning Environments in Norwegian ECEC Child Groups

22:25–22:35 **Ann LeSage**, Robyn Ruttenberg–Rozen (Ontario Tech University, Canada)
“More Gooder”: Children Evaluate Early Numeracy Apps

22:35–23:00 **Discussion and Closing TSG 1**

TSG2: Mathematics Education at Tertiary Level

Chair: Ghislaine Gueudet (University of Western Brittany, France)

Co-chair: Irene Biza (University of East Anglia, UK)

Team members: Rongrong Cao (Qingdao University, China), Victor Giraldo (Universidade Federal do Rio de Janeiro, Brazil), Azimeh Khakbaz (Bu-Ali Sina University, Iran)

IPC Liaison Person: Frode Rønning (Norway)

Session I

July 13, 19:30–21:00

Location: T116

19:30–19:40 Introduction to the Work of the TSG 2

19:40–20:10 **Ignasi Florensa¹, Marianna Bosch²** (¹Escola Universitària Salesiana de Sarrià, EUSS, Universitat Autònoma de Barcelona, Spain; ²IQS School of Management, Universitat Ramon Llull, Spain)

Transition between Paradigms in the University: The Role Played by the Theoretical Framework

20:10–20:25 **Marjorie Sarah Kabuye Batiibwe** (Makerere University, Uganda)

The Quality of Mathematics Teacher Education at Tertiary Level in Uganda: Is It Relevant for 21st Century Mathematics Teachers?

20:25–20:40 **Elena Nardi¹, Irene Biza¹, Bruna Moustapha-Corrêa², Evi Papadaki¹, Athina Thoma¹** (¹University of East Anglia, UK; ²Universidade Federal do Estado do Rio de Janeiro, Brazil)

From Student Scribbles to Institutional Script: Towards a Commognitive Research and Reform Programme for University Mathematics Education

20:40–20:50 **Antonio Salinas Layana¹, Sergio Celis², Farzaneh Saadati²** (¹Universidad de Chile, Chile; ²Centro de Investigación Avanzada en Educación (CIAE), Chile)

From a “Strict and Scary” Class to the “Active and Favorite” Subject: A Long-Lasting Change in the Teaching of Mathematics at a First Year Military School in Chile

20:50–21:00 **Fei Xue¹, Robert Nanna²** (¹University of Hartford, USA; ²Massachusetts Maritime Academy, USA)

Flipping a General Education Mathematics Course

Session II

July 14, 19:30–21:00

Location: T226

19:30–19:40 Introduction to Session 2, Presentation of Posters

19:40–19:55 **Alon Pinto, Hadas Levi Gamlieli, Boris Koichu** (Weizmann Institute of Science, Israel)

The Secondary–Tertiary Transition: An International Perspective on Where We Are and How to Move Forward

19:55–20:10 **Mariana Levin¹, John P. Smith III², Shiv S. Karunakaran², Valentin A.B. Küchle², Sarah Castle²** (¹Western Michigan University, ²Michigan State University, USA)

Conceptualizing Agency and Autonomy in Tertiary Mathematics

20:10–20:20 **Jokke Häsä, Johanna Rämö & Juulia Lahdenperä** (University of Helsinki, Finland)

Comparing Two Self-Assessment Models in a Mathematics Course – An Exploratory Study

20:20–20:30 **Kimberly Cervello Rogers¹, Sean P. Yee², Jessica Deshler³, Robert Petrusis⁴** (¹Bowling Green State University, USA; ²University of South Carolina, USA; ³West Virginia University, USA; ⁴Evaluation, Policy, and Research in Education Consulting, USA)

Instructors, Mentors, and Students: A Cross-Comparison of Perceptions of Student-Centered Instruction

20:30–20:40 **James Sandefur, Michael Raney, Erblin Mehmetaj, David Ebenbach** (Georgetown University, USA)

Mentoring of Mid-Career and Early-Career Faculty

20:40–20:50 **Gloria Inés Neira Sanabria** (Universidad Distrital Francisco José de Caldas, Colombia)

An Approach to Transition of Mathematics of Secondary to Tertiary Level Mathematics

20:50–21:00 **Behailu Mammo¹, Signe E. Kastberg²** (¹Hofstra University, USA; ²Purdue University, USA)

The Relational Nature of Supports for High Priority Mathematics Students

TSG

Session III

July 16, 21:30–23:00

Location: T116

21:30–21:40 Introduction to Session 3, Presentation of Posters

- 21:40–21:55** **Derek A. Williams**¹, Jonathan López Torres², Emmanuel Barton Odro¹ (¹Montana State University, USA; ²North Carolina State University, USA)
Characteristics of Collective Mathematical Activity Associated with States of Student Engagement
- 21:55–22:10** **Laura Watkins**¹, Irene Duranczyk², Vilma Mesa³, April Ström⁴ (¹Glendale Community College, USA; ²University of Minnesota, USA; ³University of Michigan, USA; ⁴Chandler–Gilbert Community College, USA)
Investigating Mathematical Knowledge for Teaching and Quality of Instruction in US Community Colleges.
- 22:10–22:20** **Kanita K. DuCloux**¹, Corey M. Wadlington² (¹Western Kentucky University, USA; ²West Kentucky Community and Technical College, USA)
A Comparison of Prospective Mathematics Teachers' Conceptualizations of Equity: Two Different Contexts
- 22:20–22:30** **Cydara Cavedon Ripoll**, Luisa Rodríguez Doering (UFRGS – Universidade Federal do Rio Grande do Sul, Brasil)
The Double Discontinuity in Teacher Education – How to Face It?
- 22:30–22:40** **Megan Wawro**¹, John Thompson², Kevin Watson¹ (¹Virginia Tech, USA; ²University of Maine, USA)
Student Reasoning about Eigenequations in Mathematics and Quantum Mechanics
- 22:40–22:50** Michelle Morgan, **Jeffrey J. King** (Western Colorado University, USA)
Bullseyes and Circles: Alternative Scoring Practices in Collegiate Mathematics Courses
- 22:50–23:00** **Philip Uri Treisman** (The University of Texas at Austin, USA)
Remediation Reform in United States Tertiary Education: From Scaling Innovations to Innovation at Scale

Session IV

July 17, 14:30–16:30

Location: T116

14:30–14:40 Introduction to Session 4, Preparation for the Synthesis

- 14:40–14:50** **Ajit Kumar**¹, S. Kumaresan² (¹Institute of Chemical Technology, Mumbai, INDIA; ²MTTS TRUST, Hyderabad, INDIA)
Success of Mathematics Training and Talent Search Programme in India
- 14:50–15:00** Max Hoffmann, **Rolf Biehler** (Paderborn University, Germany)
Geometry for Student Teachers – A Capstone Course in Mathematics with a Multitude of Links to School Mathematics
- 15:00–15:10** **Tika Ram Pokhrel**, Parames Laosinchai (Mahidol University, Salaya, Thailand)
An Innovative Hands-on Activity to Facilitate the Learning of Group of Symmetries in Abstract Algebra
- 15:10–15:20** **Andrea Cárcamo**, Claudio Fuentealba (Universidad Austral de Chile, Chile)
Errors of Engineering Students on the Vector Subspace Concept
- 15:20–15:30** **Helena Johansson**, Magnus Oskarsson, Hugo von Zeipel (Mid Sweden University, Sweden)
Engineering Students' Approach to Studying Mathematics and its Influence on their Achievement
- 15:30–15:40** **Robin Göller** (Leuphana University of Lüneburg, Germany)
First Year University Students' Goals and Strategies
- 15:40–15:55** **Zeger-Jan Kock**¹, Birgit Pepin¹, Domenico Brunetto² (¹Eindhoven University of Technology, Eindhoven School of Education, The Netherlands; ²Politecnico di Milano, Department of Mathematics, Milano, Italy)
How University Students Perceive the Importance of Resources to Study Calculus and Linear Algebra

15:55–16:10 **Lara Gildehaus**, Michael Liebendörfe (Paderborn University, Germany)
[Gendered Patterns in University Students' Use of Learning Strategies for Mathematics](#)

16:10–16:30 [Synthesis of the TSG2 Works and Conclusions](#)

TSG3: Mathematics Education for Gifted Students

Chair: Florence Mihaela Singer (University of Ploiesti, Romania)

Co-chair: Alex Friedlander (Weizmann Institute of Science, Israel)

Team members: Viktor Freiman (Université de Moncton, Canada), Alex Golovin (Saint Petersburg Lyceum 239, Russia), Qiusheng Li (The High School Affiliated to Renmin University of China, China)

IPC Liaison Person: Ivan Yashchenko (Russia)

Session I

July 13, 14:30–16:30

Location: W211

14:30–14:40 **Hiroko Kawaguchi Warshauer**, Michael Hicks, Max Warshauer (Texas State University, San Marcos, US)
[Student Perceptions of Support Provided by a Summer Math Camp](#)

14:50–15:10 **Atsushi Tamura** (Iwate Prefectural University, Takizawa, JP)
[Derivation of Regression Equations Predicting Japan Mathematical Olympiad Preliminary Qualifiers from within Arbitrary Groups](#)

15:10–15:30 **Florence Mihaela Singer**, Cristian Voica (Petroleum Gas University of Ploiesti, Romania)
[How do Math Students Use Informal Representations? A Comparison Between Gifted and Not Gifted](#)

15:30–15:40 **Viktor Freiman**, Jacques Kamba (Universite de Moncton, Moncton, CA)
[Role of Peer and Teacher Recognition for Students Talents in STEM Projects](#)

15:40–15:50 **Aleksandr Vasilevich Iastrebov** (Yaroslavl State Pedagogical University, Yaroslavl, RU)
[School Stages of Educating the Mathematician–Investigator](#)

15:50–16:00 **Odelya Uziel**, Miriam Amit (Ben–Gurion University of the Negev, Beer–Sheva, IL)
[Problem Solving and Creativity among Talented Students from a Multi–Age Perspective](#)

16:00–16:10 **Matthias Simon Brandl**, Attila Szabo, Elisabeth Mellroth, Ralf Benölken (University of Passau, DE)
[Educating Prospective Teachers in the Field of Mathematical Giftedness–Comparing Experiences](#)

16:10–16:20 **Sharon Whitton** (Hofstra University, Northport, US)
[Pedagogy for Developing the Mathematical Talents and Creativity of Gifted Secondary Students](#)

16:20–16:30 **Ralf Benoelken**, Daniela Assmus (University of Wuppertal, DE)
[What do Prospective Teachers Express as to Mathematical Giftedness? An Exploratory Study](#)

Session II

July 14, 19:30–21:00

Location: W211

19:30–19:50 **Marianne Nolte** (Faculty of Education, Hamburg, DE)
[Questions about the Identification of Mathematically Gifted Students](#)

19:50–20:10 **Patricia Edith Guillen Aparicio**, Norma Fuentes Supanta De Fukunaga (Universidad De San Martn De Porres, Lima, PE)
[Contenidos Tematicos Matemáticos Y Las Habilidades Didacticas Para La Enseanza De La Matematica De Los Estudiantes De La Carrera De Educacion Primaria De La Universidad](#)

TSG

Catolica Sedes Sapientiae, Peru

- 20:10–20:20** **Michael Kainose Mhlolo** (Central University of Technology, Bloemfontein, ZA)
[Egalitarianism in Inclusivity: Thwarting the Intellectual Growth of Mathematically Gifted Students in South African Schools](#)
- 20:20–20:30** **Mirjam Harkestad Olsen**, Anita Movik Simensen (UiT The Arctic University of Norway, Alta, NO)
[Learning Opportunities for Mathematically Gifted Pupils in Inclusive Settings](#)
- 20:30–20:40** **Xue Suyue** (Soochow University, Suzhou, CN)
[Thoughts on the Elite Mathematics Education of Middle School in China](#)
- 20:40–21:00** **Discussion**

Session III

July 17, 21:30–23:00

Location: W211

- 21:30–21:40** **Bostjan Kuzman**, Mojca Jurišević, Urška Žerak (University of Ljubljana, Ljubljana, SI)
[Activities for the Mathematically Gifted and Their Evaluation in Slovenia](#)
- 21:40–21:50** **Sara Hinterplattner**, Zsolt Lavicza, Marca Wolfensberger (JKU Linz, Linz, AT)
[Using Interdisciplinary Problem Posing to Promote Gifted Students in the Regular Classroom](#)
- 21:50–22:00** **Ban Har Yeap** (Pathlight School, Singapore, SG)
[Mathematically Gifted Students: Challenges and Opportunities in the Primary Years](#)
- 22:00–22:10** **Chan Xiangrui** (Northeast Yucai School, Shenyang, CN)
[Discovering and Educating the Gifted Students with Excellent Problems](#)
- 22:10–22:15** **Yanchun Liu** (Dezhou No.2 Experimental Primary School, CN)
[Mathematical Culture and Teaching of Equation](#)
- 22:15–22:20** **Hideyo Makishita** (Shibaura Institute of Technology, Tokyo, JP)
[Study of Construction by Quadratic Curve Addition Method](#)
- 22:20–22:25** **Alena Witte**, Franziska Strübbe (WWU Muenster, DE)
[Intuitive Sense Constructions of Children with Mathematical Giftedness](#)
- 22:25–22:30** **Lea Martina Schreiber**, Philipp Guillaume Girard, Yannick Ohmann, Julia Kaiser, Wiebke Auhagen, Friedhelm Käpnick (WWU Muenster, Dusseldorf, DE)
[‘LemaS’ –A Joint Initiative of Government and Germanys Federal States to Foster High-Achieving and Potentially Gifted Pupils](#)
- 22:30–22:35** **Mirela Vinerean Bernhoff**, Yvonne Liljekvist, Elisabet Mellroth (Karlstad University, Karlstad, SE)
[University Students’ Self-evaluation: Digital Solutions for Identifying Highly Motivated Students](#)
- 22:35–22:40** **Yuwen Li** (Karlstad University, Karlstad, SE)
[Experimental Study on Intellectual Development in Elementary School Students](#)
- 22:40–23:00** **Discussion**

TSG4: Mathematics Education for Students with Special Needs

Chair: Michelle Stephan (University of North Carolina at Charlotte, USA)

Team members: Anette Bagger (University of Umeå, Sweden), Juuso Nieminen (University of Eastern Finland, Finland), Yanping Xin (Purdue University, USA)

IPC Liaison Person: Caroline Lajoie (Canada)

Session I

July 13, 19:30–21:00

Location: T218

19:30–19:35 Welcome to the TSG

19:35–20:00 **Gervasoni, A., Roche, A.**
(15min+
10min
discussion)
Long Oral Presentation 1: Mathematics Learning Difficulties? The Impact of a Constructivist Oriented Approach to Intervention for Young Learners Who Struggle the Most

20:00–20:10 **Xin, Y. P., Kim, S. J., Liu, B., Lei, Q., Wei, S., Wang, W., Richardson, S. E., Kastberg, S., & Chen, Y.**
Short Oral Presentation 1: Conceptual Model–Based Problem–Solving Computer Tutor for Elementary Students Struggling in Mathematics

20:10–20:20 **Robyn Ruttenberg–Rozen, Ann LeSage**
Short Oral Presentation 2: Interventions in Micro–Spaces for Learners with Mathematics Difficulties

20:20–20:30 Discussion of Short Orals

20:30–20:40 **Haja–Becker, S.**
Short Oral Presentation 3: An Inclusive Child’s Enactment to a Task in Dynamic Geometry Environment

20:40–20:50 **I. Polo–Blanco, S. Van Vaerenbergh, M. J. González, A. Bruno**
Short Oral Presentation 4: The Effect of Schema–based Instruction on the Resolution of Addition Problems by a Student with Autism Spectrum Disorder

20:50–21:00 Discussion of Short Orals

Session II

July 14, 19:30–21:00

Location: T218

19:30–19:40 **Armstrong, A.**
Short Oral Presentation 5: Emergent Technological Practices of Middle Year Students with Mathematical Learning Disabilities

19:40–19:50 **Nadine Da Costa Silva**
Short Oral Presentation 6: Introduction to Probability in an Inclusive Setting–insights by a Student with Learning Difficulties

19:50–20:00 **Sarah Van Ingen, Samuel Eskelson, David Allsopp, Steffen Siegemund, Anna–Sophia Bock, Vera Lúcia Messias, Fialho Capellini, Ana Paula Pacheco Moraes Maturana, Di Liu**
Short Oral Presentation 7: Preparing Teachers for Mathematics and Special Education Consultations. A Collaboration across Four Continents

20:00–20:15 Discussion of Short Orals

20:15–20:25 **Shemunyenge Taleiko Hamukwaya**
Short Oral Presentation 8: Criteria Used by Teachers to Identify Students with Difficulties in Learning Mathematics

20:25–20:35 **Juuso Nieminen**
Short Oral Presentation 9: Becoming a Mathematician: The Role of Learning Environments in the Identity Narratives of Mathematics Students with Learning Disabilities

20:35–20:45 **Patricia Baggett**
Short Oral Presentation 10: Tactile Drawings and 3–D Objects: Two Keys to Geometry for a Blind Student in an Inclusion University Course for Preservice K–8 Teachers

20:45–21:00 Discussion of Short Orals

TSG

Session III

July 16, 21:30–23:00

Location: T218

- 21:30–21:55 (15min+ 10min discussion) José Ignacio Cogolludo–Agustín, **Gil–Clemente E.**, Ana Millán Gasca
Long Oral Presentation 2: Arithmetical Achievements of Children with Trisomy 21 Supported on Geometrical Basis
- 21:55–22:05 **Jessica Hunt**, Kristi Martin
Short Oral Presentation 11: Intervention Based on Mathematical Thinking Improves Student Outcomes: Math Disabilities and Difficulties
- 22:05–22:15 **Anette Bagger**, Alexis Padilla, Paulo Tan
Short Oral Presentation 12: Beyond Ability Rankings: Educational Assessment as Relational Rigor and Accountability
- 22:15–22:25 **Discussion of Short Orals**
- 22:25–22:35 **Marcon Mello, E.**
Short Oral Presentation 13: Mathematics and Blind Students: The Problem of Representations
- 22:35–22:45 **Chi To Lui**, Ida Ah Chee Mok
Short Oral Presentation 14: Mathematics Difficulty of Students with Special Needs from the Perspective of Memory Theories
- 22:45–23:00 **Discussion of Short Orals**

Session IV

July 17, 14:30–16:30

Location: T218

- 14:30–14:55 (15min+ 10min discussion) Julie Vangsøe Færch, Signe Gottschau Malm, **Steffen Overgaard**
Long Oral Presentation 3: A Teacher's Attitude and Approaches to High and Low Achieving Students
- 14:55–15:05 **Christopher Kurz**
Short Oral Presentation 15: Mathematical Literacy Citizenship: Deaf and Hard-of-hearing Experience
- 15:05–15:15 **Caroline Hilton**
Short Oral Presentation 16: Using Fingers for Arithmetic Calculations in Children with Complex Hand Anomalies
- 15:15–15:25 **A. van Leendert**, M. Doorman, J. Pel, J. van der Steen
Short Oral Presentation 17: The Variety of Mathematical Braille Notations and Their Underlying Principles
- 15:25–15:40 **Discussion of Short Orals (15 min)**
- 15:40–16:10 **General Discussion of the Field**
- 16:10–16:30 **Conclusion of TSG 4**

TSG

TSG5: Teaching and Learning of Number and Arithmetic

Chair: Andrea Peter–Koop (Bielefeld University, Germany)

Co–chair: Arthur Powell (Rutgers University, USA)

Team members: Rui Ding (Northeast Normal University, China), Rose Griffiths (University of Leicester, UK)

IPC Liaison Person: Yufeng Guo (China)

Session I (a)

July 13, 14:30–16:30

Location: T218

Moderator: Andrea Peter–Koop

- 14:30–14:45** **Samantha Morrison** (University of the Witwatersrand, South Africa)
Representational Flexibility Linked to Higher Attainment in Early Number Learning
- 14:45–14:55** **Yuan Yuan, Kuolong Chen** (Chung Yuan Christian University, China)
A 3–year Study of the Number Estimation Ability of Early Child and Its Relationship to Number Sense
- 14:55–15:05** **Andrea Peter–Koop** (Bielefeld University, Germany)
School–readiness in Mathematics: Development of a Screening Test for Children Starting School
- 15:05–15:20** **Herman M. Tshesane** (Wits, South Africa)
South African Learner’s Patterns of Performance on Additive Word Problems
- 15:20–15:30** **Discussion of Presented Papers**
- 15:30–15:40** **Sameera Hansa, Hamsa Venkat** (University of Witwatersrand, South Africa)
Identifying South African Primary Learners Doubling and Halving Reasoning through a Written Assessment
- 15:40–15:50** **Luciana Vellinho Corso¹, Sula Cristina Teixeira Nunes¹, Évelin Fulginiti de Assis²**
(¹Universidade Federal do Rio Grande do Sul, Brazil; ²Porto Alegre, Brazil)
Flexible Mental Calculation: A Study with 2nd and 4th Grade Brazilian Students
- 15:50–16:00** **Évelin Fulginiti de Assis², Sula Cristina Teixeira Nunes¹, Luciana Vellinho Corso¹**
(¹Universidade Federal do Rio Grande do Sul, Brazil; ²Porto Alegre, Brazil)
The Flexibility in Mental Calculation: Characterizing the Profiles of a Group of Brazilian Elementary Students
- 16:00–16:10** **Beatriz Vargas Dorneles, Camila Peres Nogueis, Elielson Magalhães Lima** (Universidade Federal do Rio Grande do Sul, Brazil)
Precursors of Problem–solving in Two Brazilian Cities: The Role of Social and Economic Differences
- 16:10–16:20** **Camila Peres Nogueis, Elielson Magalhães Lima, Beatriz Vargas Dorneles** (Universidade Federal do Rio Grande do Sul, Brazil)
The Performance in Domain–specific Cognitive Abilities among Low and Typical Mathematical Achievers
- 16:20–16:30** **Discussion**

Session I (b)

Location: T230

July 13, 21:30–23:00

Moderator: Andrea Peter–Koop

- 21:30–21:45** **Ron Tzur** (University of Colorado Denver, USA)
Toward a Universal Cognitive Core: A Cross–Cultures (USA, China) Progression in Multiplicative Reasoning
- 21:45–22:00** **Ola Helenius, Linda Marie Ahl** (University of Gothenburg, Sweden; Kriminalvrden, Sweden)
The Case against Coherence in Mathematics Instruction
- 22:00–22:10** **Sandra Gleissberg, Li Ang, Klaus–Peter Eichler** (University of Education, Germany; Nord University, Norway)
The Offer of Tasks to Work on Multiplication in Grades 2 And 3 – A Comparison between Chinese and German Teaching Materials
- 22:10–22:20** **Discussion of Presented Papers**
- 22:20–22:30** **Karl Wesley Kosko** (Kent State University, USA)
The Influence of Visual Models for Assessing Children’s Multiplicative Reasoning
- 22:30–22:40** **Mayamiko Malola** (The University of Melbourne, Australia)
The Use of Arrays in Solving Multiplication Word Problems in Grade 4
- 22:40–22:50** **Alina Galvao Spinillo, Lianny Melo, Juliana Ferreira Gomes Da Silva** (Federal University

TSG

of Pernambuco, Brazil)
How the Presentation of Problem-solving Situations Affects Combinatorial Reasoning in Children

22:50–23:00 Discussion

Session II

Location: T230

July 14, 19:30–21:00

Moderator: Arthur Powell

19:30–19:45 Coulange Lalina, Gregory Train (University of Bordeaux, France)
Reasoning and Comparing Fractions

19:45–19:55 Arthur Belford Powell, Kendell V. Ali (Achva Academic College, Israel)
Proving Student Knowledge of Fraction Magnitude in the Early Grades

19:55–20:05 Raisa Guberman, Meital Galili (Universidad De San Martn De Porres, Lima, PE)
Insights from a Re-teaching Process: Comparing Fractions Using the Problem-solving

20:05–20:12 Discussion of Presented Papers

20:12–20:22 Nor' Arifahwati Abbas, Masitah Shahrill, Mohd Khairul Amilin Tengah, Nor Azura Abdullah (UBD, Universiti Brunei Darussalam, Brunei)
Conceptual and Procedural Understanding on Addition of Fractions among Year 5 Primary Children

20:22–20:32 Rodrigo Vargas Farias, Ruth Galindo Navarro (Universidad De Playa Ancha Campus San Felipe, Chile)
Mistakes and Opportunities in the Teaching Learning Process of Rational Number

20:32–20:42 MarÍA Leticia Rodríguez González (C CINVESTAV-IPN, Mexico)
Students Performance When Solving Word Problems Involving Fractions

20:42–20:52 Özdemir Tiflis, Gwen Ireson (Brunel University London, UK)
Errors in Ratio and Proportion: A Framework for Analysis

20:52–21:00 Discussion of Presented Papers

Session III

Location: T218

July 17, 21:30–23:00

Moderator: Arthur Powell

21:30–21:40 Judy Sayers, Jöran Petersson, Eva Rosenqvist, Paul Andrews (University of Leeds, UK)
English and Swedish Year-one Teachers Aims for the Teaching of Number: Culturally Situated Norms

21:40–21:50 Krista Francis, Sharon Friesen, Miwa Takeuchi, Armando Paulino Preciado Babb, Barb Brown (Werklund School of Education, University of Calgary, Canada)
Elementary Teacher Professional Learning to Explore and Extend Nuanced Meaning of Number

21:50–22:00 Moshe M Phoshoko, Ramashego Mphahlele (Department of Mathematics Education, South Africa)
Student Teachers' Representation of Numbers and Their Operations on a Number Line

22:00–22:10 Xinyi Zhou, Zikun Gong, Min Wang (Hangzhou Normal University, China)
A Comparative Study on Representations of Rationale of Fraction Division: Teachers' Choice between China and America

22:10–22:15 Discussion of Presented Papers

22:15–22:25 Daniela Fernandes, Jeanne Koudogbo (Universite De Sherbrooke, Canada)
Difficulties of Learning the Decimal Positional Numeration (DPN) System: The Principle of Exchange

22:25–22:35 Jeanne Koudogbo (University of Sherbrooke, Canada)
Decimal Number System in Quebec Mathematics Program and in Textbooks: What Knowledge and for Which Mathematical Education

- 22:35–22:45** **Anat Even–Zahav**, Philip Slobodsky (Talpiot College of Education, Israel; Halomda Educational Software, Israel)
Teaching Arithmetic and Fractions Based on Inherent Gamification: The Case of Domino–math Approach
- 22:45–22:55** **Xiaowen Cui**, Hiroko Kawaguchi Warshauer, M. Alejandra Sorto (Texas State University, USA)
Exploring the Thematic Coherence of a Chinese Lesson on the Topic of Unit–Fractions
- 22:55–23:00** **Discussion of Presented Papers**

TSG6: Teaching and Learning of Algebra at Primary Level

Chair: Jodie Hunter (Massey University, New Zealand)

Co–chair: Doris Jeannotte (Université du Québec à Montréal, Canada)

Team members: Ann Gervasoni (Monash University, Australia), Eric Knuth (The University of Texas at Austin, USA), Xiaoyan Zhao (Nanjing Normal University, China)

IPC Liaison Person: Caroline Lajoie (Canada)

Session I

July 13, 19:30–21:00

Location: W301

- No.1** **Francesca Gregorio**
Mathematical Learning Disabilities in Algebra
- No.2** **Yuriko Yamamoto Baldin**
The Pedagogical Journey from Arithmetic to Algebraic Reasoning in a Professional Development Project through the Theme of Fractions
- No.3** **Strachota, Morton, Torres, Stephens, Sung, Gardiner, Blanton, Stroud, Knuth**
Generalizing about Odd and Even Numbers
- No.4** **Jana Trgalova, Mohammad Dames Alturkmani, Sophie Roubin**
Toward a Common View of Algebraic Thinking through Design of Resources by Primary and Secondary Teachers

Session II

July 16, 21:30–23:00

Location: W301

- No.1** **Passaro, Polotskaia, Javaherpour Azadeh**
Cognitive Routes of Algebraic Thinking in Pre–School and Elementary School: Literature Review
- No.2** **Doris Jeannotte, Hassane Squalli**
Highlighting the Potential for Developing Early Algebraic Thinking: A Praxeological Framework of Reference
- No.3** **Yoshiki Nisawa**
Poster Presentation
- No.4** **Adam Ross Scharfenberger**
Poster Presentation
- No.5** **Jeongsuk Pang, Jin Sunwoo (Invited Presentation)**
Development and Implementation of the Unit of Pattern and Correspondence to Foster Functional Thinking

Session III

July 17, 14:30–16:30

Location: W301

- No.1** **Celia Maria Mestre**
The Relation between the Evolution of Generalization and the Development of Relational Thinking and Functional Thinking: A Study with Grade 4 Students
- No.2** **Lorena Trejo Guerrero**

TSG

- No.3 Siyu Sun**
Investigating Early Algebraic Thinking in Primary School: An Empirical Study from China
- No.4 Gervasoni & Roche**
Multiplication and Division Problems as a Context For Developing Young Children's Algebraic Thinking
- No.5 Jodie Louise Miller, Jodie Hunter**
Young Students Noticing and Generalising Growing Pattern Tasks
- No.6 Lorraine Day, Max Stephens, Marj Horne**
Designing an Evidence-Based Learning Progression for Algebraic Reasoning
- No.7 Pearn**
Fraction Tasks Which Identify Algebraic Reasoning

TSG7: Teaching and Learning of Algebra at Secondary Level

Chair: Boon-Liang Chua (National Institute of Education, Singapore)

Team members: Levi Elipane (Philippine Normal University, Philippines), Yali Pang (Shanghai Normal University, China), Michael Steele (University of Wisconsin-Milwaukee, USA)

IPC Liaison Person: Daniel Chazan (USA)

Session I

July 13, 14:30–16:30

Location: T120

14:30–14:40 Welcome and housekeeping matters by Chair of TSG7

Session Chair then takes over. (Session Chair: Dr. Levi Elipane)

14:40–15:00 Demonty Isabelle¹, Vlassis Joëlle² (University of Liège/Department of psychology, Speech Therapy and Education Sciences/ Research Unit EQUALE (Evaluation and quality of teaching), Belgium¹; University of Luxemburg/Faculty of Humanities, Education and Social Sciences/Department of Education and Social Work, Luxembourg²)
Knowledge for Teaching Algebra: Variation in the Use of Knowledge in the Light of Classroom Constraints

15:00–15:20 Klila Copperman¹, Anatoli Kouropatov² (Jerusalem College of Technology, Israel¹, Levinsky College of Education, Israel²)
Constructing the Link between Graphical Visualization and Algebraic Computation by Means of Analogy: The Case of a System of Equations

15:20–15:30 Jiqing Sun (Deakin University, Australia)
Using an Online Card Game-Based Activity to Build Algebra Foundation

15:30–15:40 Al Jupri (Department of Mathematics Education, Universitas Pendidikan Indonesia, Indonesia)
Investigating Students' Algebraic Proficiency from a Symbol Sense Perspective

15:40–15:50 Mukunda Prakash Kshetree (Tribhuvan University, M. R. Campus (Dept of Maths Ed), Kathmandu, Nepal)
Diagnosis and Treatment of Students' Algebraic Misconceptions and Errors

15:50–16:00 Aline Dorimana¹, Alphonse Uworwabayeho² and Gabriel Nizeyimana² (University of Rwanda College of Education/ African Center of Excellence for Innovative Teaching and Learning Mathematics and Science (ACEITLMS), Rwanda¹; University of Rwanda College of Education, Rwanda²)
Examining the Quality of Classroom Interactions in the Teaching of Algebra for Upper Secondary Schools

16:00–16:20 Q & A for Short Oral

16:20–16:30 Sum Up and Closure of Session 1

Session II

July 14, 19:30–21:00

Location: T120

19:30–19:40 Housekeeping Matters by Session Chair (Dr. Yali Pang)

19:40–20:00 **Lori Burch**, Erik Tillema (Indiana University Bloomington, United States of America)
Generalization as a Marker for Robust Mathematical Meanings among In-Service Algebra Teachers

20:00–20:20 **Robert Powers**¹, Alees Lee¹, Melissa Troudt², & Jodie Novak¹ (University of Northern Colorado, United States of America; University of Wisconsin – Eau Claire, United States of America)
Student Knowledge of Exponential Functions

20:20–20:30 **Vlassis Joëlle**¹, Demonty Isabelle² (University of Luxemburg, Luxemburg, Faculty of Humanities, Education and Social Sciences, Department of Education and Social Work, Luxembourg; University of Liège, Department of psychology, Speech Therapy and Education Sciences, Research Unit EQUALE, Belgium)
The Importance of Teacher-Student Interactions in Mathematical Learning: The Example of Generalization

20:30–20:40 **Zwelithini Dhlamini** (Department of Mathematics Science and Technology Education, South Africa)
Learners' Number Patterns Generalizations in a South African Evaluative Assessment

20:40–20:50 Q & A for Short Oral

20:50–21:00 Sum Up and Closure of Session 2

Session III

July 17, 21:30–23:00

Location: T120

21:30–21:40 Housekeeping matters by Session Chair, Dr. Michael Steele

Introduction of Invited Speaker by Session Chair

21:40–22:10 **Noemí Ruiz-Munzón**¹, Marianna Bosch², Josep Gascón³ (Universitat Pompeu Fabra-Tecnocampus, Spain; Universitat Ramon Llull, Spain; Universitat Autònoma de Barcelona, Spain)
Thinking about Algebra from the Anthropological Theory of the Didactic: Reference Models for the Analysis and the Design

22:10–22:20 **Laurie Cavey**, Tatia Totorica, Patrick Lowenthal (Boise State University, United States of America)
Students' Unconventional Graphical Representations of Covariational Reasoning

22:20–22:30 **Zachary Stepp** (School of Teaching and Learning, College of Education, University of Florida, United States of America)
The Impact of an Online Learning Platform in Algebra

22:30–22:40 Q & A for Short Oral

22:40–23:00 Sum up by Session Chair; Closure by TSG Chair

TSG

TSG8: Teaching and Learning of Geometry at Primary Level

Chair: Nathalie Sinclair (Simon Fraser University, Canada)

Co-chair: Michael Battista (Ohio State University, USA)

Team members: Eszter Herendiné-Kónya (University of Debrecen, Hungary), Haiyue Jin (Nanjing Normal University, China)

IPC Liaison Person: Ewa Swoboda (Poland)

Session I

July 13, 19:30–21:00

Location: T120

19:30–19:40 **Introduction to the Group Michael Battista (Chair)**

19:40–20:05 **Tomoko Yanagimoto**, Akiyo Higasio, Madoka Koyama, Hisashi Kinoshita, Moe Miyazaki
Mathematical Knots as a Teaching Material to Improve Pupils Spatial Abilities in Elementary School

20:05–20:30 **Eszter Herendiné-Kónya**
The Transition from Informal to Formal Area Measurement

20:30–20:45 Paolo Bellingeri, **Emmanuelle Feaux De Lacroix**, Eric Reysat, Andre Sesboue
Tilings and Symmetry Using the Labosaique

20:45–21:00 **Nazlı Akar**, Mine Işıksal Bostan
The Knowledge to Be Taught: A Novice Mathematics Teacher Plans to Teach Quadrilaterals in 5th Grade

Session II

July 16, 21:30–23:00

Location: T120

21:30–21:40 **Opening Remarks**
Nathalie Sinclair

21:40–22:05 **Catherine Diane Bruce**, Zachary Hawes, Tara C Flynn
Supporting the Development of Young Children's Spatial Reasoning: Insights from the Math for Young Children (M4yc) Project

22:05–22:30 **Gunter J. Maresch**
The Basic Routines of Spatial Thinking and Acting

22:30–22:45 Jean-Luc Dorier, **Sylvia Coutat**
Developing Spatial Abilities and Geometrical Knowledge with Use of a Virtual City

22:45–23:00 **Elisabeth Mantel**
Understanding Path Descriptions in a Manhattan-Like Map – A Comparison of German 2nd and 3rd Graders

Session III

July 17, 14:30–16:00

Location: T120

14:30–14:40 **Introduction to Session 3, Presentation of Posters**

14:40–15:05 **Ann Patricia Downton**
Impact of Teacher Professional Learning on Students Geometric Reasoning Relating to Prisms

15:05–15:30 **Shweta Sharma**
Unpacking Language in Geometry Lesson on Shapes in a New Zealand Multilingual Primary Class

15:30–15:55 **Taro Fujita**, Yutaka Kondo, Hiroyuki Kumakura, Susumu Kunimune, Keith Jones
Spatial Visualisation Reasoning about 2d Representations of 3d Geometrical Shapes: The Case of G4–6

15:55–16:10 **Yan-Hong Chen**
Exploring Second Graders Performances on Reading Comprehension of Mathematics Picture Book with Words and No-Word

16:10–16:25 **Jinyu Yu**
Implementing the Project-Based Approach in Teaching the Area of Circle: An Explorative Study

16:25–16:30 **Open Discussion**

TSG9: Teaching and Learning of Geometry at Secondary Level

Chair: Keith Jones (University of Southampton, UK)

Co-chair: Matthias Ludwig (Goethe University Frankfurt, Germany)

Team members: Liping Ding (Norges Teknisk–naturvitenskapelige Universitet, Norway), Joris Mithalal (University of Lyon, France), Yiling Yao (Hangzhou Normal University, China)

IPC Liaison Person: Maria Alessandra Mariotti (Italy)

Session I

July 13, 14:30–16:30

Location: T523

14:30–14:32 Introduction

14:32–14:44 **Marjorie Helen Horne**
Reasoning in Geometry in the Middle Years

14:44–14:49 **Elvira Garcia–Mora**
Didactic Suitability Characterization of Three Levels of Achievement on Geometric Drawing of Secondary School Students

14:49–14:54 **Judah Paul Makonye**
High School Learners' Preconceptions on the Classification of Quadrilaterals

14:54–15:00 Discussion + Change

15:00–15:12 **Alain Kuzniak**
Towards a Compliant and Correct Geometric Work in Context of Use of Classical and Digital Geometric Tools

15:12–15:17 **Feishi Gu**
Geometric Reasoning and Mechanics Experiment: A Case Study of Interdisciplinary Integration Teaching with Graphic Center of Gravity as an Example

15:17–15:21 Discussion + Change

15:21–15:26 **Zhikun Zhang**
A Study on the Performance of Seventh–grade Students in Mathematical Spatial Reasoning Tasks

15:26–15:31 **Yutaka Kondo**
Spatial Visualisation Reasoning about 2D Representations of 3D Geometrical Shapes: Case of G7–9

15:31–15:36 **Marion Zoeggeler**
Students Spatial Ability and Solving–strategies for Spatial Geometrical, Mathematical, and Physical Task

15:36–15:42 Discussion + Change

15:42–15:47 **Ken–ichi Iwase**
Let's Make a Circle by Three Persons

15:47–15:52 **Edwin Gerardo Acuna**
Workshop Geometry of the Space Illusions and Optical Analysis the Beauty and the Observation of the Geometry of the Space

15:52–15:57 **Melih Turgut**
Implicative Relationships among Spatial Perception, Mental Rotation and Spatial Visualisation: Implications for Teaching Geometry

15:57–16:00 Discussion

TSG

Session II

July 13, 19:30–21:00

Location: T234

19:30–19:31 **Introduction**

19:31–19:36 **Edward Southall**

Constructions: Alternative Approaches to Compass and Straight Edge Tasks

19:36–19:41 **Tsuyoshi Sonod**

Study of Angles and Trigonometric Ratio for 7th Grade

19:41–19:47 **Discussion + Change**

19:47–19:52 **Yuki Osawa**

Inquiry-based Learning Using the Centroids of the Circumscribed Equilateral Triangles

19:52–19:57 **Oi-Lam Ng**

Learning Circle Properties in Dynamic Geometry Environments: A Commognitive Perspective

19:57–20:04 **Discussion + Change**

20:04–20:09 **Ryoto Hakamata**

Possibility of the Pirates Treasure Problem for Teaching Elementary Geometry

20:09–20:14 **Eszter Varga**

Distance Under the Magnifying Glass: Developing Series of Problems around Fundamental Concepts in Geometry

20:14–20:19 **Matthias Ludwig**

Geometry Modelling Outdoors with MATHCITYMAP

20:19–20:30 **Discussion + Summary**

Session III

July 14, 19:30–21:00

Location: T523

19:30–19:33 **Introduction**

19:33–19:45 **Alik Palatnik**

Introduction of an Auxiliary Element as a Shift of Attention

19:45–19:50 **Benjamin James Waine**

An Unexpected Angle to Teaching Congruent Triangles

19:50–19:55 **Melissa Denisse Castillo Medrano**

Reconfiguration of Polygons to Determine the Measurement of Their Area

19:55–20:03 **Discussion + Change**

20:03–20:15 **Yael Luz**

Online Formative Assessment in Geometry Proving

20:15–20:20 **Ali Simsek**

A Teacher's Use of Dynamic Digital Technology to Address Students' Misconceptions Concerning the Use of Additive Strategies within Geometric Similarity

20:20–20:28 **Discussion + Change**

20:28–20:40 **Michelle Cirillo**

Decomposing Proof in Secondary Classrooms: A Promising Intervention for School Geometry

20:40–20:45 **Jeong-Won Noh**

Learning the Proof Structure through Semiotic Mediation Using Diagrams

20:45–20:50 **Joris Mithalal**

20:50–21:00 **Discussion + Summary**

Session IV

July 17, 21:30–23:00

Location: T523

21:30–21:32 **Introduction**

21:32–21:42 **Li Hai**

The Grasp of the Pythagorean Theorem and Its Proof by Chinese Pre-service Mathematics Teachers

21:42–21:47 **Rocio Gallardo**

Fostering Geometric Reasoning

21:47–21:52 **Murat Akarsu**

A Pre-service Teacher Mental Structure Development for Understanding the Geometric Reflection in Terms of Motion and Mapping View: Alexis Case

21:52–21:58 **Discussion + Change**

21:58–22:08 **Jogymol Alex**

Teacher Knowledge Related to Secondary School Level Geometry: Evidence from Teacher Development in SA

22:08–22:13 **Svein Arne Sikko**

Understanding Student Teachers' Mathematical Knowledge for Teaching Geometry in a History of Mathematics Course

22:13–22:18 **Liping Ding**

Distinguishing Content Knowledge and Pedagogical Content Knowledge for Geometry Teaching

22:18–22:25 **Discussion + Summary**

22:25–22:30 **TSG summary**

TSG10: Teaching and Learning of Measurement

Chair: Christine Chambris (Cergy University, France)

Co-chair: Florent Gbaguidi (Institut de Mathématiques et de Sciences Physiques, Benin)

Team members: Paula Baltar (Universidade Federal de Pernambuco, Brazil), Richard Lehrer (Vanderbilt University, USA), Yuqian Wang (University of Durham, UK)

IPC Liaison Person: Ewa Swoboda (Poland)

Session I

July 13, 19:30–21:00

Location: W107

19:30–19:40 **Introduction and Overview of Three Sessions**

19:40–20:10 Bonissoni, Marina Cazzola, Gianstefano Riva, **Ernesto Rottoli**, Sonia Sorgato (Gruppo di Ricerca sull'insegnamento della matematica per la scuola primaria – Università Milano Bicocca, Italy)
[Rethinking Measure](#)

20:10–20:40 Chambris Christine¹, **Coulange Lalina**², Train Grégory² (¹CY Cergy Paris Université, Université de Paris, Univ Paris Est Creteil, Univ. Lille, UNIROUEN, LDAR, F-95000 Cergy-Pontoise, France; ²Lab-E3D – Université de Bordeaux, France)
[Measurement Units and Numeration Units: What Reveals the Introduction of a “Mixed” Table in Decimals Teaching](#)

TSG

20:40–21:00 **Chaareen Han**, Oh Nam Kwon (Graduate School of Seoul National University and Seoul National University, Korea)
[Teaching with Clocks: Instrumental Dynamics' Effects on Time Learning](#)

Session II

July 16, 21:30–23:00

Location: W107

21:30–22:00 **Ishan Santra**, Jeenath Rahman (Homi Bhabha Centre for Science Education, TIFR, Mumbai, India)
[The Role of Error in Measurement](#)

22:00–22:20 **Liveness Mwale** (University of Malawi, Malawi)
[An Investigation of Teachers' Explanatory Talk When Introducing Standard Units of Measuring Length to Standard 4 Learners in Malawi](#)

22:20–22:30 **Phei Ling TAN**¹, Liew Kee KOR² (¹Methodist Girls' School, Penang, Malaysia; ²Universiti Teknologi MARA (UiTM), Kedah, Malaysia)
[Insight into Pupils' Errors in Solving Problems Involving Calendar Dates Through Analysis of Knowledge States](#)

22:30–23:00 **Russell Tytler**, Peta White, Joseph Ferguson (Deakin University, Melbourne, Australia)
[Measuring the Teacher's Arm Span: Interpreting a Data Modeling Sequence Through an Aesthetic Lens](#)

Session III

July 17, 14:30–16:30

Location: W107

14:30–14:40 **Samet Okumus** (Recep Tayyip Erdoğan University, Turkey)
[Conceiving Volume as a Multiplication of Three Quantities: The Cases of Stan and Sloane](#)

14:40–14:50 **Charlotte de Varent** (LDAR, SPHERE, Université de Paris, France)
[Articulations Between Mathematics and Physics Education: The Concept\(s\) of Unit of Measurement, From Geometry to Formulas](#)

14:50–15:10 **Gbaguidi Ahonankpon Florent** (Institut de Mathématiques et de Sciences Physiques, Benin)
[The Use of Geometric Construction Problems to Solve Measurement Problems at Middle School](#)

15:10–15:40 **Peta White**¹, Russell Tytler¹, Joanne Mulligan², Melinda Kirk¹ (¹Deakin University; ²Macquarie University, Australia)
[Young Students Learning the Mathematics of Measurement through an Interdisciplinary Approach](#)

15:40–16:10 **Richard Lehrer** (Vanderbilt University, The USA)
[Introduction to Final Discussion: Epistemological Junctures and Synergies in Co-Disciplinary Experiences of Measure](#)

16:10–16:30 **Final Discussion**

TSG

TSG11: Teaching and Learning of Probability

Chair: Egan Chernoff (University of Saskatchewan, Canada)

Co-chair: Ernesto Sánchez (CINVESTAV, Instituto Politécnico Nacional, Mexico)

Team members: Kan Guo (Beijing Normal University, China), Sibel Kazak (Pamukkale University, Turkey), Ali Rejali (Isfahan University of Technology, Iran)

IPC Liaison Person: Celi Espasandin Lopes (Brazil)

Session I

July 13, 14:30–16:30

Location: W203

14:30–14:33 **Welcome**

Egan Chernoff & **Ernesto Sánchez** (University of Saskatchewan, Canada, Canada)

Departamento de Matemática Educativa, Cinvestav–IPN, México)

- 14:33–14:53** **Amy Renelle**, Stephanie Budgett & Rhys Jones (The Department of Statistics at the University of Auckland, New Zealand)
[A Consideration of Alternative Sample Spaces Used in Coin–Toss Problems](#)
- 14:54–15:09** Sandra A. Martínez Pérez & **Ernesto Sánchez** (Departamento de Matemática Educativa, Cinvestav–IPN, México)
[High–School Students’ Probabilistic Reasoning When Working with Random Intervals](#)
- 15:10–15:25** Zikun Gong & **Du Zhang** (Hangzhou Normal University, China; Xianlin Middle School, China)
[Children’s Spatial Cognitive Strategies and Their Development from the Perspective of Microgenesis](#)
- 15:26–15:41** **Haneet Gandhi** (Department of Education, University of Delhi, INDIA)
[Teachers’ Epistemological Assumptions That Tend to Govern Their Pedagogy While Teaching Probability](#)
- 15:42–15:57** **Sibel Kazak** & Aisling Leavy (Pamukkale University, Turkey; University of Limerick, Ireland)
[The Emerging Interplay between Subjective and Objective Notions of Probability in Young Children](#)
- 15:58–16:08** **Maria Ricart**, Pablo Beltrán–Pellicer & Assumpta Estrada (University of Lleida, Spain; University of Zaragoza, Spain)
[Establishing Connections between Language and Probabilistic Notions through a WODB Task](#)
- 16:09–16:19** **Oedoen Vancso** & Eszter Varga (Eötvös Loránd University, Budapest; Bornemissza Péter Highschool, Budapest)
[Problem Sequences for Developing Two Basic Notions: Probability and Expected Value in Hungarian Secondary Schools](#)
- 16:20–16:30** **Susanne Podworny** (Paderborn University, Germany)
[Understanding Elements of a Randomization Test](#)

Session II

July 14, 19:30–21:00

Location: W203

- 19:30–19:49** **Vincent Martin**, **Mathieu Thibault** & **Marianne Homier** (Université de Sherbrooke, Québec, CA, Université du Québec en Outaouais, Québec, CA)
[Self–Reported Practices of Probability Teaching: The Use of the Frequentist Approach, Manipulatives and Technological Tools](#)
- 19:50–20:05** **Egan Chernoff**, Nat Banting & Ryan Banow (University of Saskatchewan, Canada, CA)
[Is It in the Cards?!? Revealing Consequential Probability](#)
- 20:06–20:16** **Jannick Trunkenwald**¹, Fernand Malonga Mounghabio² & Dominique Laval¹ (¹LDAR Université Diderot Paris 7, France; ²Université Marien Ngouabi, Congo)
[The Frequentist Approach of Probability, From Random Experiment to Sampling Fluctuation](#)
- 20:17–20:27** Claudia Vázquez, **Flavio Guíñez**, Camila Brito & Salomé Martínez (Universidad de Chile and Pontificia Universidad Católica, Chile)
[Alice in Randomland: Differences in Attitudes of Future Primary School Teachers Towards Probability and Its Teaching](#)
- 20:28–20:38** **Santiago Inzunza** (Universidad Autónoma de Sinaloa, Culiacán, MX)
[Modeling Eliciting Activities for the Teaching of the Probability in a Computer Environment](#)
- 20:39–20:49** **Bai Sheng–nan** & Han Ji–wei (Collaborative Innovation Center of Assessment toward Basic Education Quality, Beijing Normal University, Beijing, 100875; School of

TSG

Mathematics and Statistics, Northeast Normal University, Changchun, Jilin, 130024)
[Developing a Learning Progression for Probability Based on the GDINA Model in China](#)

- 20:50–21:00** **Lamanna Luca**, Magdalena Gea & Carmen Batanero (Free University of Bozen–Bolzano, Italy; University of Granada, Spain)
[Secondary School Students' Strategies in Solving Permutation Problems](#)

Session III

July 17, 21:30–23:00

Location: W203

- 21:30–21:50** **Gale Russell** (University of Regina)
[From Towers of Linking Cubes to the Binomial Expansion Theorem: What Can Be Learned about Combinatorics?](#)
- 21:51–22:06** **Caterina Primi**, Maria Anna Donati (NEUROFARBA – University of Florence, Italy)
[How Can Probability Reasoning Protect Adolescents from Problem Gambling?](#)
- 22:07–22:22** **Katherine Machuca Pérez** (Pontificia Universidad Católica de Valparaíso)
[The Mathematical Work of Secondary Teachers in the Domain of Probability in Chili](#)
- 22:23–22:33** **Jesús Salinas** & Julio César Valdez (Colegio de Ciencias y Humanidades, Plantel Vallejo, UNAM, México)
[The Computer Simulation as a Resource to Teach Normal Distribution](#)
- 22:34–22:44** **Beatriz A. Rodríguez González**¹, Gabriela Noemí Figueroa Ibarra¹, Omar Alejandro Guirette Barbosa¹, Héctor Antonio Durán Muñoz¹, Difariney González Gómez² (¹Universidad Politécnica de Zacatecas, México; ²Universidad Nacional de Colombia, Colombia)
[Use of the Empirical Rule in the Course of Probability: An Application Proposed by Students](#)
- 22:45–22:55** **Bustang Bustang** (Loughborough University and Universitas Negeri Makassar, England, UK)
[Confidence and competence of Indonesian secondary school students in completing probability tasks.](#)
- 22:56–23:00** **Closure**
Egan Chernoff & Ernesto Sánchez (University of Saskatchewan, Canada, CA; Departamento de Matemática Educativa, Cinvestav–IPN, México)

TSG12: Teaching and Learning of Statistics

Chair: Enriqueta Reston (University of San Carlos, Philippines)

Co-chair: Andreas Eichler (University of Kassel, Germany)

Team members: Gail Burrill (Michigan State University, USA), Qian Chen (Sichuan Normal University, China), Leandro de Oliveira Souza (Universidade Federal de Uberlândia, Brazil)

IPC Liaison Person: Celi Espasandin Lopes (Brazil)

Session I

July 13, 19:30–21:00

Location: T423

- 19:30–20:05** **Lonneke Boels**, (Utrecht University/ Christelijk Lyceum Delft, The Netherlands)
[Designing Embodied Tasks in Statistics Education for Grade 10–12](#)
- 20:05–20:20** **Hanan Innabi** (University of Gothenburg, Sweden)
[Teaching Statistics and Sustainable Learning](#)
- 20:20–20:35** **Daniel Frischemeier** (University of Paderborn, Germany)
[Reading and Interpreting Distributions of Numerical Data in Primary School](#)
- 20:35–20:50** Carlos Monteiro¹, **Karen François**² (¹Universidade Federal de Pernambuco / The Federal

TSG

University of Pernambuco (UFPE), Brazil; ²Vrije Universiteit Brussel / Free University Brussels (VUB), Belgium)
Statistical Literacy as Central Competence to Critically Understand Big Data

20:50–21:00 **General Discussion**

Session II

July 14, 19:30–21:00

Location: T234

19:30–20:05 **Danny Parsons**, David Stern, Balázs Szendrői, Elizabeth Dávid–Barrett (IDEMS International, University of Oxford, University of Sussex, United Kingdom)
Interdisciplinary Data Workshops

20:05–20:20 AnnaMarie Conner¹, Susan A. Peters² (¹University of Georgia; ²University of Louisville, U.S.A.)
Distinctive Aspects of Reasoning in Statistics and Mathematics: Implications for Classroom Arguments

20:20–20:35 **Péter Fejes Tóth**¹, Ödön Vancsó² (¹Szent István University; ²Eötvös Loránd University, Hungary)
A School Experiment for Introductory Inferential Statistics in Hungarian Secondary Schools

20:35–20:50 **Soledad Estrella**, Maritza Méndez–Reina, Tamara Rojas, Rodrigo Salinas (Pontificia Universidad Católica de Valparaíso, Chile)
An Informal Statistical Inferential Reasoning Experience with Seventh Graders: A Lesson Study

20:50–21:00 **General Discussion**

Session III

July 16, 21:30–23:00

Location: T423

21:30–22:05 **Gail Burrill** (Michigan State University, U.S.A.)
Margin of Error: Connecting Chance to Plausible

22:05–22:20 Cindy Alejandra Martínez–Castro¹, **Lucía Zapata–Cardona**¹, Gloria Lynn Jones² (¹University of Antioquia, Colombia; ²University of Georgia, USA)
Critical Citizenship in Statistics Teacher Education

22:20–22:35 **Adam Molnar**, Shiteng Yang (Oklahoma State University, U.S.A.)
Mathematics Ability and Other Factors Associated with Success in Introductory Statistics

22:35–22:50 **Karoline Smucker**, Azita Manouchehri (The Ohio State University, U.S.A.)
Elementary Students' Responses to Quantitative Data

22:50–23:00 **General Discussion**

Session IV

July 17, 14:30–16:30

Location: T423

14:30–14:45 **Saleha Naghmi Habibullah** (Kinnaird College for Women, Lahore, Pakistan)
Implementation of a Course on Tidyverse in Pakistan Under the Asa Educational Ambassador Program

14:45–15:00 **Michal Dvir**, Dani Ben–Zvi (University of Haifa, Israel)
Young Learners' Reasoning with Informal Statistical Models and Modeling

15:00–15:15 **Von Bing Yap** (National University of Singapore, Singapore)
The Binomial Model: Coin Tosses or Clay Pots?

15:15–15:30 **Orlando González** (Assumption University, Thailand)
Variability Modeling and Data–Driven Decision–Making Using Socially Open–Ended Problems: A Comparative Study of High School Students in Thailand, Brunei and Zambia

15:30–15:45 **Mara Magdalena Gea**, Jocelyn D. Pallauta, Pedro Arteaga, Carmen Batanero (University of Granada, Spain)
Algebraization Levels of Statistical Tables in Secondary Textbooks

15:45–16:00 **Stine Gerster Johansen** (Danish School of Education, Aarhus University & University College Copenhagen, Denmark)

TSG

16:00–16:15 **Jale Gunbak Hatil**, Gulseren Karagoz Akar (Bogazici University, Turkey)
Investigating Mathematics Teacher Educators' Conceptions for Informal Line of Best Fit

16:15–16:30 **General Discussion**

TSG13: Teaching and Learning of Calculus

Chair: David Bressoud (Macalester College, USA)

Co-chair: Kristina Juter (Kristianstad University, Sweden)

Team members: Xuefen Gao (Zhejiang Sci-Tech University, China), Elizabeth Montoya (Pontifical Catholic University of Valparaíso, Chile), Carlos Armando Cuevas Vallejo (CINVESTAV, Instituto Politécnico Nacional, Mexico)

IPC Liaison Person: Luc Trouche (France)

Session I

July 13, 14:30–16:30

Location: W215

14:30–14:45 **Jonaki B Ghosh** (Lady Shri Ram College for Women, University of Delhi, New Delhi, India)

Mathematical Knowledge for Teaching of Calculus: An Exploratory Study of Secondary School Teachers Mathematical Thinking Related to Concepts in Calculus

14:50–15:05 **Vladimir Nodelman** (Holon Institute of Technology, Holon, Israel)

Modeling Concepts of Derivative and Differential with Educational Software

15:10–15:25 **Regina Ovodenko**, Anatoli Kouropatov (Shenkar College of Engineering, Netanya, Israel)

Constructing Knowledge Using Digital Tools: The Case of the Inflection Point

15:30–15:45 **Inen Akrouti** (Virtual University of Tunis, Bizerta, Tunisia)

Students' Interpretations of the Definite Integral

15:50–15:55 **Yun Lu** (Education Department of East China Normal University, China)

Comparison of Mathematics Textbooks in IB School and Chinese Public High School: Take Core Concept—Calculus as an Example

15:58–16:03 **Gordana Stankov**¹, Djurdjica Takači² (¹Subotica Tech College of Applied Sciences, Novi Knezevac, Serbia; ²University of Novi Sad, Novi Sad, Serbia)

Research in Calculating Areas Between Curves

16:06–16:11 **Yingzhe Ban**¹, Qi Zhang² (¹Peking University, Beijing, China; ²Beijing Normal University, Beijing, China)

Cause Analysis and Solutions on the Problems in Teaching the Concept of Differential

16:14–16:19 **Matthaios Antonopoulos**, Eleonora Antonopoulou (University of Athens, Nea Pedeli, Greece)

The Concept of Continuity through Different Types of Representations of the Function

16:22–16:27 **Han Yue** (Jieyin Temple, CN)

How to Teach Calculus Correctly

Session II

July 14, 19:30–21:00

Location: W215

19:30–19:45 **Kristina Elisabeth Juter**, Örjan Hansson, Andreas Redfors (Faculty of Education, Kristianstad, Sweden)

Actions in the Learning Environment: Analyzing Physics and Mathematics Lessons in the

Case of ODE

- 19:50–20:05** **Arne Hole, Inger Christin Borge, Liv Sissel Grønmo** (University of Oslo, Oslo, Norway)
From Upper Secondary School to University Calculus: Language Difficulties versus Conceptual Difficulties
- 20:10–20:15** **Elizabeth Montoya Delgadillo** (Pontificia Universidad Catolica de Valparaiso, Chile)
The Discrete–Dense–Continuous Phenomenon and its Implication in Continuous
- 20:18–20:23** **Maria Astrid Cuida Gomez** (Universidad de Valladolid, Valladolid, Spain)
A Limit Free Calculus for Introducing the Concepts of Tangent and Asymptote. An Educational Proposal Inspired by the Past
- 20:26–20:31** **Jianhui Pan** (Chongqing University of Posts and Telecommunications, Chongqing, China)
An Approach to Reduce the Number of Failure Students in a Large Calculus Class
- 20:34–20:39** **Carlos Andres Ledezma Araya, Elizabeth Montoya Delgadillo** (University of Barcelona, Chile)
The Exponential Function from the Viewpoint of Mathematical Modelling: a Chilean Lesson Study
- 20:42–20:47** **Kenneth Horwitz** (New Jersey Institute of Technology, Cedar Grove, NJ, USA)
Using Open Educational Resources to Promote the Active Learning of Calculus in Urban Districts
- 20:50–20:55** **Harman Prasad Aryal, Otto Joshua Shaw** (Ohio University, Kapilvastu, Nepal)
Mathematics Anxiety Levels among Students in an Inquiry–Based Calculus I Class

Session III

July 17, 21:30–23:00

Location: W215

- 21:30–21:45** **David C. Webb** (University of Colorado Boulder, Boulder, CO, USA)
The Design and Use of Low Instructional Overhead Tasks in Undergraduate Calculus: Making Student Reasoning More Accessible to Calculus Instructors
- 21:50–22:05** **Su Liang** (University of Texas–San Antonio, San Antonio, TX, USA)
The Observed Impact Implementing Inquiry–Based Learning at a Calculus Classroom
- 22:10–22:15** **Mehmet Turegun** (Barry University, Miami, FL, USA)
Teaching Calculus Based on Complexity Theory of Teaching and Learning
- 22:18–22:23** **Antonio Bonilla, Ricardo Cantoral, Ricardo Cantoral** (Centro de investigacion y de estudios avanzados, Ciudad de Mexico, Mexico)
Notions of Continuity of Pre–Service Teachers; Reflections for a Problematization
- 22:26–22:31** **Jose Luis Morales Reyes, Francisco Cordero Osorio** (Cinvestav, Ciudad de Mexico, Mexico)
Resignification of the Derivative in a School Situation with a Perspective of an Exclusion – Inclusion Dialectic: From Emulation of the Concept to Autonomy of Uses
- 22:34–22:39** **Mihaly Andre Martinez Miraval, Martha Leticia García Rodríguez** (Universidad Peruana de Ciencias Aplicadas, Lima, Peru)
Covariational Reasoning: An Axis in the Construction Process of the Definite Integral Concept
- 22:42–22:47** **Nicolas Lopez, Gloria Ines Neira Sanabria** (Universidad Nacional de Colombia, Bogota, Colombia)
The “Overgeneralization of Linearity”: Difficulty, Conflict or Obstacle?

TSG

TSG14: Teaching and Learning of Programming and Algorithms

Chair: Chantal Buteau (Brock University, Canada)

Co-chair: Marina Rafalskaya (National Pedagogical Dragomanov University, Ukraine)

Team members: Xuemei Chen (Hebei Normal University, China), Bakhyt Matkarimov (Nazarbayev University, Kazakhstan)

IPC Liaison Person: Ivan Yashchenko (Russia)

Session I

July 13, 19:30–21:00

Location: T124

19:30–19:40

Chantal Buteau¹, Maryna Rafalska² (¹Brock University, Canada; ²Université Côte d'Azur, France)

[Introducing TSG 14](#)

19:40–20:05

Max Stephens¹, Djordje M. Kadijevich² (¹The University of Melbourne, Melbourne, Australia; ²Institute for Educational Research, Belgrade, Serbia)

[Algorithmic Thinking: Emerging Implications for School Mathematics Education](#)

20:05–20:20

Takuma Takayama (Shimoda Junior High School, Japan)

[Mathematics Education and Computational Thinking](#)

20:20–20:35

Camilla Finsterbach Kaup (Aalborg University, Denmark)

[Teachers Perceptions of Computational Thinking as Part of the Teaching of Mathematics: A Hermeneutic Literature Review](#)

20:35–20:40

Allyson Hallman–Thrasher, **Susanne Strachota**, Danielle Dani (Ohio University, USA)

[Engaging Prospective Teachers and Students in Programming Activities](#)

20:40–21:00

Chantal Buteau, Maryna Rafalska (Brock University, Canada; Université Côte d'Azur, France)

[Discussion](#)

Session II

July 16, 21:30–23:00

Location: T124

21:30–21:35

Chantal Buteau¹, Maryna Rafalska² (¹Brock University, Canada; ²Université Côte d'Azur, France)

[Introduction](#)

21:35–22:00

Djordje M Kadijevich¹, Max Stephens² (¹Institute for Educational Research, Belgrade, Serbia; ²The University of Melbourne, Melbourne, Australia)

[Three Important Aspects of Research on Computational/Algorithmic Thinking](#)

22:00–22:25

Simon Modeste (IMAG, University of Montpellier, CNRS, Montpellier, France)

[On Enumeration in Mathematics and Computer Science: Some Didactical Issues](#)

22:25–22:40

Tran Kiem Minh, Nguyen Thuy Viet Anh, Tran Trong Ha (College of Education, Hue University, Vietnam)

[A Framework for Analyzing the Integration of Algorithms and Programming into Mathematics Textbooks](#)

22:40–23:00

Chantal Buteau¹, Maryna Rafalska² (¹Brock University, Canada; ²Université Côte d'Azur, France)

[Discussion](#)

Session III

July 17, 14:30–16:30

Location: T124

14:30–14:35

Chantal Buteau¹, Maryna Rafalska² (¹Brock University, Canada; ²Université Côte d'Azur, France)

[Introduction](#)

14:35–15:15

Elena Prieto¹, Kathryn Holmes² (¹The University of Newcastle, Australia; ²Western Sydney University, Australia)

[Working Mathematically and Thinking Computationally: Capitalising on Commonalities for Integrated Teaching](#)

- 15:15–15:30** **Gregor Milicic & Matthias Ludwig** (Goethe University Frankfurt)
Modelling and 3D Printing A Circular Staircase for a Doll's House: Teaching Computational Thinking Using a Range of Different Tools
- 15:30–15:45** Chantal Buteau¹, Eric Muller¹, Ghislaine Gueudet², Joyce Mgombelo¹, Ana I. Sacristán³
(¹Brock University, Canada; ²University of Brest, France; ³Cinvestav, Mexico)
Researching the Teaching and Learning of Programming for University Mathematical Investigation Projects
- 15:45–16:00** David Doyen¹, **Antoine Meyer**² (¹LAMA (UMR), UPEM, UPEC, CNRS, Université Paris–Est, France; ²LIGM (UMR), UPEM, CNRS, ESIEE, ENPC, Université Paris–Est, France)
Math & CS Labs: A Bi–Disciplinary Course for Second–Year Undergraduates in Mathematics or Computer Science
- 16:00–16:30** **Chantal Buteau**¹, **Maryna Rafalska**² (¹Brock University, Canada; ²Université Côte d'Azur, France)
Discussion and Conclusion

TSG15: Teaching and Learning of Discrete Mathematics

Chair: Elise Lockwood (Oregon State University, USA)

Co–chair: Cecile Ouvrier–buffet (Université de Reims Champagne–Ardenne, France)

Team members: Mariana Durcheva (Technical University of Sofia, Bulgaria), Han Ren (East China Normal University, China), Ambat Vijayakumar (Cochin University of Science and Technology, India)

IPC Liaison Person: Catherine Vistro–Yu (Philippines)

Session I

July 13, 14:30–16:30

Location: W107

- 14:30–14:50** **Thomas Borys** (University of Education Karlsruhe, Institute of Mathematics, Germany)
Suggestion for an Integration of Cryptology into a Math Curriculum
- 14:50–15:10** **Cecile Ouvrier–Buffet** (Université Paris–Est Creteil, France)
Enriching Pre–Service Teachers Conceptions about Proof with Discrete Mathematics
- 15:10–15:30** **Melissa Windler** (University of Bremen, Germany)
Graph Theory in Primary School Mathematical Education – A Quantitative Study on the Impact of Graph Theory Concepts on Psychological Characteristics of Fourth Grade Students
- 15:30–15:40** **Break**
- 15:40–16:00** **Jaime Carvalho e Silva** (Universidade de Coimbra, Portugal)
The Role of Discrete Mathematics in Secondary Mathematics for Non–Stem Paths
- 16:00–16:20** **Katalin Gosztonyi**, Csaba Csapodi (Eötvös Loránd University of Budapest, Mathematics Teaching and Education Centre, Hungary)
Discrete Mathematics in the Hungarian Mathematics Curriculum
- 16:20–16:30** **Discussion**

Session II

July 14, 19:30–21:00

Location: W107

- 19:30–20:00** **Erik S. Tillema**, Lori Burch (Indiana University, United States of America)
Leveraging Combinatorial and Quantitative Reasoning to Support the Generalization of Advanced Algebraic Identities
- 20:00–20:20** **Karina Höveler**, Janet Winzen (Westfälische Wilhelms–Universität Münster, Germany)
Combinatorial Counting Problems in Elementary School: A Comparative Analysis of

TSG

German Textbooks

- 20:20–20:40** **Joseph Antonides**, Michael T. Battista (Ohio State University, USA)
[Preliminary Levels of Sophistication for Enumerating Permutations](#)
- 20:40–21:00** **Belmira Mota**^{1,2} and Rosa Antónia Tomás Ferreira^{2,3} (¹Colégio Efanor; ²Faculdade de Ciências da Universidade do Porto; ³CMUP CMUP, Portugal)
[Guiding Students' Reinvention of Combinatorial Operations](#)

Session III

July 17, 21:30–23:00

Location: W107

- 21:30–21:50** **Elise Lockwood**, Adaline De Chenne (Oregon State University, United States of America)
[Preservice Teachers' Development of Mathematical Knowledge for Teaching via Combinatorial Tasks in a Computational Setting](#)
- 21:50–22:10** **Janka Medová**, Soňa Čeretková (Department of Mathematics, Faculty on Natural Sciences, Constantine the Philosopher University in Nitra, Slovakia)
[Relation between Algorithmic and Combinatorial Thinking of Undergraduate Students of Applied Informatics](#)
- 22:10–22:30** **Mariana Durcheva** (Technical University of Sofia, Bulgaria)
[Some Approaches for Incorporation of CAS in a Discrete Mathematics Course](#)
- 22:30–22:50** **Eleonóra Stettner**, Szabina Tóth (Hungarian University of Agriculture and Life Sciences, Szabó Lőrinc Bilingual Primary and Secondary School, Hungary)
[How Can Poly–Universe Sets Develop Creativity During the Solution of Combinatorial Exercises?](#)
- 22:50–23:00** **Closure Wrap Up and Discussion**

TSG16: Reasoning, Argumentation and Proof in Mathematics Education

Chair: Viviane Durand–Guerrier (Montpellier University, France)

Co–chair: Samuele Antonini (University of Pavia, Italy)

Team members: Nadia Azrou (University Yahia Fares, Algeria), Kotaro Komatsu (Shinshu University, Japan), Chao Zhou (Soochow University, China)

IPC Liaison Person: Takeshi Miyakawa (Japan)

Session I

Moderator: Kotaro Komatsu (online)

July 13, 19:30–21:00

Location: T223

- 19:30–19:45** **Presentation of the four Sessions**
- 19:45–20:00** **Nadia Azrou** (University Yahia Fares, Algeria)
[Writing a Proof Text at the University Level: The Role of Knowing What a Proof Is](#)
- 20:00–20:15** **Faiza Chellougui** (Faculty of Sciences of Bizerte–Univ. of Carthage, Bizerte, Tunisia)
[Formalisation of Proof. A Tool for Researcher](#)
- 20:15–20:20** **Younggon Bae** (University of Texas Rio Grande Valley, Korea)
[Student Interpretation of Diagram in Hyperbolic Geometry: Changes in the Ontology of Geometric Models](#)
- 20:20–20:25** **GwiSoo NA**, Eric Knuth (Cheongju National University of Education, Cheongju–si, Chungcheongbuk–do, Korea; University of Texas at Austin, United States of America)
[A Comparative Study of Example Use in the Proving–related Activities of Korean and American Students](#)
- 20:25–20:30** **Michael Meyer**, Christoph Koerner, Julia Rey (University of Cologne, Cologne, Germany)
[When is an Argument an Argument? Area–specific Aspects of Argument–reception](#)

- 20:30–20:35** **Horacio Cristian Solar**¹, Manuel Goizueta², Maria Aravena–Diaz³, Andres Ivan Ortiz Jimenez⁴
(¹Pontificia Universidad Catolica de Chile, ²Pontificia Universidad Catolica de Valparaiso, Italy; ³Catholic University of Maule, Chile; ⁴Universidad Católica de la Santísima Concepción, Chile)
[Articulation of Argumentation and Mathematical Modelling in the Math Classroom](#)
- 20:35–20:40** **Hochieh Lin** (The Ohio State University–STEM Education, Columbus, United States of America)
[Fostering Third Graders Fraction Conceptions through Argumentation and Technology](#)
- 20:40–20:45** **Edgar Balaguera Ascencio** (Universidad Santo Tomas, Bogota, Colombia)
[From Abductive Reasoning to the Proof](#)
- 20:45–21:00** **Collective discussion on the six short oral presentations**

Session II

Moderator: Nadia Azrou (online)

July 14, 19:30–21:00

Location: T219

- 19:30–19:45** **Simone Jablonski**, Matthias Dieter Ludwig (Goethe University, Frankfurt, Germany)
[Changes in the Argumentation Characteristics of Mathematically Gifted Students–A Longitudinal Study](#)
- 19:45–20:00** **Carlotta Soldano** (University of Torino, Torino, Italy)
[An Inquiring–Game for Discovering and Proving a Geometric Theorem](#)
- 20:00–20:15** **Judith Njomgang Ngansop Sadjia Kam** (University of Yaounde 1, Yaounde, Cameroon)
[Why Do Teachers Write “ \$f\(x\) = a, \forall x \in \mathcal{D}_f\$ ”](#)
- 20:15–20:20** **Markos Dallas** (University of Agder, Kristiansand, Norway)
[Mathematics Classroom Argumentation: An Interactional Perspective](#)
- 20:20–20:25** **Shogo Murata** (University of Tsukuba, Tsukuba, Japan)
[The Function of Definition in Japanese Textbooks](#)
- 20:25–20:30** **Milena Damrau** (Bielefeld University, Germany)
[Understanding the Generality of Mathematical Statements and the Role Proofs Play](#)
- 20:30–20:35** **Yoshiki Shibata, Tadashi Misono** (Shimane University, Japan)
[Is There Any Difference in Students’ Descriptions Due to Direction Differences in a Deductive Reasoning Task?](#)
- 20:35–20:40** **Leander Kempen** (University of Paderborn, Paderborn, Germany)
[Investigating the Difference between Generic Proofs and Purely Empirical Verifications](#)
- 20:40–20:45** **Chun–Yeung Lee** (University of Oxford, United Kingdom)
[Proof and Reasoning in High–stakes Testing Systems: The Senior Secondary Mathematics Curricula in Hong Kong and International Baccalaureate Diploma Programme](#)
- 20:45–21:00** **Collective Discussion of the Six Short Oral Presentations**

Session III

Moderator: Samuele Antonini (online)

July 16, 21:30–23:00

Location: T223

- 21:30–21:45** **Xiaoheng (Kitty) Yan**, Gila Hanna (Simon Fraser University, Burnaby, Canada; OISE, University of Toronto, Canada)
[Computer–assisted Proving in the Classroom](#)
- 21:45–22:00** **Yuling Zhuang**, Anna Marie Conner (University of Georgia, Athens, United States of America)
[An Application of Habermas’ Theory of Validity Claims for Classroom–based Argumentation](#)
- 22:00–22:15** **Orly Buchbinder**, Sharon Mc Crone (University of New Hampshire, Durham, United States of America)
[Characterizing Mathematics Teachers’ Proof–specific Knowledge, Dispositions and Classroom Practices](#)
- 22:15–22:20** **Alejandro Walter De La Cruz Sanchez** (Universidad Peruana de Ciencias Aplicadas, Peru)
[Development of Quantitative Reasoning through Neuro Learning in Students of Basic Mathematics](#)
- 22:20–22:25** **Jeffrey Mark Rabin**, David Quarfoot (University of California San Diego, San Diego, United States of America)

TSG

Understanding Students' Difficulties in Producing Proofs by Contradiction

- 22:25–22:30** **Salvador Huitzilopochtli**, Daniel Lopez–Adame, Judit Moschkovich (University of California–Santa Cruz, Santa Cruz, United States of America)
[Using Writing and Discussions to Support Mathematical Arguments in Early Algebra](#)
- 22:30–22:35** **Kristen Marie Lew** (Texas State University, San Marcos, United States of America)
[The Necessity of Context in Mathematical Proof Writing at the University Level](#)
- 22:35–22:40** **Lucas Carato Mazzi** (Unesp, Rio Claro, Brazil)
[Different Types of Reasoning in Geometry in Brazilian High School Mathematics Textbooks](#)
- 22:40–22:45** **Marta T. Magiera** (Marquette University, Milwaukee, United States of America)
[Prospective K–8 Teachers' Problem Posing and Their Views of Task That Promote Mathematical Argumentation](#)
- 22:45–23:00** **Collective Discussion on the Six Short Papers**

Session IV

Moderator: Viviane Durand–Guerrier (online) & Zhou Chao (Shanghai)

July 17, 14:30–16:30

Location: T223

- 14:30–14:45** **Tomohiko Makino** (Utsunomiya University, Japan)
[Cognitive Characteristics Generating Incomplete Proof: Analyzing the Solving Process of a Geometrical Problem by Japanese Ninth Graders](#)
- 14:45–15:00** **Sikunder Ali, Trond Stoelen Gustavsen, Sigurd Johannes Hals, Andrea Hofmann, Silje Trai** (University of South–Eastern Norway, Drammen, Norway)
[Caught In–Between Tensions in Teaching Proof and Proving](#)
- 15:00–15:15** **Andreas Stylianides, Gabriel Stylianides** (University of Cambridge, Cambridge, Great Britain)
[Posing New Researchable Questions as a Dynamic Process: The Case of Research on Students' Justification Schemes](#)
- 15:15–15:20** **Kwong Cheong Wong** (The Hong Kong Polytechnic University, Honk Kong, SAR, China)
[Justifications in Exposition in Algebra in School Mathematics Textbooks in Hong Kong](#)
- 15:20–15:25** **Yaoyao Dong, Jian Liu** (Beijing Normal University, Beijing, China)
[Analysis of Analogical Reasoning Exercises in Primary School Mathematics Textbooks: Taking Geometry Field as an Example](#)
- 15:25–15:30** **Xin Zheng, Jing Cheng** (East China normal university, shanghai, China)
[Regional and Gender Differences in Chinese 8th Grade Students' Mathematical Reasoning Competency](#)
- 15:30–15:35** **Lei Hao, P–Jen Lin** (Mathematics and Science Education, NTHU, China)
[A Comparative Study of Geometric Proof Opportunities in Taiwan and Mainland Middle School Textbooks](#)
- 15:35–15:40** **Yi Zhang, Xiaopeng Wu** (East China Normal University, China)
[A Study of the Teaching Process of Mathematical Concept Argumentation Based on Tap–taking Function Concept Teaching between Expert Teacher and Novice Teacher in China as a Case](#)
- 15:40–15:55** **Collective Discussion on the Five Short Papers**
- 15:55–16:30** **Discussion on Future Research Agenda and Possible Collaborations**

TSG

TSG17: Problem Posing and Solving in Mathematics Education

Chair: Tin Lam Toh (Nanyang Technological University, Singapore)

Team members: Nicolina A. Malara (University of Modena and Reggio Emilia, Italy), Manuel Santos (CINVESTAV, Instituto Politécnico Nacional, Mexico), Dan Zhang (Beijing Academy of Educational Sciences, China)

IPC Liaison Person: Yufeng Guo (China)

Session I

July 13, 14:30–16:30

Location: T225

- 14:30–14:40** **Zheng PeiJun** (Qinghai Normal University, CN)
Analysis on Creating Problem Situation in Middle School Mathematic Teaching
- 14:40–14:55** Rong Wang, **Cuiqiao Wang** (Peoples Education Press, CN)
Historical Comparison and Analysis of Problems and Problem-posing in Middle School Mathematics Textbooks
- 14:55–15:05** **Ma Nympha Beltran-Joaquin** (University of the Philippines, Quezon City, PH)
Problem Posing among Pre-service and In-service Mathematics Teachers
- 15:05–15:15** **Puay Huat Chua** (Nanyang Technological University, NIE, Singapore, SG)
Regulation of Cognition during Problem Posing—A Case Study
- 15:15–15:25** **Stephane Favier** (Universite de Geneve, FR)
Characterizing the Problem-solving Processes Used by Pupils in Classroom: Proposition of a Descriptive Model
- 15:25–15:35** **Na Yan**, Lianchun Dong (Minzu University of China, Beijing, CN)
A Study on Primary School Students Mathematical Problem-posing Abilities in China
- 15:35–15:50** **Ling Zhang**, Jinfa Cai, Naiqing Song (Southwest University, CN)
A Framework for Examining Mathematical Communication in Problem Posing
- 15:50–16:05** **Yiling Yao**, Jinfa Cai (Hangzhou Normal University, Hangzhou, CN)
Using Problem Posing to Diagnose and Understand Preservice Teachers Conceptual Understanding
- 16:05–16:15** **Dan Zhang**, Yiling Yao, Jinfa Cai (Beijing Academy Of Education Sciences, China, CN)
Elementary Mathematics Teachers Learning to Teach Through Problem Posing: Initial Findings of a Longitudinal Study
- 16:15–16:30** **Benjamin Rott** (University of Cologne, Cologne, DE)
Primary School Teachers' Behaviors, Beliefs, and Their Interplay in Teaching for Problem Solving

Session II

July 14, 19:30–21:00

Location: T225

- 19:30–19:45** **Peter Juhasz**, Reka Szasz, Lajos Posa, Ryota Matsuura (Alfred Renyi Institute of Mathematics, Budapest, HU)
Teaching Students How to Pose Mathematical Questions
- 19:45–19:55** **Sintria Lautert**, Alina Galvao Spinillo, Rute Elizabete Borba, Juliana Silva, Ernani Martins dos Santos (Universidade Federal de Pernambuco – UFPE, Recife, BR)
How Elementary and Middle School Teachers Formulate Multiplication and Division Word Problems
- 19:55–20:05** **Yeliz Yazgan** (Bursa Uludag University, Bursa, TR)
Gifted Students Strategy Flexibility in Non-routine Problem Solving
- 20:05–20:15** **Maud Chanudet** (University of Geneva, FR)
Types of Reasoning Promoted in Mathematics Classes in the Context of Problem-solving Instruction in Geneva
- 20:15–20:25** **Min Wang**, Candace Ann Walkington (Southern Methodist University, Dallas, US)
Investigating Elementary School Students' Stem Problem Posing: The Walkstem After-School Club
- 20:25–20:35** **Jillian White**, Patrick Johnson, Merrilyn Enid Goos (University of Limerick, Limerick, IE)
Designing Professional Development Programs That Support Teachers' Incorporation of Problem Solving in Their Mathematics Instruction—The DCP Model
- 20:35–20:45** **Silvanio De Andrade** (UEPB, Campina Grande, BR)
Mathematics Problem Multicontextual Exploration, Solving and Posing in the Classroom and Teacher Education: A Perspective in Critical Education

TSG

20:45–20:55 **Tuba Aydogdu Iskenderoglu** (Trabzon University, Trabzon, TR)
The Problems Posed by Primary School Teachers, On Addition with Fractions

Session III

July 17, 14:30–16:30

Location: T234

- 14:30–14:40** **Jiajie Yan**, Yufeng Guo, Wenjia Zhou (Beijing Normal University, Beijing, CN)
How Do Chinese Textbooks Incorporate Mathematical Problem Posing in Different Stages?
- 14:40–14:50** **Hayato Hanazono** (Miyagi University of Education, JP)
Appreciation of the Aesthetic Qualities of Mathematical Objects: An Analysis of Students Problem Solving
- 14:50–15:00** **Jayasree Subramanian**, K. Subramaniam, R. Ramanujam (Homi Bhabha Centre for Science Education, Chennai, IN)
Towards LITE, a Local Instructional Theory for Mathematical Explorations
- 15:00–15:10** **Nor Azura Abdullah** (Universiti Brunei Darussalam, Brunei, BN)
Graphic Organizers for Problem-solving in Primary Mathematics: Teachers' Reflections
- 15:10–15:20** **Eda Vula** (University of Prishtina, Prishtina, AL)
The Effect of Problem-posing Strategies on Primary Pre-service Teachers Conceptual Knowledge of Fractions
- 15:20–15:30** **Brantina Chirinda**, Patrick Barmby (University of Johannesburg, Auckland Park, ZA)
Investigating Mathematics Teachers' Knowledge for Teaching Problem-solving
- 15:30–15:45** **Matias Camacho-Machin**, Alexander Hernandez, Josefa Perdomo-Dıaz (Universidad de La Laguna, La Laguna, ES)
Elements of Mathematical Activity That Emerge When Future Teachers of Secondary School Mathematics Use Digital Technologies to Solve Problems
- 15:45–15:55** **Zoltan Kovacs** (Eszterhazy Karoly University, Eger, HU)
A Study on Evaluating Prospective Teachers' Problem Posing Activity

Session IV

July 17, 21:30–23:00

Location: T225

- 21:30–21:40** **Rogier Bos**, Rona Lemmink (Freudenthal Institute, Utrecht University, NL)
Supporting Students to Compress Mathematical Knowledge While Problem Solving
- 21:40–21:50** **Miguel Cruz Ramerez** (University of Holguın, Cuba)
A Strategy for Enhancing Mathematical Problem Posing
- 21:50–22:00** **Benjamin Dickman** (The Hewitt School, New York City, US)
Inverted Tasks and Bracketed Tasks in Mathematical Problem Posing
- 22:00–22:10** **Lukas Baumanns**, Benjamin Rott (University of Cologne, DE)
The Process of Posing Problems: Development of a Descriptive Process Model for Problem Posing
- 22:10–22:20** **Sergei Nickolaevitch Pozdniakov** (Saint Petersburg Electrotechnical University, St. Petersburg, RU)
Automation of Math Discovery Support: Reinforcement of Problems with Criteria for Evaluating Partial Solutions
- 22:20–22:30** **Fenqjen Luo**, Yali Yu, Monte Meyerink, Ciara Bursal (Montana State University, Bozeman, US)
Division Problem Posing of Fifth Graders: A Cross-national Study in China and the United States
- 22:30–22:40** **Nelia Amado**, Susana Carreira, Monica Alexandra Rebelo Valadao (UIDEF, IE-UL, FARO, PT)
Students Engagement in Problem Posing While Solving A Fermi Problem
- 22:40–22:50** **Luisa-Marie Hartmann**, Stanislaw Schukajlow, Janina Krawitz (Muenster University, Muenster, DE)
Develop Your Own Problem! – Problem Posing in Given Real-world Situations

TSG18: Students' Identity, Motivation and Attitudes towards Mathematics and Its Study

Chair: Maike Vollstedt (University of Bremen, Germany)

Co-chair: Masitah Shahrill (Universiti Brunei Darussalam, Brunei)

Team members: Karin Brodie (University of the Witwatersrand, South Africa), Donglin Chen (The University of Hong Kong, Hong Kong SAR, China), Bozena Maj-Tatsis (University of Rzeszow, Poland)

IPC Liaison Person: Ewa Swobodal (Poland)

Session I

July 17, 14:30–16:30

Location: T230

14:30–14:35 **Opening Session**

Maike Vollstedt¹, Masitah Shahrill², Bozena Maj-Tatsis³, Karin Brodie⁴, Donglin Chen⁵
(¹University of Bremen, Germany; ²University of Brunei Darussalam, Brunei Darussalam;
³University of Rzeszow, Poland; ⁴University of Witwatersrand, South Africa; ⁵The University
of Hong Kong, Hong Kong SAR, China)

14:35–15:00 **Katrina Grace Q. Sumagit**, Nympha B. Joaquin (Ateneo de Manila University; University of the Philippines Diliman)

[Mathematical Problem-solving Beliefs of Filipino Seventh Graders](#)

Masitah Shahrill, Ai Len Gan (Sultan Hassanah Bolkiah Institute of Education, Universiti Brunei Darussalam; Sekolah Menengah Sayyidina Hasan, Ministry of Education, Brunei Darussalam)

[Understanding the Intentions of Shadow Education in Brunei Darussalam](#)

Changgen Pei, **Jiancheng Fan** (Southwest China University; Teaching Research and Teacher Training Center for Primary and Middle Schools, Xindu District, Chengdu, China)

[Developing and Validating a Scale for Measuring Students' Critical Thinking Disposition in Mathematics Education](#)

Beijia Tan, Jenee Love, Leigh M. Harrell-Williams, Christian E. Mueller (University of Memphis)

[Exploration of Math Mindset Changes over Time in an Urban Sample of Elementary and Secondary School Students in the United States](#)

15:00–15:25 **Yang Rui**, Wang Guangming, Li Shuang (Tianjin Normal University, China; Tianjin Economic-Technological Development Area International School, China)

[The Non-intellectual Level of Efficient Mathematics Learning of Junior High School Students and Their Influence Pathways on Mathematics Learning Performance](#)

Cao Chengcheng (The University of Hong Kong, Hong Kong SAR, China)

[Integrating Physical Activity into Mathematics Lessons](#)

Sheng Zhang, Guanming Wang (Tianjin Normal University, China)

[Different Contributions of Parental Expectations and Teacher's Behaviors to Students' Mathematics-related Beliefs](#)

Mingxuan Pang, Xiaorui Huang (Institute of Curriculum and Instruction, East China Normal University, China)

[Does Parents' Attitude towards Math Matter to Young Adolescents' Math Achievement in China? Meditating Effects of Math Anxiety](#)

15:25–15:40 **Zhi-Cheng Chen, Juei Hsin Wang** (Taichung University of Education, Department of Math Education, Taiwan, China; Chiayi University, Taiwan, China)

[The Action Research of 'Math Table Game' in Teaching and Learning](#)

Meng Guo, Xiang Hu (Faculty of Education, The University of Hong Kong, Hong Kong SAR, China; School of Education, Renmin University of China, China)

[Classroom Goal Structures, Chinese Students' Goal Orientations and Mathematics Achievement](#)

Zifu Shi, Yuntian Xie, **Jingjing Liang** (Department of Psychology, Hunan Normal University, China)

[Effect of Mathematics Anxiety on Probabilistic Reasoning among Junior Middle School](#)

TSG

Students: A Moderated Mediation Model

15:40–16:05 Xiaorui Huang, Bo Dong (Institute of Curriculum and Instruction, East China Normal University, China)
[Stereotype on Female's Success Boosts Female's Math Learning](#)

Yelena Portnov Neeman, Miriam Amit (Department of Science and Technology Education, Ben-Gurion University of the Negev, Beer-Sheva, Israel)
[Students Attitudes towards Metacognitive Skills for Strategic Math Problems](#)

16:05–16:30 Zahra Rahimi, Mohammad Bahrami (Department of Education, Allameh Tabataba'i University, Tehran, Iran; Department of Computer Science, University of Texas, Texas, United States)
[Investigating the Effects of Multiple Solutions on Students' Attitudes Towards Mathematics](#)

Wellington Munetsi Hokonya, Pamela Vale Mellony Graven (Rhodes University, grahamstown, ZA)
[Mathematical Identities of a High School Mathematics Learner in Landscapes of Mathematical Practice](#)

Lovejoy Comfort Gweshe, Karin Brodie (University of the Witwatersrand, Johannesburg–Braamfontein, ZW)
[A Conceptual Framework Relating Mathematics Clubs and Mathematical Identities](#)

Maike Vollstedt (University of Bremen, Bremen, Germany)
[Meaningful Reasons for Learning Mathematics](#)

Session II

July 13, 19:30–21:00

Location: T225

19:30–19:55 Daniel Barton (Bielefeld University, Bielefeld, DE)
[Make a Tutorial! The Impact of a Classroom Video Project on Emotions, Motivation and Achievement](#)

Aarifah Gardee, **Karin Brodie** (University of the Witwatersrand, South Africa)
[A Framework for Learners' Mathematical Identities](#)

19:55–20:10 Mun Yee Lai, Pauline Wong Wing Man Kohlhoff (University of Technology Sydney, AU)
[Applying the Theory of Planned Behaviour to 2012 Australian PISA Data](#)
Ana Isabel Silvestre, Célia Mestre, Cristina Martins, Elvira Santos, Hélia Jacinto, Hélia Pinto, Joana Pacheco de Castro, Manuel Vara Pires, Nelia Amado, Rosa Antonia Tomas Ferreira (Research Group of the Portuguese Association of Mathematics Teachers)
[What Is Valued in Learning and Teaching Mathematics? An Overview of the WIFItto Study in Portugal](#)

Rleigh Luczak (Michigan State University, USA)
[Math Circles and Secondary School-aged Children's Mathematical Identities](#)

20:10–20:35 Farzaneh Saadati (Center for Advanced Research in Education, Institute of Education (IE), Universidad de Chile)
[Influence of Collaborative Learning on Student Attitudes toward Mathematical Problem Solving](#)

Ciara Lane, Megan Heffernan, Kerrie–Anne Kelly (University of Limerick, Ireland)
[A Comparison of Student Interest in Mathematics under Two Curricula: Has Anything Changed?](#)

20:35–21:00 Marta Saccoletto, Camilla Spagnolo (University of Torino, Free University of Bolzano/Bozen)
[Perceived Difficulty in Answering Mathematical Task: Reflections on Metacognitive Factors](#)

García–Cerdá, C. & Ferrando, I (Departamento de Didáctica de la Matemática, Universitat de València, Spain)
[Does Type of Problem Influence on Interest? A Replication of a German Study in the Spanish Context](#)

Marios Ioannou (Alexander College, Canada)
[Affective Issues in the Learning of Abstract Algebra](#)

Bozena Maj-Tatsis; Konstantinos Tatsis; Andreas Moutsios–Rentzos (University of Rzeszow, Poland; University of Ioannina, Greece; University of the Aegean, Greece)
[Peer Pressure Effect on Student Teachers' Affective Relationship with Problem Posing](#)

Session III

July 16, 21:30–23:00

Location: T225

21:30–21:55 **Yuliya Melnikova,** Kristen Lawson, **Yongtao Cao** (Indiana University of Pennsylvania, USA)
[Effects of a Summer Bridge Program: Changes in Math Self–efficacy over the Course of a Semester](#)

Elizabeth Ottie Ayisi, Mathew Felton–Koestler (Ohio University, USA)
[College Student Perceptions of the Transition from High School to College Mathematics](#)

Claudia Vargas–Díaz, Victoria Núñez–Henríquez (Universidad de Santiago de Chile, Liceo Bicentenario Italia)
[Attitudes, Beliefs and Emotions Towards Graph Theory](#)

Hongwei Yang, Giang–Nguyen Nguyen, Shanshan Hu, Mark Malisa, Clement Yeboah, Thelma Quardey Missedja (University of West Florida, University of West Florida; Virginia Premier, University of West Florida; University of Southern Mississippi; University of West Florida)
[Assessing Measurement Invariance of Mathematics Self–efficacy between Chinese \(Shanghai\) and American Students](#)

21:55–22:10 **Jihyun Hwang,** Kyong Mi Choi (University of Iowa; University of Virginia)
[Predicting College Major Choice in STEM with Students Data at Grades 9 and 11](#)

Carlos R. Paez Paez, Mayra L. Ortiz Galarza, Maria Cruz & Rocio Gallardo (Navajo Technical University, New Mexico, USA; UT Rio Grande Valley, USA; UACJ, Mexico UT at El Paso, USA)
[Views from a Community College on the U.S.–Mexico Border: Mexican/Mexican–American Postsecondary Students' Perceptions of K–16 Mathematics](#)

22:10–22:35 **Paul Regier,** Miloš Savić, **Houssein El Turkey** (University of Oklahoma, USA; University of New Haven, USA)
[A Quantitative Analysis of Six Aspects of Student Identity and Creativity–fostering Instruction](#)

Gustavo Martínez–Sierra, Yuridia Arellano–García, Antonia Hernández–Moreno (Research Centre of Mathematics Education, Faculty of Mathematics, Autonomous University of Guerrero, México)
[Changes in Attitudes towards Mathematics of High–school Students in a Problem–posing Workshop](#)

22:35–23:00 **Amanda Meiners,** Kyong Mi Choi, Dae Hong (University of Iowa, USA; University of Virginia, USA)
[Exploring Pre–service Teachers Persistence through Multiple Strategies Tasks](#)

Yewon Sung, Ana Stephens, Ranza Veltri Torres, Susanne Strachota, Karisma Morton, Maria Blanton, Angela Murphy Gardiner, Eric Knuth, Rena Stroud (University of Wisconsin–Madison; TERC, University of Texas–Austin; Merrimack College)
[Positive Emotions in Early Algebra Learning](#)

Shande King¹, Lynn Hodge², Qintong Hu³ (¹The University of Tennessee, ²The University of Tennessee, ³Shandong University of Science and Technology)
[The Role of Interpersonal Discourse in Small–group Collaboration in Developing Mathematical Arguments and Student Identity](#)

Katherine N. Vela & Robert M. Capraro (Texas A&M University, Bryan, US)
[Attitudes, Affect, and Beliefs: What Is the Difference?](#)

Session IV

July 17, 14:30–16:30

Location: T225

14:30–14:55 **Isao Shimada** (Nippon Sport Science University, Tokyo, JP)
[Aspects of Critical Thinking Abilities That Primary School Students Express When Solving a](#)

TSG

Socially Open-ended Problem: Focus on Values and Mathematical Models in Classroom

Yoshinori Fujii, Koji Watanabe (University of Miyazaki; Miyazaki International College)
Questionnaire of Attitudes toward Statistics for Junior High School Students in Japan

Natanael Karjanto (Sungkyunkwan University, Suwon, KR)
“Dear ‘Kingos’, It’s All Right to Be Noisy!” Why Is It So Hard to Get Them Talking?

Miho Yamazaki, Wee Tiong Seah (U Teikyo University, JP)
The Character of Students Mathematical Values in Learning Mathematics

14:55–15:20 Tomoaki Shinobu (Sakata First Junior High School, Sakata, JP)
A Case Study of Mathematical Research Presentation in a Public Junior High School; Focus on the Relationship of Assumption of Others and the Quality of Learning

Wee Tiong Seah, Na Wang (Melbourne Graduate School of Education; The University of Melbourne, Australia)
Mathematics Education in the Fourth Industrial Revolution: The Jedi Approach to Developing Soft Skills

Gregory Hine (The University of Notre Dame Australia)
Declining Mathematics Enrolments at Secondary Level: An Australian Perspective

Penelope Kalogeropoulos (Monash University, AU)
Student Valuing of Mathematics Learning through the Getting Ready in Numeracy (G.R.I.N.) Intervention Program

15:20–15:35 Vanda Santos, Anabela Pereira, Teresa Neto, Margarida M. Pinheiro (CIDTFF–Research Centre on Didactics and Technology in the Education of Trainers, University of Aveiro, Portugal; Department of Education and Psychology, Portugal; Higher Institute of Accounting and Administration–University of Aveiro, Portugal)
Mathematics Anxiety: A Portuguese Study in Higher Education

Sebastian Geisler (Ruhr–Universitaet Bochum, DE)
The Transition from School to University Mathematics: Which Role Do Students Interest and Beliefs Play?

15:35–16:00 Jake Stephen Little (The University of Sydney, Sydney, AU)
Contextualising Mathematics Teaching through Science Connections and Gendered Mathematics Motivations

Kai Kow Joseph YEO (National Institute of Education, Nanyang Technological University)
Mathematics–anxiety Students Reasons and Feelings When Choosing to Solve Particular Problems

16:00–16:25 Hongyu Xiang (Tianli Primary School, Chengdu, Chengdu, China)
Put Title Here, Which Can Be Multiple Lines, But No Return Key Allowed within the Title

Jiraporn Wongkanya, Narumon Changsri, Kiat Sangaroon, Maitree Inprasitha (Master Program in Science and Technology Education, Faculty of Education, KKU, Thailand; Mathematics Education Program, Faculty of Education, KKU, Thailand; Center for Research in Mathematics Education, KKU, Thailand)
Exploring 11th Grade Students’ Attitude towards Mathematics

Ruiyan Gao, Simiao Liu (The University of Hong Kong, Hong Kong SAR China)
From Escs to Math Achievement: The Mediating Role of Math Self–efficacy, Math Anxiety and Math Self–concept

Shashidhar Belbase (United Arab Emirates University, Al Ain, AE)
High School Students Images, Anxieties and Attitudes toward Mathematics

16:25–16:30 Maike Vollstedt, Masitah Shahrill, Bozena Maj–Tatsis, Karin Brodie, Donglin Chen (University of Bremen, Germany; University of Brunei Darussalam, Brunei Darussalam; University of Rzeszow, Poland; University of Witwatersrand, South Africa; The University of Hong Kong, Hong Kong SAR, China.)
Closing Session

TSG19: Mathematical Literacy, Numeracy and Competency in Mathematics Education

Chair: Sarah Bansilal (University of KwaZulu–Natal, South Africa)

Co–Chair: Ratu Ilma Indira Putri (Universitas Sriwijaya, Indonesia)

Team members: Kathy O’Sullivan (National University of Ireland, Galway (NUIG), Ireland), Vince Geiger (Australian Catholic University, Australia), Bo Zhang (Yangzhou University, China)

IPC Liaison Person: Gabriele Kaiser (Germany)

Session I

July 13, 14:30–16:30

Location: W303

14:40–15:10 **Ross Turner** (Australian Council for Educational Research, Australia)
[Mathematical Literacy: What, Why and How](#)

15:10–15:20 **He Xuan**¹, Ma Yunpeng² (¹BUU, China; ²Northeast Normal University, China)
[Elements and Definitions of the Core Literacy of Mathematics in Primary School from an International Perspective: Based on NVivo 12.0 Coding Analysis](#)

15:20–15:30 **Feng Ma** (Shanghai High School, Shanghai China)
[Top–level Design and Systematic Thinking for the Cultivation of Math Competencies–Case Study and Inspirations](#)

15:30–15:40 **Questions**

15:40–15:50 **Kathy O’Sullivan** (EPI-STEM, School of Education, University of Limerick, Ireland)
[It Is Time Pre–service Teachers Develop Their Numerate Abilities to Support Their Students’ Numeracy Learning](#)

15:50–16:00 **Yuichiro Hattori**, Hiroto Fukuda (Kochi University, Okayama University of Science)
[Aspects of Fair–minded Critical Thinking in Mathematics Education: Based on the Perspective of Critical Mathematics Education](#)

16:00–16:10 **Questions**

16:10–16:30 **Vince Geiger** (Institute for Learning Sciences and Teacher Education, Australia)
[How Teachers Generate Ideas for Classroom Numeracy Tasks](#)

Session II

July 14, 19:30–21:00

Location: W303

19:30–20:00 **Kees Hoogland**, Javier Díez–Palomar, Niamh O’Meara (HU University of Applied Sciences Utrecht, University of Barcelona, University of Limerick)
[Common European Numeracy Framework–A Multifaceted Perspective on Numeracy](#)

20:00–20:10 **Jennifer Hall**, Anna Podorova (Monash University)
[Pre–service Teachers’ Experiences with the Australian National Numeracy Test](#)

20:10–20:20 **Zetra Hainul Putra**, Gustimal Witri, Syahrilfuddin (Department of Elementary Teacher Education, Faculty of Education and Teacher Training, University of Riau, Indonesia)
[Mathematical Literacy in Pre–service Teacher–designed Mathematics Picture Books](#)

20:20–20:30 Maryam Mohsenpour, Mahbobeh Rohanifar and Zahra Gooya (Alzahra University, Alzahra University and Shahid Beheshti University)
[Identifying 9th Grade Students’ Errors in Solving A Mathematical Literacy Problem](#)

20:30–20:40 **Cigdem Arslan**, Murat Altun, Tugce Kozaklı–Ulger, Isıl Bozkurt, Recai Akkaya, Furkan Demir, Zeynep Ozaydin, Burcu Karaduman (Bursa Uludag University, Harran University, Bolu Abant Baysal University, Dumlupınar University, Turkey)
[A New Model Design to Improve Mathematical Literacy: A Dual Focus Teaching Model](#)

20:40–20:50 **Sarah Bansilal** (University of KwaZulu–Natal, South Africa)
[Unpacking Some Challenges of Learning Mathematical Literacy in South Africa](#)

20:50–21:00 **Questions**

TSG

Session III

July 17, 21:30–23:00

Location: W303

- 21:30–21:45** **Ratu Ilma Indra Putri**, Zulkardi (Universitas Sriwijaya, Palembang, Indonesia)
[Designing Pisa–Like Mathematics Task Using Asian Games Context](#)
- 21:45–22:00** **Ahmad Wachidul Kohar**, Tatag Yuli Eko Siswono, Dayat Hidayat (Universitas Negeri Surabaya; Universitas Negeri Surabaya; Universitas Negeri Surabaya, Indonesia)
[Assessing Pisa–Like Tasks Considering Levels of Context Use for Mathematical Problem](#)
- 22:00–22:10** **Questions**
- 22:10–22:20** **AS Cavalcante**, A Savard (Mcgill University)
[Financial Numeracy Practices in Secondary School: A Study with Mathematics Teachers from Quebec, Canada](#)
- 22:20–22:30** **Eun Hyun Kim**, Rae Young Kim (The Graduate School of EWHA Womans University, EWHA Womans University)
[A Semantic Network Analysis of Information Literacy in School Mathematics in Korea](#)
- 22:30–22:40** **Oda Heidi Bolstad** (Volda University College, Norway)
[Mathematical Literacy in Norway](#)
- 22:40–22:50** **Luckson Muganyizi Kaino** (Josiah Kibira University College, Tumaini University, Tanzania)
[Merging the Classroom to Practice: Enhancing Mathematical Literacy through the Artifacts](#)
- 22:50–23:00** **Questions**

TSG20: Learning and Cognition in Mathematics (Including the Learning Sciences)

Chair: Gaye Williams (University of Melbourne, Australia)

Co-chair: Pablo Dartnell (University of Chile, Chile)

Team members: Wenjuan Li (New York University, USA), Chunli Zhang (Beijing Normal University, China)

IPC Liaison Person: Maria Alessandra Mariotti (Italy)

Session I

July 13, 19:30–21:00

Location: W315

- 19:30–20:00** **Alison Superfine Castro** (University of Illinois at Chicago)
[Exploring New Models for Teacher Professional Learning: Working with Teachers Rather than on](#)
- 20:00–20:15** **Fatlume Berisha**, Eda Vula (Faculty of Education, University of Prishtina, Kosovo)
[Introduction of STEM Education through Collaborative Action Research Practices](#)
- 20:15–20:30** **Biyao Liang**, Kevin C. Moore (University of Georgia, USA)
[Theorizing Teachers' Learning of Students' Mathematical Thinking in the Context of Student–teacher Interaction](#)
- 20:30–20:40** **Joyce Mgombelo**¹, Wendy Ann Forbes¹, Chantal Buteau¹, Eric Muller¹, Ana I. Sacristán²
(¹Brock University, Canada; ²Cinvestav, Mexico)
[Students' Ways of Thinking in a Computer–based Mathematics Investigation Projects](#)
- 20:40–20:50** **Gaye Williams** (the University of Melbourne, Australia)
[Reciprocity between Teachers' and Students' Problem–solving Actions Enables Teacher Change](#)
- 20:50–21:00** **Discussion**

TSG

Session II

July 16, 21:30–23:00

Location: W315

- 21:30–22:00** **Keiko Hino**¹, Yuka Funahashi² (¹Utsunomiya University, Japan; ²Nara University of Education, Japan)
[Interactive Patterns that Lead to Children’s Discursive Changes in Lessons Comparing Fractions](#)
- 22:00–22:15** **Eivind Kaspersen**, Trygve Solstad (Norwegian University of Science and Technology, Norway)
[Assessing Mental Abstraction Activities Using Eye-tracking Techniques](#)
- 22:15–22:30** **Michael Neubrand** (Carl von Ossietzky University Oldenburg, Germany)
[Mathematics Itself: Reflections about an Often Neglected, but Pivotal Dimension](#)
- 22:30–22:40** **Marcia M. F. Pinto**¹, Thorsten Scheiner² (¹Federal University of Rio de Janeiro, Brazil; ²Institute for Learning Sciences & Teacher Education, Australia)
[On the Epistemological Significance of Contextualizing in Mathematical Cognition](#)
- 22:40–22:50** **Bishnu Khanal** (Tribhuvan University, Kathmandu, Nepal)
[Learning Strategies Used by High Achieving and Low Achieving Students in Mathematics](#)
- 22:50–23:00** **Discussion**

Session III

July 17, 14:30–16:30

Location: W315

- 14:30–15:00** **Lieven Verschaffel**, Joke Torbejns, Gwen Verguts, Bert De Smedt (KU Leuven, Belgium)
[The Amazingly Frequent, Efficient, and Flexible Use of the Subtraction-by-addition Strategy in Elementary School Children’s Mental Multi-digit Arithmetic: A Challenge for Cognitive Psychology and Mathematics Education](#)
- 15:00–15:15** **Nancy Estévez**¹, Danilka Castro², Eduardo Martínez³, Vivian Reigosa⁴ (¹Neurodevelopmental Laboratory, Cuban Centre for Neurosciences, Cuba; ²Centre for Advanced Research in Education, Universidad de Chile, Chile, School of Psychology, Universidad Mayor, Chile; ³Neuroinformatics Department, Cuban Centre for Neurosciences, Cuba; ⁴National Institute for Educational Assessment, Uruguay)
[Numerical Processing Profiles in Children with Varying Degrees of Arithmetical Achievement](#)
- 15:15–15:25** Estivaliz Aragon, Gamal Cerda, Manuel Aguilar, Carlos Mera, **Jose I. Navarro**¹ (¹University of Cadiz, Spain)
[General and Specific Cognitive Precursors on the Early Mathematical Performance](#)
- 15:25–15:35** **Jairo Alfredo Navarrete** (Universidad de O’Higgins, Chile)
[A Cognitive Model of Learning Applied to Data Analysis of Mathematics Learning](#)
- 15:35–15:45** Danilka Castro Cañizares¹, **Pablo Dartnell**², Nancy Estévez Pérez³ (¹Center for Advanced Research in Education, Universidad de Chile, Chile, School of Psychology, Universidad Mayor, Chile; ²Center for Advanced Research in Education and Center for Mathematical Modeling, Universidad de Chile, Chile; ³Educational Neurosciences Department, Cuban Centre for Neurosciences, Cuba)
[Exploring Basic Numerical Capacities in Children with Varying Degrees of Arithmetical Achievement](#)
- 15:45–15:55** **Discussion for Session 3**
- 15:55–16:30** **Overview Discussion**

TSG

TSG21: Neuroscience and Mathematics Education / Cognitive Science

Chair: Inge Schwank (University of Cologne, Germany)

Co-chair: Mary-line Gardes (Lyon University, France)

Team members: Yijie He (East China Normal University, China), Yasufumi Kuroda (Kyoto University)

of Education, Japan), Trygve Solstad (Norwegian University of Science and Technology, Norway)
IPC Liaison Person: Jiansheng Bao (China)

Session I

July 14, 19:30–21:00

Location: T206

19:30–19:45 **Inge Schwank**¹, Marie–Line Gardes² (¹University of Cologne, Germany; ²Lyon Neuroscience Research Center (CRNL), University of Lyon 1, France)

Introduction & General Discussion

19:45–20:00 Zhou Xinlin, Qi Chunxia, Wang Li, **Cao Chen** (Beijing Normal University, China)
General Spatial Ability Other than Special Mathematical Ability Correlates with Ill–Structured Problems in Junior Students

20:00–20:15 Parnika Bhatia, Jessica Leone, Jerome Prado, **Marie–Line Gardes** (Lyon Neuroscience Research Center (CRNL), University of Lyon 1, France)

Behavioral Processing of Fractions in Adults with and without Mathematics Learning Difficulties

20:15–20:30 **Tatsuki Kondo**¹, Naoko Okomato², Yasufumi Kuroda³ (¹Graduate school of Education, Kyoto University of Education, Japan; ²Department of Social Sciences, College of Social Sciences, Ritsumeikan University, Japan; ³Department of Mathematics, Faculty of Education, Kyoto University of Education, Japan)

Consideration of Characteristics of Eye Movement and Brain Activity during Mental Rotation Tasks

20:30–20:45 **Trygve Solstad**, Silvester Sabathiel, Celestino Creatore (Norwegian University of Science and Technology, Norway)

Learning Representations of Mathematical Objects in Computational Models of Mathematical Cognition

20:45–21:00 **Yuqing Zhao**¹, Feidan Yu², Zikun Gong¹ (¹Hangzhou Normal University, China; ²Yuhang Chongxian First Primary School, China)

Electrophysiological Characteristics of First–grade Children at Different Levels of Number Sense

Session II

July 17, 21:30–23:00

Location: T206

21:30–21:55 Roland Grabner¹, Stefan Halverscheid², Jochen A. Mosbacher¹, **Kolja Pustelnik**² (¹Institute of Psychology, University of Graz, Austria; ²Mathematics Institute, University of Göttingen, Germany)

Declarative Knowledge and Procedural Knowledge: Learning Processes in the Case of Pound Arithmetic

21:55–22:20 **Inge Schwank**¹ & Elisabeth Schwank² (¹University of Cologne, Germany; ²University of Münster, Germany)

Even Young Children Are Able to Grasp and Apply Logical Rules in Mathematically Structured Environments. The Puzzle of Cognition

22:20–22:45 **Jo Van Hoof**¹, Eva Ceulemans², and Wim Van Dooren¹ (¹Centre for Instructional Psychology and Technology, University of Leuven, Belgium; ²Centre for Quantitative Psychology and

Individual Differences, University of Leuven, Belgium)

The Role of the Natural Number Bias and Strategy Switch Cost in a Fraction Comparison Task: A Reaction Time Study with Seventh Graders

22:45–23:00 Inge Schwank¹, Marie-Line Gardes² (¹University of Cologne, Germany; ²Lyon Neuroscience Research Center (CRNL), University of Lyon 1, France)

General Discussion & Closing

TSG22: Mathematical Applications and Modelling in Mathematics Education

Chair: Gilbert Greefrath (University of Münster, Germany)

Co-chair: Susana Carreira (Universidade do Algarve, Portugal)

Team members: George Ekol (University of Witwatersrand, South Africa), Xiaoli Lu (East China Normal University, China)

IPC Liaison Person: Gabriele Kaiser (Germany)

Session I

July 13, 14:30–16:30

Location: T219

14:30–14:45 Introduction

14:45–15:05 Gabriele Kaiser (University of Hamburg, Germany)

The Teaching and Learning of Mathematical Modelling a Description of the Current State-of-the-Art

15:05–15:10 Discussion

15:10–15:20 Milton Rosa, Daniel Clark Orey (Universidade Federal de Ouro Preto, Brazil)

Sociocultural Influences on Mathematical Modelling: An Ethnomathematical Perspective

15:20–15:30 Stanislaw Schukajlow, Werner Blum (University of Muenster, University of Kassel, Germany)

Teaching Methods for Modelling Problems

15:30–15:35 Discussion

15:35–15:40 Masahiro Takizawa (Otawara Senior High School, Otawara City, Japan)

Examining the Geographical Features of the Nasu Area Analyzing the Origin of the Nasu Area Using Mathematics

15:40–15:45 Eloisa Benitez-Mariño (Universidad Veracruzana, Xalapa, Mexico)

A Mathematical Modelling Technique as Tool for Teaching Mathematics

15:45–15:50 Wenmin Zhao, Samuel Otten (Guangdong University of Education, Guangzhou, China)

Theorizing Tensions between Mathematical Modeling Processes and Conventional Mathematics Instruction

15:50–15:55 Discussion

15:55–16:00 Takashi Kawakami, Jonas Bergman Arleback (Utsunomiya University, Japan)

The Rationales of Statistical Modelling in Education Research from a Mathematical Modelling Perspective

16:00–16:05 Dragana Martinovic (University of Windsor, Canada)

Modelling in a Teacher Education Programme

16:05–16:15 Discussion

16:15–16:30 Poster Presentation

TSG

Session II

July 13, 19:30–21:00

Location: T219

- 19:30–19:40** **María Aravena Diaz**, Marcelo Alejandro Rodriguez, Susan Valeria Sanhueza Henriquez, Maria Jose Seckel, Angelica Urrutia Sepveda (Catholic University of Maule, Talca, Chile)
[Mathematical Modeling in STEM Contexts. Characterization of STEM Skills and Gender Gaps in Initial Formation of Mathematics Teachers](#)
- 19:40–19:50** **Dario Andres Gonzalez** (Universidad de Chile, Santiago, Chile)
[Correspondence versus Covariation Perspectives While Modeling Global Warming](#)
- 19:50–19:55** **Discussion**
- 19:55–20:00** **George Ekol** (University of Witwatersrand, Johannesburg, South Africa)
[Using Assessment for Learning to Support Students Modelling Activities](#)
- 20:00–20:05** **George Gotoh**, Mitsuru Kawazoe, Hirofumi Ochiai (Niigata University, Japan)
[Epistemic States of University Mathematics Teachers in Mathematical Modelling Education](#)
- 20:05–20:10** **Alina Alwast**, Katrin Vorhölter (University of Hamburg, Germany)
[Using Staged Videos to Foster Pre-service Teachers Noticing Skills](#)
- 20:10–20:20** **Hans-Stefan Siller, Gilbert Greefrath**, Raphael Wess, Heiner Klock (University of Wuerzburg, University of Muenster, Germany)
[Prospective Teachers Self-efficacy for Teaching Mathematical Modelling](#)
- 20:20–20:30** **Discussion**
- 20:30–20:35** **Rejoice Akapame**, Robin Angotti (University of Washington Bothell, United States of America)
[Pedagogy That Supports Mathematical Modeling One Elementary School Teachers Story](#)
- 20:35–20:40** **JooYoung Park** (Florida institute of technology, Melbourne, United States of America)
[Pre-service Mathematics Teachers Project-based Mathematical Modeling Instruction: Conception, Task Design, And Enactment](#)
- 20:40–20:45** **Akihiko Saeki**, Masafumi Kaneko, Takashi Kawakami, Toshikazu Ikeda (Naruto University of Education, Yokohama National University, Japan)
[The Development of a Modelling Teacher Education Program Starting from the Transformation of a Mathematized Task into Modelling Tasks](#)
- 20:45–20:50** **Abolfazl Rafiepour**, Zohreh Khazaei (Shahid Bahonar University of Kerman, Iran)
[Prospective Teachers of Mathematics Suspend Common Sense in Solving Word Problem](#)
- 20:50–21:00** **Discussion**

Session III

July 16, 21:30–23:00

Location: T219

- 21:30–21:35** **Armando Paulino Preciado Babb**, Fredy Peña Acuña, Andrea Ortiz Rocha, Armando Solares Rojas (University of Calgary, Canada)
[The Mathematical Modelling Landscape: A Literature Review on Perspectives, Methodology, Content, Unit of Analysis, And Geography](#)
- 21:35–21:45** **Paola Andrea Ramirez Gonzalez** (Universidad de Talca, Chile)
[Distinguishing the Distinctions: Observing the Solving of a Mathematical Modelling Task](#)
- 21:45–21:50** **Discussion**
- 21:50–21:55** **Kwan Eu Leong** (University of Malaya, Kuala Lumpur, Malaysia)
[Mathematical Modelling Skills of Secondary Students](#)
- 21:55–22:05** **Jian Huang**, Binyan Xu (East China Normal University, Shanghai, China)
[Mathematical Modeling in the New Curriculum: Are Chinese Students Ready?](#)
- 22:05–22:15** **Hyunyi Jung**¹, Corey Edison Brady², Jeffrey Allen McLean³, Angeles Dominguez⁴, Aran Glancy⁵ (¹University of Florida, US; ²Vanderbilt University, US; ³University of North Carolina at Chapel Hill, US; ⁴Tecnologico de Monterrey, Mexico; ⁵University of St. Thomas, USA)
[Student Presentations of Mathematical Modelling as a Site for Fostering Reflective Discourse](#)

- 22:15–22:20 Discussion**
- 22:20–22:25 Kazuhiko Imai** (Graduate school of education, Saitama University, Kawagoeshi, Japan)
How Do Undergraduate Students Hold the Individual Assumptions in Collaborative Modelling?
- 22:25–22:30 Jeffrey Allen McLean¹**, Corey Edison Brady², Hyunyi Jung³, Angeles Dominguez⁴, Aran Glancy (University of North Carolina at Chapel Hill, US; ²Vanderbilt University, US; ³University of Florida, US; ⁴Tecnologico de Monterrey, Mexico)
Investigating Students Data Moves in a Citizen Science Based Data-Rich Model-Eliciting Activity
- 22:30–22:35 Flavio Guíñez** (Universidad de Chile, Santiago, Chile)
Differences in Students Conceptions about Mathematics When Participating in a Mathematical Modeling Contest
- 22:35–22:40 Discussion**
- 22:40–22:45 Xie Zhiyong**, Li Yaling, Wang Tian, Liu Jian (Beijing Normal University, Beijing, China)
Measurement Mathematical Modeling Competency and Its Relationship to Mathematical Interests of Seventh Grade
- 22:45–22:50 Tian Wang**, Xie Zhiyong, Jian Liu (Beijing Normal University, Beijing, China)
Assessment of Four-grade Students Mathematical Modelling Competency: Take One City of China as an Example
- 22:50–23:00 Discussion**

Session IV

July 17, 14:30–16:30

Location: T219

- 14:30–14:35 Laurent Moutet** (Paris Diderot University, Paris, France)
Study of a Problem Solving Using the Extended Mathematical Working Space Framework (Extended MWS)
- 14:35–14:40 Bambang Riyanto** (Sriwijaya University, Ogan Komering Ilir, Indonesia)
Mathematical Modelling Learning in Indonesian Senior High School
- 14:40–14:45 Kazem Abdollahpour Chenary, Abolfazl Rafiepour** (Shahid Bahonar University of Kerman, Iran)
Introducing a Composite Model for Investigation in Real World Problem
- 14:45–14:55 Discussion**
- 14:55–15:00 Lena Frenken** (University of Muenster, Germany)
A Computer-based Learning Environment on Mathematical Modelling: Research Design and Pilot Studies
- 15:00–15:05 Susana Carreira**, Guillermo Enrique Ramirez Montes, Ana Claudia Henriques (Universidade do Algarve & UIDEF – IE, UL, Faro, Portugal)
Undergraduate Students' Modelling Routes Mediated by Technology in the Learning of Linear Transformations
- 15:05–15:10 Discussion**
- 15:10–15:20 Rina Durandt**, Werner Blum, Alfred Lindl (University of Johannesburg, South Africa)
Is Quality Teaching Favourable for the Development of Modelling Competency? An Empirical Study with Engineering Students over Two Years
- 15:20–15:30 Jennifer A. Czoher**, Sindura Kandasamy, Elizabeth Roan (Texas State University, United States of America)
Validating a Modelling Competencies Assessment
- 15:30–15:35 Saul Ernesto Cosmes Aragon**, Elizabeth Montoya Delgadillo (Pontificia Universidad Catolica de Valparaiso, Chile)
Mathematical Modelling in The Training of Engineers in the Civil Structures Context
- 15:35–15:40 Discussion**
- 15:40–15:45 Yuriy Rogovchenko** (University of Agder, Krisitansand, Norway)

TSG

Mathematical Modelling with Biology Undergraduates: Using Activity Theory to Understand Tensions

- 15:45–15:50** **Lorenza Illanes, Roberto Retes** (Tecnológico de Monterrey, México; Universidad Peruana de Ciencias Aplicadas (UPC), Santiago, Chile)
Calculus Learning Competency through Mathematical Modelling
- 15:50–15:55** **John Anthony Gordon** (City University of New York, United States of America)
Applicability and Transferability—Important Pedagogical Objectives Crucial in the Compartmental Analysis Module of an Introductory Course in Ordinary Differential Equations
- 15:55–16:00** **Yixin Dong, Huanhuan Zhang, Meng Ci, Ziyi Wang** (Huaibei Normal University, China)
Research on Evaluation of College Students' Mathematical Modeling Ability Based on AHP and BP Neural Network
- 16:00–16:10** **Discussion**
- 16:10–16:30** **Final Report and Discussion**

TSG23: Visualization in the Teaching and Learning of Mathematics

Chair: Cristina Sabena (University of Torino, Italy)

Co-chair: Marc Schäfer (Rhodes University, South Africa)

Team members: Marei Fetzer (Goethe–University Frankfurt, Germany), Hui–Yu Hsu (Taiwan Tsing Hua University, Taiwan, China), Zhiqiang Yuan (Hunan Normal University, China)

IPC Liaison Person: Alicia Dickenstein (Argentina)

Session I

July 13, 14:30–16:30

Location: T418

- 14:30–14:50** **Welcome and Introduction – Setting the Scene: Visualization and Problem–solving**
- 14:50–15:06** **Ferdinando Arzarello, Cristina Sabena, Carlotta Soldano** (University of Turin, Torino, Italy)
Imaging and Visualizing in Geometry: Explorations by Mathematics University Students
- 15:06–15:22** **Beata Dongwi, Marc Schäfer** (Rhodes University, Windhoek, South Africa)
Visualization as an Embodied Problem–solving Process
- 15:22–15:38** **Leah Michelle Frazee, Michael Battista** (Central Connecticut State University, US)
Characterizing Visualization and Spatial Analytic Reasoning for Solving Isometry Problems
- 15:38–15:54** **Dennis Lee Jarvis Baring Ybanez, Catherine Vistro Yu** (Ateneo de Manila University, Quezon City, Philippines)
The Role of Visualization towards Student's Mathematical Abstraction and Representation in Solving Probabilities
- 15:54–15:58** **Introduction to the Theme: Classroom Interaction**
- 15:58–16:14** **Clemence Chikiwa, Marc Schäfer** (Rhodes University, Grahamstown, South Africa)
The Use of Gestures and Language as Co–existing Visualization Teaching Tools in Multilingual Classes
- 16:14–16:30** **Marei Fetzer** (Goethe–University, Frankfurt, Germany)
On Objects and Visualizations—An Interactionistic Perspective

Session II

July 13, 19:30–21:00

Location: T226

- 19:30–19:33** **Link with Previous Session and Introducing the New Session: Visualization and Teaching**
- 19:33–19:49** **Hui–yu Hsu** (Taiwan Tsing Hua University, Taiwan, China)
How Teachers Scaffold Students in Visualizing Diagram for Understanding Geometric Problem

Solving

- 19:49–20:05** **Vimolan Mudaly** (University of KwaZulu–Natal, Durban, ZA, South Africa)
Preservice and Inservice Teachers' Mathematics Visualization Skills
- 20:05–20:16** **Hirotsu Furutsu**, Yukiko Ishii, Hisashi Kato, Yusuke Washio, Noriko Hirata–Kohno (Nihon University, Japan)
Dynamic Visual Instructions by Geogebra for Introducing Takada's Theorem on Pentagons
- 20:16–20:27** **Wei Wang**, Xue Huang (Northeast Yucai School, Shenyang, China)
High School Mathematics Inquiry Teaching Based on Geogebra Visualization Environment
- 20:27–20:28** **Introduction to the Theme: Different Kinds of Representations, Different Technologies**
- 20:28–20:44** **Jill A. Cochran** (Berry College, Rome, US)
The Development of 3D Representations Using Physical Manipulatives, Technology–aided Design and 2D Drawings
- 20:44–21:00** **Elena Naftaliev** (Achva Academic College, Israel)
The Social Construction of Knowledge in a New Pedagogical Setting: The Same Activity Presented as Three Different Interactive Diagrams

Session III

July 14, 19:30–21:00

Location: T418

- 19:30–19:35** **Emerging Themes from Previous Session and Prompt for Discussion**
- 19:35–19:58** **Discussion**
- 19:58–19:59** **Introduction to the Theme: Diagrams and Mathematics Visualization**
- 19:59–20:15** **Francesco Beccuti** (University of Turin, Italy)
Visualization as Vision, Imagination and Intuition: Reflections on Graduate Students Struggling with a Visual Conjecturing Problem
- 20:15–20:26** **Martin Flashman** (Humboldt State University, US)
Mapping Diagrams: Function Visualization of Real and Complex Analysis and Matrix Algebra
- 20:26–20:37** **Antti Rasila** (Guangdong Technion Israel Institute of Technology, Shantou, China)
Interactive Visualizations of Topics in Engineering Mathematics
- 20:37–20:38** **Introduction to the Theme: Math, Visualization and Other Disciplines**
- 20:38–20:49** **Liora Nutov** (Gordon Academic College of Education, Haifa, Israel)
Concept Images of Infinity in Pre–service Teachers Artworks
- 20:49–21:00** **Yan Li**, Pan Liu, Xinyu Liu (East China Normal University, Shanghai, China)
Research on Visualization in Mathematics Learning Based on Mathematical Drama Performance or by Video

Session IV

July 17, 21:30–23:00

Location: T418

- 21:30–21:33** **Link with Previous Session and Introduction to the Theme: Visualization and (Latest) Technologies**
- 21:33–21:49** **Giulia Bini**, Ornella Robutti (University of Turin, Italy)
Some Like It Social: Looking into the Interplay Between Math and Internet Memes
- 21:49–22:05** **Daniela Goetze** (University of Siegen, Germany)
Children's Ambiguous Interpretation of Visualizations – Eye Tracking as a Diagnostic Tool for Division Concepts
- 22:05–22:16** **Luona Wang** (East China Normal University, China)
A Review of the Application Cases of Augmented Reality (AR) in Mathematics Education
- 22:16–22:17** **Introduction to the Theme: Educational Materials**
- 22:17–22:28** **Jiling Gu**, Fei Zhang (Nanjing normal university, Nanjing, China)

TSG

The Textbook Design of Geometrical Visualization in "Number and Algebra" Field

- 22:28–22:39** **Janos Szasz Saxon**, Zsuzsa Dardai (Poly–Universe Ltd, Budapest, Hungary)
PUSE (Poly–universe in School Education) Methodology Visual Experience Based Mathematics Education 2019
- 22:39–22:50** Santanu Dutta, Charudatta Sharad Navare, HARITA RAVAL (Homi Bhabha Centre for Science Education, Mumbai, IN)
Drawing (on) Diagrams: Typicality of Geometric Shapes in Concept Image Elicitation for Secondary Students
- 22:50–23:00** **Discussion and Conclusion**

TSG24: The Role and the Use of Technology in the Teaching and Learning of Mathematics at Primary Level

Chair: George Gadanidis (Western University, Canada)
Co–chair: Sitti Patahuddin (University of Canberra, Australia)
Team members: Jiaxia Liu (Beijing Institute of Education, China)
IPC Liaison Person: Luc Trouche (France)

Session I

July 13, 19:30–21:00 **Location: W111**

19:30–19:40 **Introductions, TG Organization**

19:40–20:05 **Kevin Larkin¹, Christina Marie Watts Lommatsch², Thomas Lowrie³** (¹Griffith University, Australia; ²University of Canberra, USA; ³University of Canberra, USA)
Developing Young Children’s Early Logical Reasoning: A Novel Approach to the Use of User Generated Content

20:05–20:15 **Discussion**

20:15–20:30 **Jia Yi Boo**, Kwan Eu Leong (University Malaya, Malaysia)
Effectiveness of Digital Game–based Learning (DGBL) in Enhancing Fraction Skills among Primary Four Pupils

20:30–20:40 **Ernest Qinghua Lin** (Pei Hwa Presbyterian Primary School, Singapore)
How Will the Use of Technology Enhance the Conceptual Understanding of Comparing Fractions at Lower Primary?

20:40–20:50 **Sitti Patahuddin**, Jonathan Adam (University of Canberra, Australia)
ELPSA Framework Uses in Designing Lessons with Web–based Resources: A Case of Equivalent Fractions

20:50–21:00 **Discussion**

Session II

July 16, 21:30–23:00 **Location: W111**

21:30–21:35 **Introduction**

21:35–21:50 **Mollie Helen Appelgate**, Christa DeAnn Jackson, Kari Nicole Jurgenson (Iowa State University, USA)
Using Mathematically–focused Text Messages to Connect Families with Their Childs Learning

21:50–22:05 **Rafikh Rashid Shaikh, Harita Raval, Harshit Agrawal, Nagarjuna Gadiraju** (HBCSE, Tata Institute of fundamental Reasearch, India)
Impact of Computer–mediated Sharing on Classroom Activities

22:05–22:15 **Discussion**

22:15–22:30 **Nigel Stuart Calder** (University of Waikato, New Zealand)

Interacting with Scratchmaths to Facilitate Collaborative Problem Solving

22:30–22:45 **George Gadanidis**, Janette Hughes, Immaculate Namukasa, Ricardo Scucuglia (Western University, Canada)
Computational Modelling in Grades 1–3 Mathematics

22:45–23:00 **Discussion**

Session III

July 17, 14:30–16:30

Location: W111

14:30–14:35 **Introduction**

14:35–14:45 **Discussion**

14:45–15:00 **Catherine Attard**, Kathryn Holmes (Western Sydney University, Australia)
An Exploration of the Effective Use of Technology in Four Primary Mathematics Classrooms

15:00–15:15 **K M Leung**, P Y Tang (Curriculum Institution, Hong Kong SAR, China)
Coding in Elementary Mathematics Lessons

15:15–15:25 **Discussion**

15:25–15:35 **Rune Herheim**, Elena Severina (Western Norway University of Applied Sciences, Norway)
Scratch Programming and Students Explanations

15:35–15:45 **Manabu Goto** (Sagami Womens University, Japan)
Proposal on How to Use Digital Textbooks at Primary Level and Research Directions

15:45–15:55 **Megan Lea Clune** (The University of Auckland, New Zealand)
Understanding Students Use of Mathematical Processes during a Digital Escape Experience

15:55–16:10 **Discussion**

16:10–16:30 **Global Discussion and Remarks**

TSG25: The Role and the Use of Technology in the Teaching and Learning of Mathematics at Lower Secondary Level

Chair: Morten Misfeldt (University of Copenhagen, Denmark)

Co-chair: Hans-Stefan Siller (University of Wuerzburg, Germany)

Team members: Mariam Haspekian (Université Paris Descartes, France), Arthur Lee (The University of Hong Kong, Hong Kong SAR, China), Mailizar Mailizar (Syiah Kuala University, Indonesia)

IPC Liaison Person: Alicia Dickenstein (Argentina)

Session I

July 13, 14:30–16:30

Location: T223

14:30–14:40 **Welcome and Housekeeping**

14:40–14:50 **Morten Elkjaer**, Lui Albaek Thomsen (AU / EduLab, Denmark; Aalborg University, Denmark)
An Immersive Learning Experience for Teaching Equations Equation Lab

14:50–15:00 **Ghislaine Gueudet**, Sophie Joffredo–Le Brun (University of Brest, France; Catholic University of the West, France)
Student's Autonomy and Digital Technologies: Collective Documentation Work in Preservice Teacher Education

15:00–15:10 **Discussion of the two long papers**

15:10–15:20 **Break**

15:20–15:28 **Shiwei Tan** (Guangxi Normal University, China)
Using Augmented Reality Technology for Instructional Media in Mathematics Education

TSG

- 15:28–15:36** **Marianne Thomsen**¹, Uffe Thomas Jankvist² (¹Aarhus University, DPU, Denmark; ²Aarhus University, Afghanistan)
Mediations and Rules when Working with the Interplay between Original Sources and Geogebra
- 15:36–15:44** **Sylvia Van Borkulo**, Paul Drijvers (Utrecht University, Netherlands)
Developing Spatial Skills in a Virtual Reality Environment for Carpentry Apprentices
- 15:44–15:54** **Discussion of the Three Short Papers**
- 15:54–16:04** **Break**
- 16:04–16:07** **Wesley Matheus Moura Balbino**, Medeiros de Oliveira, Francismar Holanda (Instituto Federal Do Piaui, Brazil)
Application of GeoGebra in the Function Study: The Use of ICT in Teaching Mathematics
- 16:07–16:10** **André Greubel**, Hans–Stefan Siller (Faculty of Mathematics and Computer Science, Germany)
EVA: An Educational Tool to Simulate Evacuations of Buildings
- 16:10–16:13** **Erin Herz, George Ekol** (University of Witwatersrand, South Africa)
Perspectives on the Use of ICT in the High School Mathematics Classrooms
- 16:13–16:16** **Santosh Paudel**¹, **Binaya Bhandari**² (¹Adarsha Secondary School, Layaku Thimi Bhaktapur, Nepal; ²Sainik Awasiya Mahavidyalaya, Nepal)
Role of ICT to Enhance Mathematics Teaching
- 16:16–16:19** **Carlos Eduardo Leon**¹, **Jefer Camilo Sachica–Castillo**² (¹La Gran Colombia University, Colombia; ²Universidad Nacional De Colombia, Colombia)
The Mathema Kids Research Seed: A Geogebra Youth Club that Tells Stories
- 16:19–16:29** **Discussion of the 5 posters**

Session II

July 14, 19:30–21:00

Location: T223

- 19:30–19:40** **Zhu Fangchun** (East China Normal University, China)
Instrumental Orchestration with Dynamic Geometry: A Chinese Case Study
- 19:40–19:50** **Cecilie Carlsen Bach** (Aarhus University, Denmark)
Gray–boxing as a Means for Mathematical Communication
- 19:50–20:00** **Discussion of long papers**
- 20:00–20:10** **Break**
- 20:10–20:18** **Jair Dias de Abreu**¹, Silviano de Andrade² (¹Universidade Estadual Da Paraiba, Brazil; ²UEPB, Brazil)
Desmos App in the Mathematics Classroom: Limitations and Potentialities
- 20:18–20:26** **Adi Nur Cahyono**, Yulius Leonardus Sukestiyarno, Mohammad Asikin and Matthias Dieter Ludwig (Universitas Negeri Semarang, Indonesia)
Augmented Reality for Outdoor Modeling Tasks: Bridging Real Problems with Mathematical Concepts
- 20:26–20:34** Daniel Thurm, **Baerbel Maria Barzel** (University Duisburg–Essen, Germany)
Micro–teaching of Landmark Jobs Fostering Self–efficacy for Teaching Mathematics with Technology
- 20:34–20:42** **Joaquin Gimmenez**, Silvia Carvajal, Vicenç Font (Barcelona University, Spain)
Digital Competency Found by Prospective Secondary Teachers According Ontosemiotic Approach
- 20:42–20:52** **Discussion of the four short papers and the poster**

Session III

July 16, 21:30–23:00

Location: T226

- 21:30–21:40** **Ahlam Anabousy**, Michal Tabach (Tel–aviv university, Seminar Hakibutzim College, Israel)
The Development of Technological Craft Knowledge within a Community of Inquiry

- 21:40–21:50** **Ana Donevska–Todorova** (Goethe University Frankfurt am Main, Germany)
Mobile Learning of Mathematics with Apps for Math Trails
- 21:50–22:00** **Discussion of long papers**
- 22:00–22:10** **Break**
- 22:10–22:18** **Prateek Shah¹**, Harshit Agrawal², Sanjay Chandrasekharan (¹Indian Institute of Management Ahmedabad, India; ²Homi Bhabha Centre for Science Education, India)
Media, Cognition and Assemblage Perspectives on ICT in Education: A Three–part Study in an Indian School
- 22:18–22:26** **Mariam Haspekian** (University of Paris, France)
Evolution of Teaching Practices with ICT: A Case Study with Scratch in the French New Mathematics Curricula
- 22:26–22:34** **Ingi Heinesen Hojsted** (Aarhus University, Denmark)
Connecting Conjectures and Proof Using Dynamic Geometry Environments and a Toolbox Puzzle Approach
- 22:34–22:37** **Alejandro Miguel Rosas Mendoza** (Instituto Politecnico Nacional, Mexico)
Technology in Classroom: A Report of 3 Researches
- 22:37–22:47** **Discussion of the Three Short Papers and the Poster**

Session IV

July 17, 21:30–23:00

Location: T223

- 21:30–21:38** **Brigitte Grugeon–Allys**, Elann Lesnes–Cuisiniez, Fabrice Vandebrouck (University Paris Est Creteil, France)
Impact of Online Automated Learning Path on Student Learning: The Mindmath Project in Elementary Algebra
- 21:38–21:46** **Joseph Simon Madrinan**, Catherine Vistro Yu (Ateneo de Manila University, The Philippines)
Engagement and Moderation of Mathematical Modelling Tasks in Virtual Environments
- 21:46–21:54** **Rabindra Kumar Bhattacharyya** (Retired. Calcutta University, Dept App Math, India)
Computer–dependent Mathematics Teaching in Schools
- 21:54–22:02** **Liping Yao** (South Dongchang Middle School Attached to ECNU, China)
Type of Mathematics Tasks with Dynamic Geometry Software
- 22:02–22:12** **Discussion of the Four Short Papers**
- 22:12–22:17** **Break**
- 22:17–22:25** **Thomas K.F. Chiu** (The Chinese University of Hong Kong, Hong Kong SAR, China)
Strategic Use of Content–specific and Content–neutral Technologies to Cater Learning Diversity in Mathematics
- 22:25–22:33** **Rikke Maagaard Gregersen** (Aarhus University, Denmark)
Digital Tools and Mediation in Informal Justification
- 22:33–22:41** **Mathilde Kjaer Pedersen¹**, Uffe Thomas Jankvist², Morten Misfeldt³ (¹Danish School of Education, Aarhus University, Denmark; ²Aarhus University, Afghanistan; ³University of Copenhagen, Denmark)
Digital Technology in Relation to the Mathematical Thinking Competency
- 22:41–22:44** **Hoi Kei Melody Wong¹**, I.A.C.Mok² (¹Good Hope School, Hong Kong SAR, China; ²The University of Hong Kong, Hong Kong SAR, China)
Students Mathematics Experience of the Technology Self–directed Learning (TSDL) Pedagogy
- 22:44–22:54** **Discussion of the Three Short Papers and the Poster**
- 22:54–22:55** **Closing**

TSG

TSG26: The Role and the Use of Technology in the Teaching and Learning of Mathematics at Upper Secondary Level

Chair: Ornella Robutti (Universita degli Studi di Torino, Italy)

Co-chair: Gilles Aldon (École Normale Supérieure de Lyon, France)

Team members: Rongrong Cao (Qingdao University, China), Victor Giraldo (Universidade Federal do Rio de Janeiro, Brazil), Azimeh Khakbaz (Bu-Ali Sina University, Iran)

IPC Liaison Person: Alicia Dickenstein (Argentina)

Session I

July 13, 19:30–21:00

Location: T316

19:30–19:45 Introduction

19:45–20:00 **Gilles Aldon**¹, Monica Panero² (¹IFÉ–ENS de Lyon, France; ²SUPSI, Locarno, Confédération Helvétique)

Formative Assessment and Technology: An Attempt of Framework

20:00–20:15 **Annalisa Cusi**¹, Agnese Ilaria Telloni² (¹Sapienza University of Rome, ²University of Ancona)
Students as Designers of Digital Curriculum Resources

20:15–20:30 **Rosa Annalucia Alberto**, Anna Shvarts, Arthur Bakker, Paul Drijvers (Freudenthal Institute, Faculty of Science, Utrecht University, the Netherlands)
Straightening the Bend: Sequencing Embodied Experiences with High and Low-tech Designs for the Notion of Radian

20:30–21:00 Discussion

Session II

July 16, 21:30–23:00

Location: T316

21:30–21:40 Introduction

21:40–21:45 **Marie Joubert**, Geoff Wake, Marc North (University of Nottingham, Great Britain)
Questions of Design Research: A Technology Mathematics Lesson Framed by the Didactical Triangle

21:45–21:50 Ornella Robutti¹, **Theodosia Prodromou**², Gilles Aldon³ (¹University of Torino, Italy; ²University of New England, Australia, ³IFÉ–ENS de Lyon, France)
Merlo Item as Boundary Object in Teachers Professional Development

21:50–21:55 **Maxima Joyosa Acelajado**¹, Arlene B. Miyas² (¹De La Salle University–Manila, ²Muntinlupa National High School, Main)
Acceptability of the Proposed Multimedia Instructional Module in Selected Pre-calculus Topics among STEM Students of Muntinlupa National High School

21:55–22:00 **Mario Sanchez Aguilar** (Instituto Politecnico Nacional, CICATA Legaria, Mexico City, MX)
Twitter, Emotion and Mathematics

22:00–22:25 Discussion

22:25–22:30 **Mingyu Shao** (East China Normal University, China/ENS de Lyon, France)
Integrating Geogebra in Classroom Teaching of 3d Geometry: Contrasting a French and a Chinese Cases

22:30–22:35 **Kim Agatha Ramatlapana** (Botswana Open University, Gaborone, BW)
Mathematics Prospective Teacher Display of Technological Content Knowledge in a Geogebra-based Environment

22:35–22:40 **Carolina Guerrero Ortiz** (Pontificia Universidad Católica de Valparaíso, Valparaíso, CL)
An Implementation of Technological Pedagogical Content Knowledge Framework for Analysing the Design of Tasks in an Digital Environment

22:40–23:00 Discussion

Session III

July 17, 14:30–16:30

Location: T316

14:30–14:40 **Introduction**

14:40–14:45 **Jijian Lu**, Xiaoyuan Shen, Yi Lv (Hangzhou Normal University, Hangzhou, CN)
Mathematics VR Teaching Design Mode and Its Practice at Upper Secondary Level: Based on VR All-in-one Computer

14:45–14:50 **Stefan Rothschuh** (University of Calgary, Calgary, CA)
Mobilizing Mathematics: How Technology Enhances Embodied Learning

14:50–14:55 Roberto Capone, Federica Ferretti, Alessandro Gambini, **Camilla Spagnolo** (Free University of Bolzano/Bozen, Forli, IT)
The Reading and the Comprehension of Mathematics Text: An Eye-tracking Study with Primary Pre-service Teachers

14:55–15:00 **Yahya Tabesh** (Polyup Research, US)
Computational Thinking for Mathematical Learning

15:00–15:25 **Discussion**

15:25–15:30 **Jose Orozco-Santiago**, Carlos Armando Cuevas Vallejo, Luc Trouche (CINVESTAV, Mexico City, MX)
Students' Understanding of the Notion of Collinear Vectors in Dynamic Geometry Environment

15:30–15:35 **Chak Him Fung**, Poon Kin-Keung, Michael Besser (Education University of Hong Kong, Hong Kong SAR, China)
Enhancing Metacognition by Using Flipping Classroom with Geogebra

15:35–15:40 **Sofya Lyakhova**, Marie Joubert, Dominic Richard Oakes (Swansea University, Swansea, GB)
Students Coping with a Post-16 Mathematics Course: Flipped Learning, Self-regulation and Technology

15:40–16:00 **Discussion**

16:00–16:30 **Synthesis and Conclusion**

TSG27: The Role of the History of Mathematics in Mathematics Education

Chair: Ysette Weiss (Johannes Gutenberg-University Mainz, Germany)

Co-chair: Desiree van den Bogaart (Amsterdam University of Applied Sciences, the Netherlands)

Team members: Silvia Schoeneburg-Lehnert (University of Leipzig, Germany), Jiachen Zou (East China Normal University, China)

IPC Liaison Person: Maria Alessandra Mariotti (Italy)

Session I

July 13, 14:30–16:30

Location: T423

No.1 **Erika Zubillaga Guerrero**
Methodological Proposal for the Analysis of Historical Sources of Mathematics

No.2 **David Guillemette**
Towards Qualitative and Participative Research on History of Mathematics in Mathematics Education: Some Arguments and Possible Paths

No.3 **Jiaye Han**
The Application of HPM Micro-video in the Teaching of Binomial Theorem

No.4 **Zhuochen Li**
The Design and Cases of Primary School HPM Micro-video

TSG

Session II

July 14, 19:30–21:00

Location: T423

No.1 **Desiree van den Bogaart–Agterberg**

Combining Cognitive Demand with History of Mathematics in Mathematics (Teacher) Education

No.2 **Ysette Weiss**

The Gradual Linearization of German Geometry Teaching

No.3 **Silu Liu**

An Empirical Study on the Impact of Students' Cognition through the Concept of Function Teaching from the Perspective of HPM in Senior High School

Session III

July 16, 21:30–23:00

Location: T230

No.1 **Zhongyu Shen**

The Development of Teachers' MKT: A Case Study of HPM Learning Community

No.2 **Haozhe Jiang**

Enhancing Mathematics Teaching Self-efficacy in Pre-service Teachers: Effects of an HPM Learning Community in Shanghai

No.3 **Yanjun Hong**

A Study on History of Mathematics & Professional Development for Middle School Mathematics Teachers from the Perspective of MKT

Session IV

July 17, 21:30–23:00

Location: T423

No.1 **Silvia Schoeneburg–Lehnert Organum**

Organum Mathematicum – a Mathematical Shrine as Source for Modern Math Education

No.2 **Jorge Soto–Andrade**

The Binary Tree and Its Avatars: From Xiantian to the Eternal Symmetree

No.3 **Qingchun Yu**

An Empirical Research on the Intension of Mathematical Culture Based on the History of Mathematics

TSG28: Preservice Mathematical Teacher Education at Primary Level

Chair: Salvador Llinares (Universidad de Alicante, Spain)

Team members: Hui Jiang (Shanghai Normal University, China), Rukiye Didem Taylan (MEF University, Turkey), Craig Willey (Indiana University, USA)

IPC Liaison Person: Caroline Lajoie (Canada)

Session I

July 13, 14:30–16:30

Location: T226

14:35–14:50

Christin Laschke, Bettina Rösken–Winter, Sven Schüler (Humboldt–Universität zu Berlin, Germany)

How Pre-service Teachers Judge an Unexpected Student Solution – Explicit and Implicit Criteria

14:50–15:05

Ji–Eun Lee¹, Mi Yeon Lee² (¹Oakland University, USA; ²Arizona State, USA)

An Analysis of Preservice Teachers' Noticing of Student Pattern Generalization Strategies

15:05–15:10

Bernabeu, M., Moreno, M., Llinares, S. (University of Alicante, Spain)

Designing Tasks for Support Preservice Primary Teachers' Noticing of Geometrical Thinking

15:15–15:25

Jia He¹, Bo Zhang² (¹Augusta University, USA; ²Yang Zhou University, China)

Preservice Chinese Teachers' Responses of a Student Invented Decimal Division Algorithm

TSG

- 15:25–15:35** **Guðbjörg Pálsdóttir** (University of Iceland, Iceland)
Student Teachers' Noticing of Children's Beliefs and Understanding in Mathematics
- 15:35–15:45** **Qintong Hu**¹, Lynn Hodge², Shande King² (¹Shandong University of Science and Technology, China; ²The University of Tennessee, Knoxville)
Relationship between Preservice Teachers' Knowledge and Their Responses to Students' Errors: Making Word Problems for the Concept of Division
- 15:45–15:55** **Müjgan Baki**, Zeynep Medine Özmen (Trabzon University, Trabzon, Turkey)
A Study on Written Feedback on Preservice Teachers' Teaching Practices and Its Impact on Noticing
- 15:55–16:05** **Zeynep ÖZEL**¹, Mine İŞIKSAL–BOSTAN², Reyhan TEKİN–SİTRAĞA³ (¹Kırıkkale University; ²Middle East Technical University; ³Kırıkkale University, Turkey)
Prospective Teachers' Noticing of Student's Algebraic Thinking: Pattern Generalization
- 16:05–16:15** Hiroko Warshauer¹, **Christina Starkey**², Christine Herrera³, Shawnda Smith⁴ (¹Texas State University; ²Southern New Hampshire University; ³California State University; ⁴Chico Texas Woman's University, USA)
Developing Preservice Teachers' Noticing and Notions of Productive Struggle with Video Analysis

Session II

July 13, 19:30–21:00

Location: T319

- 19:30–19:45** **Gwen Ineson**¹, **Julie Alderton**², Chronoula Voutsina³, Kirsty Wilson⁴, Gina Donaldson⁵, Tim Rowland⁶ (¹Brunel University London; ²University of Cambridge; ³University of Southampton; ⁴University of Birmingham; ⁵Canterbury Christ Church University; ⁶University of Cambridge, UK)
Tracing Threads of Awareness in Initial Teacher Education: Peer-collaboration
- 19:45–19:55** **Kinful Lartebea Aryee**, Immaculate Kizito Namukasa, Marja Bertrand (Western University, USA)
Preservice Mathematics Teacher Education for the Montessori Teachers
- 19:55–20:05** **Sangyeon Park** (University of Florida, USA)
Exploring Pre-service Teachers' Mathematics Learning Experiences and Self-efficacy in Teaching Primary Level Mathematics
- 20:05–20:15** **Xue Han** (National Louis University, USA)
Developing Prospective Teachers' Mental Models of Expertise in Teaching Elementary Mathematics
- 20:15–20:25** **Chikiwa Samukeliso**, Graven Mellony (Rhodes University, South Africa)
Where the Journey to Reflective Practice Begins: A Case of Pre-service Teachers
- 20:25–20:35** **Anjali Khirwadkar**, Candace Figg (Brock University, Canada)
Preservice Teachers Designing Meaningful Digital Learning Environments Using Makerspaces for Math
- 20:35–20:45** **Jean Claude Dushimimana**, Alphonse Uworwabayeho (University of Rwanda, Rwanda)
Situation Analysis on the Teaching and Learning of Statistics and Probability in Teacher Training Colleges

Session III

July 16, 21:30–23:00

Location: T319

- 21:30–21:45** Valentina Celi¹, José Ignacio Cogolludo², Raquel García Catalán³, Elena Gil Clemente⁴, **Inmaculada Lizasoain**⁵, Ana María Millán Gasca⁶, Luigi Regoliosi⁷ (¹Université Bordeaux; ²Universidad de Zaragoza; ³Universidad Pública de Navarra; ⁴Universidad de Zaragoza; ⁵Universidad Pública de Navarra; ⁶Università Roma Tre; ⁷Associazione Tokalon)
Mathematics Workshops: Changing the Perceptions of Both In-service and Prospective Teachers with Regard to Mathematics
- 21:45–22:00** **Rukiye Didem Taylan**, Zelha Tunç-Pekkan, Mustafa Özcan (MEF University, Turkey)
School University Partnership in Mathematics Teacher Education: How Prospective Mathematics Teachers View Their Experiences

TSG

- 22:00–22:10** **Ryan G. Zonnefeld**, Valorie L. Zonnefeld (Dordt University, USA)
Building a University–school Partnership: From Early Missteps to Emerging Success
- 22:10–22:20** **Bridgette A. Fincher¹**, Derrel V. Fincher² (¹Pittsburg State University; ²Oklahoma House of Representatives, USA)
Pre–service Elementary Teachers Do STEM Night: Inquiry Learning and Aha! Moments
- 22:20–22:30** **Dongchen Zhao¹**, Yunpeng Ma² (¹Harbin Normal University, China; ²Northeast Normal University, China)
Features of Exemplary Lessons over Different Decades: A Comparative Analysis of Eleven Elementary Mathematics Lessons in China
- 22:30–22:40** **Mark Arvidson** (Azusa Pacific University, USA)
In What Ways Does a Mathematics Curriculum Based on the Theory of Multiple Intelligences Affect the Attitudes and Beliefs of Pre–service Elementary School Teachers toward Mathematics?
- 22:40–22:50** **Suzanne R. Harper, Dana C. Cox**, Jane M. Keiser (Miami University, USA)
The Impact of Defining Activity on the Beliefs of Prospective Elementary Teachers

Session IV

July 17, 14:30–16:30

Location: T319

- 14:30–14:45** **Montes, M., Martín, J., Pascual, M.I., Climent, N., Carrillo, J.** (University of Huelva, Spain)
Exploring How Prospective Teachers Pose Problems: The Case of $8 \times (-2)$
- 14:45–15:00** **Marjolein Kool¹**, Ronald Keijzer² (¹Hogeschool Utrecht, the Netherlands; ²Hogeschool iPabo, the Netherlands)
Torpedo, a Digital Learning Environment for Developing Mathematical Problem–solving Ability in Primary Teacher Education
- 15:00–15:15** **Melva R. Grant¹**, Signe Kastburg² (¹Old Dominion University, USA; ²Purdue University, USA)
Using Technology for Virtual Representation of Teaching for Developing Math Talk during Problem Solving
- 15:15–15:25** **Suhaidah Tahir**, Masami Isoda, Munirah Ghazali, Dominador Dizon Mangao (Teacher Training Institute, Malaysia)
Pre–service Teachers' Conceptual Understanding of Fractions: Implications for Improving Curriculum Standards and Classroom Practices
- 15:25–15:35** **Norma J. Boakes** (Stockton University, USA)
Integrating EDTPA Preparation in a Methods of Teaching Elementary Mathematics Course
- 15:35–15:45** **Hyun Jung Kang¹**, Paula Guerra Lombardi² (¹University of Northern Colorado, USA; ²Kennesaw State University, USA)
Elementary Preservice Teacher's Understanding of Fraction – In the Context of Fraction Division
- 15:45–15:55** **Alejandro López¹**, Salomé Martínez², Aldo Ramírez², Ricardo Salinas² (¹Universidad Andres Bello, Chile; ²Universidad de Chile, Chile)
Design of a Learning Unit for Pre–service Elementary School Teachers: Definition of the Boundary of a 2D Shape
- 15:55–16:05** **Israel García–Alonso**, Josefa Perdomo–Díaz, **Diana de las Nieves Sosa–Martín** (Universidad de La Laguna, Spain)
Contribution of a Didactic Course on the Development of Primary Pre–service Teachers' Knowledge of Measurement and Geometry
- 16:05–16:15** **Justina Longwe–Mandala** (University of Malawi, Malawi)
Explanatory Talk in the Teaching of Number Concepts and Operations to Pre–service Teachers: A Case of One Mathematics Teacher Educator

TSG29: Preservice Mathematical Teacher Education at Secondary Level

Chair: Olive Chapman (University of Calgary, Canada)

Co-chair: Benita Nel (The University of Cape Town, South Africa)

Team members: Jing Cheng (East China Normal University, China), Tracy Helliwell (University of Bristol, UK), Immaculate Kizito Namukasa (Western University, Uganda)

IPC Liaison Person: Jiansheng Bao (China)

Session I

July 13, 14:30–16:30

Location: W301

- 14:30–14:45** **Kim Beswick** (University of New South Wales, Australia)
[Measuring Prospective Secondary Mathematics Teachers' Knowledge](#)
- 14:45–14:57** **Jacqueline Coomes** (Eastern Washington University, USA)
[Developing Preservice Teachers' Ability to Enact Formative Assessment for Mathematical Practices](#)
- 14:57–15:05** **Ana Henriques**, Hélia Oliveira, Leonor Santos, and Henrique Guimarães (Universidade de Lisboa, Portugal)
[Developing Prospective Teachers' Knowledge to Promote Students' Mathematical Reasoning: Design of a Teacher Education Experiment](#)
- 15:05–15:13** **Na Young Kwon** (Inha University, South Korea)
[A Case Study on Applied Lesson Study for Korean Secondary Pre-service Teachers](#)
- 15:30–15:40** **Judy Anderson**, Debbie Tully (The University of Sydney, Australia)
[Developing an Identity as a Mathematics Teacher: Connecting with the Community of Teacher Graduates](#)
- 15:40–15:48** **Réka Szász** (Budapest Semesters in Mathematics Education, Hungary)
[Emotional Awareness and Support for Preservice Teachers during Micro-teaching](#)
- 15:48–15:56** **Viren Ramdhany** (University of Johannesburg, South Africa)
[Should School and University Mentors Agree in Their Feedback to Pre-service Mathematics Teachers?](#)
- 15:56–16:04** Ruthmae Sears¹, **Cynthia Castro-Minnehan**¹, Laurie Riggs², Pier Junor Clarke³, Jamalee Stone⁴, Charity Cayton⁵, Maureen Grady⁵, Jennifer Oloff-Lewis⁶, Patricia Brosnan⁷, Marilyn Strutchens⁸ (¹University of South Florida, USA; ²Cal Poly Pomona, USA; ³Georgia State University, USA; ⁴Black Hills State University, USA; ⁵East Carolina University, USA; ⁶Chico State University, USA; ⁷Ohio State University, USA; ⁸Auburn University, USA)
[Teacher Candidates' and Mentor Teachers' Perspectives of Using Co-planning and Co-teaching During Clinical Experiences in Secondary Mathematics](#)
- 16:04–16:12** **Kakoma Luneta** (University of Johannesburg, South Africa)
[Mentor Teachers as Inductors of Preservice Mathematics Teachers at Secondary Schools– A Southern African Perspective](#)

Session II

July 14, 19:30–21:00

Location: W301

- 19:30–19:45** **W. Gary Martin**, Marilyn E. Strutchens (Auburn University, USA)
[Transforming Secondary Mathematics Teacher Preparation: A Multi-dimensional Problem](#)
- 19:45–19:57** **Daniel Chazan**, Patricio Herbst (University of Maryland and University of Michigan, USA)
[Teacher Educators' Use of Technology to Represent Instruction](#)
- 19:57–20:05** **Immaculate Namukasa**, George Gadanidis, Derek Tangredi (Western University, Canada)
[Integrating Computational Making Tools in Mathematics Thinking Activities](#)
- 20:05–20:17** **Xiangquan Yao** (Pennsylvania State University, USA)
[Instrumental Genesis and the Growth of Preservice Secondary Mathematics Teachers' Technological Content Knowledge](#)
- 20:17–20:27** **Le Thi Bach Lien**, Tran Kiem Minh (Quang Binh University, Hue University, Vietnam)
[A Situated Approach to Assess Prospective Mathematics Teachers' Professional Competencies](#)

TSG

- 20:27–20:35** **Jeremy Zelkowski**, Tye Campbell (The University of Alabama, USA)
Direct & Indirect Effect Sizes on Secondary Mathematics Teacher Candidates' Content Knowledge & Pedagogical Content Knowledge as Measured by National Examinations: A Structural Equation Modeling Multi-Cohort Longitudinal Study

Session III

July 17, 21:30–23:00

Location: W301

- 21:30–21:42** **Meiyue Jin** (Liaoning Normal University, China)
A case study on the development of pedagogical design capacity of mathematics prospective
- 21:42–21:57** **James A. Mendoza Álvarez**, Theresa Jorgensen, Janessa Beach (The University of Texas at Arlington, USA)
Using Multiple Scripting Tasks to Probe Preservice Secondary Mathematics Teachers' Understanding of Visual Representations of Function Transformations
- 21:57–22:09** **Xiaoying Chen**, Bomi Shin (Chonnam National University, South Korea)
Tertiary and Secondary Mathematical Knowledge for Prospective Teachers: A Comparison on Teacher Employment Tests for Secondary Mathematics in Korea and China
- 22:09–22:17** **Benita Portia Nel** (University of the Western Cape, South Africa)
Investigating the Professional Learning of Pre-service Mathematics Education Students Using Reflection and Collective Feedback to Enhance Teaching
- 22:17–22:25** **Cristina Ochoviet** (Consejo de Formación en Educación, Uruguay)
Concept Cartoon Design in Preservice Teacher Training: An Opportunity to Learn from the Practice
- 22:25–22:35** **M. Kathleen Heid**, Matthew Black (Pennsylvania State University, USA)
Physical Representations and Understanding of Multivariate Functions

TSG30: In-service Mathematical Teacher Education and Mathematical Teacher Professional Development at Primary Level

Chair: Yeping Li (Texas A&M University, USA)

Co-chair: Leonor Santos (Universidade de Lisboa, Portugal)

Team members: Munira Amirali (Aga Khan University Pakistan, Pakistan), Xingfeng Huang (Shanghai Normal University, China), Masakazu Okazaki (Okayama University, Japan)

IPC Liaison Person: Anjum Halai (Pakistan/Tanzania)

Session I

Moderator: Leonor Santos

July 13, 19:30–21:00

Location: T418

- 19:32–19:54** **Xingfeng Huang**, Yunji Zhang (Shanghai Normal University, China)
Chinese Teachers' Learning as Transformation of Didactic Praxeologies in a Cross-cultural Teacher Exchange Programme
- 19:54–20:16** **Sharyn Livy**¹, Janette Bobis², Ann Downton¹, Sally Hughes¹, Maggie Feng², Melody McCormick¹, James Russo¹, Peter Sullivan¹ (¹Monash University, Australia; ²University of Sydney, Australia)
Developing Teachers' Classroom Actions and Pedagogical Knowledge through the Facilitation of Teaching a Challenging Task
- 20:16–20:38** **Kyong Mi Choi**¹, Jihyun Hwang², Jessica Jensen³, Dae Hong², Wesley Cox¹ (¹University of Virginia, USA; ²University of Iowa, USA; ³California Polytechnic University, USA)
Changes in Mathematical Knowledge for Teaching and Belief on Practices through Professional Development Based on Reasoning-modeling Approach
- 20:38–21:00** **Yeping Li**¹, Huirong Zhang², Naiqing Song² (¹Texas A&M University, USA; ²Southwest University, China)
Are Elementary In-service Teachers Confident and Well Prepared in Mathematics They Teach? – The Case of Fraction Division

TSG

Session II

July 16, 21:30–23:00

Moderator: Munira Amirali

Location: T418

- 21:30–21:41** **Leonor Santos**¹, Ana Henriques², Joana Mata–Pereira³, Lurdes Serrazina⁴ (¹Instituto de Educação; ²Universidade de Lisboa; ³Escola Superior de Educação; ⁴Instituto Politécnico de Lisboa, Portugal)
[Mathematical Reasoning and Teacher Education](#)
- 21:41–21:52** **Lurdes Serrazina**¹, Joana Brocardo² (¹Escola Superior de Educação, Instituto Politécnico de Lisboa; ²Escola Superior de Educação, Instituto Politécnico de Setúbal; ^{1, 2}UIDEF; ^{1, 2}Instituto de Educação, Universidade de Lisboa, Portugal)
[In–service Teacher Education for Promoting Mathematics Reasoning in Primary School](#)
- 21:52–22:03** **Derek J. Sturgill** (University of Wisconsin–Stout, U.S.A.)
[Growing through Inquiry: A Story of Three Primary Teachers Investigating Their Practice](#)
- 22:03–22:14** **Ana Paula Canavarro** (Universidade de Évora, Portugal)
[Analyzing Students' Mathematical Productions: A Successful Strategy for the Development of Mathematical Demanding Practices?](#)
- 22:14–22:25** **Ilze France**, Dace Namsonē, Liga Cakane, Ilze Saleniece (University of Latvia, Letonia)
[Math Teachers Competence Assessment to Develop Personalized Professional Learning](#)
- 22:25–22:36** **Babette Moeller**¹, Matt McLeod¹, Teresa Duncan², Jason Schoeneberger³, John Hitchcock⁴, Marvin Cohen⁵ (¹Education Development Center; ²Deacon Hill Research Associates; ³ICF; ⁴Abt Associates; ⁵Bank Street College of Education, USA)
[Assessing the Efficacy of the Math for All Professional Development Program for Primary Teachers and Their Students](#)
- 22:36–22:47** **Viviane Hummes**¹, Adriana Breda¹, Elvira García–Mora¹, Vicenç Font¹, Javier Díez–Palomar¹, Maria José Seckel² (¹University of Barcelona, Spain; ²Universidad Católica del Maule, Chile)
[Drawing on the Didactical Suitability Criteria to Analyse a Lesson Study Enhancing Teachers Competence of Didactical Reflection](#)
- 22:47–22:58** **Hong Yuan** (The City University of New York, USA)
[Insights on Shanghai In–service Primary Mathematics Teachers' Acquisition of Pedagogical Content Knowledge through Teaching Research Group Activities: A Case Study](#)

Session III

July 17, 14:30–16:30

Moderators: Xingfeng Huang, Masakazu Okazaki

Location: T418

- 14:30–14:44** **Masakazu Okazaki**¹, Keiko Kimura², Keiko Watanabe³ (¹Okayama University, Japan; ²Hiroshima–Shudo University, Japan; ³Shiga University, Japan)
[Kyozaikenkyu as Well–formed Story Making for Developing Quality Mathematics Lessons](#)
- 14:45–14:59** **Ban Heng Choy**¹, Jaguthsing Dindyal² (¹National Institute of Education; ²Nanyang Technological University, Singapore)
[Teaching as Professional Learning: Small Steps towards Sustainable Mathematics Teacher Professional Development](#)
- 15:00–15:14** **Nagisa Nakawa**¹, Nanae Matsuo² (¹Kanto Gakuin University; ²Chiba University, Japan)
[Improvement of a Preschool Teacher's Reflection on Pedagogical Content Knowledge during a Professional Development Programme in Japan](#)
- 15:15–15:29** **Jill Cheeseman** (Monash University, Australia)
[Teachers Views of the Effects of the Fostering Inquiry in Mathematics Project](#)
- 15:30–15:44** **Munira Amirali** (Aga Khan University Institute for Educational Development, Karachi, Pakistan)
[Developing Teachers' Knowledge of Fractions: A Case from Karachi, Pakistan](#)
- 15:45–15:59** **Shikha Takker**, K. Subramaniam (Homi Bhabha Centre for Science Education, TIFR, Mumbai, India)
[Contingencies as Moments of Collaboration: A Report on Investigating and Supporting Mathematics Teachers' Knowledge](#)
- 16:00–16:14** **Lawan Abdulhamid**¹, Balarabe Yushau² (¹University of the Witwatersrand, Johannesburg, South Africa; ²Abubakar Tafawa Balewa University, Bauchi, Nigeria)
[Re–conceptualizing Primary Mathematics In–service Teacher Professional Development in](#)

TSG

Nigerian Context

- 16:15–16:29** **Tan Saw Fen** (Wawasan Open University, Bayan Lepas, Malaysia)
[Development of Critical Lenses among Teachers in Lesson Study](#)
- 16:29–16:30** **Wrap-up** (Xingfeng Huang, Masakazu Okazaki, Munira Amirali)

TSG31: In-service Mathematical Teacher Education and Mathematical Teacher Professional Development at Secondary Level (Focus on Scaling Up)

Chair: Konrad Krainer (Alpen-Adria-Universität Klagenfurt, Austria)

Co-chair: Betina Duarte (Universidad Pedagógica Nacional, Argentina)

Team members: Youchu Huang (Shanghai Normal University, China), Talli Nachlieli (Levinsky College, Israel), Craig Pournara (University of the Witwatersrand, South Africa)

IPC Liaison Person: Jill Adler (South Africa)

Session I

July 13, 14:30–16:30

Location: T116

- 14:30–14:50** **Konrad Krainer, Betina Duarte, Youchu Huang, Craig Pournara, Talli Nachlieli**
[Introduction](#)
- 14:50–15:30** **Paul Cobb** (Vanderbilt University, USA)
Invited speaker (40 minutes: 30 minutes input, 10 minutes discussion)
[Investigating What It Takes to Improve the Quality of Mathematics Teaching and Learning on a Large Scale](#)
- 15:30–15:45** **Talli Nachlieli**¹, Einat Heyd-Metzuyan² (¹Levinsky College of Education, Technion, Israel; ²Israel Institute of Technology, Israel)
[Shifting Cultural Contexts: A Professional Development Program towards Cognitively Demanding Instruction](#)
- 15:45–16:00** **Chenfei Zhu**¹, Hongbing Wang² (¹East China Normal University, China; ²Teaching and Researching Department of Nanjing, China)
[How Chinese Mathematics Teachers Prepare for Teaching Competition in Community?](#)
- 16:00–16:15** **Wenjun Zhao**¹, Rui Ning¹, Xiaoxia Zhang², Chuan Zeng³, Xianjia He³, Jun Wen³
(¹Sichuan Normal University, China; ²Teacher (cadre) Development Center, China; ³Chengdu Experimental Foreign Language School West Campus, China)
[Linking Theories and Practices: Understanding Teachers' Learning in Chinese Lesson Study through Activity Theory Perspective](#)
- 16:15–16:30** **Discussion**

Session II

July 14, 19:30–21:00

Location: T116

- 19:30–19:40** **Craig Pournara** (University of the Witwatersrand, South Africa)
[Scaling Up a Mathematics Professional Development Course in South Africa and Its Impact on Students](#)
- 19:40–19:50** **Tamsyn Margaret Terry** (University of Canberra, Australia)
[Action Learning: A Tool to Help Teachers Promote Self-regulation \(SR\) in Students](#)
- 19:50–20:00** **Discussion**
- 20:00–20:07** **Pilar Peña**¹, **Horacio Solar**¹, Constanza San Martín², Florencia Gómez¹ (¹Pontificia Universidad Católica de Chile, Chile; ²Universidad Diego Portales, Chile)
[Collaboration between Mathematics and Special Education Teachers to Promote](#)

Argumentation as an Inclusive Practice

- 20:07–20:14** Lillie R. Albert, Chi–Keung Cheung, **Solomon Friedberg** (Boston College, USA)
Developing and Supporting Exemplary Mathematics Educators in High Need Schools
- 20:14–20:21** **Ralf Nieszporek**, Birgit Griese, Rolf Biehler (Paderborn University, Germany)
Professional Development Facilitators and Their Learning Goals towards a PD Course on Teaching Probability and Inferential Statistics
- 20:21–20:28** **Adnan Baki**, Bülent Güven, Aslihan Batur (Trabzon Üniversitesi, Artvin Çoruh Üniversitesi, Turkey)
Investigation of Secondary Mathematics Teachers' Noticing of Students' Mathematical Thinking in Numbers, Algebra, Geometry, Statistics and Probability
- 20:28–20:35** **Limin Chen**¹, Caroline Williams–Pierce², Min Jing, Lieven Verschaffel³ (¹Shenyang Normal University, Shenyang, China; ²University of Maryland, College Park, Maryland, America; ³Center for Instructional Psychology and Technology, KU Leuven, Belgium)
An Investigation on Mathematics Teachers' Professional Development in Rural China
- 20:35–20:42** **Nouzha El Yacoubi** (Mohammed V University, Rabat, Morocco)
In–service Mathematical Teacher Education in Morocco: Impediments and Challenges
- 20:42–21:00** **Discussion**

Session III

July 16, 21:30–23:00

Location: T132

- 21:30–21:40** **Zhen Feng Eric Koh**, Leng Low, Ngan Hoe Lee (Yusof Ishak Secondary School, Academy of Singapore Teachers, National Institute of Education, Singapore)
Sustainability and Scaling Up of School–based Teacher Professional Development Programme
- 21:40–21:50** **Karen Hollebrands**, Hollylynne S. Lee (North Carolina State University, USA)
Effective Design of Massive Open Online Courses to Support Mathematics Teachers' Professional Learning
- 21:50–22:00** **Discussion**
- 22:00–22:07** **Derya ÇELİK**¹, Mustafa GÜLER¹, Rukiye Didem TAYLAN², Müjgan BAKI¹, Esra Bukova GÜZEL³, Fatma Aslan TUTAK⁴, Damla KUTLU¹, Aytuğ Özaltun ÇELİK⁵
(¹Trabzon University, Fatih Faculty of Education, Department of Mathematics Education, Turkey; ²MEF University, Faculty of Education, Department of Mathematics Education, Turkey; ³Dokuz Eylül University, Buca Faculty of Education, Department of Mathematics Education, Turkey; ⁴Boğaziçi University, Faculty of Education, Department of Mathematics Education, Turkey; ⁵Pamukkale University, Faculty of Education, Department of Mathematics Education, Turkey)
Developing an E–mentoring Professional Development Program in Supporting Pedagogical Content Knowledge of Novice Mathematics Teachers: A Design–based Study
- 22:07–22:14** **Christoph Look**, Christin Laschke, Bettina Roesken–Winter, Rebekka Stahnke (Humboldt–Universität zu Berlin, Germany)
Using Videos to Foster Facilitators' Noticing in the Field of Language–responsive Mathematics Teaching
- 22:14–22:21** **Luyishou Ma** (Shanghai Normal University, China)
Investigation on the Identification and Group Differences of Professional Development Approaches of Mathematics Teachers
- 22:21–22:28** **Yan Deming**, Wang Hongwei (School of Mathematics and Statistics, Henan Finance University, Henan Zhengzhou 450046, China)
Survey and Analysis of Confusion of the Implementation of the New Curriculum for High School Mathematics Teachers in Henan Province
- 22:28–22:35** **Ming–Yan Tsui**, Ida A. C. Mok (The University of Hong Kong, Hong Kong SAR, China)
Changes in Mathematics Teachers' Technology Acceptance after the Implementation of

TSG

BYOD Scheme

22:35–22:42 **Soo Kyung Jeon**, Cheong–Soo Cho (Sangwon High School, YeungNam University, South Korea)
[Difficulties of Using Technology in Mathematics Classes: A Study of Secondary Mathematics Teachers in Korea](#)

22:42–23:00 **Discussion**

Session IV

July 17, 21:30–23:00

Location: T116

21:30–21:40 Joana Mata–Pereira, **João Pedro da Ponte** (Instituto de Educação, Universidade de Lisboa, Portugal)
[Enhancing Students' Mathematical Reasoning through a Professional Development Experiment](#)

21:40–21:50 Robert Weinhandl, **Stefanie Schallert** (Johannes Kepler University, Linz, Austria)
[Exploring Online Learning Environments in Professional Development for Scaling–up Educational Innovations](#)

21:50–22:00 **Discussion**

22:00–22:07 **Freyja Hreinsdóttir** (School of Education, University of Iceland, Iceland)
[On the Efficiency of a Professional Development Program for Mathematics Teachers in Upper–secondary Schools in Iceland](#)

22:07–22:14 **Steffen Lünne**, Rolf Biehler (Paderborn University, Germany)
[Out–of–field Teachers' Acquisition of School–related Content Knowledge during a Professional Development Course](#)

22:14–22:21 **Ilana Horn** (Vanderbilt University, Nashville, US)
[Windows on the Backstage of the Classroom: Using Video to Support Mathematics Teachers Conceptual Change about Instruction](#)

22:21–22:28 **Victoria Mamani Choque** (Universidad Pedagógica, Bolivia)
[Postgradual Training of Masters and Masters of Mathematics in Bolivia](#)

22:28–22:40 **Discussion**

22:40–23:00 **Summary and Closing**

TSG32: Knowledge in/for Teaching Mathematics at Primary Level

Chair: Stephane Clivaz (Haute École Pédagogique de Vaud, Switzerland)

Co–chair: Polly Lao (The Open University of Hong Kong, Hong Kong SAR China)

Team members: Janne Fauskanger (University of Stavanger, Norway), Verónica Martín Molina (University of Sevilla, Spain)

IPC Liaison Person: Catherine Vistro–Yu (Philippines)

Session I

July 13, 19:30–21:00

Location: W303

19:30–19:40 **Introduction**

19:40–19:55 **Lilian Cristina de Souza Barboza**, Etienne Lautenschlager (Federal University of ABC (UFABC); Federal University of Rio Grande do Norte (UFRN), Brazil)
[Teachers' Knowledge of the Early Years and the Sign of Equality: An Investigation with Professional Learning Task](#)

19:55–20:05 **Yolanda Chávez Ruiz**, Lorena Trejo Guerrero (Escuela Normal de Rincón de Romos, Universidad Nacional Autónoma de México, Mexico)

Addition and Multiplication Teaching in the Multi-grade Primary School

- 20:05–20:15** **Discussion**
- 20:15–20:30** **Carolyn A. Maher**, James A. Maher, Louise Cherry Wilkinson (Rutgers University, Syracuse University, USA)
[Primary Teachers' Recognition of Students' Mathematical Reasoning and Beliefs about Teaching and Learning](#)
- 20:30–20:45** **Christine Alyssa Herrera**, Shawnda Rae Smith, Christina Starkey, Hiroko Kawaguchi Warshauer (California State University, Chico, Texas Women's University, Southern New Hampshire University, Texas State University, USA)
[Exploring Preservice Teachers' Noticing of Resources That Support Productive Struggle and Promote Equity](#)
- 20:45–20:55** **Barbara Beata Pieronkiewicz** (Institute of Mathematics, Pedagogical University of Cracow, Poland)
[Why Does \$1/4:1/5\$ Equal \$5/4\$? A Case of a Post-graduate Student's Understanding of Common Fractions Division](#)
- 20:55–21:00** **Discussion**

Session II

July 16, 21:30–23:00

Location: W303

- 21:30–21:35** **Introduction**
- 21:35–21:45** **Mi Yeon Lee**, Ji-Eun Lee (Arizona State University, Tempe, USA)
[Elementary Preservice Teachers' Expected Challenges in Teaching Pattern Generalization](#)
- 21:45–21:55** **Muteb M. Alqahtani**, Arthur Belford Powell (State University of New York at Cortland, Rutgers University–Newark, USA)
[Affordances of Measurement Approach: Pre-service Teachers' Knowledge of Fraction Magnitude](#)
- 21:55–22:10** **Verónica Martín-Molina** (Universidad de Sevilla, Spain)
[Pre-service Primary Teachers' Knowledge and the Mathematical Practice of Defining](#)
- 22:10–22:25** **Discussion**
- 22:25–22:55** **Randolph Philipp**, John (Zig) Siegfried, Eva Thanheiser (San Diego State University, San Diego, USA)
[Seeing Mathematics through the Lens of Children's Mathematical Thinking: A Perspective on the Enhancement of Mathematical Knowledge for Teaching](#)
- 22:55–23:00** **Discussion**

Session III

July 17, 14:30–16:30

Location: W303

- 14:30–15:00** **Elisabeth Rathgeb-Schnierer** (University of Kassel, Germany)
[Flexibility in Mental Calculation](#)
- 15:05–15:15** **Thevarasa Mukunthan** (The Open University of Sri Lanka, Colombo, LK)
[Achievement Levels in Mathematics of the Primary School Grade 4 Children in Sri Lanka](#)
- 15:15–15:25** **Gönül Günes**, Furkan Keleş (Trabzon University, Fatih Education Faculty, Department of Basic Education, Turkish Ministry of Education, Turkey)
[An Analysis of Novice Primary School Teachers' Knowledge of Mathematics Curriculum](#)
- 15:25–15:40** **Stéphane Clivaz, Valérie Batteau**, Audrey Daina, Luc-Olivier Bunzli, Sara Presutti (Lausanne University of Teacher Education, Switzerland)
[Towards a Dialogic Analysis of Mathematical Problem-solving Knowledge for Teaching in a Lesson Study Group](#)
- 15:40–15:50** **Discussion**
- 15:50–16:05** **Reidar Mosvold, Janne Fauskanger**, Kjersti Wæge, Raymond Bjuland (Norwegian University of Science and Technology, University of Stavanger, Norway)

TSG

- 16:05–16:20** **Kam Ling Lao** (The Open University of Hong Kong, Hong Kong SAR, China)
[A Comparative Study on the Professional Knowledge of Elementary Mathematics Teachers in Shanghai and Hong Kong – From Two Scenarios in Data Handling and Geometry](#)

TSG33: Knowledge in/for Teaching Mathematics at Secondary Level

Chair: Nils Buchholtz (University of Oslo, Norway)

Co-chair: Miguel Ribeiro (University of Campinas, Brazil)

Team members: Miroslawa Sajka (Pedagogical University of Cracow, Poland), Thorsten Scheiner (Australasian Catholic University, Australia), Qiaoping Zhang (The Education University of Hong Kong, Hong Kong SAR, China)

IPC Liaison Person: Catherine Vistro–Yu (Philippines)

Session I

July 13, 14:30–16:30

Location: T323

14:30–14:50 **TSG organizing team**

[The team will introduce to the main topics of the TSG 33](#)

14:50–15:10 **Thorsten Scheiner** (Institute for Learning Sciences & Teacher Education, Australian Catholic University, Australia)

[Critical Remarks on The Notion of Unpacking Mathematics in Discourses of Teacher Knowledge](#)

15:10–15:30 **Dandan Sun** (School of Mathematical Sciences, East China Normal University, China)

[What Subject Matter Knowledge Do Chinese In-service Junior Middle School Teachers Lack?](#)

15:30–15:40 **Mailizar Mailizar** (Universitas Syiah Kuala, Banda Aceh, Indonesia)

[Assessing the Relationship between Teachers' Knowledge and Classroom Practices in the Use of ICT in the Secondary Mathematics Classroom](#)

15:40–15:50 **Rahmah Johar**, Munirah Ghazali, Mailizar, Suci Maulina (Universitas Syiah Kuala & Universiti Sains, Malaysia)

[Number Sense of Teachers in Different School Levels](#)

15:50–16:00 **Binod Prasad Pant**, Bal Chandra Luitel, Indra Mani Shrestha (Kathmandu University, Nepal)

[Arts Integrated Pedagogy for Meaningful Mathematics Teaching and Learning](#)

16:00–16:10 **Achmad Nizar**, Merrilyn Goos, Niamh O'Meara, Ciara Lane (University of Limerick, Ireland)

[Uncovering Mathematics Teaching Knowledge of Out-of-field Mathematics Teachers](#)

16:10–16:20 **G.M. Wadanambi**¹, Frederick K.S. Leung² (¹Nilwala National College of Education, Sri Lanka; ²The University of Hong Kong, Hong Kong SAR, China)

[A Study of Sri Lanka's Pre-service Mathematics Teachers' Pedagogical Content Knowledge](#)

16:20–16:30 **Discussion**

Session II

July 14, 19:30–21:00

Location: T323

19:30–19:40 **TSG organizing team**

[Introduction to session 2 TSG 33](#)

19:40–20:00 **Ruti Segal**, Atara Shriki, Boaz Silverman, Nitsa Movshovitz–Hadar Oranim (Academic College of Education, Kibbutzim College of Education, Technion –I.I.T, Israel)

Interweaving Mathematics–news–snapshots in Class: Implications for Teachers’ Horizon Content Knowledge

- 20:00–20:20** **Veronika Hubeňáková**, Ute Sproesser, Ingrid Semanišínová (Pavol Jozef Safarik University in Košice, Ludwigsburg University of Education)
Comparing German and Slovak Teachers’ Knowledge of Content and Students Related to Functions
- 20:20–20:30** **Miguel Ribeiro**, Marlova Caldato, Milena Policastro (State University of Campinas – UNICAMP, Brazil; Federal Technological University of Paraná – UTFPR, Brazil)
A Focus on the Specificities of Teachers’ Knowledge for Improving Teacher Education: The Case of the MTSK Conceptualization
- 20:30–20:40** **Maria D. Cruz Quiñones¹**, Mourat Tchoshanov², Héctor Jesús Portillo Lara¹, Carlos Paez³, Rocio Gallardo² (¹Universidad Autónoma de Cd. Juárez, ²University of Texas at El Paso, ³Navajo Technical University)
The Influence of Teaching Experience on Mathematical Teacher Content Knowledge at Middle School Level
- 20:40–20:50** **Sarah Sparks**, Alees Lee, Katie Morrison, Gulden Karakok (University of Northern Colorado)
Implementation of Eight Teaching Practices for Teaching Problem Solving
- 20:50–21:00** **David Alfonso Páez¹**, Cesar Martínez Hernández², Daniel Eudave Muñoz¹, Teresa de J. Cañedo Ortiz¹ (CONACyT, ²Universidad de Colima, & ¹Universidad Autónoma de Aguascalientes)
Teacher’s Mathematical Knowledge in Solving a System of Linear Equations. A Case Study

Session III

July 17, 14:30–16:30

Location: T226

- 14:30–14:40** **TSG organizing team**
Introduction to session 3 TSG 33
- 14:40–15:00** **Rüya Savuran**, Mine İşıksal–Bostan (Middle East Technical University, Turkey)
A Preservice Secondary Mathematics Teacher’s Specialized Knowledge: The Case of Limit
- 15:00–15:20** **Anna Hoffmann**, Ruhama Even (Weizmann Institute of Science, Israel)
What Do Teachers Learn about What Mathematics Is in Academic Mathematics Courses?
- 15:20–15:40** **Yi–An Cho** (Hsin Chu Senior Industrial Vocational School, Taiwan, China)
High–school Mathematics Teacher’s Horizon Content Knowledge: A Case Study
- 15:40–15:50** **Fatma Aslan–tutak**, Buket Semercioglu Kapcak (Bogazici University, Turkey)
Mathematical Quality of Geometry Instruction of a Novice High School Teacher in Terms of Richness of Mathematics
- 15:50–16:00** **Zeynep Pehlivan**, Fatma Aslan–Tutak Achmad (Bogazici University & Bogazici University, Turkey)
Investigation of Preservice Mathematics Teachers’ Translations among Multiple Representations
- 16:00–16:10** **Florence Thomo Mamba** (Mathematics and Statistics Department, University of Malawi–Polytechnic, The Republic of Malawi)
Preservice Secondary School Teacher’s Errors When Translating between Representations
- 16:10–16:20** **Mirosława Sajka** (Institute of Mathematics, Pedagogical University of Cracow, Poland)
Influence of Everyday Experience on Pre–service Teachers Subject Matter Knowledge of Functions
- 16:20–16:30** **Discussion**

TSG

Session IV

July 17, 21:30–23:00

Location: T323

- 21:30–21:50** **Agida G. Manizade**, Dragana Martinovic (Radford University, USA; University of Windsor, Canada)
[Connecting Knowledge for Teaching Geometry at the Secondary Level with Instructional Quality in Mathematics Teaching](#)
- 21:50–22:10** **Nicholas H. Wasserman**, Keith Weber, Juan Pablo, Mejia–Ramos, Timothy Fukawa–Connelly (Columbia University & Rutgers University, USA)
[Upgrading Learning for Teachers in Real Analysis \(ultra\): An Instructional Model for Secondary Teacher Education](#)
- 22:10–22:30** **Elizabeth G. Arnold**, Elizabeth A. Burroughs, Elizabeth W. Fulton, James A. Mendoza Álvarez (James Madison University, Montana State University & University of Texas at Arlington, USA)
[Applications of Teaching Secondary Mathematics in Undergraduate Mathematics Courses](#)
- 22:30–22:40** **Heather Bleecker**, Polly Dupuis (Salish Kootenai College)
[Mathematics Teachers' Perceptions of Teaching Competencies: A Study of Grades 5 through 8](#)
- 22:40–22:50** Jodie D. Novak, Robert A. Powers, Alees T. Lee, **Michelle (Morgan) King**, Adam Ruff, Shweta Naik (University of Northern Colorado & Western Colorado University, USA)
[Identifying Mathematical Learning Opportunities in a Task as a Missing, Essential Skill of Teaching](#)
- 22:50–23:00** **Discussion**

TSG34: Affect, Beliefs, and Identity of Mathematics Teachers

Chair: Francesca Morselli (University of Goenoa, Italy)

Co–chair: Einat Heyd–Metzuyanim (Technion – Israel Institute of Technology, Israel)

Team members: Narumon Changsri (Khon Kaen University, Thailand), Forster Ntow (University of Cape Coast, Ghana), Shengying Xie (Hunan Normal University, China)

IPC Liaison Person: Jiansheng Bao (China)

Session I

July 13, 19:30–21:00

Location: T519

- 19:30–19:35** **Introduction to the TSG34**
- 19:35–19:50** **Dionne Cross Francis**¹, Ji Hong, Jinqing Liu¹, Ayfer Eker², Pavneet Kaur Bharaj, MiHyun Jeon¹ (¹Indiana University, US, ²Giresun University, University of Oklahoma, US, Turkey)
[Examining Teachers' Emotional Experiences through the Process of Mathematics Instructional Change](#)
- 19:50–20:05** **Wilfred W.F. Lau** (The Chinese University of Hong Kong, Hong Kong SAR, China)
[Investigating Changes in Attitudes toward Calculus of Pre–service Mathematics Teachers Enrolled in a Pedagogy Course](#)
- 20:05–20:10** **Hui Min Chia**, Xuanzhu, Jin, Qiaoping Zhang (The Education University of Hong Kong, Hong Kong SAR, China)
[Comparing Espoused Values in Mathematics Teaching between Novice and Experience Primary Teachers: A Case Study in Mainland China](#)
- 20:10–20:15** **Kanita Pamuta**¹, Narumon Changsri^{1,2}, Maitree Inprasitha¹ (¹Mathematics Education Program, Faculty of Education, KKU, ²Center for Research in Mathematics Education, KKU)
[Mathematics Student Teachers' Self–efficacy Beliefs on Teaching](#)
- 20:15–20:20** **Elizar Elizar**, Cut Khairunnisak (Universitas Syiah Kuala, ID)
[Teacher's and Students' Beliefs Concerning Higher Order Thinking in Mathematics: Are They](#)

TSG

on the Same Page?

20:20–20:30 Discussion on the Short Papers 4, 5, 6

20:30–20:35 Gabriella Pocalana (Università degli Studi di Torino, Italy)

What Kind of Students Should Deserve Challenging, Laboratory and Inquiry-based Mathematical Activities?

20:35–20:40 Harita Raval, Aaloka Kanhere (Homi Bhabha Centre for Science Education, TIFR)

Understanding Open Exploration in a Classroom

20:40–20:45 Candy Clara Ordoñez Montañez¹, Gina Patricia Paz Huamán² (¹Peruvian Research Association in Mathematical Education, ²Ministry of Education)

A Study on Conceptions of Trainers of Mathematics Teachers in Pedagogical Superior Educational Institutes of Peru in Relation to Mathematics and Their Teaching

20:45–21:00 Discussion on the Papers 8, 9, 10

Session II

July 16, 21:30–23:00

Location: T519

21:30–21:35 Introduction

21:35–21:50 Sonja Lutovac, Raimo Kaasila (Faculty of Education, University of Oulu)

'There Are So Many Ways to Fail': Pre-service Elementary School Teachers Define Failure in Mathematics

21:50–22:05 Einat Heyd-Metzuyanin, Talli Nachlieli (Technion – Israel Institute of Technology)

Teacher's Identity Negotiation while Presenting Themselves on Video in a Professional Development Setting

22:05–22:20 Diane Dalby, Andrew Noyes (University of Nottingham, UK)

The Changing Professional Identities of Mathematics Teachers within Further Education in England

22:20–22:25 Tara Paudel (Department of Mathematics Education, Tribhuvan University, Mahendraratna Campus, Tahachal, Nepal)

Identity Construction of Female Mathematics Teachers in Professional Life: A Narrative Inquiry

22:25–22:30 Forster D. Ntow¹, Jill Adler² (¹University of Cape Coast, Ghana; ²University of the Witwatersrand, South Africa)

Learning and Developing as a Mathematics Teacher Educator

22:30–22:35 Jukyung Park¹, Youngyoul Oh² (¹Graduate School of Education, Seoul National University of Education, Korea; ²Seoul National University of Education, Korea)

Understanding South Korean Elementary Mathematics Teachers' Identities in Relation to Their Professional Development

22:35–22:50 Discussion on the Papers 16, 17, 18

22:50–23:00 Discussion

Session III

July 17, 14:30–16:30

Location: T519

14:30–14:35 Introduction

14:35–14:50 Lars Jenßen, Regina Möller, Bettina Roesken-Winter (Humboldt-Universität zu Berlin, Germany)

Shame: A Significant Emotion Influencing Pre-service Primary School Teachers' Mathematics Education

14:50–15:05 Annalisa Cusi¹, **Francesca Morselli²** (¹University of Rome "La Sapienza", ²University of Genoa, Italy)

Prospective Teachers' Attitude towards Mathematics and Its Teaching: Stories of Development

15:05–15:20 Qiaoping Zhang, **Xuanzhu Jin**, Hui Min Chia (Department of Mathematics and Information Technology, The Education University of Hong Kong, Hong Kong SAR, China)

Affect in Mathematics Curriculum in Mainland China: A Review of Seventy Years in

TSG

Compulsory Education

- 15:20–15:35** **Wanda Masondo** (University of the Witwatersrand, Johannesburg, South Africa)
Using a Quantitative Approach to Explore Teachers' Identity in Mathematics
- 15:35–15:40** **Zheng Jiang**¹, Ida Ah Chee Mok¹, Jinbo Tang² (¹The University of Hong Kong, Hong Kong SAR, China ²Shenzhen High School of Science, China)
Mathematics Teacher Emotions during Classroom Practice: A Case Study in Mainland China
- 15:40–15:45** **Indra Mani Shrestha**, Bal Chandra Luitel, Binod Prasad Pant (School of Education, Kathmandu University, Nepal)
Touching the Untouchables: Promoting Non/Linear Mathematics Pedagogy
- 15:45–15:55** **Discussion on the Papers 26,27**
- 15:55–16:00** **Hanna Viitala** (University of Helsinki, Finland, Luleå University of Technology, Sweden)
Excited but Sceptical: Examining Teachers' Motivational Aspects for a Professional Development Project
- 16:00–16:05** **David Tannor** (Kellogg Community College, US)
Two-year College: Teacher Self-efficacy and Knowledge Levels for Effective Mathematics Instruction
- 16:05–16:15** **Discussion on the Papers 29,30**
- 16:15–16:30** **Final Discussion**

TSG35: Knowledge and Practice of Mathematics Teacher Educator

Chair: Maria Giuseppina Barttolini Bussi (Università di Modena e Reggio Emilia, Italy)

Co-chair: Paola Sztajn (North Carolina State University, USA)

Team members: Chi-Tai Chu (Taiwan Normal University, Taiwan, China), Ruchi Kumar (Tata Institute for Fundamental Research, India), Nada Vondrova (Charles University, Czech)

IPC Liaison Person: Binyan Xu (China)

Session I

July 13, 14:30–16:30

Location: T316

14:30–15:00 Mariolina, **Bartolini Bussi** (Department of Education and Humanities, Italy)
Introduction

15:00–15:30 **Merrilyn Goos**¹, Margaret Marshman² (¹University of Limerick, Ireland; ²University of the Sunshine Coast, Australia)
Boundary Crossing and Mathematics Teacher Educators' Hybrid Identities

15:30–15:50 **Discussion**

15:50–16:00 **Short Break**

16:00–16:10 **Ruchi S. Kumar** (Tata Institute of Social Sciences, India)
Analyzing Challenges in the Practice of a Math Teacher Educator for Developing Community of Math Educators

16:10–16:15 **Discussion**

16:15–16:25 **Nada Vondrova** (Charles University, CZ)
Mathematics and Science Teacher Educators Learning Induced by Common Research on Professional Vision

16:25–16:30 **Discussion**

TSG

Session II

July 14, 19:30–21:00

Location: T316

19:30–19:40 **Melissa Soto**¹, Lara Dick², Mollie Appelgate³, Dittika Gupta⁴ (¹San Diego State University, US; ²Bucknell University, US; ³Iowa State University, US; ⁴Midwestern State University, US)

Using a Community of Practice Perspective to Analyze Mathematics Teacher Educator Learning during Lesson Study

19:40–19:45 **Discussion**

19:45–19:55 **Zhenzhen He**, feishi Gu, lingyuan Gu (Shanghai Normal University, CN)

Characterizing Mathematics Teaching Research Specialists' Mentoring in the Context of Chinese Lesson Study

19:55–20:00 **Discussion**

20:00–20:05 **Carola Manolino**¹, Viviane Hummes², Adriana Breda², Alicia Sánchez², Vicenç Font² (¹University of Torino, Italy; ²University of Barcelona, Spain)

Didactical Suitability Criteria Used by Italian Teachers in Lesson Studies

20:05–20:10 **Alessandro Ramploud**¹, Maria Mellone², Silvia Funghi³, Simone Esposito² (¹University of Pisa, Italy; ²University of Naples, Italy; ³University of Modena and Reggio Emilia, Italy)

The Lesson Studys Cultural Transposition: From Chinese Lesson Study to Italian Lesson Study

20:10–20:15 **Yingkang Wu** (East China Normal University, CN)

Using a Nested Structure of Lesson Study Approach: A Self-study as a Mathematics Teacher Educator

20:15–20:20 **Daniela Pages** (Consejo de Formacion en Educacion, UY)

A Collaborative Work of Four Mathematics Teacher Educators. A Study in Uruguay

20:20–21:00 **General Discussion: Lesson Study**

Session III

July 16, 21:30–23:00

Location: T234

21:30–21:35 **Introduction**

21:35–21:45 **Paola Sztajn**¹, Kristen Malzahn², Reema Alnizami³ (¹North Carolina State University, USA; ²Horizon Research Inc., USA; ³North Carolina State University, USA)

Teacher Educators' Preparation Model: Example from a Successful Professional Development

21:45–21:50 **Discussion**

21:50–21:55 **Lindsay Keazer**¹, Kathleen Nolan² (¹Sacred Heart University, USA; ²University of Regina, Canada)

A Collaborative Self Study of Two Mathematics Teacher Educators Learning and Growing as Culturally Responsive Pedagogues

21:55–22:00 **Craig Joseph Willey**¹, Michael Richard Lolkus², Jill Newton³, Troy Bell⁴ (¹Indiana University–Indianapolis, US; ²Purdue University, US; ³Purdue University, US; ⁴Purdue University, US)

Exploring Power and Oppression: A Study of Mathematics Teacher Educators' Professional Growth

22:00–22:05 **Hwa Young Lee**, Emily Miller, Travis Weiland, Tuyin An, Daniel Clark (Texas State University, KR)

Differing Contexts and Tensions Mathematics Teacher Educators Experience in Content Courses for Elementary Preservice Teachers

22:05–22:15 **Discussion of the first short oral of the day**

TSG

- 22:15–22:20** **Chadd McGlone** (Teachers2Teachers Global, US)
Developing Mathematics Education Leaders in Schools in Guatemala and Implications for Work in Other Countries
- 22:20–22:25** **Natalia Ruiz**, Nicole Fuenzalida & Luz Valoyes–Chávez (University of Chile, Chile)
Transitioning between Different Identities: How the Different Positions Assumed by the Mathematics Teacher Educator Impact Their Practice
- 22:25–22:30** **Helena Montenegro**¹, Salomé Martínez², Francisco Rojas¹ (¹Pontificia Universidad Católica de Chile, Chile; ²Center for Mathematical Modeling, Chile)
Mathematics Teacher Educators as Role Model: Intentions and Strategies
- 22:30–22:35** **Francisco Rojas**¹, Helena Montenegro¹, Flavio Guiñez², Marco Catalán¹, Valentina Giaconi³ (¹Pontificia Universidad Católica de Chile, Chile; ²Universidad de Chile, Chile; ³Universidad de O'Higgins, Chile)
Experience of Learning to Teach Mathematics: What Do Prospective Teachers Learn from Their Mathematics Teacher Educators?
- 22:35–22:40** **Sagar Dahal** (Kathmandu University School of Education, Nepal)
Narratives of Maths Teachers: Students & Teacher Ratio in Mathematics Classes in Private Schools
- 22:40–23:00** **General Discussion of the short orals**

Session IV

July 17, 21:30–23:00

Location: T316

21:30–21:35 **Introduction**

- 21:35–21:40** **Haw–Yaw Shy**¹, Ting–Ying Wang², Yen–Ting Chen³, Chi–Tai Chu², Chen–Ju Pai¹, Mei–Hsien Chen⁴ (¹Changhua Normal University, Taiwan, China; ²Taiwan Normal University, Taiwan, China; ³Taichung University of Education, Taiwan, China; ⁴Liuqiu Junior High School, Taiwan, China)
Integrated Mathematics Teacher Educators' Professional Development Program
- 21:40–21:45** **Cengiz Alacaci**¹, Bulent Cetinkaya², Ayhan Kursat Erbas³ (¹University of Agder, Norway; ²Middle East Technical University, Turkey; ³Middle East Technical University, Turkey)
Talking across Professional Communities: Teacher Educator Competencies in Mathematics and in Technology
- 21:45–21:50** **Dinglei Huang** (Independent Researcher)
Mathematics Teacher Educators' Knowledge for Designing Online Professional Development
- 21:50–21:55** **Annie Mamoretsi Kgosi** (University of the Witwatersrand, South Africa)
Mathematics Teachers' Professional Noticing in Teaching of Inverse Functions and Graphs in Grade 12
- 21:55–22:25** **Discussion of the first papers**
- 22:25–22:30** **Marta Kobile** (McGill University)
Examining Teacher Educator Noticing during Rehearsals of Teaching: A Focus on Attending
- 22:30–22:35** Signe Kastberg, Lizhen Chen, **Sue Ellen Richardson**, Mahtob Aqazade (Purdue University, USA)
Mathematics Teacher Educator Care and Questioning in Mathematics Methods Early Field Debriefing Discussions
- 22:35–22:40** **Amrit Bahadur Thapa** (Ohio University, USA)
Un/Intelligent Way to Professional Development of Mathematics Teachers: A Case from Nepal
- 22:40–23:00** **General discussion – Conclusions**

TSG36: Research on Classroom Practice at Primary Level

Chair: Shuhua An (California State University, Long Beach, USA)

Co-chair: Birgit Brandt (Technical University of Chemnitz, Germany)

Team members: Benedetto Di Paola (University of Palermo, Italy), Wanzala Batalingaya Richard (Busuubizi Primary teachers' college, Uganda), Jiushi Zhou (Tianjin Normal University, China)

IPC Liaison Person: Anjum Halai (Pakistan/Tanzania)

Session I

July 13, 19:30–21:00

Location: W201

- 19:30–20:00** **Carolyn A. Maher** (Rutgers University, US)
[The Benefits of Using Videos from Research Studies for Teacher Education: Attending to Students' Reasoning and Argumentation](#)
- 20:00–20:15** **Jinqing Liu**¹, Dionne Cross Francis², Ayfer Eker³ (¹Indiana University; ²University of North Carolina; ³Giresun University)
[Examining U.S. Elementary Teachers' Perceptions of and Comfort with Students' Mathematical Mistakes](#)
- 20:15–20:30** **Benedetto Di Paola** (Università degli Studi di Palermo, Italy)
[Problems With Variation: An Educational Experience of Cultural Transposition with Prospective Primary Teachers](#)
- 20:30–20:40** **Min Zhang** (Teaching Research Section of Shanghai Municipal Education Commission)
[Shanghai Practice of Primary Mathematics Classroom Activities](#)
- 20:40–21:00** **Open Discussion**

Session II

July 16, 21:30–22:00

Location: W201

- 21:30–22:00** **Pi-Jen Lin** (Taiwan Tsing-Hua University, Taiwan, China)
[Conjecturing Teaching as Competency-based Instruction](#)
- 22:00–22:15** **Valérie Batteau** (HEP Lausanne, Switzerland)
[How Does a Japanese Primary School Teacher Manage the Whole-class Discussion Named Neriage?](#)
- 22:15–22:25** **Edith Arévalo Vázquez**, Hilda Alicia Guzmán Elizondo, Elvira Alicia Sánchez Díaz (Escuela Normal Miguel F. Martínez, Mexico)
[Teaching Mathematics at Mexican Elementary Schools](#)
- 22:25–22:35** **Antoine Fenech**¹, Richard Cabassut² (¹IREM de Strasbourg; ²Strasbourg University, France)
[Action-research Group on Go Game as Classroom Practice to Learn Mathematics at Primary Level](#)
- 22:35–22:45** **Fraser Gobede** (University of Malawi)
[A Grade 2 Teacher's Shift in the Use of Mediation Means within and across Two Addition Lessons](#)
- 20:45–21:00** **Open Discussion**

Session III

July 17, 14:30–16:30

Location: W201

- 14:30–14:45** **Shuhua An** (California State University, Long Beach)
[Using Math Clinic to Support Classroom Teaching Practice and Sharpen Teachers' Pedagogical Content Knowledge](#)
- 14:45–15:00** **Kirsty Jane Watson** (University of Northampton)
[How Might Reasoning Question and Answer Prompts Impact Learners Mathematical Thinking?](#)
- 15:00–15:10** **Jong Cherng Meei** (Institute of Teacher Education Penang Campus, Malaysia)
[Data Use to Inform Mathematics Instruction: An Exploratory Study](#)

TSG

- 15:10–15:20** **Takeshi Miyakawa**¹, Valérie Batteau², Minbom Ryu³ (¹Waseda University, Japan; ² HEP Lausanne, Switzerland; ³Joetsu Univ. of Education, Japan)
[Concept of Collective Milieu to Understand the Japanese Mathematics Lesson](#)
- 15:20–15:30** **Yiru Pei**¹, Min Chen², Qiaoping Zhang³ (¹The Education University of Hong Kong, Hong Kong SAR, China; ²College of Teacher Education, East China Normal University, Shanghai, China; ³The Education University of Hong Kong, Hong Kong SAR, China)
[Exploring the Differences between Expert and Pre-service Teachers Noticing](#)
- 15:30–15:40** **Allan Tarp** (MATHeCADEMY.net, Denmark)
[From Loser to User, from Special to General Education, Learning inside Mathematics through outside Actions](#)
- 15:40–16:00** **Open Discussion**
- 16:00–16:30** **Closing Discussion**

TSG37: Research on Classroom Practice at Secondary Level

Chair: Yoshinori Shimizu (University of Tsukuba, Japan)

Team members: Carmel Mesiti (University of Melbourne, Australia), Jarmila Robova (Charles University in Prague, Czech), Li Tong (Chongqing Normal University, China)

IPC Liaison Person: Daniel Chazan (USA)

Session I

July 13, 14:30–16:30

Location: T419

14:30–14:40 **An Overview and Introduction to the TSG 37**

14:30–14:50 **Julie Horoks**¹, Julia Pilet¹, Brigitte Grugeon–Allys¹, Sylvie Coppé², Marina De Simone² (¹LDAR: UPEC; ²FAPSE: UNIGE, France)
[A Large-scale Study of Teachers' Practices in Algebra](#)

14:50–15:00 Ayse Kaya, **Fatma Aslan–Tutak** (Bogazici University, Turkey)
[Teaching Functions Using RME Approach to Improve Students' Perceptions of Mathematics Learning and Learning Functions](#)

15:00–15:10 **Marie Aasa Viktoria Sjöblom**¹, Paola Valero², Clas Olander¹ (¹Malmö University, Sweden; ²Stockholm University, Sweden)
[Teachers Promoting Student Interaction: What Happens When Teachers Enter a Mathematical Discussion?](#)

15:10–15:20 **Discussion**

15:20–15:30 **Carmel Mesiti**, David Clarke, Jan van Driel (University of Melbourne, Australia)
[The LEXICON Project: Seeking a Structure for the Australian Mathematics Teachers' Professional Lexicon](#)

15:30–15:40 **Jarmila Novotná**¹, Alena Hošpesová², Hana Moraová¹, Iva Žlábková² (¹Charles University, Czech Republic; ²University of South Bohemia, Czech Republic)
[The Lexicon Project: Understanding the Universality and Applicability of the Czech Teachers Professional Lexicon](#)

15:40–15:50 **Yoshinori Shimizu**¹, Yuka Funahashi², Hayato Hanazono¹ (¹University of Tsukuba, Japan; ²Nara University of Education, Japan)
[Technical Vocabulary of Japanese Mathematics Teachers: The Japanese Lexicon in the Tradition of Lesson Study](#)

TSG

15:50–16:00 Discussion

16:00–16:25 Cheng Lu Pien¹, **Cynthia Seto**², Lee Ngan Hoe¹, Wong Zi Yang¹, June Lee¹ (¹National Institute of Education, Singapore; ²Academy of Singapore Teachers, Singapore)
Inquiry-based Learning in the Mathematics Classroom: Insights from a Case of Two Lessons

Dan Shen (Ningbo No.7 Middle School, China)
The Practice of Project-based Mathematics Extended Curriculum at Secondary Level

Abdul Halim Abdullah¹, Bomi Shin² (¹Universiti Teknologi Malaysia, Malaysia; ²Chonnam National University, South Korea)
The Implementation of Project-based Learning (PBL) in Middle School Mathematics Classroom in Malaysia and South Korea

16:25–16:30 Discussion

Session II

July 14, 19:30–21:00

Location: T419

19:30–20:15 **Charalambos Y. Charalambous** (University of Cyprus, Cyprus)
Studying Instructional Quality in Mathematics: The Need for Content-specificity and Other Open Challenges

20:15–21:00 **Aurelie Chesnais** (Université de Montpellier et Université Paul Valéry de Montpellier, France)
An Approach of Mathematics Teaching and Learning Based on Activity Theory: Principles and Examples of Results

Session III

July 17, 14:30–16:30

Location: T230

14:30–14:40 **Nitsa Movshovitz-Hadar**, Ruti Segal, Karni Shir, Atara Shriki, Boaz Silverman, Varda Zigerson (Technion – Israel Institute of Technology, Israel)
A Multi-stage Attempt at Narrowing the Gap between Contemporary Mathematics and High School Mathematics

14:40–14:50 **Luca Agostino**¹, Bruno Durand, Laetitia Sonia-Doucet, Dimitri Zvonkine Varda Zigerson (¹Laboratoire de mathématiques de Trappes Espe d'Evry, UEVE; Laboratoire de mathématiques de Versailles, UVSQ, CNRS, France)
Puzzle-based Class Format to Foster Students' Mathematical Oral Production and Exchange

14:50–15:00 Low Leng¹, **Ang Yue Hua**², Lee Ngan Hoe³ (¹Academy of Singapore Teachers, Singapore; ²Yusof Ishak Secondary School, Singapore; ³National Institute of Education, Singapore)
Developing Students' Metacognitive Practice: A Systematic Approach

15:00–15:10 Discussion

15:10–15:20 **Iben Maj Christiansen**, Johan Lagneborg (Stockholm University, Sweden)
Applying the MDI Framework to Swedish Classrooms

15:20–15:30 **Hyun-Young Kang**¹, Byungjoo Tak², Daewon Park³, Chung Rok Lee⁴, Namhyeong Kim⁵, Hee Dong Han⁶ (¹Mokwon University, South Korea; ²Jeonju National University of Education, South Korea; ³Sejong Seongnam High School, South Korea; ⁴Daejeon Daeshin High School, South Korea; ⁵Daejeon Science High School for the Gifted, South Korea; ⁶Daejeon Dongsan Middle School, South Korea)
The Role of Curricular Noticing as Mediating between the Written Curriculum and Enacted Curriculum

15:30–15:40 Discussion

15:40–16:20 **Yu Hongyu** (Nanjing University of Information Science & Technology, China)
Learning Situation Analysis: Problem, Focus and Method

Mayumi Kawamura, Kazuya Kageyama, Masataka Koyama (Hiroshima University,

TSG

Japan)

A Lesson Design Model to Enhance Students' Activities with Examples

Vasantha Moodley (University of the Witwatersrand, South Africa)

Re-visiting Instructional Explanations: How Might the Organisation of a Lesson Contribute to an Explanation

Yukiko Asami-Johansson (University of Gävle, Sweden)

Anthropological Perspective on Japanese Mathematics Teachers' Professional Knowledge of Board Writing

Jarmila Robová, Vlasta Moravcová (Charles University, Czech Republic)

The Implementation of a Set of Tasks for the Development of Spatial Ability in Secondary Schools

16:20–16:30 Discussion

Session IV

July 17, 21:30–23:00

Location: T419

21:30–21:40 Azita Manouchehri, Reyhan Safak (The Ohio State University, USA)

Productive Struggle: A Focus on Sense Making and Connecting

21:40–21:50 Melissa Kemmerle (University of Michigan, USA)

Promoting Student Questions in Mathematics Classrooms

21:50–22:40 Sashi Sharma (University of Waikato, New Zealand)

English Language Learners Learning Statistics in Multilingual Classrooms

Tomohiko Shima¹, Minoru Ito² (¹Kanagawa Gakuen Girls' Junior and Senior High School, Japan; ²Tokyo University of Science, Japan)

A Class for Conceptualizing Lagrange's Four-square Theorem

Li Changjie, Lu Yun (Faculty of Education, East China Normal University, China)

Different Learning Opportunities for Students Provided by Teachers in High School Mathematics Classrooms: A Classroom Video Analysis

Xu Wang (Anhui Vocational and Technical College, China)

A Study on Unit Instructional Design Based on UBD – Taking “Logarithm” Unit as an Example

22:40–23:00 Reflections for the Next Steps

TSG38: Task Design and Analysis

Chair: Minoru Ohtani (Kanazawa University, Japan)

Co-chair: Michiel Doorman (Utrecht University, Netherlands)

Team members: Berta Barquero (University of Barcelona, Spain); Heather Johnson (University of Colorado Denver, USA); Xuhua Sun (University of Macau, Macao SAR, China)

IPC Liaison Person: Binyan Xu (China)

Session I

July 13, 19:30–21:00

Location: T419

19:30–19:40 Introduction to TSG38

19:40–20:00 Maria Trigueros¹, Asuman Oktaç², Rita Xochitl Vázquez Padilla³, Avenilde Romo

Vázquez⁴ (¹ITAM, Instituto Tecnológico Autónomo de México; CINVESTAV, ²Centro de

Investigación y de Estudios Avanzados del IPN; ³UACM, Universidad Autónoma de la Ciudad de México; ⁴CICATA, Instituto Politécnico Nacional)

[Action, Process or Object? Can They All Be Perceived in a Single Task?](#)

- 20:00–20:10** **Willy Viviani**, Kayla White (University of Maryland, College Park, USA)
[The Design of Tasks for Automatic Formative Assessment: Supporting Teachers and Students](#)
- 20:10–20:20** **Heather Lynn Johnson**¹, Anna Shvarts², Amy Smith¹ (¹University of Colorado Denver, USA; ²Utrecht University, The Netherlands)
[A Joint Embodied and Simulation Design for Graphing: Coordinating Distances That Change Together](#)
- 20:20–20:30** **Natalie Ross**¹, Ann–Kristin Adleff¹, Gabriele Kaiser¹, Johannes König², Sigrid Blömeke³ (¹University of Hamburg, Germany; ²University of Cologne, Germany; ³CEMO, University of Oslo, Norway)
[Classification of Mathematical Tasks to Study Subject–specific Aspects of Instructional Quality](#)
- 20:30–20:40** **Berta Barquero**¹, Sonia Esteve² (¹Universitat de Barcelona, Spain; ²Universitat de Vic–Universitat Central de Catalunya, Spain)
[Collective Work on Task Design through Study and Research Path for Teacher Education](#)
- 20:40–21:00** **Time for questions/discussion**

Session II

July 16, 21:30–23:00

Location: T419

- 21:30–21:40** **Ruchi Mittal**¹, Alprata Ahuj² (¹PhD Scholar, Department of Education, University of Delhi, India; ²PhD Scholar, School of Education Studies, Ambedkar University, India)
[Exploring Mathematical Task Designed by Pre–service Teachers](#)
- 21:40–21:50** **Xuhua Sun** (University of Macau, Macao SAR, China)
[The Fundamental Idea of Task Design in China for Algebraic Development](#)
- 21:50–22:00** **Eugenio Chandia Muñoz** (Universidad de Concepción, Chile)
[Schooling Experience as Mediating Variables in Preservice Teachers’ Beliefs and Instructional Practice When Designing Mathematical Tasks](#)
- 22:00–22:10** **Guillermina Avila–Garcia**, Liliana Suárez Téllez, Víctor Hugo Luna Acevedo (Instituto Politécnico Nacional, Mexico)
[Transforming Mathematics Tasks: An Important Mathematics Teacher’s Role](#)
- 22:10–22:20** **Bjarnheidur Kristinsdottir**¹, Freyja Hreinsdottir¹, Zsolt Lavicza² (¹ University of Iceland, School of Education, Iceland; ²Johannes Kepler University Linz, Austria)
[Developing Silent Video Tasks’ Instructional Sequence](#)
- 22:20–22:30** **Diego Lieban**¹, Zsolt Lavicza², Sandra Reichenberger² (¹IFRS, Brazil; ²JKU, Austria)
[3D Tessellation Triggering the Design of Open–ended Task Combining Physical and Digital Resources](#)
- 22:30–22:40** **Koji Otaki**¹, Hiroaki Hamanaka², Takeshi Miyakawa³ (¹Hokkaido University of Education,

TSG

Japan; ²Hyogo University of Teacher Education, Japan; ³Waseda University, Japan)
[A Possible Pathway of Mathematical Inquiry: How to Calculate the Cube Root of a Given Number by Using a Simple Pocket Calculator?](#)

22:40–22:50 **Erell Germia**, Nicole Panorkou (Montclair State University, USA)
[Integrating Covariational Reasoning in the Learning of Science: The Case of Gravity](#)

22:50–23:00 **Junyi Li**¹, Zhou Chao² (¹Tin Ka Ping Experimental Senior High School, China; Soochow University, China²)
[Research on Designing and Teaching of Worked Examples in Reviewing of Sequence Based on the SOLO Taxonomy](#)

Session III

July 17, 14:30–16:30

Location: T419

14:30–14:50 **Jonas Bergman Ärlebäck**¹, Lluís Albarracín² (¹Linköping Universitet, Sweden; ²Universitat Autònoma de Barcelona, Spain)
[Fermi Problems as a Hub for Task Design in Mathematics and STEM Education](#)

14:50–15:00 **Luhuan Huang**, Michiel Doorman, Wouter van Joolingen (Freudenthal Institute for Science and Mathematics Education, Utrecht University, The Netherlands)
[Opportunities for Inquiry-based Learning Provided by Chinese and Dutch Lower-secondary School Mathematics Textbook Tasks](#)

15:00–15:10 **Meryansumayeka**, Zulkardi, Ratu Ilma Indra Putri, Cecil Hiltrimartin (Universitas Sriwijaya, Indonesia)
[Developing Digital Mathematical Tasks to Promote Students' Higher Order Thinking Skills](#)

15:10–15:20 **Luxizi Zhang**¹, Luc Trouche², Jiansheng Bao¹ (¹East China Normal University, China; ²ENS de Lyon, France)
[Potential, Actual and Practical Variations for Teaching Functions: Cases Study in China and France](#)

15:20–15:30 **Linda Opheim** (University of Agder, Norway)
[Discourse on Mathematical Tasks: A Perceived Difference between Teachers and Researchers](#)

15:30–15:40 **Jonas Jäder** (Dalarna University, Sweden)
[Students' Opportunities to Engage in Mathematical Problem Solving](#)

15:40–15:50 **Hyman Bass** (University of Michigan, USA)
[Task Design and the Unity of Mathematics](#)

15:50–16:00 **Michiel Doorman**¹, Matija Bašić², Zeljka Milin Sipus², Rogier Bos¹ (¹Utrecht University, The Netherlands; ²University of Zagreb, Croatia)
[Tasks and Scenarios for Promoting Inquiry Based Mathematics Teaching](#)

16:00–16:10 **Ng Kit Ee Dawn**¹, Lee Ngan Hoe¹, Cynthia Seto², Liu Mei¹, June Lee¹, Wong Zi Yang¹ (¹National Institute of Education, Singapore; ²Academy of Singapore Teachers, Singapore)
[Towards Differentiated Instruction: Insights from Constructivist Learning Design Author:](#)

16:10–16:30 **Time for Questions / Discussions**

Session IV

July 17, 21:30–23:00

Location: T219

21:30–21:40 **Sofia Paz Rodriguez**, Carlos Armando Cuevas Vallejo, & osé Orozco–Santiago Cinvestav (IPN, Mexico)
[Task for Introducing the Vector Concept Using Technology](#)

- 21:40–21:50** **Wenmin Zhao**, Samuel Otten (University of Missouri – Columbia, USA)
Enriching Word Problems: Examples from U.S. Prospective Secondary Teachers
- 21:50–22:00** **Galit Nagari–Haddif** (University of Haifa, Israel)
Design Tasks in MLR Environment: Constructing Examples for Proving Logical Statements
- 22:00–22:10** **Marta Martin Nieto**, Natalia Ruiz–Lopez (Universidad Autónoma de Madrid, Spain)
Didactic Sequence Planning for the Study of the Teaching and Learning of Isometries in Future Primary School Teachers
- 22:10–22:20** **Rosmawati Mohamed**¹, Munirah Ghazali² (¹PhD Candidate, School of Educational Studies, Universiti Sains Malaysia, Malaysia; ²School of Educational Studies, Universiti Sains Malaysia, Malaysia)
Analyzing Primary Two Pupils’ Errors Answering Fractions’ Task Using the Newman Procedure
- 22:20–22:30** **Franklin Falculan**, Maria Alva Aberin (Ateneo de Manila University, Philippine)
Effects of Low Floor High Ceiling Mathematical Tasks on Students’ Mathematical Proficiency in Seventh–grade Geometry
- 22:30–23:00** **Conclusions and Discussion of TSG**

TSG39: Language and Communication in the Mathematics Classroom

Chair: Marcus Schütte (Technical University of Dresden, Germany)

Co–chair: Jenni Ingram (University of Oxford, UK)

Team members: Fengjuan Hu (Capital Normal University, China), Máire Ní Riordáin (University College Cork, Ireland), Tran Vui (Hue University, Vietnam)

IPC Liaison Person: Frode Rønning (Norway)

Session I

July 13, 14:30–16:30

Location: W313

14:30–14:40 **Jenni Ingram**, Marcus Schütte, Fengjuan Hu, Máire Ní Riordáin, Tran Vui (University of Oxford, UK; Technical University of Dresden, Germany; Capital Normal University, China; University College Cork, Ireland; Hue University, Vietnam)
Meeting the Challenges of Research Language and Communication in Mathematics Education

14:50–15:05 **Krummheuer, Götz** (Kassel, Germany)
TBA

15:05–15:20 **Elisa Bitterlich** (Technische Universität Dresden, Germany)
Lifeworld Connections in Mathematics Education – Unquestioned, Indispensable, and Undefined?

15:20–15:30 **Vui Tran** (Hue University, College of Education, Vietnam)
The Threshold of Multiple Representations for Students to Discover Possible Solutions for Communicating Their New Ideas in Integrated Closed–open Approach

15:30–15:40 **Kunihiko Shimizu** (Bunkyo University, Japan)
The Practice and Examination of Opportunities to Translate Representation through Problem–solving

15:40–15:50 **Piata Allen** (University of Auckland, Australia)
Tau Ke: A Software Solution for Capturing Multiple Representations of Pangarau (Mathematics) Language

15:50–16:00 **Li Wing–kwan**, Simon S. Y. Chan (The University of Hong Kong, Hong Kong SAR, China)

TSG

The Effects of Using a Modified Frayer Model to Teach Mathematics Vocabulary to Junior-form English Learners in a Chinese Medium-of-instruction Secondary School

- 16:00–16:15** **Cartwright**, Katherin (The University of Sydney, Australia)
It Always Equaled an Odd Number: Observing Mathematical Fluency through Students' Oral Responses
- 16:15–16:30** **Mary Jane A. Castilla**, Catherine P. Vistro–Yu (University of Santo Tomas and Ateneo de Manila University, Philippines)
Achieving Meaningful Statistics Classroom Learning through Bilingualism and Multilingualism: A Case of Selected Grade 10 Students in Marikina City

Session II

July 14, 19:30–21:00

Location: W313

- 19:30–19:45** **Judith Jung**, Marcus Schütte, Götz Krummheuer (Technische Universität Dresden, Leibniz University Hannover, Kassel, Germany)
Discourse as the Place for the Development of Mathematical Thinking through an Interactionist Perspective
- 19:45–20:00** **Annica Baiker**, Daniela Götze (TU Dortmund University, Germany & University of Siegen, Germany)
Language-responsive Support of Meaning-making Processes for Understanding Multiplicative Decomposition Strategies
- 20:00–20:10** **Zhihui Chen**, Yuting Tong (South China Normal University, Guangzhou; East China Normal University, Shanghai)
A Study on the Evaluating of Learning Opportunities in Mathematics Classes of Secondary Schools Based on Discourse Analysis Techniques
- 20:10–20:20** **Cris Edmonds–Wathen** (Charles Darwin University, Australia)
Mathematical Expression in Different Languages: The Need for Systematic Description
- 20:20–20:30** **Wang Si-kai**, Ye Li-jun (Jing Hengyi Teacher Education College of Hangzhou Normal University)
A Comparative Study on Teaching Language of Algebra Classroom between Novice Teachers and Expert Teachers Taking Linear Equation in One Unknown as an Example
- 20:30–20:40** **Rachel–Ann Böckmann**, Marcus Schütte (Leibniz Universität Hannover; Leibniz Universität Hannover, Germany)
Interactional Obligations for Collective Argumentation in Pair and Group Work
- 20:40–20:50** **Victoria Shure**, Bettina Rösken–Winter (Humboldt–Universität zu Berlin, Germany)
How Pre-service Primary Teachers Engage in Language Responsive Mathematics Teaching While Working on a Scriptwriting Task
- 20:50–21:00** **Ann–Kristin Tewes** (Leibniz Universität Hannover, Germany)
Support Systems as Intersubjective Processes between Teachers and Students

Session III

July 17, 21:30–23:00

Location: W313

- 21:30–21:55** **Beth Herbal–Eisenmann**
TBA
- 22:00–22:15** **Lauren Hickman McMahon** (University of Michigan – Ann Arbor, USA)
Epistemic (in)justice in Mathematical Communication between Teachers and Students
- 22:15–22:30** **Kirstin Erath** (TU Dortmund University, Germany)
Identifying Language Demands for Understanding the Meaning of Similarity
- 22:30–22:40** **Fatou Sey** (University of The Witwatersrand, South Africa)
Exploring a Teacher's Enactment of Explanatory Communication in a Mathematics Lesson
- 22:40–22:50** **Peter Ludes–Adamy**, Marcus Schütte (Leibniz–Universität Hannover, Germany)
Dissent and Consensus Situation Structures in Mathematics and Computer Science Learning Environments

- 22:50–23:00** **Candace Joswick**, Michael T. Battista (The University of Texas at Arlington, USA, The Ohio State University, USA)
[Quadrilateral Woop–de–doos: Language Use and Geometric Property Development of Two Fifth Graders in a Dynamic Geometry Learning Environment](#)

TSG40: Research and Development on Mathematics Curriculum

Chair: Masataka Koyama (Hiroshima University, Japan)

Co–chair: Jeremy Hodgen (University College London, UK)

Team members: Gulseren Karagoz Akar (Bogazici University, Turkey), Shelly Dole (University of the Sunshine Coast, Australia), Ruilin Wang (Capital Normal University, China)

IPC Liaison Person: Thomas Lowrie (Australia)

Session I

July 13, 19:30–21:00

Location: W313

- 19:30–20:25** Masataka Koyama¹, Jeremy Hodgen², Gulseren Karagoz Akar³, Shelly Dole⁴, Ruilin Wang⁵ (¹Hiroshima University, Japan; ²University College London, UK; ³Bogazici University, Turkey; ⁴University of the Sunshine Coast, Australia; ⁵Capital Normal University, China)
[Opening Session of TSG 40](#)

- 20:25–20:45** Lara K. Dick¹, **Amanda G. Sawyer**², Margaret A. MacNeille³ (¹Bucknell University, Department of Mathematics, USA; ²James Madison University, Middle, Secondary, and Mathematics Education Department, USA; ³Bucknell University, Education Department, USA)
[Identifying the Quality of Teacher Created Curriculum Shared via the Teachers' Pay Teachers Online Platform](#)

- 20:45–21:00** **Jon D. Davis** (Western Michigan University, USA)
[Understanding U.S. Middle School Mathematics Teachers' Perceptions of the Official Curriculum through a Cultural Lens](#)

Session II

July 16, 21:30–23:00

Location: W313

- 21:30–21:45** **Xinqi Zhang**¹, Masataka Koyama² (¹Graduate School of Education, Hiroshima University, Japan; ²Graduate School of Humanities and Social Sciences, Hiroshima University, Japan.)
[Comparative Study on Statistical Contents in Chinese and Japanese Mathematics Textbooks](#)

- 21:45–22:00** **Anna Klothou**¹, Charalampos Sakonidis² (¹Department of Primary Education, Greece; ²Democritus University of Thrace, Greece)
[The Implementation of a Reformed Mathematics Curriculum: Mathematical Processes in Practice](#)

- 22:00–22:15** **Eun Young Cho**¹, Rae Young Kim² (¹Graduate School, Ewha Womans University, South Korea; ²Ewha Womans University, South Korea)
[The Mathematical Literacy in Korean Mathematics Curricula](#)

- 22:15–22:30** **Daniela Căprioară**¹, Annie Savard², Alexandre Cavalcante² (¹Ovidius University of Constanța, Romania; ²McGill University, Canada)
[Financial Education in the Romanian Mathematics Curriculum: Policy and Implementation in Elementary Textbooks](#)

- 22:30–22:45** **Ellen Jameson**, Lynne McClure (Cambridge Mathematics, Cambridge Assessment, University of Cambridge, UK)
[Formative Evaluation of a Tool for Representing Ideas in Mathematics Curriculum Design: A Delohi Study Example](#)

TSG

22:45–23:00 **Laxman Luitel**, Bal Chandra Luitel (Kathmandu University School of Education, Department of STEAM Education, Nepal)
[Images of Mathematics Curriculum and Pedagogical Influences](#)

Session III

July 17, 14:30–16:30

Location: W313

14:30–14:45 **Catherine P. Vistro–Yu** (Mathematics Department, Ateneo de Manila University, Philippines)

[A Participative Approach to Designing a New Mathematics Course for All College and University Students in the Philippines](#)

14:45–15:00 **Lili Zhou**, Jinqing Liu, Jane–Jane Lo (Curriculum & Instruction, Purdue University, USA)

[A Comparison of U.S. and Chinese Geometry Strands through the Lens of Van Hiele](#)

15:00–15:15 **Francisco Antonio Mejia Ramos** (Ministry of Education of El Salvador)

[Curriculum Proposal from El Salvador for Improving Math Learning, Description, Structure, First Results and Effectiveness](#)

15:15–15:45 **Break**

15:45–16:00 **Yamei Zhu** (East China Normal University, China)

[A Meta–analysis of the Effects of Standard–based Curriculum on USA Students Mathematics Achievement](#)

16:00–16:15 **Dae S. Hong** (University of Iowa, United States)

[Examining the Initial Treatment of the Area and Volume Measurement in the Selected Elementary Mathematics Textbooks from US and Korea](#)

16:15–16:30 **Su Shengkui**^{1,2}, Miao Lin^{1,3}, Chen Qinghua¹ (¹College of Mathematics and Informatics, Fujian Normal University, China; ²Xiamen No.6 Middle School of Fujian, China; ³Shanghai Hongkou Experimental School, China)

[A Course Design for Mathematical Modeling in High School Based on STEM Education](#)

TSG41: Research and Development on Textbooks and Resources for Learning and Teaching Mathematics

Chair: Sebastian Rezat (Paderborn University, Germany)

Co–chair: Jana Visnovska (University of Queensland, Australia)

Team members: Moneoang Leshota (National University of Lesotho, Lesotho), Hussein Sabra (Reims University, France), Guorui Yan (The University of Hong Kong, Hong Kong SAR, China)

IPC Liaison Person: Luc Trouche (France)

Session I

July 13, 14:30–16:30

Location: W315

14:30–14:40 **Opening and Introduction**

14:40–15:00 **Susanne Prediger** (Technical University Dortmund / IPN Kiel, Germany)

[Textbooks as Teacher Support for Engaging Students in Active Knowledge Organization](#)

15:05–15:10 **Xiang Gao, Gergely Balazs Wintsche, Wenbin Xu, Marc van Zanten, Jana Visnovska**

Report on the Discussion of the Following Contributions

Xiang Gao (East China Normal University, China)
[An Analysis of Data and Probability Tasks in US and Chinese Elementary Mathematics Textbooks](#)

Jana Visnovska, José Luis Cortina, Pamela Vale (The University of Queensland, Australia; Universidad Pedagógica Nacional, Colombia; Rhodes University, South Africa)
[Learning to Design Resources for Teachers](#)

Gergely Balazs Wintsche (Eötvös Loránd University, Budapest, Hungary)
[The Effect of the Curricula on Textbooks for the Teaching of Probability and Statistics](#)

Shiqi Lu, Wenbin Xu (Nanjing Normal University, China)
[Constructing a Textbook Analysis Framework of Statistics and Probability Areas in Elementary Math](#)

Marc van Zanten, Marja van den Heuvel–Panhuizen (Utrecht University, The Netherlands; Nord University, Norway)

15:15–15:25 [Mathematics Education According to the Textbook: Opportunities to Learn Investigated](#)
Moneoang Leshota (University of the Witwatersrand, South Africa)
[Identifying Educative Features in Scripted Mathematics Lesson Plans](#)

15:30–15:35 **Anatoli Kouropatov, Moneoang Leshota, Shuhui Li, Yang Shen, Fulin Liu**
[Report on the Discussion of the Following Contributions](#)

Anatoli Kouropatov, Regina Ovodenko, Michal Fraenkel, Maureen Hoch (Levinsky College of Education, Israel; Shenkar College of Engineering and Design & Center for Educational Technology, Israel; Center for Educational Technology, Israel)
[Didactic Considerations Regarding the Iterative Development Design of Dynamic Digital Tools](#)

Moneoang Leshota (University of the Witwatersrand, South Africa)
[Identifying Educative Features in Scripted Mathematics Lesson Plans](#)

Shuhui Li (Columbia University, USA)
[A Comparative Study of Bidirectional Connections in U.S. and Chinese High School Mathematics Textbook Problems](#)

Yang Shen, Jiansheng Bao (East China Normal University, China)
[Translations of Function Representation in Different Textbooks](#)

Fulin Liu, Yiming Cao, Dengfeng Liang (People's Education Press, Beijing Normal University, Beijing Technology Business University, China)
[A Comparative Study on Fractions in Primary Schools Mathematics Textbooks of China and the United States](#)

15:40–15:50 **Jana Visnovska**, José Luis Cortina, Pamela Vale (The University of Queensland, Australia; Universidad Pedagógica Nacional, Colombia; Rhodes University, South Africa)
[Learning to Design Resources for Teachers](#)

15:55–16:00 **Suijun Jia, Yao Li, Hongwei Ran, Sebastian Rezat**
[Report on the Discussion of the Following Contributions](#)

Suijun Jia (Zhejiang International Studies University, China)
[A Comparative Study of Problem Solving in Chinese and U.S. Primary Mathematics Textbook](#)

Yao Li, Lianchun Dong (Minzu University of China, China)
[A Comparative Analysis of Tasks Contexts in Mathematics Textbooks in China and Singapore](#)

Hongwei Ran, Lianchun Dong (Minzu University of China, China)
[A Comparative of Mathematical Inquiry Activities in Textbooks in China and Singapore](#)

Sebastian Rezat (Paderborn University, Germany)
Elements of a Theory of Textbook Design

16:05–16:15 **Sebastian Rezat** (Paderborn University, Germany)
Elements of a Theory of Textbook Design

16:20–16:30 **Discussion**

Session II

July 14, 19:30–21:00

Location: W315

19:35–19:55 **Birgit Pepin** (Eindhoven University of Technology, The Netherlands)
Digital Mathematics Curriculum Resources: Towards Design Principles of Educative Materials for Students and Teachers

20:00–20:10 **Anatoli Kouropatov**, Regina Ovodenko, Michal Fraenkel, Maureen Hoch (Levinsky College of Education, Israel; Shenkar College of Engineering and Design & Center for Educational Technology, Israel; Center for Educational Technology, Israel)
Didactic Considerations Regarding the Iterative Development Design of Dynamic Digital Tools

20:15–20:20 **Saba Gerami, Dewi Rahimah, Yi Wang, Lynda M. Wynn**
Report on the Discussion of the Following Contributions

Vilma Mesa, Saba Gerami (University of Michigan, USA)
Teaching and Learning with Dynamic Textbooks: Studying Student Uses at Scale

Dewi Rahimah, Jana Visnovska (The University of Queensland, Australia)
The Elements of Textbooks That Indonesian Mathematics Teachers Use

Yi Wang, Lianghuo Fan (Beijing Normal University, China; East China Normal University, China; University of Southampton, UK)
Investigating the Use of Mathematics Textbooks by Students in Shanghai and England: A Comparative Study

Lynda M. Wynn (California State University, USA)
Examining Curriculum and Teacher Supports for Engaging Second. Emergent Bilingual STDS in MATHEM. Practice

20:25–20:35 **Vilma Mesa, Saba Gerami** (University of Michigan, USA)
Teaching and Learning with Dynamic Textbooks: Studying Student Uses at Scale

20:40–20:45 **Karima Sayah, Dominic R. Oakes, Hendrik Van Steenbrugge, Maryna Rafalska**
Report on the discussion of the following contributions

Karima Sayah (Al AWAEL School of Education and Learning Annaba, Algeria)
Sesamath Resources and Collective Work from Mathematical Laboratory to Classes in Arabic Environment

Dominic R. Oakes, Sofya Lyakhova (Swansea University, UK)
Promoting the Teaching and Learning of Mathematics Through Visualising Connections in Post-16 Resources

Hendrik Van Steenbrugge, Andreas Ryve (Stockholm University, Sweden; Mälardalen University, Sweden)
A Method to Analyze Teachers' Collective Work Around Resources in the Context of PD

Maryna Rafalska, Chongyang Wang, Luc Trouche (Université Côte d'Azur, France; Beijing Normal University, China; ENS de Lyon, France)
Comparing Naming Systems Used by Chinese and Ukrainian Teachers: Exploring T's Resource System

22:45–21:00 **Discussion**

Session III

July 17, 21:30–23:00

Location: W315

21:35–21:45 **Yi Wang**, Lianghuo Fan (Beijing Normal University, China; East China Normal University, China; University of Southampton, UK)
[Investigating the Use of Mathematics Textbooks by Students in Shanghai and England: a Comparative Study](#)

21:50–21:55 **Guorui Yan, Ok–Kyeong Kim, Katiane de Moraes Rocha, Everaldo Silveira**
[Report on the Discussion of the Following Contributions](#)

Guorui Yan (The University of Hong Kong, Hong Kong SAR, China)
[How Expert Mathematics Teacher Design Curriculum Based on Textbook Use: A Case Study in Beijing](#)

Ok–Kyeong Kim (Western Michigan University, USA)
[Toward Systematic Support for Preservice Teachers Learning of Productive Resource Use](#)

Katiane de Moraes Rocha (University Center Anhanguera of Campo Grande, Brazil)
[Analysing Teachers Individ. and Coll. Resources Through the Lens of Their Digital Resources](#)

Everaldo Silveira, Arthur B. Powell (Federal University of Santa Catarina, Brazil; Rutgers University–Newark, USA)
[Student Understanding of Textbook Visual Representations of Natural and Fractional Numbers](#)

22:00–22:05 **Maxim Brnic, Lisnet Mwadzaangati, Niamh O’Meara, Hilary Tanck**
[Study of Construction by Quadratic Curve Addition Method](#)

Maxim Brnic (University of Münster, Germany)
[Long–term Use of a Digital Mathematics Textbook with Integrated Digital Tools: Investigating the Influence on Students’ Achievement and Self–efficacy](#)

Lisnet Mwadzaangati (University of Malawi, Malawi)
[The Relationship Between Mathematical Examples in Malawian Grade 1 Primary School Mathematics Teachers’ Guide and the Goals of Outcome Based Education](#)

Niamh O’Meara, Olivia Fitzmaurice, Patrick Johnson (University of Limerick, Ireland)
[Career Mathways: A Teaching & Learning Intervention to Show the Relevance of Mathematics in Careers](#)

Hilary Tanck (Clemson University, USA)
[Unbounding Curriculum Resources](#)

22:10–22:30 Erin Henrick, **Paul Cobb** (Vanderbilt University, USA)
[Instructional Materials as Tools for Instructional Improvement](#)

22:30–22:50 [Discussion](#)

22:50–23:00 [Closing Remarks](#)

TSG

TSG42: Research and Development in Assessment in Mathematics Education

Chair: Abid Sohail (Aga Khan University Karachi, Pakistan)

Co–chair: Caroline Long (University of Johannesburg, South Africa)

Team members: Shai Olsher (University of Haifa, Israel), Nathalie Sayac (University Paris Est Créteil, France), Xiong Wang (University of Alberta, Canada)

IPC Liaison Person: Anjum Halai (Pakistan/Tanzania)

Session I

July 13, 19:30–21:00

Location: W215

19:30–19:40 **Online Pre-recorded video**

Federica Ferretti (Free University of Bolzano–Bozen, Italy)

[Students' Difficulties in the Management of Algebraic Expression Highlighted in Large-scale Assessment](#)

19:40–19:50 **Online Pre-recorded video**

Alberto Arnal–Bailera¹, José M. Muñoz–Escolano¹, Antonio M. Oller–Marcén² (¹Universidad de Zaragoza, Spain; ²Centro Universitario de la Defensa de Zaragoza, Spain)

[In-service Teachers Marking Students' Answers Containing Derivation Errors](#)

19:50–20:00 **Online Pre-recorded video**

Valentina Vaccaro¹, Eleonora Faggiano², Federica Ferretti³ (¹University of Oviedo, INVALSI – Roma, Italy; ²University of Bari Aldo Moro, Italy; ³University of Ferrara, Italy)

[Investigating Teachers' Awareness of the Reasons for Students' Math Errors at Primary School Level](#)

20:00–20:10 **Online Pre-recorded video**

Emiliano Augusto Chagas¹, Mauricio Urban Kleinke² (¹IFSP – Instituto Federal de São Paulo (Federal Institute of São Paulo), Brazil; ²Unicamp – Universidade Estadual de Campinas (State University of Campinas), Brazil)

[Cognitive Load Reduction in Math Items: Performance, Gender and Socioeconomic Status](#)

20:10–20:20 **Online Power Point Presentation**

Priscila D. Corrêa (University of Windsor, Canada)

[Expressions of Mathematical Proficiency in Students' Mathematical Work](#)

20:20–20:30 **Online Power Point Presentation**

Timothy Sibbald (Nipissing University, Ontario, Canada)

[Structural Features in Classroom Level Standardized Mathematics Achievement Results](#)

20:30–20:40 **Online Pre-recorded video**

Ian Cantley (Queen's University Belfast, North Ireland)

[Philosophical Insights into PISA and Mathematics Education Policy Issues](#)

20:40–20:50 **Online Pre-recorded video**

Ya Mo, Laurie Cavey, Michele Carney, Tatia Totorica, Patrick Lowenthal (Boise State University, Idaho)

[A Unique Item Format to Assess Attentiveness to Students' Mathematical Ideas](#)

20:50–21:00 **Online Power Point Presentation**

Kim Koh, Olive Chapman, Shimeng Liu (Werklund School of Education, University of Calgary, Canada)

[Developing Preservice Elementary Teachers' Capacity in the Design of Authentic Mathematics Assessment](#)

Session II

July 16, 21:30–23:00

Location: W215

21:30–21:45 **Online Power Point Presentation**

Xiong Wang (University of Alberta, Canada)

[Evaluating Mathematics Teachers' Professional Learning in a PLN: A Complex Systems Perspective](#)

21:45–22:00 **Online Power Point Presentation**

Nadine Grapin (Laboratoire de Didactique André Revuz, Université Paris Est Créteil, France)

[Validity of Assessments in Mathematical Textbooks: A Study of Beginning of Primary School Level Textbook Assessments](#)

22:00–22:15 **Online Power Point Presentation**

Richelle Marynowski (University of Lethbridge, Canada)

[Are the Stakes the Same? A Comparison of Three Types of Large Scale Assessments in Alberta, Canada](#)

22:15–22:30 **Online Pre-recorded video**

Shai Olsher, Kawthar, **Nakhash Khalaila** (University of Haifa, Israel)
[Factors Related to Mathematics Teachers Pedagogic Discretion, Specifically When Evaluating Parabolic Sketches](#)

- 22:30–22:45** **Online Pre-recorded video**
Marta Barbarics (Budapest Semesters in Mathematics Education, Hungary)
[Assessment Based on Gamification in Hungarian Secondary Mathematics Classes](#)
- 22:45–23:00** **Online Power Point Presentation**
Anne D’Arcy–Warmington (Curtin College, Australia)
[‘I Know All about This Mathematical Topic, But I Cannot Answer This Question’ Moment, Can I Have a Clue Please?](#)

Session III

July 17, 14:30–16:30

Location: W215

- 14:30–14:45** **Online Power Point Presentation**
Caroline Long¹, Johann Engelbrecht², Vanessa Scherman³, (¹University of Johannesburg; ²University of Pretoria; ³University of South Africa)
[Investigating the Treatment of Missing Data in an Olympiad-Type Test – The Case for Selection Validity](#)
- 14:45–15:00** **Online Power Point Presentation**
Nathalie Sayac¹, **Michiel Veldhuis**² (¹LDAR Université Paris–Diderot, ESPE Créteil; ²iPabo University of Applied Sciences Amsterdam & Utrecht University, France)
[Mathematics Assessment Practices of Primary School Teachers in France](#)
- 15:00–15:10** **Online Power Point Presentation**
Adri van der Nest¹, Caroline Long², Johann Engelbrecht³ (¹University of South Africa; ²University of Johannesburg; ³University of Pretoria)
[The Role of Formative Assessment Experiences in the Teaching and Learning of Mathematics](#)
- 15:10–15:20** **Online Pre-recorded video**
Willem van der Vegt (Windesheim University of Applied Sciences, Zwolle, The Netherlands)
[Assessing Math in Teacher Training; What to Learn from Our Students Research](#)
- 15:20–15:30** **Online Power Point Presentation**
Basanta Raj Lamichhane (Saptagandaki Multiple Campus, Bharatpur, Chitwan, Nepal)
[Transformative Assessment System in Mathematics Education: Engaging Mind, Body and Soul](#)
- 15:30–15:40** **Online Pre-recorded video**
Ummi Salmah, Uki Rahmawati, Bungkus Dias Prasetyo (SEAMEO Regional Centre for QITEP in Mathematics, Indonesia)
[Analyzing Students’ Errors in Solving Context-based Problems in Marwa Assessment](#)
- 15:40–15:50** **Online Power Point Presentation**
Hairon Salleh¹, **Foo Kum Fong**², Koh Wei Xun¹ (¹National Institute of Education, Singapore; ²Academy of Singapore Teachers, Ministry of Education, Singapore)
[Raw Scores or Rasch Measures? Lessons from Rasch Analysis of Secondary One Mathematics Test](#)
- 15:50–16:00** **Online Pre-recorded video**
Hua Wu, **Junhan Liu**, Fengqi Zhai (LiaoNing Normal University, China)
[Research on the Level Division of Mathematical Logical Reasoning Literacy Based on Solo Taxonomy Theory](#)
- 16:00–16:10** **Online Power Point Presentation**
Vitus Paul L. de Jesus¹, Angela Fatima H. Guzon² (¹La Salle Green Hills / Ateneo de Manila University, Philippines; ²Ateneo de Manila University, Philippines)
[Quality of Mathematical Reasoning in a Philippine Senior High School’s Pre-calculus Examinations on Conic Sections](#)
- 16:10–16:20** **Online Pre-recorded video**
Alessandro Gambini¹, **Roberto Capone**² (¹Sapienza University of Rome, Rome; ²University of Salerno, Rome)
[The Results of Large-scale Assessment as Tools for Mathematics Activity Design](#)

TSG

16:10–16:30 Online Power Point Presentation

Niu Jian-ren, Lai Li, Chen Chao-dong, He Zhi-rong, Yang Liang (College of Mathematics, Sichuan University, China)

[Research on the Assessment System Combining Standardization and Non-standardization in the Mathematics Education of Top Talents](#)

TSG43: Research and Development in Testing (National and International) in Mathematics Education

Chair: Ivan Vysotskij (Moscow Center for Teachers Excellence, Russia)

Co-chair: Fumi Ginshima (National Institute for Educational Policy Research, Japan)

Team members: Richard T. Houang (Michigan State University, USA), Maria Isabel Ramalho Ortigão (Universidade do Estado do Rio de Janeiro, Brazil), Lidong Wang (Beijing Normal University, China)

IPC Liaison Person: Ivan Yashchenko (Russia)

Session I

July 14, 19:30–21:00

Location: T213

19:30–19:50 Qi Chunxia¹, Wang Ruilin², Huang Qi³, **Fu Yu**¹ (¹Faculty of Education of Beijing Normal University, China; ²Capital Normal University, China; ³University of Wisconsin–Madison, USA)

[On the Eighth Grade Mathematics Achievement and Its Effect Factors–based on Seven Areas Study](#)

20:00–20:20 **Tibor Marcinek**¹, Arne Jakobsen², Edita Partová³ (¹Central Michigan University, USA; ²University of Stavanger, Norway; ³Comenius University, Slovakia)

[International Comparisons of Teacher Knowledge: The Case of the LMT Measures](#)

20:30–20:50 Maria Isabel Ramalho Ortigão (Rio de Janeiro State University)

[PISA Assessment of Brazilian Students' Mathematical Literacy](#)

Session II

July 17, 21:30–23:00

Location: T213

21:30–21:40 Kuksa Ekaterina (Moscow Center for Continuous Mathematical Education, Russia)

[On Composing Distractors for Multiple Choice Problems](#)

21:50–22:00 Jiangong Dong (Wuhu Institute of Educational Science, Wuhu City, Anhui Province, China)

[How Chinese Design Mathematics Test](#)

22:10–22:20 **Bruno Damien da Costa Paes Jürgensen**, **Mara Regina Lemes De Sordi** (State University of Campinas (UNICAMP), Brazil)

[Reflections on Large-scale Assessment and the Formatting Power of Mathematics](#)

TSG

TSG44: Mathematics and Interdisciplinary Education

Chair: Carl Winsløw (University of Copenhagen, Denmark)

Co-chair: Rita Borromeo Ferri (University of Kassel, Germany)

Team members: Nicholas Mousoulides (University of Nicosia, Cyprus), Avenilde Romo–Vasquez (The National Polytechnic Institute of Mexico, Mexico), Guangtian Zhu (East China Normal University, China)

IPC Liaison Person: Takeshi Miyakawa (Japan)

Session I

July 13, 19:30–21:00

Location: W211

19:30–19:35 WINSLØW

Introduction and Welcome to TSG44

19:35–20:05 **Francisco Javier Garcia Garcia** (University of Jaen, Spain)
Interdisciplinary Mathematics Education: Some Reflections from the Anthropological Theory of the Didactic

20:05–20:35 **Yuichi Nezu** Takeshi Miyakawa (Joetsu University of Education, Japan; Waseda University, Japan)
Interdisciplinary Inquiry-based Learning with Queuing Situations: Investigating the Questions Triggering Mathematical Activities

20:35–20:40 **Viana Nallely Garcia**¹, Flor Monserrat Rodríguez Vásquez (¹Universidad Autonoma De Guerrero, Mexico)
A Classroom Experience: Vector Concept

20:40–20:45 **Mehtap Kus**¹, Erdinc Cakiroglu (¹Aksaray University, Turkey)
Students' Use of Geometric Cues in an Art Studio: Scaling of Artworks

20:45–21:00 **Discussion in Small Groups on Short Oral 1–2**

Session II

July 16, 21:30–23:00

Location: W211

21:30–22:00 **Avenilde Romo-Vazquez**¹, Lenin Augusto Echavarría Cepeda¹, Luis Ramon Siero González (¹Instituto Politecnico Nacional, Mexico)
Posing a Generating Question with the Pedagogy of Questioning the World: The Case of GPS Coordinates

22:00–22:30 **Annie Savard** (McGill University, Canada)
Mathematics and Financial Education: How Do They Intersect Together?

22:30–22:35 **Debasmita Basu**¹, Nicole Panorkou² (¹The New School, USA; ²Montclair State University, USA)
Task Design Features for Integrating Covariational Reasoning with Science

22:35–22:40 **Aitzol Lasa**, Miguel R. Wilhelmi, Olga Belletich, Jaione Abaurrea, Haritz Iribas (Spain, Public University of Navarre)
STEM Projects as Didactical Situations in Mathematics: Theoretical Frame to Construct Algebraic Institutional Meanings

22:40–22:45 **Lubomira Valovicova**, Janka Medova (Constantine the Philosopher University in Nitra, Slovakia)
Physical Measurements as an Environment Supporting Primary Pupils Reasoning about Central Tendency

22:45–23:00 **Discussion in Small Groups on Short Oral 3–5**

Session III

July 17, 14:30–16:30

Location: W211

14:30–15:00 **Eleonora Barelli**¹, Laura Branchetti², Berta Barquero³, Oscar Romero (¹University of Bologna, Bologna; ²University of Milan, Italy; ³University of Barcelona, Spain)
Questioning Interdisciplinarity within Teacher Education: A Module on the Evolution of the COVID-19 Pandemic

15:00–15:30 **Thi Nga Nguyen**¹, Thien Thanh Lam, Minh Dung Tang (¹Ho Chi Minh city University of Education, Vietnam)
A Situation of Interdisciplinary Mathematics Education in Context of Protecting Water Resources

15:30–15:35 **Break**

15:35–15:40 **Shan Chen** (Southwest university, China)
Integrating Mathematics into STEAM Education: Constructing Models and Developing

TSG

Measurement Scale of Students' STEAM Competence

- 15:40–15:45** **Sarah Christina Phillips**¹, Jan Mills² (¹International Baccalaureate Organization, Canada; ²International Baccalaureate, New Zealand)
Transdisciplinary and Interdisciplinary Mathematics in the International Baccalaureate
- 15:45–16:00** **Discussion in small groups on Short Oral 8–9**
- 16:00–16:30** **Common discussion, networking in small groups, publication plans**

TSG45: Mathematics for Non-specialist/mathematics as a Service Subject at Tertiary Level

Chair: Burkhard Alpers (Aalen University of Applied Sciences, Germany)

Co-chair: Mitsuru Kawazoe (Osaka Prefecture University, Japan)

Team members: Olov Viirman (University of Gävle, Sweden), Jing Zeng (Zhejiang Normal University, China)

IPC Liaison Person: Faïza Chellougui (Tunisia)

Session I

July 13, 14:30–16:30

Location: T205

- 14:30–15:00** **Burkhard Alpers** (Aalen University, Germany)
Mathematics as a Service Subject: Historical Development and Major Players from a European Perspective
- 15:00–15:30** **Wes Maciejewski** (San José State University, USA)
Conceptualizing Service and General Education Mathematics
- 15:30–16:00** **Mitsuru Kawazoe** (Osaka Prefecture University, Japan)
A Practice Report on Mathematical Modelling Education for Humanities and Social Sciences Students
- 16:00–16:30** **Deependra Budhathoki**, Gregory D. Foley, Stephen N. Shadik (Ohio University, USA)
Flexible Content, Instruction, and Assessment in a University-level Quantitative Reasoning Course

Session II

July 14, 19:30–21:00

Location: T205

- 19:30–20:00** **Olov Viirman**, Irina Pettersson (Uppsala University, Sweden, University of Gävle, Sweden)
A Small-scale Implementation of Inquiry-based Teaching in a Single-variable Calculus Course for First-year Engineering Students
- 20:00–20:30** **Jana Peters**, Reinhard Hochmuth (Leibniz University Hannover, Germany)
Sometimes Mathematics Is Different in Electrical Engineering
- 20:30–21:00** **Malte Lehmann** (Humboldt-Universität Berlin, Germany)
Which Mathematics Competences Are Relevant for Engineering Education? – A Mixed Methods Study

Session III

July 17, 21:30–23:00

Location: T205

- 21:30–22:00** **Farzad Radmehr**^{1,2}, Faezeh Rezvani², Michael Drake³ (¹University of Agder, Norway; ²Ferdowsi University of Mashhad, Iran; ³Victoria University of Wellington, New Zealand)
The Attitudes of Lecturers and Students towards Puzzle-based Learning: The Case of Differential Equations
- 22:00–22:30** **Svitlana Rogovchenko** (University of Agder, Norway)

Can We Make Mathematics Interesting for Engineering Students? Modelling Tasks in an Ordinary Differential Equations Course

22:30–23:00 **Satoru Takagi**, Kesayoshi Hadano, Sei-ichi Yamaguchi (Waseda University, Kyushu Sangyo University, Rikkyo University, Japan)
[Teaching Materials on Calculus as Seen from the Application to Engineering](#)

TSG46: Mathematical Competitions and Other Challenging Activities

Chair: Boris Koichu (Weizmann Institute of Science, Israel)

Co-chair: Peter Taylor (University of Canberra, Australia)

Team members: Sergey Dorichenko (Moscow Center for Teachers Excellence, Russia), Ingrid Semanišinová (Pavol Jozef Šafárik University in Košice, Slovakia), Yijun Yao (Fudan University, China)

IPC Liaison Person: Ivan Yashchenko (Russia)

Session I

July 13, 19:30–21:00

Location: W101

19:30–19:45 **Boris Koichu** (Weizmann Institute of Science, Israel)
[A Short Overview of the History of TSG46 and Introductions of the Participants](#)

19:45–20:30 **Maria Falk de Losada** (Universidad Antonio Nariño, Bogotá, Colombia)
[What Competitions Can Tell Us about Theories in Mathematics Education](#)

20:30–20:45 **Ingrid Semanišinová**, Lubomír Antoni, Stanislav Krajčí, Daniela Vířazková (Pavol Jozef Šafárik University in Košice, Slovakia)
[How to Identify Multiple Solution Tasks for Mathematical Competitions](#)

20:45–21:00 **Hoyun Cho** (Capital University, Columbus, Ohio, USA)
[Challenging Math Tasks for Teaching through Problem Solving Approach](#)

Session II

July 16, 21:30–23:00

Location: W101

21:30–22:15 **Roza Leikin** (University of Haifa, Israel)
[Unravelling the Construct of Mathematical Challenge Based on Conceptual Characteristics of Mathematical Tasks](#)

22:15–22:30 **Reut Parasha**, Boris Koichu, Michal Tabach (Weizmann Institute of Science, Israel)
[A Challenge of Deciding Who Is Right and Why](#)

22:30–22:45 **Elisabeth Roan**, Jenifer Czoher (Texas State University, USA)
[Students' Expected Gains from a Modeling Competition](#)

22:45–23:00 **Rosa Antonia Thomas Ferreira** (University of Porto & CMUP, Portugal)
[Math Trails: Opportunities to Learn Rich Mathematics outside the Classroom](#)

Session III

July 17, 14:30–16:30

Location: W101

14:30–15:15 **Kiril Bankov** (University of Sofia, FMI, Bulgaria)
[Cutting a Polygon: From Mathematics Competition Problems to Mathematical Discovery](#)

15:15–15:30 **Yijie He**, Tianqi Lin (East China Normal University and Shanghai Key Laboratory of Pure Mathematics and Mathematical Practice, China)
[An Introduction of Shanghai Grade 11 Mathematics Competition](#)

15:30–15:45 **Eszter Bora** (Eötvös Loránd University, Budapest, Hungary)
[POSA Weekend-camps: A Challenging Mathematical Environment for the Highly Gifted in Hungary](#)

15:45–16:00 **Valorie Lynn Zonnefeld**, Ryan Glenn Zonnefeld (Dordt University, Iowa, USA)

TSG

Competitions Promoting the Mathematical Science

- 16:00–16:30** Boris Koichu¹, Sergei Dorichenko² (¹Weizmann Institute of Science, Israel; ²Moscow Center for Teachers Excellence, Russia)
Whole–group Discussion of Where We Are in Relation to the Questions Posed in the Call for Papers of TSG46, and with an Eye on the Future Plans

TSG47: Mathematics Education in a Multilingual Environment

Chair: Eva Norén (Stockholm University, Sweden)

Co–chair: Anthony Essien (University of the Witwatersrand, South Africa)

Team members: Nancy Chitera (University of Malawi, Malawi), Mun Yee Lai (University of Technology Sydney, Australia), Alexander Schüler–Meyer (Technical University of Dortmund, Germany)

IPC Liaison Person: Jill Adler (South Africa)

Session I

July 13, 14:30–16:30

Location: W101

14:30–14:45 Welcome to TSG 47, Short Presentation of the Participants

14:45–15:00 **Hao** (Ateneo de Manila University, Philippines)
Code–switching: Proposing Linguistic Relativity as Lens in Multilingual Mathematics Education Research

15:00–15:15 **Rabih El Mouhayar** (American University of Beirut, Lebanon)
Practices and Functions of Colloquial Arabic Use to Generalize Patterns in Multilingual Classrooms

15:15–16:05 **Katabua** (University of the Witwatersrand, Johannesburg, South Africa)
Localised Instructional Mathematics Application Programmes: Providing Access into Mathematics in Multilingual Classrooms

16:05–16:20 **Paolucci** (University of Florida, USA)
Fostering Mathematics Teacher Development through Experiential Learning in Multilingual Communities

16:20–16:30 **Kimura** (Waseda University, Tokyo, JAPAN)
Study on Difficulties of Math Word Problems in English–international Baccalaureate in Japanese High School

Session II

July 14, 19:30–21:00

Location: W101

19:30–20:00 **Uribe, Prediger** (TU Dortmund University, Germany)
Activating Multilingual Resources in a Superdiverse Covariation Classroom – A Design Research Study

20:00–20:10 **Ryan** (Malmö Univ, Sweden)
Non–shared Language Translanguaging in Math Class

20:10–20:25 **Zahner** (San Diego State University, USA)
Examining Equitable Participation and Positioning in Multilingual Classrooms: Tasks, Language(s), and Norms

20:25–20:40 **Robertson** (Rhodes University, South Africa)
The Importance of Students' First Language as a Sense–making Resource in Multilingual Mathematics Classrooms

20:40–20:50 **Tshabalala** (Gauteng department of education, Johannesburg, South Africa)
Exploring the Enablement of Mathematical Proficiency in Grade Four English Second Language Mathematics Classrooms

20:50–21:00 **Baschek** (Justus Liebig University, DE, German)

Session III

July 17, 21:30–23:00

Location: W101

21:30–21:55

Barwell (University of Ottawa, Canada)

Language Positive Classrooms: An Example

21:55–22:05

Svensson Källberg (Malmö University, Sweden)

Implementing Translanguaging as Pedagogy in Mathematics Classrooms a Dilemma

22:05–22:15

Essien (University of Witwatersrand, Johannesburg, South Africa)

Towards a Framework for Understanding the Choice and Use of Examples in Teacher Education Multilingual Mathematics Classrooms

22:15–22:30

Ji Yeong I (Iowa State University, South Korea)

Impact of an Online Course of Teaching Mathematics to Emergent Bilinguals on Teacher Perspectives

22:30–22:40

Yee Lai (University of Technology Sydney, Australia)

Language-related Barriers to Mathematics Learning: An Alternative Diagnosis

22:40–22:50

Mohamed (Beni-Suief University, Egypt)

The Problems of Bilingual Mathematical Learners when Using Mathematics in Arabic

22:50–23:00

Zollman (Indiana University Southeast, USA)

A Student May Speak with an Accent, but No Student Thinks with an Accent in Mathematics

TSG48: Mathematics Education in a Multicultural Environment

Chair: Florence Glanfield (University of Alberta, Canada)

Co-chair: Anthony Fernandes (The University of North Carolina at Charlotte, USA)

Team members: Qin Jing (Tsinghua International School, China), Peter Kajoro (The Aga Khan University, Tanzania), Annica Andersson (University of Southeastern Norway, Norway)

IPC Liaison Person: Anjum Hailai (Pakistan/Tanzania)

Session I

July 16, 21:30–23:00

Location: T209

21:30–21:35

Welcome to TSG 48 and Overview of Engagement.

TSG organizers: **Florence Glanfield** (University of Alberta, Canada)

21:35–22:05

Kathleen Nolan (University of Regina, Canada)

Conceptualizing a Framework for a New (Disruptive) Form of Culturally Responsive Pedagogy in Mathematics/Teacher Education

22:05–22:25

Anthony Fernandes (The University of North Carolina Charlotte, USA)

Preservice Teachers Engaging with Traffic Stop Data to Examine Issues of Bias

22:25–22:45

Florence Glanfield (University of Alberta, Canada)

Intersections of Indigenous Knowledge Systems and Mathematics Education

22:45–23:00

Discussion of the Papers

TSG Organizers: **Peter Kajoro**¹, Qin Jin², Anthony Fernandes³, Florence Glanfield⁴ (¹Aga Khan University, Institute of Educational Development, East Africa, Tanzania; ²Tsinghua International School, China; ³The University of North Carolina at Charlotte, USA; ⁴University of Alberta, Canada)

Session II

July 17, 14:30–16:30

Location: T209

14:30–14:35

Welcome to TSG 48 and Overview of Engagement.

TSG organizers: **Anthony Fernandes** (The University of North Carolina Charlotte, USA)

TSG

- 14:35–15:05** **Marta Civil¹, Roberta Hunter²** (¹The University of Arizona, USA; ²Massey University, New Zealand)
Taking a Strengths Based Approach to Learning and Teaching Mathematics
- 15:05–15:25** **Andreas Ulovec¹, Jarmila Novotná², Hana Moraová³** (¹University of Vienna, Austria; ²Charles University Prague, Czechoslovakia; ³Charles University Prague, Czechoslovakia)
Developing Concepts for Mathematics Teaching Units with a Focus on Migrant and Minority Students
- 15:25–15:45** **Michael Alexander** (University of the Witwatersrand, Johannesburg Wits School of Education, South Africa)
The Use of Dominant Discourse Practices in Secondary Multilingual Mathematics Classrooms: A Comparison of Lessons Given by Two Teachers
- 15:45–16:30** **Discussion of the Papers**
TSG Organizers: **Qin Jing¹**, Peter Kajoro², Anthony Fernandes³, Florence Glanfield⁴ (¹Tsinghua International School, China; ²Aga Khan University (Institute of Educational Development, East Africa), Tanzania; ³The University of North Carolina at Charlotte, USA; ⁴University of Alberta, Canada)

TSG49: Distance Learning, E-learning and Blended Learning of Mathematics

Chair: Marcelo Almeida Bairral (Federal Rural University of Rio de Janeiro, Brazil)

Co-chair: Tracey Muir (University of Tasmania, Australia)

Team members: Veronica Hoyos (Universidad Pedagógica Nacional, Mexico), Xinbing Luo (Shaanxi Normal University, China), Philippe R. Richard (Université de Montréal, Canada)

IPC Liaison person: Thomas Lowrie (Australia)

Session I

July 13, 14:30–16:30

Location: T124

- 14:30–14:45** **Jennifer Rothe** (Universitaet Leipzig, DE, Germany)
Fostering Higher Order Thinking in the Flipped Classroom – An Analysis of Students Proof Schemes
- 14:50–15:05** **Mustafa Cevikbas**, Gabriele Kaiser (University of Hamburg, Germany)
Student Engagement in a Mathematics Classroom
- 15:10–15:25** **Cameline Nafula Orlendo** (Maseno University, Kenya)
Delivery of Electronic Assessments in a First Year Basic Mathematics Course at Maseno University, Kenya
- 15:30–15:45** **Veronica Hoyos**, Estela Navarro, Victor Raggi, Sergio López (National Pedagogical University, Mexico)
Hybrid Environments of Learning: Teacher Efficiency and Potential for Student Learning by Collaboration
- 15:50–16:30** **Questions/Discussion**
- 19:30–19:45** **Rosie Lopez Conde¹**, Merlyn M. Lingo, Jurdil Faith D. Salas (¹Philippine Normal University, The Philippines)
Students' Enhancements and Praxeologies on Learning Integer Operations Using GeoGebra
- 19:45–20:00** **Leicha Bragg**, Chris Walsh, Tracey Muir (Deakin University, Australia)
Transforming Numeracy Professional Development for Pre- and In-service Mathematics Teachers and Families through E-learning
- 20:05–20:20** **Peter Joseph Esperanza**, Ma Kristin Fabian (Barstow Community College, USA)

Session II

July 14, 19:30–21:00

Location: T124

TSG

Gender Difference in Mathematics Performance: Online vs Face-to-face

- 20:20–20:35** **Ilya Alexandrovich Posov**, Dmitry Irikovich Mantserov (Saint Petersburg State University, Russia)
Using Free Software to Implement Verification Problems with Parameters
- 20:40–20:55** **Marcelo A. Bairral**, Alexandre Assis (Federal Rural University of Rio de Janeiro, Brazil)
Designing Tasks to Improve Plane Transformation Using DGE with Touchscreen

Session III

July 17, 14:30–16:30

Location: T222

- 14:30–14:45** **Tracey Muir** (University of Tasmania, Australia)
The Role of the Lecturer in Facilitating Productive Mathematical Conversations in Online Mathematics Pre-service Teacher Education
- 14:50–15:05** **Heather Allmond Barker**, Karen Hollebrands, Gemma Foust Mojica (North Carolina State University, USA)
Participants Patterns of Interaction within and across Social Networks in a Massive Open Online Course for Educators
- 15:10–15:25** **Haoyi Wang** (University of Illinois at Urbana Champaign, USA)
A Reflective Practice on an Online Mathematics Class
- 15:35–16:00** **Dovie Louise Kimmins**, Rongiiin Huang (Middle Tennessee State University, USA)
Exploratory Study of Technology Assisted Lesson Study

Session IV

July 17, 21:30–23:00

Location: T124

- 21:30–21:55** **Philippe Richard** (Universite de Montreal, Canada)
Understanding and Creating to Better Understand Instrumental Proofs in Mathematics Class
- 22:00–22:25** **Stefanie Schallert**, Robert Weinhandl (Johannes Kepler University Linz, Austria)
Case Study on the Change Process of a Mathematics Teacher in an Online Professional Development Course
- 22:30–22:55** **Niroj Dahal** (Kathmandu University, Nepal)
Workshop Activity in Online Courses of Mathematics Education: Insights for Learning and Assessment

TSG50: Mathematics Education in and for Work; Continuous Mathematics Education including Adult Education

Chair: Lisa Björklund Boistrup (Malmö University, Sweden)

Co-chair: Geoff Wake (University of Nottingham, UK)

Team members: Maria da Conceição Ferreira Reis Fonseca (Universidade Federal de Minas Gerais, Brazil), Pradeep Kumar Misra (Chaudhary Charan Singh University, India), Haixia Si (Hangzhou Normal University, China)

IPC Liaison Person: Gabriele Kaiser (Germany)

Session I

July 13, 19:30–21:00

Location: T213

- No.1** **Introduction**
- No.2** **Geoff Wake** (University of Nottingham, UK)
Designing for the Learning of Mathematics for Vocational Competence
- No.3** **Li Xiaocheng** (Huaibei Normal University, China)
Construction of Mixed Training Model for Rural Mathematics Teachers in Junior Middle School
- No.4** **Trude Sundtjønn** (Oslo Metropolitan University, Norway)

TSG

Sociomathematical Norms in Vocational Mathematics Education

- No.5** **Lauro Chagas e Sá¹**, Guilherme Guilhermino Neto², Maria Auxiliadora Vilela Paiva (¹Instituto Federal do Espírito Santo, Brazil; ²Ifes, Vila Velha, Brazil)
Infographics about the World of Work: An Experience with Students of Vocational Education Integrated to High School (poster)
- No.6** **Joint Discussion on Considerations in Designing for Me in and for Work**

Session II

July 16, 21:30–23:00

Location: T213

No.1 **Introduction**

- No.2** **Lisa Björklund Boistrup** (Malmö University, Sweden)
Investigating Interfaces between Mathematics and Vocational Content: Logos and Praxis in Education
- No.3** **Maria da Conceicao Ferreira Reis Foncesca¹**, Valdenice Leitão da Silva² (¹Universidade Federal de Minas Gerais, Brazil; ²Secretaria da Educacao de Pernambuco, Brazil)
“Here We Are the Boss”: Numeracy Practices as Resistance Tactics of Clothing Factory Workers in Brazilian Northeast
- No.4** **Joint Discussion on the Role of Theory**

Session III

July 17, 14:30–16:30

Location: T213

No.1 **Introduction**

- No.2** **Linda Marie Ahl¹**, Lars Ola Helenius² (¹Kriminalvården, Sweden; ²University of Gothenburg, Sweden)
Adults’ Proportional Reasoning in a Volume Scaling Situation
- No.3** **Javier Diez–Palomar¹**, Kees Hoogland², Isabelle Demonty³ (¹University of Barcelona, Spain; ²HU University of Applied Sciences Utrecht, Netherlands; ³Université de Liège, Belgium)
Re–thinking the Assessment of Adults’ Numeracy Skills: New Challenges, New Responses
- No.4** **Pradeep Kumar Misra** (Chauhary Charan Singh University, India)
Moocs for Lifelong Mathematics Learning of Adults in India: Promises and Strategies
- No.5** **Joint Discussion on How to Support the Learning of Mathematics by Adults**
- No.6** **Discussion on a Possible Post–publication from TSG50**

TSG51: Mathematics Education for Ethnic Minorities

Chair: Aldo Parra (Aalborg University in Denmark, Colombia)

Co–Chair: Robin Averill (Victoria University of Wellington, New Zealand)

Team members: Aditya Adiredja (University of Arizona, USA), Lianchun Dong (Minzu University of China, China), Nancy Nui (CEMASTEAM Nairobi–Kenya, Kenya)

IPC Liaison Person: Marta Civil (USA)

Session I

July 13, 14:30–16:30

Location: T209

14:30–14:34 **Opening Words by TSG Team**

- 14:35–15:05** **John Griffith Tupouniua**, Jodie Hunter (Massey University, New Zealand)
How Does a Teacher Sustain Collective Mathematizing among Non–dominant Students?
- 15:06–15:25** **Lianchun Dong**, Wei He (Minzu University of China, China)
Chinese Ethnic Minorities Students Performance in Mathematical Problem Posing

15:26–15:45 **Aoxue Su** (Minzu university of china, China)
Study on Influencing Factors of Math Achievements of Ethnic Minority Senior High School Students in Mainland China

15:46–15:55 **Hsueh–Yun Yu**, Huey–Lien Kao, Kuo–Hua Wang (Changhua University of Education, Taiwan, China)
The Implementation of Culturally Responsive Teaching Practices into the Mathematics Course

15:56–16:30 **Round of Debate**

Session II

July 14, 19:30–21:00

Location: T209

19:30–20:00 **Chang–Jun Zhou** (Dehong Teachers College, China)
A Case Study on the Application of "Situational Problems" Teaching Model in the Mathematics Education of Ethnic Primary School Students

20:01–20:20 **Mudan Chen**, Ida A.C. Mok (The University of Hong Kong, Hong Kong SAR, China)
Investigation on Teacher Professional Development in Minority Areas: Taking Yao Autonomous County of Liannan, Qingyuan as an Example

20:21–20:30 **Christine Darling Thomas**, Natalie Simone King (Georgia State University, USA)
Renegotiating Recruitment and Retention Efforts: Promoting Teacher Diversity in Mathematics and Science Classrooms

20:31–21:00 **Round of Debate**

Session III

July 17, 21:30–23:00

Location: T209

21:30–22:00 **Carolina Tamayo**¹, Aldo Parra² (¹Universidade Federal de Minas Gerais, Brazil; ²Universidad del Cauca, Colombia)
Rethinking Ethnography in Mathematics Education of Ethnic Minorities

22:01–22:20 Jun Wu, **Jing Ting** (Yunnan Normal University, Kunming, China)
Investigation and Research on Mathematical Culture Accomplishment of Primary School Mathematics Teachers in Ethnic Minority Areas

22:21–22:30 Daniela Cabrera, **Jose David Fonseca**, Gerardo Lopez (University of Arizona, USA)
Preparing the Next Generation of STEM Innovators

22:31–23:00 **Round of Debate**

TSG52: Ethnomathematics and Mathematics Education

Chair: Gelsa Knijnik (Universidade do Vale do Rio dos Sinos, Brazil)

Co–chair: Marcos Cherinda (UNESCO–Maputo, Mozambique, Mozambique)

Team members: Arindam Bose (Tata Institute of Social Sciences, India), Cynthia Nicol (University of British Columbia, Canada), Aihui Peng (Southwest University, China)

IPC Liaison Person: Celi Espasandin Lopes (Brazil)

Session I

July 13, 19:30–21:00

Location: T523

19:30–20:10 **Welcome Intro and Tribute to Ubiratan D’Ambrosio**
TSG Team Members

20:10–20:40 **Arindam Bose** (Tata Institute of Social Sciences (TISS), Mumbai, IN)
Revisiting Ethnomathematics: Another Social Turn?

20:40–21:00 **General Discussion**

TSG

Session II

July 16, 21:30–23:00

Location: T523

21:30–21:40 **Welcome and Plan for the Day**

TSG Team Members

21:41–21:46 **Aihui Peng** (Faculty of Education, Southwest University, China)

[A Framework for Examining the Quality of Mathematics Teaching for Mathematical Understanding in Ethnic Minority Cultural Contexts](#)

21:47–21:52 Daniel Clark Orey, **Milton Rosa** (Universidade Federal de Ouro Preto, Ouro Preto, BR)

[Ethnomathematics and Ethnomodelling Research: Glocalizing Educational Systems from Exclusion to Inclusion at Local and Global Levels](#)

21:52–22:02 **Discussion**

22:02–22:07 **Vanessa SenaTomaz**, Ozirlei Teresa Marcilino (Universidade Federal de Minas Gerais, Belo Horizonte, BR)

[Ethnomathematics as Pedagogical and Political Tool in an Indigenous School Curriculum](#)

22:08–22:13 **Fany Salazar**, Marta Civil (University of Arizona, Tucson, US)

[Mexican American Women Talking about Graphs: A Focus on Their Lived Experiences](#)

22:13–22:23 **Discussion**

22:23–22:28 **Ma. Elena Gavarrete**, Milton Rosa, Daniel Clark Orey (Universidad Nacional, Heredia, CR)

[Regaining Cultural Signs through Ethnomathematical Descriptors: Artifacts, Sociofacts and Mentifacts](#)

22:29–22:32 **Thomas E Gilsdorf** (Central Michigan University, Mt. Pleasant, US)

[Perspectives of Mathematics by Traditional Purhecha Artists](#)

22:33–22:36 **Maria del Carmen Bonilla** (International Study Group on Ethnomathematics, Lima, PE)

[A Study of the Quechua Weaving Elaboration Process and Mathematics Teaching in Basic Education](#)

22:36–22:46 **Discussion**

22:46–22:49 **Toyanath Sharma** (Center for Activity Based instruction, Lalitpur, NP)

[Math Trail Activity on Machchhindranath Chariot: Cultural Perspective on Mathematics Education in Nepal](#)

22:50–22:53 **Jaya Bishnu Pradhan** (Tribhuvan University, Mahendra Ratna Campus, Kathmandu, NP)

[Ethnomathematical Study on Cultural Artefacts: An Ethnographic Field to Classroom Practice](#)

22:53–22:58 **Discussion**

22:58–23:00 **Wrap-Up**

Session III

July 17, 14:30–16:00

Location: T523

14:30–14:35 **Welcome and Plan for the Day**

TSG Team Members

14:35–14:55 **Wilfredo Alangui** (University of the Philippines Baguio, Baguio City, PH)

[Coming Together, Research and Desire in the Field of Ethnomathematics](#)

14:55–15:05 **Discussion**

15:05–15:10 **Anthony Benjamin Trinick**, Tamsin Meaney (The University of Auckland, Auckland, NZ)

[Waka Migrations: Reclaiming Cultural Traditions and Identity](#)

15:11–15:16 **Fe Reston Janiola** (Holy Name University, Tagbilaran City, PH)

[Exploring Mathematics in the Eskaya Tribe: An Ethnolearning Theory](#)

15:16–15:26 **Discussion**

15:26–15:31 **Mega Teguh Budiarto**, Rini Setianingsih, Rudianto Artiono (Universitas Negeri Surabaya, Surabaya, ID)

Ethno–mathematics of Banyuwangi Culture: Bamboo Woven

- 15:37–15:42** **Georgios Kyriakopoulos** (University of Thessaly, Athens, GR)
Towards Mathematics Curriculum Recontextualisation: Developing a Rhizocurrere with Roma Students
- 15:42–15:52** **Discussion**
- 15:52–15:57** **Eirini Lazaridou**, Anna Chronaki (University of Thessaly, Volos, GR)
Mathematics as Venture for Learning and Apprenticeship in a Collective for the Commons
- 15:58–16:01** **Marc Sauerwein** (University of Bonn, Germany)
An International Class in Germany: The Need for Ethnomathematical Considerations
- 16:01–16:11** **Discussion**
- 16:11–16:14** **Solomon Abedom Tesfamicael**, Anne H. Nakken, Tirillo, Peter Grey (Teacher Education Department, NTNU, Kattem, NO)
Ethnomathematics in Ethiopia Using Glocal Approach: The Case of Gebeta Playing
- 16:15–16:18** **Epsi Deme** (University of port harcourt, Port Harcourt, NG)
Ethnomathematics Constructs of IBO Society in Chinua Achebes "Things Fall Apart"
- 16:18–16:28** **Discussion**
- 16:28–16:30** **Wrap-Up**

TSG53: Equity in Mathematics Education

Chair: Jayasree Subramanian (Tata Institute of Social Sciences, India)

Team members: Changgen Pei (Southwest University, China), Darinka Radovic (Universidad de Chile, Chile), Constantinos Xenofontos (University of Stirling, UK)

IPC Liaison Person: Marta Civil (USA)

Session I

July 13, 14:30–16:30

Location: T222

- 14:30–14:35** **Welcome and Introduction by Jayasree Subramanian (Chair)**
- 14:35–14:47** **Frederick Koon Shing Leung** (The University of Hong Kong, Hong Kong SAR, China)
Education Equity in Hong Kong: Factors that Contribute to Hong Kong Students' Mathematics Performance in Trends in International Mathematics and Science Study (TIMSS) 2015.
- 14:47–14:55** **Discussion**
- 14:56–15:08** **Theodore Chao**, Melissa Adams–Corral, Youmna Deiri, Joanne Vakil (The Ohio State University, US)
Critical Mathematics Teacher Noticing: Exploring Pre–service Teachers' Noticing of Power, Privilege, and Identity Using Online Video.
- 15:08–15:16** **Discussion**
- 15:17–15:22** Desiree Ippolito, **Weverton Ataide Pinheiro**, Jinqing Liu (Indiana University, BR)
Gender Differences in Student–student Interactions
- 15:22–15:27** **Itzel H. Armenta** (Tecnologico de Monterrey, MX)
Socioeconomic Differences Delimited by Gender: Students' Perceptions about Mathematics in Mexican Schools.
- 15:27–15:32** **Chiara Giberti** (University of Bergamo, IT)
Gender Differences on Specific Issue: The Case of Misconceptions in Operating with Percentage

TSG

- 15:32–15:37** **Phil Kane** (The University of Auckland, NZ)
Support for Students with Mathematics Learning Dis/abilities on Bridging Programmes in New Zealand Universities
- 15:37–15:53** **Discussion**
- 15:54–15:59** **Ram Krishna Panthi** (Tribhuvan University, Nepal)
Coping with the Challenges while Promoting Social Justice in Mathematics Classroom
- 15:59–16:04** **Nina Ines Bohlmann**, Ralf Benölken, Timo Dixel (Leipzig University, Leipzig, DE)
Adapting Tasks between Including and Excluding Students.
- 16:04–16:09** **Anne Cawley**, Max Adam Altman (California State Polytechnic University, US)
Supporting Students at Multiple Levels in Accessing and Succeeding in College Credit Mathematics.
- 16:09–16:14** Ruthmae Sears, Marilyn Strutchensy, Brian Lawler, Lakesia Dupree, Caree Pinder, **Cynthia Castro–Minnehan** (University of South Florida, BS)
Teacher Candidates Perspectives of Means to Facilitate Equitable Learning Opportunities during a High School Mathematics Methods Course
- 16:14–16:19** **Ana Carolina Faustino** (Universidade Federal do Mato Grosso do Sul, BR)
Children, Dialogue and Mathematics Education
- 16:19–16:30** **Discussion**

Session II

July 14, 19:30–21:00

Location: T222

- 19:30–19:32** **Chenggen Pei** (Southwest University, China)
Introduction
- 19:32–19:57** **Luis Leyva** (Vanderbilt University, Nashville, US)
A Framework for Detailing White, Heteropatriarchy in Mathematics Education
- 19:57–20:15** **Discussion**
- 20:18–20:30** **Darinka Radovic** (Universidad de Chile, Santiago, CL)
Disentangled Narratives: Exploring Institutional and Students' Gendered Discourses in an Engineering Faculty.
- 20:30–20:38** **Discussion**
- 20:40–20:52** **Weverton Ataide Pinheiro**, Vanessa Franco Neto (Indiana University, Brasilia, BR)
Gender Issues and Consequences for Undergraduate Mathematics Women Students
- 20:52–21:00** **Discussion**

Session III

July 16, 21:30–23:00

Location: T222

- 21:30–21:32** **Introduction by Constantinos Xenofontos**
- 21:32–21:57** **Luz Valoyes–Chavez** (CIAE–University of Chile, Santiago, CL)
Cultural Power and the Fabrication of Race Difference in the Mathematics Classroom
- 21:57–22:15** **Discussion**
- 22:18–22:30** **Jayasree Subramanian** (SRM University, Amaravati, Andhra Pradesh, India)
History of Whose Mathematics for Teaching: Raising the Caste Question in Mathematics Education in India
- 22:30–22:38** **Discussion**
- 22:40–22:52** **Kishorkumar Darak** (Tata Trusts, Pune, India)
From Invisible to Domestic Gender in Mathematics Textbooks in India
- 22:52–23:00** **Discussion**

Session IV

July 17, 21:30–23:00

Location: T222

21:30–21:32 **Introduction by Darinka Radovic**

21:32–21:57 **Charoula Stathopoulou** (University of Thessaly, Volos, Greece)
Challenging the Abyssal Line between Roma and Non-Roma, in and out of the (Mathematics) Classroom, through Common Spaces

21:57–22:15 **Discussion**

22:17–22:28 **Constantinos Xenofontos** (University of Stirling, Stirling, Great Britain)
Teaching Practices in Diverse Mathematics Classrooms of the Republic of Cyprus: Equitable or Not?

22:28–22:36 **Discussion**

22:37–22:49 **Amanda Queiroz Moura** (University of Klagenfurt, Klagenfurt, AT)
Micro-exclusions as a Challenge to Dialogue among Deaf and Hearing Students

22:49–22:57 **Discussion**

22:57–23:00 **Closing Remarks**

TSG54: Social and Political Dimensions of Mathematics Education

Chair: Paola Valero (Stockholm University, Sweden)

Co-chair: Kate Le Roux (University of Cape Town, South Africa)

Team members: Andrew Brantlinger (University of Maryland, USA), Murad Jurdak (American University of Beirut, Lebanon), Xuhui Li (California State University Long Beach, USA)

IPC Liaison Person: Marta Civil (USA)

Session I

July 13, 19:30–21:00

Location: T323

19:30–19:40 **Paola Valero**¹, Kate Le Roux², Andrew Brantlinger³, Murad Jurdak⁴, Xuhui⁵ (¹Stockholm University, Sweden; ²University of Cape Town, South Africa; ³University of Maryland, USA; ⁴American University of Beirut, Lebanon; ⁵California State University, Long Beach, USA)
Mathematics, Mathematics Education and Research in the New Climatic Regime

19:40–19:45 **Alf Coles** (University of Bristol, United Kingdom)
Mathematics Education and the Anthropocene: Educating in Precarious Times

19:45–19:50 **Paola Valero** (Stockholm University, Sweden)
The Cultural Politics of Mathematics Education in the “New Climatic Regime”

19:50–19:55 **Ayşe Yolcu** (Hacettepe University, Turkey)
Promised ‘Land’ of Mathematics Education: Towards a Sociomaterial Tracing of Research on Children’s Mathematics

19:55–20:00 **Dionysia Pitsili-Chatzi** (University of Ottawa, Canada)
Thinking about Mathematics Education and the Political with Laclau and Mouffe

20:00–20:05 **Dalene Swanson** (University of Stirling, UK)
Critical, Reflexive, Justice-informed Mathematics Education: Troubles of Justice and Decolonial Possibilities

20:05–20:30 **Small Group Discussion**

20:30–21:00 **Plenary Discussion on the Topic of the Panel, and Questions to All Participants**

TSG

Session II

July 16, 21:30–23:00

Location: T323

21:30–21:35 **Welcome Back to the Group and the Sessions of the Day**

21:35–21:40 **Shintia Revina**, Goldy Fariz Dharmawan, Florischa Ayu Tresnatri (The SMERU Research Institute, Indonesia)

Within-school Tracking and Mathematics Learning Outcomes: A Case Study in Yogyakarta

21:40–21:45 Natalia Ruiz-López, **José Bosch Betancor** (Autonomous University of Madrid, DICEMA-GICE Research group, Spain)

Teacher Conceptions on Social Justice and Democracy in Mathematical Education

21:45–21:50 **Gustavo Nicolas Bruno**, Natalia Ruiz-López (Autonomous University of Madrid, Spain)

Maths vs. Letters: A Systematic Delirium

21:50–21:55 **Sabrina Bobsin Salazar** (Universidade Federal de Pelotas, Brazil)

Making Mathematical Talk Possible: A Case of Teaching Calculus in Our Contemporary World

21:55–22:00 **Melissa Andrade-Molina** (Pontificia Universidad Católica de Valparaíso, Chile)

Black Holes in Chilean Teachers Training Programs: Mathematics Teacher Practices and Educational Policies

22:00–22:05 **Yasmine Abtahi** (Western Norway University of Applied Science, Norway)

About the Mathematics that We Teach

22:05–22:10 **Dale Aldrinn Pradel**¹, Catherine Vistro-Yu² (¹ Xavier School, Philippines; ² Ateneo de Manila University, Philippines)

Crests and Troughs: The Use of Trigonometric Modeling towards a Critical and Realistic Mathematics Education

22:10–22:30 **Small Group Discussion**

22:30–23:00 **Plenary Discussion on the Topic of the Panel, and Questions to All Participants**

Session III

July 17, 14:30–16:30

Location: T323

14:30–14:35 **Welcome Back to the Group and the Sessions of the Day**

14:35–14:40 Effie Manioti¹, Anna Chronaki^{1&2}, **Eirini Lazaridou**¹ (¹University of Thessaly, Greece; ²Malmö University, Sweden)

Mathematics Education, Citizenship and the Commons in Our Global World?

14:40–14:45 **Jian Li**¹, Lili Song¹, Na Tang², Zhentian Mao², Yueyuan Kang², Hong Yan³, Han Yu⁴ (¹ People's Education Press; ²Tianjin Normal University; ³ Guizhou Normal University; ⁴ Chifeng Erzhong International Experimental School)

The Presentation of Core Socialist Values in Chinese Junior Middle School Mathematics Textbooks: Based on the Analysis of Five Series of PEP Textbooks

14:45–14:50 **Lisa Jean Darragh** (University of Auckland, New Zealand)

Interrogating the Promise of Online Mathematics Instructional Programs

14:50–14:55 **Mariam Makramalla**, Andreas J. Stylianides (University of Cambridge, United Kingdom)

Contextual Barriers to the Integration of Problem Solving in the Egyptian Mathematics Classroom

14:55–15:00 **Daniela Steflitsch** (Alpen-Adria University Klagenfurt, Austria)

Teaching Critical Mathematics: Obstacles from the Teacher's Perspective

15:00–15:05 **Anita Rampal** (University of Delhi, India)

The Globalisation of Testing and Learning Outcomes

15:05–15:10 **Satoshi Kusaka** (Hiroshima University, Japan)

Transition of Mozambique's Primary Mathematics Intended Curriculum in Post-colonial Period: A Focus on Adaptation from Exogenous Curriculum

15:10–15:15 **Kate le Roux** (University of Cape Town, South Africa)

A Southern Perspective on Sociopolitical Mathematics Education Research in the New Climatic Regime

15:15–15:40 **Small Group Discussion**

15:40–16:00 **Kate le Roux¹, Paola Valero²** (¹University of Cape Town, South Africa; ²Stockholm University, Denmark)
[Gathering General Points from the Sessions and Connecting Back to the Theme of the Topic Study Group](#)

16:00–16:30 **Final General Discussion**

TSG55: The History of the Teaching and the Learning of Mathematics

Chair: Wagner Rodrigues Valente (Universidade Federal de São Paulo, Brazil)

Co-chair: Alexander Karp (Teachers College, Columbia University, USA)

Team members: Toya Frank (George Mason University, USA), Chunlan Li (Inner Mongolia Normal University, China), Naomichi Makinae (University of Tsukuba, Japan)

IPC Liaison Person: Daniel Chazan (USA)

Session I

July 13, 14:30–16:30

Location: T319

14:30–14:40 **Opening**

Alexander Karp (Teachers College, Columbia University, USA)

14:40–14:55 **Vasily Busev, Alexander Karp** (Mathematical institute, Russian Academy of Sciences, Russia; Teachers College, Columbia University, USA)
[Pafnuty Chebyshev as a Mathematics Educator](#)

14:55–15:10 **Dirk De Bock** (KU Leuven, Belgium)
[Frédérique Papy–Lenger, the Mother of Modern Mathematics in Belgium](#)

15:10–15:20 **Ildar Safuanov** (Moscow City University, Russia)
[The History of Mathematics Education of Tatar Nation](#)

15:20–15:30 **María José Madrid¹, Carmen León–Mantero², Alexander Maz–Machado²** (¹Universidad Pontificia de Salamanca, Spain; ²Universidad de Córdoba, Spain)
[Mathematics and Mathematics Education in the 18th Century Spanish Journal “Semana de Salamanca”](#)

15:30–15:45 **José Manuel Matos** (Universidade Federal de Juiz de Fora, Brasil and Universidade Nova de Lisboa, Portugal)
[Interweaving Past and Present — Historical Research in the Field of Mathematics Education](#)

15:45–16:00 **Karolina Karpińska** (Institute for the History of Science Polish Academy of Sciences, Poland)
[Gnomonics in Mathematics Secondary School Education on the Territories of Poland in the 17th–20th Century](#)

16:00–16:15 **Antonio M. Oller–Marcén** (Centro Universitario de la Defensa de Zaragoza, Spain)
[The Beginning of Modern Mathematics in Spanish Primary Education. A Look through Textbooks and Curriculum](#)

16:15–16:30 **Shinnosuke Narita¹, Naomichi Makinae², Kei Kataoka³** (¹Tokyo Gakugei University, Japan; ²University of Tsukuba, Japan; ³Kwansei Gakuin University, Japan)
[Approach of an Early–1940s Japanese Secondary Mathematics Textbook to Teaching the Fundamental Theorem of Calculus](#)

Session II

July 14, 19:30–21:00

Location: T319

19:30–19:45 **Maja Cindrić** (University of Zadar, Department of Teacher and Preschool Teacher Education, Croatia)
[Arithmetic Textbooks in Croatia in the Premodern Period](#)

19:45–19:55 **Bernardo Gómez–Alfonso¹, María Santágueda–Villanueva²** (¹Universitat de València

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(UVEG), Spain; ²Universitat Jaume I, Spain)
Missing Arithmetic Methods: “On the Rules for the Mixing of Analogous Things”

- 19:55–20:10** **Pilar Olivares–Carrillo**, Dolores Carrillo–Gallego (University of Murcia, Spain)
The Calculation in the First Commercialized Decroly’s Games
- 20:10–20:20** **Yoshihisa Tanaka**¹, Eiji Sato², Nobuaki Tanaka³ (¹Hirosaki University, Japan; ²Meiji University, Japan; ³Mie University, Japan)
Mathematical Activities Focusing on Japanese Elementary Arithmetic and Secondary Mathematics Textbooks in the Early 1940s
- 20:20–20:30** **Zhang Hong** (Sichuan Normal University, China)
Development History and Course Setting of Mathematics Department in Early Universities in Sichuan Province in Modern Times (1896–1937)
- 20:30–20:45** **Li Wei Jun** (Inner Mongolia Normal University, China)
A Probe into Compiling Mathematics Textbooks by Christian Missionaries in Late Qing Dynasty
- 20:45–21:00** **Discussion**

Session III

July 17, 21:30–23:00

Location: T319

- 21:30–21:45** **Sian E. Zelbo** (The Brearley School, New York; Stern College for Women, New York, USA)
Building an American Mathematical Community from the Ground Up: Artemas Martin and the Mathematical Visitor
- 21:45–22:00** **Elisabete Zardo Búrigo** (Universidade Federal do Rio Grande do Sul, Brazil)
The Discarding of the Rule of Three in the 1960s: Changes in Elementary Education in France and Brazil
- 22:00–22:15** **Yana Shvartsberg** (Pace University, USA)
Mathematics Education for Young Women During Progressive Era: Historical Overview
- 22:15–22:30** **Alexei Volkov**¹, Viktor Freiman² (¹Taiwan Tsing–Hua University, Taiwan, China; ²Université de Moncton, Canada)
David Eugene Smith (1860–1944) and His Work on Mathematics Education
- 22:30–22:45** **Alexander Karp** (Teachers College, Columbia University, USA)
College Entrance Exams in Mathematics in Russia before the Second World War: Development, Role, Objectives
- 22:40–23:00** **Discussion and Closing Remarks**
Alexander Karp (Teachers College, Columbia University, USA)

TSG56: Philosophy of Mathematics and Mathematics Education

Chair: Maria Aparecida Viggiani Bicudo (Universidade Estadual Paulista “Júlio de Mesquita Filho”, Brazil)

Co–chair: Paul Ernest (University of Exeter, UK)

Team members: Piotr Blaszczyk (Pedagogical University of Cracow, Poland), Thomas Hausberger (Montpellier University, France), Gang Peng (Guangxi Normal University, China)

IPC Liaison Person: Abraham Arcavi (Israel)

Session I

July 13, 19:30–21:00

Location: W203

- 19:30–19:50** **Introduction**
- 19:50–20:20** **Ole Skovsmose** (Universidade Estadual Paulista (UNESP), Brazil)
Mathematics and Ethics
- 20:20–20:30** **Discussion**

TSG

- 20:30–20:40** **Min Bahadur Shrestha** (Tribhuvan University, Nepal)
Philosophy, Rigor and Axiomatics in Mathematics: Intimately Related or Imposed?
- 20:40–20:50** **Yenealem Ayalew** (Dire Dawa University, Ethiopia)
Imagination in the Philosophy of Mathematics and Its Implication for Mathematics Education
- 20:50–21:00** **Discussion**

Session II

July 16, 21:30–23:00

Location: W203

- 21:30–21:45** Regina D. Möller¹, **Peter Collignon**² (¹Humboldt University of Berlin, Germany; ²University of Erfurt, Germany)
Towards a Philosophy of Algorithms as an Element of Mathematics Education
- 21:45–21:55** **Mitsuru Matsushima** (Kagawa University, Japan)
Appropriation Mediates between Social and Individual Aspects of Mathematics Education
- 21:55–22:05** **Nadia Kennedy** (CUNY, NYC, USA)
Philosophical Inquiry for Critical Mathematics Education
- 22:05–22:15** **Discussion**
- 22:15–22:30** **Theodore Savich** (Indiana University, USA)
Towards Critical Mathematics
- 22:30–22:40** **Thomas Ricks** (Louisiana State University, USA)
Recognizing Mathematical Anthropocentrism
- 22:40–22:50** **YanYaqiang**, XueSuyue, MaJunfeng (Soochow University, China)
Curriculum System of the Philosophy of Mathematics Education for Normal Students
- 22:50–23:00** **Discussion**

Session III

July 17, 14:30–16:30

Location: W203

- 14:30–14:45** **Maria Bicudo**¹, Verilda Speridião Kluth² (¹São Paulo State University, Rio Claro Campus, São Paulo, Brazil; ²Federal University of Sao Paulo, São Paulo, Brazil)
Research Procedures to Understand Algebraic Structures: Hermeneutic Approach.
- 14:45–15:00** **David Kolosche** (University of Klagenfurt, Austria)
2+2=4? Mathematics Lost between Two Pitfalls of Essentialism and Alternative Truths
- 15:00–15:15** **Bronislaw Czarnocha** (Hostos Community College, CUNY, NYC, USA)
Does Constructivism Tell Us How to Teach?
- 15:25–15:40** **Karla Sepúlveda Obreque**¹, Javier Lezama Andalón² (¹Centro de Investigación Escolar y Desarrollo, Catholic University of Temuco, Chile; ²Instituto Politécnico Nacional, México)
Teachers Epistemology on the Origin of Mathematical Knowledge
- 15:40–15:55** **Maurício Rosa**¹, Danyal Farsani², Caroline Antunes da Silva³ (¹Federal University of Rio Grande do Sul, Brazil; ²University of Chile, Chile; ³Federal University of Rio Grande do Sul, Brazil)
Mathematical Education, Body and Digital Games: Play the Ball in This Way So That It Goes, It Goes Further than the Floor
- 15:55–16:05** **Marli Regina dos Santos** (Federal University of Ouro Preto, Minas Gerais, Brazil)
Internet, Teaching Mathematics: Weaving the Web
- 16:05–16:30** **Discussion**

TSG

TSG57: Diversity of Theories in Mathematics Education

Chair: Angelika Bikner (University of Bremen, Germany)

Co-chair: Ivy Kidron (LEV Academic Center, Jerusalem College of Technology, Israel)

Team members: Erika Bullock (University of Wisconsin, USA), Yusuke Shinno (Osaka Kyoiku University, Japan), Qinqiong Zhang (Wenzhou University, China)

IPC Liaison Person: Takeshi Miyakawa (Japan)

Session I

July 13, 14:30–16:30

Location: T128

14:30–14:40 Introduction to the TSG57

14:40–15:10 **Michèle Artigue** (LDAR, Université Paris–Diderot, France)
Facing the Challenge of Theoretical Diversity: The Digital Case

15:10–15:30 **Angelika Bikner–Ahsbabs**, Estela Vallejo–Vargas, Steffen Rohde (Bremen University, Faculty of Mathematics, Germany)
Role of Feedback When Learning with an Artifact

15:30–15:50 **Ivy Kidron** (Jerusalem College of Technology, Jerusalem, Israel)
Constructing Mathematical Knowledge by Means of Analogy: Connecting Fischbein’s Theory on the Role of Intuition in Mathematics and the Theory of Abstraction in Context

15:50–16:00 **Marcel Klinger** (University of Duisburg–Essen, Germany)
A Theoretical Framework for Students’ Conceptual Understanding in the Early Calculus Classroom

16:00–16:20 **Yusuke Shinno**, Tatsuya Mizoguchi (Hiroshima University, Japan; Tottori University, Japan)
Seeking a ‘THEORY’ of Networking Praxeologies in Mathematics Education: A Meta-theoretical Discussion

16:20–16:30 Final discussion of Session 1

Session II

July 14, 19:30–21:00

Location: T128

19:30–19:40 Introduction

19:40–20:00 **Arthur Bakker**¹, William R. Penuel² (¹Utrecht University, the Netherlands; ²University of Colorado, USA)
Networking Theories and Methodology: Identifying Argumentative Grammars in Design Research

20:00–20:20 **Ulises Salinas–Hernández**^{1,2}, Luis Moreno–Armella², Isaias Miranda³ (¹ENS de Lyon, France; ²Cinvestav IPN, Mexico, Cinvestav IPN, Mexico; ³IPN–CICATA, Legaria)
Configuration of the Theoretical–methodological Construct «The Teaching Model» by Affinity between Theories

20:20–20:30 **Jessica Lajos**, Sepideh Stewart (University of Oklahoma, USA)
Mathematical Intuition in Formal Proof Construction: Developing an Approach to Theoretical Research

20:30–20:40 **ShiQi Lu**, Wenbin Xu (Nanjing Normal University, China)
The Holistic Instructional Design Model of the Unit Knowledge Structure of Elementary School Mathematics Based on Core Competencies

20:40–20:50 **Anna Shvarts**, Arthur Bakker (Utrecht University, the Netherlands)
Vertical Analysis as a Strategy of Theoretical Work: From Philosophical Roots to Instrumental and Embodied Branches

20:50–21:00 Final discussion of Session 2

Session III

July 17, 21:30–23:00

Location: T128

21:30–21:40 **Introduction**

21:40–22:00 **Luis Radford** (Laurentian University, Ontario, Canada)
[Mathematics Teaching and Learning as an Ethical Event](#)

22:00–22:10 **Tatsuya Mizoguchi**¹, Yusuke Shinno², Toru Hayata³ (¹Tottori University, Japan; ²Hiroshima University, Japan; ³Naruto University of Education, Japan)
[How Can We Classify Teachers' Paradidactic Praxeologies in Different Institutional Settings?](#)

22:10–22:20 **Sun Young Ban** (Merritt College, USA)
[The Effect of Pedagogical Knowledge on Mathematics Anxiety in Developmental Mathematics Course](#)

22:20–22:30 **Lena Lindenskov** (Danish School of Education, Aarhus University, Denmark)
[Theoretical Networking in a Large-scale Danish and a Large-scale Norwegian Intervention Study: TMTM and PBG](#)

22:30–23:00 **Final Discussion:**
[Ethical Issues in the Use of Theories in Mathematics Education, in Design Research and the Diversity of Theories Relating to Technology.](#)

TSG58: Empirical Methods and Methodologies in Mathematics Education

Chair: Christine Knipping (The University of Bremen, Germany)

Co-chair: Soo Jin Lee (Korea National University of Education, Korea)

Team members: Christian Bokhove (University of Southampton, UK), Bagele Chilisa (University of Botswana, Botswana), Na Li (Central China Normal University, China)

IPC Liaison Person: Yufeng Guo (China)

Session I

July 13, 19:30–21:00

Location: T128

19:30–19:50 **Christine Knipping**¹, Soo Jin Lee² (¹University of Bremen, Germany; ²Korea National University of Education, Korea)
[Introduction to TSG 58](#)

19:50–20:20 **Zhenzhen Miao**¹, David Reynolds², Christian Bokhove³ (¹Jiangxi Normal University, China; ²Swansea University, UK; ³University of Southampton, UK)
[First Voyage of the Integrated Paradigm: The Case of an International Study on Effective Mathematics Teaching](#)

20:20–20:35 **Na Li**¹, Ida Ah Chee Mok² (¹Central China Normal University, China; ²The University of Hong Kong, Hong Kong SAR, China)
[The Teaching of Mathematical Thinking: The Conceptualization of a Special Class Teacher in China](#)

20:35–20:50 **Fan Weiyuan** (Jiading No.1 High School, Shanghai, China)
[Teaching Design of Combination from HPM Perspective](#)

20:50–21:00 **Christine Knipping**¹, Soo Jin Lee² (¹University of Bremen, Germany; ²Korea National University of Education, Korea)
[Summarizing Discussion](#)

TSG

Session II

July 16, 21:30–23:00

Location: T128

- 21:30–22:00** **Ann-Kristin Adleff¹**, Natalie Ross¹, Gabriele Kaiser¹, Johannes König², Sigrid Blömeke³ (¹University of Hamburg, Germany; ²University of Cologne, Germany; ³University of Oslo, Norway)
[Understanding the Relations between Instructional Quality and Task Quality in Mathematics Classrooms](#)
- 22:00–22:15** Ying Zhou, Xiaofeng Lan, **Tommy Tanu Wijaya** (Guangxi Normal University, China)
[What Is Six-questions Cognitive Model?](#)
- 22:15–22:30** **Soo Jin LEE**, Jaehong SHIN (Korea National University of Education, Korea)
[Units Coordination as a Theoretical Construct to Understand Students Mathematical Activities](#)
- 22:30–22:45** **Zhenrong Xiong**, Ying Zhang, Bo Li, Na Li (Central China Normal University, China)
[The Influence of ICT on the Students' Science Literacy at the National and Student Level Based on ITU IDI Index and PISA2015](#)
- 22:45–22:50** **Try Kimhor** (National Institute of Education, Phnom Penh, Cambodia)
[Poster Presentation I: The Effectiveness of Teaching Mathematics in Circle Equation by Using 5E Instructional Model in Inquiry-based Learning](#)
- 22:50–22:55** Lin Yi, **Tommy Tanu Wijaya**, Zhou Ying (Guangxi Normal University, Guilin, China)
[Poster Presentation II: The Trend of Mathematics Teaching Method Has Changed from Fragments to Systematics](#)
- 22:55–23:00** **Christine Knipping¹**, Soo Jin Lee² (¹University of Bremen, Germany; ²Korea National University of Education, Korea)
[Summarizing Discussion](#)

Session III

July 17, 14:30–16:30

Location: T128

- 14:30–15:00** **Markku S. Hannula¹**, Enrique Garcia Moreno-Esteva¹, Miika Toivanen² (¹University of Helsinki, Finland; ²SeeTrue Technologies, Finland)
[Eye Movements and Collaborative Problem Solving: What Do Long Fixations Tell about Student Cognition?](#)
- 15:00–15:15** **Ann Sophie Stuhlmann** (Universität Hamburg, Germany)
[Examining the Phenomenon of Interlocutors Talking past Each Other in Collaborative Proof Constructions](#)
- 15:15–15:30** Christine Knipping¹, **Soo Jin Lee²** (¹University of Bremen, Germany; ²Korea National University of Education, Korea)
[Summarizing Discussion](#)
- 15:30–15:45** **Christian Bokhove¹**, Jasperina Brouwer², Chris Downey¹ (¹University of Southampton, UK; ²University of Groningen, The Netherlands)
[Using MRGQAP to Analyse the Development of Mathematics Pre-service Trainees' Communication Networks](#)
- 15:45–16:00** **Lei Wang**, Yong Zhang, Na Li, Bo Li (Central China Normal University, China)
[Case Study of Personalized Teaching Based on the Q-learning Algorithm in the Era of Big Data](#)
- 16:00–16:15** **Man Ching Esther Chan**, David Clarke (Melbourne Graduate School of Education, The University of Melbourne, Australia)
[Learning Research in a Laboratory Classroom: Advancing Methodology and Technology](#)
- 16:15–16:30** Christine Knipping¹, **Soo Jin Lee²** (¹University of Bremen, Germany; ²Korea National University of Education, Korea)
[Summarizing Discussion](#)

TSG59: Mathematics and Creativity

Chair: Chronis Kynigos (University of Athens, Greece)

Co-chair: Roza Leikin (Haifa University, Israel)

Team members: Thorsten Fritzlar (Martin Luther University, Germany), Theodosia Prodromou (University of New England, Australia), Hongyu Su (South China Normal University, China)

IPC Liaison Person: Thomas Lowrie (Australia)

Session I

July 13, 14:30–16:30

Location: T519

14:30–14:40 **Roza Leikin** (Haifa University, Israel)

[Introduction: Different Faces of Creativity: On the Program and Participants of the TSG–59 ICME–14](#)

14:40–14:55 **Chronis Kynigos** (University of Athens, Greece)

[Opening: Individual vs Social Perspectives of Mathematical Creativity](#)

Collaborative Creativity:

14:55–15:05 **Malgorzata Aneta Marciniak** (City University of New York, Long Island City, US)

[Fostering Creativity in a Diverse Classroom of a Community College](#)

15:05–15:15 **M. Alicia Venegas–Thayer** (Pontificia Universidad Catolica de Valparaiso, Valparaiso, Chile)

[Collaborative Creation between University Students from Mathematics and Music](#)

15:15–15:25 **Erik Ottar Jensen** (Aalborg University, Virum, Denmark)

[Understanding Students Everyday Play Experiences when Designing Games in the Mathematics Classroom](#)

15:25–15:35 Dimitris Diamantidis, **Chronis Kynigos** (National and Kapodistrian University of Athens, Athens, Greece)

[Creative Design of Digital Tools for Teaching in a Mathematics' Teachers' Community](#)

15:35–15:45 **Irina Lyublinskaya**¹, Marta Cadral² (¹Teachers College, Columbia University, New York, US; ²CUNY College of Staten Island, US)

[Creative Art Processes to Deepen Geometrical Thinking of Middle School Mathematics Teachers](#)

15:45–15:55 **Jeffrey J Wanko** (Miami University, Oxford, US)

[Beyond Sudoku: Creating a Course for Developing Deductive and Creative Skills](#)

15:55–16:05 Chronis Kynigos, **Dimitris Diamantidis** (National and Kapodistrian University of Athens, Athens, Greece)

[Social Creativity in a Constructionist Classroom Context](#)

16:05–16:30 **Discussion**

Session II

July 14, 19:30–21:00

Location: T519

Round table 1: Cognitive Perspective of Creativity (Chair: Kynigos)

19:30–19:37 **Jiali Xing**¹, Qiaoping Zhang², Xuanzhu Jin³ (¹Zhejiang New Thought Educational Science Academy, Hangzhou, China; ²The Education University of Hong Kong, Hong Kong SAR, China; ³The Education University of Hong Kong, Hong Kong SAR, China)

[Exploring Primary Students' Creativity in Hands-on Mathematical Activities](#)

19:37–19:44 **Shin Watanabe** (The Mathematics Certification Institute of Japan, Japan)

[A Leap from in School to out School – Possibility is Creativity Development](#)

19:44–19:51 **Aditya P. Adiredja**¹, Michelle Zandieh² (¹The University of Arizona, US; ²Arizona State University, Polytechnic Campus, US)

[Creativity in Linear Algebra through Interactions](#)

19:51–19:58 **Mariia Pavlova**¹, Maria Shabanova² (¹Northern (Arctic) Federal University, Arkhangelsk, Russia; ²Moscow Center of the Development of Human Resources for Education, Russia)

[Students Make Interactive Exhibition “Experimental Mathematics” for the Museum of Entertaining Sciences](#)



Round Table 2: Creativity in the World (Chair: Leikin)

- 19:58–20:05** **Lady Angela Mico Rocena**¹, Ma. Nympha B. Joaquin¹, Manabu Sumida², Naomichi Yoshimira²
(¹University of the Philippines, Quezon City, Philippines; ²Ehime University, Japan)
[Mathematical Creativity of Filipino and Japanese Students: A Comparative Study](#)
- 20:05–20:12** **Yi Chu**, Haiyue Jin (Nanjing Normal University, Nanjing, China)
[An Exploration into Chinese High School Students' Consciousness of Enquiring and Innovation](#)
- 20:12–20:19** **Deborah Sarah Sutch**, Helen Thomas (International Baccalaureate Organization, Den Haag, Netherlands)
[Promoting Creativity in the International Baccalaureate Diploma Programme Mathematics](#)
- 20:19–20:26** **Anzhi Wang** (Beijing Normal University, China)
[Establishment of Evaluation Index System for Primary School Students' Mathematical Innovation Competency: Investigation and Analysis Based on Delphi Method](#)
- 20:26–20:33** **Valentina Gogovska** (University "Ss. Cyril and Methodius", Institute of Mathematics, 1000 Skopje, N. Macedonia)
[Brain Exercises for Improving Math Creativity and Physical Health](#)
- 20:33–21:00** **Discussion**

Session III

July 17, 14:30–16:30

Location: T132

14:30–14:55 Invited Lecture: Speaker and Title to Be Announced

Cognitive Abilities and Development of Creativity (Session chair: Kynigos)

- 14:55–15:05** **Theodosia Prodromou**¹, Chronis Kynigos² (¹University of New England, Armidale, Australia; ²National and Kapodistrian University of Athens, Greece)
[Designing Games to Foster Creativity Thinking about Randomness](#)
- 15:05–15:15** **Svenja Bruhn** (Bielefeld University, Germany)
[Creativity Varies from Task to Task, Doesn't It? – A Qualitative View on First Graders' Individual Creativity](#)
- 15:15–15:25** **Torsten Fritzlär**, Karin Richter (University of Halle–Wittenberg, Germany)
["Rethinking the World" with Mathematics: The Geometric Chess from Bauhaus as a Basis for Creating Mathematical Ideas and Materials](#)
- 15:25–15:35** **Daniela Assmus**, Torsten Fritzlär (Martin Luther University of Halle–Wittenberg, Germany)
[Inventing Growing Patterns by Primary School Students – A Creativity Provoking Task](#)
- 15:35–15:45** **Anastasia Datsogianni**¹, Pantelitsa Eleftheriou³, Nektaria Panagi–Louka², Athanasios Gagatsis²
(¹University of Munich (LMU), Munich, Germany; ²University of Cyprus, Cyprus; ³Cyprus Ministry of Education and Culture, Cyprus)
[The Relation between Spatial Ability and Creativity in Geometry in Primary School](#)
- 15:45–15:55** **Bruce Stuart Ferrington** (Radford College, Canberra, Australia)
[How Long is Half a Piece of String? – The Journey Continues](#)
- 15:55–16:05** Haim Elgrably, **Roza Leikin** (University of Haifa, Haifa, Israel)
[Strategy–related and Outcome–related Mathematical Creativity in All as Compared to That in Gifted](#)
- 16:05–16:30** **Discussion**

Session IV

July 17, 21:30–23:00

Location: T519

Round Table 3: Collaborative and Interactive Creativity (Chair: Prodromou)

- 21:30–21:37** **Motshidisi Gertrude van Wyk** (Central University of Technology, Free State, South Africa)
[A Survey of Mathematics Teachers' Perceptions on Mathematically Gifted Learners in Thaba Nchu Primary Schools in South Africa](#)
- 21:37–21:44** **Hanna Zdziarska Slabikowska** (University South–Eastern Norway, Solbergmoen, Norway)

Inquiry Dialogues in Mathematics Classroom and Mathematical Representations and Their Role in Learning Mathematics

- 21:44–21:51** **Matheus Delaine Teixeira Zanetti**¹, Mateus G. Fonseca^{1,2}, Cleyton H. Gontijo¹ (¹University of Brasilia, Brasilia, Brazil; ²Federal Institute of Brasilia, Brazil)
[Mathematical Creativity Workshop to Review Elements of Geometry with High School Students](#)
- 21:51–21:58** **Nataly Essonnier**¹, Mohamed El-Demerdash², Jana Trgalová³ (¹University of Geneva, Switzerland; ²Menoufia University, Egypt; ³University of Lyon, France)
[Comparing Social Creativity among Designers with Creativity of Mathematical Digital Resources Produced](#)
- 21:58–22:05** **Ayman Eleyan Aljarrah**, Jo Towers (Acadia University, Wolfville, Canada; University of Calgary, Canada)
[Expanding Possibilities: A Metaphor for the Co-construction of Students' Creative Acts](#)
- 22:05–22:12** **Hye-Yun Jung**, Kyeong-Hwa Lee (Sejong Science High School, Korea; Seoul National University, Korea)
[Developing Mathematical Group Creativity through Mathematical Modelling](#)

Round Table 4: Evaluation of Creativity (Chair: Fritzlar)

- 22:12–22:19** **Emili Cilli-Turner**¹, Miloš Savić², Gail Tang¹ (¹University of La Verne, US; ²University of Oklahoma, US)
[Sources of Evolution of University Students Views on Mathematical Creativity](#)
- 22:19–22:26** **Mateus Gianni Fonseca**¹, Cleyton H. Gontijo² (¹Federal Institute of Education, Science and Technology of Brasilia, Brazil; ²University of Brasilia, Brazil)
[Mathematical Creativity Workshops to High School Brazilian Students and Their Effects on Motivation and Performance in Mathematics](#)
- 22:26–22:33** **Noriko Tanaka** (Asahigaoka Senior High School, Japan)
[Research Problems and Assessment by Students](#)
- 22:33–22:55** **Discussion**
- 22:55–23:00** **Closing: Summary and Future Plans**
Chronis Kynigos (University of Athens, Greece)

TSG60: Semiotics in Mathematics Education

Chair: Ricardo Nemirovsky (Manchester Metropolitan University, UK)

Co-chair: Christina Krause (University of Duisburg–Essen, Germany)

Team members: Suanrong Chen (Yangzhou University, China), Francesca Ferrara (University of Turin, Italy), Kazuya Kageyama (Hiroshima University, Japan)

IPC Liaison Person: Faïza Chellougui (Tunisia)

Session I

July 13, 19:30–21:00

Location: T205

[Embodied Aspects, Gestures / Movement, Technology](#)

19:30–19:45 **Introduction**

19:45–20:00 **Candace Walkington**¹, Min Wang¹, Mitchell Nathan² (¹Southern Methodist University, USA; ²University of Wisconsin–Madison, USA)
[Collaborative Gestures among Secondary Students Conjointly Proving Geometric Conjectures](#)

20:00–20:15 **Kazuma Kageyama**, Masataka Koyama (Hiroshima University, Japan)
[Conceptualization of Co-emergent Curriculum in a Mathematics Lesson](#)

20:15–20:30 **Laurie D. Edwards** (Saint Mary's College of California, USA)

TSG

Proof, Conditionals and Gesture

20:30–20:45 **Giulia Ferrari**, Francesca Ferrara (Università degli Studi di Torino, Italy)
[Can a Movement Notation Be a Mathematical Notation?](#)

Session II

July 16, 21:30–23:00 **Location: T205**

Language, Meaning Making, Social Factors

21:30–21:45 **Introduction**

21:45–22:00 **Hiroaki Hamanaka**, Masayoshi Yoshikawa, Hisae Kato, Mitsunobu Kawauchi (Hyogo University of Teacher Education, Japan)
[Semiotic Character and Issues in the Learning and Teaching of Linear Functions in Japan: The Influence of Terminology](#)

22:00–22:15 **Christina M. Krause**¹, Annika M. Wille² (¹University of California Berkeley, USA / University of DuisburgEssen, Germany; ²Universität Klagenfurt, Austria)
[A Semiotic Lens on Learning Math in Sign Languages](#)

22:15–22:30 **Hamide Dogan** (University of Texas at El Paso, USA)
[Semiotic Chaining in Linear Algebra](#)

22:30–22:45 **Andrea Maffia**, Mirko Maracci (University of Pavia, Italy)
[Interference between Artifacts in Semiotic Chains](#)

Session III

July 17, 14:30–16:30 **Location: T205**

Christina Krause, Ricardo Nemirovsky, Tam Dibley

[Workshop: Semiotics and Abstraction: Exploring Potential Relationships by Means of Two Cases of Mono Printing and Sign Languages](#)

14:30–15:00 **General Discussion of the Papers Presented and Transition towards the Workshop**

TSG61: International Cooperation in Mathematics Education

Chair: Uihock Cheah (Methodist Council of Education, Malaysia)

Co-Chair: Masami Isoda (University of Tsukuba, Japan)

Team members: Bernadette Denys (Paris Descartes University, France), Jiwei Han (Northeast Normal University, China), Arne Jakobsen (University of Stavanger, Norway)

IPC Liaison Person: Thomas Lowrie (Australia)

Session I

July 13, 14:30–16:30 **Location: W111**

14:30–14:35 **Welcome and Introduction**

14:35–14:47 **Maitree Inprasitha**¹, Masami Isoda² (¹Khon Kaen University, Thailand; ²University of Tsukuba, Japan)
[Adapting Lesson Study in Thailand through International Cooperation](#)

14:47–14:59 **Kim Hong Teh**¹, Masami Isoda² (¹SEAMEO RECSAM, Malaysia; ²University of Tsukuba, Japan)
[An Experience in Developing the Regional Mathematics Curriculum Standards](#)

14:59–15:11 **Russasmita Sri Padmi**¹, Gabriel Matney² (¹SEAMEO QITEP in Mathematics, Yogyakarta, Indonesia; ²Bowling Green State University, Ohio, USA)

TSG

Fostering Global Citizenship in Mathematics Classrooms

15:11–15:26 Discussion

15:26–15:38 Ileen Palan¹, Steven Tandale¹, Gandhi Lavaki¹, Masami Isoda², Satoshi Kusaka³, Akinori Ito⁴ (¹Department of Education, Papua New Guinea; ²CRICED, University of Tsukuba, Japan; ³Hiroshima University, Japan; ⁴Waseda University, Japan)

Development of the National Mathematics Textbook in Primary Schools in Papua New Guinea

15:38–15:50 Lambas¹, Masami Isoda², Wahyudi³ (¹Center for Curriculum and Instruction, Republic of Indonesia; ²CRICED, University of Tsukuba, Japan; ³SEAMEO, Bangkok, Thailand)

The Challenges of Improving Mathematics Education through Translated Textbook

15:50–16:02 Wahid Yuniarto¹, Uki Rahmawati¹, Masami Isoda² (¹SEAMEO QITEP in Mathematics, Indonesia; ²University of Tsukuba, Japan)

Developing Mathematical Thinking through Robot Programming

16:02–16:14 James Musyoka¹, Michael Obiero¹, David Stern², Danny Parsons² (¹Maseno University, Kenya; ²IDEMS International, UK)

An Electronic Assessment Workshop for 1st & 2nd Year Mathematics & Statistics Course Lecturers from East African Universities

16:14–16:30 Discussion

Session II

July 14, 19:30–21:00

Location: W111

19:30–19:34 Welcome and Introduction

19:34–19:47 Ui Hock Cheah¹, Masami Isoda² (¹Penang Math Platform, Malaysia; ²University of Tsukuba, Japan)

Understanding Narratives: A Pathway towards Resolving Issues and Challenges in International Cooperation in Mathematics Education

19:47–20:00 Masami Isoda¹, Maitree Inprasitha², Roberto Araya³, Sofian Tajul Arus⁴ (¹University of Tsukuba, Japan; ²Khon Kaen University, Thailand; ³University of Chile, Chile; ⁴Ministry of Education, Malaysia)

APEC Lesson Study Project (2006–2018) for Mathematics Education and AI Era Curriculum Project (2019–)

20:00–20:13 Arne Jakobsen¹, Mercy Kazima² (¹University of Stavanger, Norway; ²University of Malawi, Malawi)

Improving Quality and Capacity of Mathematics Education in Malawi through Collaboration – Lessons from a Collaboration between University of Malawi and University of Stavanger

20:13–20:26 Discussion

20:26–20:39 Bernadette Denys¹, Jannick Trunkenwald² (¹Paris Diderot University, France; ²French High School, Algiers)

Informal International Collaboration and Its Potentialities: The Example of Grema

20:39–20:52 Calvin Swai¹, Joyce Mgombelo², Andrew Binde¹, Florence Glanfield³, Elaine Simmt³ (¹University of Dodoma, Tanzania; ²Brock University, Canada; ³University of Alberta, Canada)

Capacity Development for Mathematics Teaching in Tanzania: A Follow Up of Impact on Participants

20:52–21:00 Discussion

Session III

July 17, 21:30–23:00

Location: W111

21:30–21:43 Norihiro Nishikata (Japan International Cooperation Agency, Japan)

How El Salvador Improved Student Learning Achievement in Mathematics? A Principle Methodology of JICA toward Achieving SDGS 4

21:43–21:56 Takashi Itoh¹, Isamu Imahori², Koji Takahashi² (¹Gunma University, Japan; ²PADECO Co., Ltd., Japan)

The Development of Mathematics Textbooks in Myanmar: Under the Create Project

TSG

- 21:56–22:09** **Raimundo Olfos**, Soledad Estrella (Pontifical Catholic University of Valparaíso, Institute of Mathematics, Chile)
[Impact of APEC Lesson Study Project \(2006–2018\) in Chile](#)
- 22:09–22:22** **Elsa Santaolalla Pascual**, Belén M. Urosa Sanz, Olga Martín Carrasquilla (Universidad Pontificia Comillas, Spain)
[Guatematics in Action. A Service Learning Project for Mathematics Education between Spanish Preservice Teachers and Teachers from Rural Schools in Guatemala](#)
- 22:22–22:39** **Discussion**
- 22:39–23:00** **Wrap-up of TSG 61: The way forward**

TSG62: Popularization of Mathematics

Chair: Christian Mercat (Université Lyon 1, France)

Co-chair: Clara Grima (Universidad de Sevilla, Spain)

Team members: Pan Liu (East China Normal University, China), Abolfazl Rafiepour (Shahid Bahonar University of Kerman, Iran), Patrick Vennebush (University of Maryland, College Park, USA)

IPC Liaison Person: Abraham Arcavi (Israel)

Session I

July 13, 19:30–21:00

Location: T206

19:30–19:50 **Maria Shabanova**¹, Mariia Pavlova² (¹Northern (Arctic) Federal University M. V. Lomonosov; ²Moscow Center for Educational Quality, Russia)
[Students Make Interactive Exhibition Experimental Mathematics for the Museum of Entertaining Sciences](#)

19:50–20:10 Iwan Gurjanow¹, **Joerg Zender**², Matthias Ludwig¹ (¹Goethe University Frankfurt; ²University of Applied Science Rhein Main, Germany)
[Mathcitymap – Popularizing Mathematics around the Globe with Maths Trails and Smartphone](#)

20:10–20:30 **Abdu Mohammed Seid**¹, Yismaw Abera Wassie¹, Danny Parsons², Haile Yideg¹, Assaye Waleign¹ (¹Bahir Dar University, Ethiopia; ²IDEMS International, Ethiopia)
[Beyond the Classroom and Curriculum: The Annual Maths Camp at Bahir Dar University, Ethiopia 2013 – 2019](#)

20:30–20:40 Rose Mbewe, Sue Ellen Richardson, **Lili Zhou** (Purdue University, USA)
[Reconsidering the M in STEM: Leaders Conceptions of Mathematics to Empower Girls in GEMS Clubs](#)

Session II

July 16, 21:30–23:00

Location: T206

21:30–21:50 **Lynn Liao Hodge**¹, Shande King², Qintong Hu² (¹University of Tennessee, USA; ²Shandong University of Science and Technology, China)
[Creating Access to Engaged Views of Mathematics and Teaching through Informal Learning Spaces](#)

21:50–22:00 **Manmohan Kaur** (Benedictine University, Chicago, USA)
[Increasing Math Appreciation Using the Upper Levels of Blooms Taxonomy](#)

22:00–22:20 **Violeta Vasilevska** (Utah Valley University, USA)
[Math + Origami + Puzzles + Magic -> The Odds Are Always in Favor of Fun](#)

Session III

July 17, 14:30–16:30

Location: T206

14:30–14:40 Junfeng Ma, **Yaqiang Yan** (School of Mathematical Sciences, Soochow University, China)
[Some Suggestions on School-based Curriculum Construction of Mathematics Culture for Middle School](#)

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- 14:40–15:00** **Xinyu Liu**, Pan Liu, Jiachen Zou (East China Normal University, China)
[Mathematical Drama: A New Form of Popularization of Mathematics at East China Normal University, China, 2012 – 2019](#)
- 15:00–15:20** **Abolfazl Rafiepour** (Shahid Bahonar University of Kerman, Iran)
[Mutual Role of Mathematics and Culture](#)
- 15:20–15:40** Elham Ebrahim Zadeh, Hasan Hoseinpoor, **Einollah Shokrpourrodbari**, Younes Karimi Fardinpour (Islamic Azad University, Ahar, Iran)
[Keeping Popularization of Mathematics on Track: Formative Assessment](#)
- 15:40–16:00** **Younes Karimi Fardinpour**¹, Akram Bagheri Gheibi², Fahimeh Kolahdouz² (¹Islamic Azad University, Iran; ²Farhangian University, Esfhan, Iran)
[On the Impact of Popularization Oriented Assessment: Creating Excitement](#)