

TSG 53 Agenda

TSG 53 : EQUITY IN MATHEMATICS EDUCATION

Class: A (We also have an additional session on the 16th in Class B)

**Please prioritize the sessions in “core-time” (from 19:30-23:00, Beijing time, i.e. Session 2, 3 for Class A and session 1, 2 for Class B) as they are friendly to most of the time zones in the world.

Session 1 13th July 2021 Class A

Chair: Jayasree Subramanian

Time: 14:30- 14:35 Welcome and Introduction by Jayasree Subramanian (Chair)

1. Time: 14:35–14:47

Title of the Paper: Education equity in Hong Kong: Factors that contribute to Hong Kong students’ mathematics performance in trends in international mathematics and science study (TIMSS) 2015.

Author: Frederick Koon Shing Leung

Institution(s) (to school/department/research center) and Country/Region: The University of Hong Kong, Hong Kong SAR, CN

Short abstract of the paper: Education equity has been an issue of concern in many countries, and in Hong Kong, education equity is an aspiration beyond high student achievements. TIMSS may provide relevant data that address the issue of equity, but its international reports only provide rough relations between different variables and student achievements. This study investigates the status of education equity in Hong Kong through secondary analysis of the TIMSS 2015 mathematics data. Various statistical techniques were employed to establish specific relationships between the background variables and student achievements. The findings contribute to better understanding of the status of education equity in a highly successful education system and point to measures for the improvement of curriculum and school programmes. The results may lead to further

conceptual discussions on education equity that are not only beneficial to Hong Kong, but also to other regions.

Discussion: 14:47-14:55

2. Time: 14:56–15:08

Title of the Paper: Critical Mathematics Teacher Noticing: Exploring Pre-Service Teachers' Noticing of Power, Privilege, and Identity using Online Video.

Author(s): THEODORE CHAO, Melissa Adams-Corral, Youmna Deiri, Joanne Vakil

Institution(s) (to school/department/research center) and Country/Region: The Ohio State University, Columbus, US

Short abstract of the paper (20 lines maximum): Mathematics teacher noticing is a construct used heavily in research around mathematics teaching and mathematics teacher education. However, just as a focus on noticing draws attention to what a teacher sees, a focus on what a teacher does NOT see is equally important. In this study, we use online video commenting tools over three years to analyze what primary pre-service notice about their case study students mathematical thinking through four-weeks of problem-solving interviews, focusing on their peer interactions around issues of power, privilege, and identity. We present the term critical mathematics teacher noticing to describe the ways that the pre-service teachers, through online, asynchronous video analysis, engaged, confronted, and reflected on racist ideologies present in how they and their peers positioned their students.

Discussion: 15:08-15:16

3. Time: 15:17–15:22

Title of the Paper: Gender differences in Student-Student Interactions

Author(s): Desiree Ippolito, WEVERTON ATAIDE PINHEIRO, Jinqing Liu

Institution(s) (to school/department/research center) and Country/Region: Indiana University, Brasilia, BR

Short abstract of the paper (20 lines maximum): Efforts in mathematics education towards gender equity have been a persistent focus in research in the past decade, however, there is still limited research regarding mathematical learning experiences and mathematical problem-solving process. This study pays special attention to gender differences in student-student interactions during a teaching experiment to understand how gender affects student-student interactions in mathematical problem-solving contexts. We noticed that man and woman students behaved differently in student-student interactions with gender characteristics.

4. Time: 15:22–15:27

Title of the Paper: Socioeconomic differences delimited by Gender: Students' Perceptions about Mathematics in Mexican Schools.

Author: Itzel H. Armenta

Institution(s) (to school/department/research center) and Country/Region:

Tecnologico de Monterrey, Monterrey, MX

Short abstract of the paper (20 lines maximum): This paper contributes to the understanding of high-school students perceptions about mathematics by gender and with different socioeconomic status in Mexico. Authors of this paper presents data obtained from the implementation of a 5-point-Likert-scale survey regarding the perception about mathematics of 9th grade (13 to 15-years old) Mexican students from two different and demographically contrasting states within the country. The results indicate that gender is the main factor implying differences in students perceptions, even taking some other socioeconomic factors into account. The social role of women could be an explaining factor in the results.

5. Time: 15:27–15:32

Title of the Paper: Gender differences on specific issue: The case of Misconceptions in operating with Percentage

Author: Chiara Giberti

Institution(s) (to school/department/research center) and Country/Region:

University of Bergamo, IT

Short abstract of the paper (20 lines maximum): International large-scale assessments highlight a gap in favor of boys in mathematics in most of the countries. Italy is one of the countries in which this gap is more remarkable and it is also confirmed by national surveys. In this paper we analyze this gap on a specific grade 10 math item which requires operating with percentages. We consider the results both in terms of percentage and using a specific output of the Rasch Model (distractor plot) to study the trend of each possible response option on the basis of students ability on the whole test. The results highlight strong difficulties for all the students in facing the task and a remarkable gender gap in favor of males. Furthermore, this gap varies according to different type of schools. We interpret students' answers using the lenses of mathematics education theories and, in particular, in terms of misconceptions in operating with rational numbers.

6. Time: 15:32–15:37

Title of the Paper: Support for Students with Mathematics Learning Dis/abilities on Bridging Programmes in New Zealand Universities

Author: Phil Kane

Institution(s) (to school/department/research center) and Country/Region: The University of Auckland, NZ

Short abstract of the paper (20 lines maximum): One of the pre-degree programmes at the University of Auckland is the two-semester Tertiary Foundation Certificate (TFC). In this two semester bridging programme, students must pass the course (MATHS91F). Students who narrowly fail MATHS91F repeat it in their second semester. Unfortunately, this situation appears to match the expectations of these students to fail mathematics again. Their previous mathematical experiences leave them with doubts about their own abilities and questioning whether they are suited for university studies. Such a position is intensified for bridging students who have a Learning Dis/ability (LD), and struggle particularly with mathematics. This study is in the early stages of an investigation into how bridging programmes in New Zealand universities attend to the mathematical learning needs of

students with LDs, considering the stated equity policies of the universities. Specifically, this study examines university equity policies with respect to students with LDs and canvases the perspectives of those who work with these students, and the bridging students themselves.

Discussion: 15:37-15:53

7. Time: 15:54–15:59

Title of the Paper: Coping with the challenges while promoting Social Justice in Mathematics Classroom.

Author: Ram Krishna Panthi

Institution(s) (to school/department/research center) and Country/Region: Tribhuvan University, MR Campus, Tahachal, Kathmandu, NP

Short abstract of the paper (20 lines maximum): The purpose of this study was to explore three mathematics teachers' strategies to cope with the challenges of social justice in their mathematics classroom. I employed an interpretive inquiry for data collection, analysis and interpretation. I selected three mathematics teachers by purposive sampling from three public secondary schools in Kathmandu. I conducted in-depth interviews with each participant. I carried out multiple layers of thematic analyses and interpretations of the participant narratives constructed from the interview data. I constructed four themes -- persuading, watching and caring, treating individually, and grouping of students. This study is likely to bring awareness among the teachers for socially just pedagogy.

8. Time: 15:59–16:04

Title of the Paper: Adapting tasks between Including and Excluding Students.

Author(s): NINA INES BOHLMANN, Ralf Benölken, Timo Dixel

Institution(s) (to school/department/research center) and Country/Region: Leipzig University, Leipzig, DE

Short abstract of the paper (20 lines maximum): Adapting tasks to students assumed needs and capabilities is an essential part of teaching mathematics. Tasks might be modified in order to fit to a whole group or adapted to meet the needs of individual students. Although adapting tasks intends to support students in the learning of mathematics, it can provoke marginalization or reinforce a marginalization. In this article, we will discuss both the chances and the risks of adapting tasks, and we will provide a theoretical founded guideline for their reflection.

9. Time: 16:04-16:09

Title of the Paper: Supporting Students at multiple levels in Accessing and Succeeding in College Credit Mathematics.

Author(s): ANNE CAWLEY, Max Adam Altman

Institution(s) (to school/department/research center) and Country/Region: California State Polytechnic University, Pomona, Pomona, US

Short abstract of the paper (20 lines maximum): While developmental (or remedial) mathematics courses were developed with the intent to prepare students for college-credit mathematics courses, many students have had poor experiences in these courses and have fixed mindsets in which they see themselves as having low mathematical ability (Cawley, 2018). In this paper, we describe two different approaches to promoting positive mathematical dispositions and developing competencies such as self-regulation, motivation, and proficiency among mathematics students: the design of high school transition courses in Pacific jurisdictions and policy changes around eliminating developmental mathematics in the state of California. We conclude with a cross-case analysis focused on improving students' mathematical experiences while promoting and developing positive dispositions and mathematics proficiency.

10. Time: 16:09-16:14

Title of the Paper: Teacher Candidates Perspectives of Means to Facilitate Equitable Learning Opportunities During a High School Mathematics Methods Course

Author(s): Ruthmae Sears, Marilyn Strutchensy, Brian Lawler, Lakesia Dupree, Caree Pinder, CYNTHIA CASTRO-MINNEHAN

Institution(s) (to school/department/research center) and Country/Region: University of South Florida, Nassau, BS

Short abstract of the paper (20 lines maximum): This paper describes 18 secondary mathematics teacher candidates' perspectives about means to support equitable learning opportunities in mathematics. The teacher candidates were enrolled in a high school (Grades 9-12) mathematics methods course that was transformed to place a greater emphasis on equity. Data were garnered from teacher candidates' reflections about equity survey, strategies identified in their classroom observations report, and their end of semester reflections. The results suggest that teacher candidates perceived equity as a construct of fairness and access, which may be difficult to attain. The teacher candidates also noted that utilizing co-teaching strategies, integrating technology, and being accommodating and culturally responsive can support equitable learning opportunities. This study has implications for developing secondary mathematics education methods courses that explicitly seeks to address equity in mathematics.

11. Time 16:14-16:19

Title of the Paper: Children, Dialogue and Mathematics Education

Author(s): Ana Carolina Faustino

Institution(s) (to school/department/research center) and Country/Region:
Universidade Federal do Mato Grosso do Sul, Navira, BR

Short abstract of the paper (20 lines maximum): This article presents the results of a doctoral research that herein aims to understand how teachers and students put dialogue into action in the mathematics classes of the early years of Elementary School. The theoretical reference is based on critical-dialogical perspectives of Paulo Freire and Helle Alr and Ole Skovsmose. As it is focused on a qualitative approach, the research had two classrooms of the early years of the Elementary School as the context for data production. The data were collected by using a field diary as well as audio recordings and video recordings of the dialogues established during the mathematics classes. The results of this study provide evidence that the dialogue can give room for children to perceive themselves as human beings who produce culture and knowledge, share different perspectives, present arguments and cooperate with each other during the learning process of mathematics. To present the research results we create a fictional dialogue that takes place in eternity. The characters Socrates, Lakatos, Galileo and the author talk about the concept of dialogue, the methodology and the research result,

Discussion: 16:19-16:30

.....

Session 2 14th July 2021 Class A

Chair: Changgen Pei

Time: 19:30-19:32 Introduction by Chenggen Pei

12. **Time: 19:32-19:57 Invited paper 1**

Title of the Paper: A Framework for Detailing White, Heteropatriarchy in Mathematics Education

Author: Luis Leyva

Institution(s) (to school/department/research center) and Country/Region:

Vanderbilt University, Nashville, US

Short abstract of the paper (20 lines maximum): This paper presents a framework for detailing white heteropatriarchy -- a system of oppression at the juncture of racism, genderism, and patriarchy -- in U.S. mathematics education. I elaborate on white supremacy and heteropatriarchy, as well as intersectionality as a lens for detailing white heteropatriarchy. Then, I situate these perspectives in mathematics education by reviewing research that characterizes whiteness, (hetero)patriarchy, and their intersections at institutional and identity levels. This review highlights the void of queerness in intersectionality research. To address this gap, I draw on research on queer issues in education, including queer of color (QOC) experiences, to propose a framework of white heteropatriarchy in mathematics education. This framework advances intersectionality research to inform practice that affirms QOC experiences in mathematics education.

Discussion: 19:57- 20:15

13. **Time: 20:18–20:30**

Title of the Paper: Disentangled Narratives: Exploring Institutional and Students' Gendered Discourses in an Engineering Faculty.

Author(s): Darinka Radovic

Institution(s) (to school/department/research center) and Country/Region):

Universidad de Chile, Santiago, CL

Short abstract of the paper (20 lines maximum): Recent theoretical developments in studies of gendered experiences in mathematically demanding practices (careers and

professional contexts) have stressed the relevance of exploring how different discourses construct these experiences and how they may be resisted, contested and changed. This is a case study in a STEM faculty in Chile, faculty that offers an interesting context to explore the intersection between social discourses (a national feminist movement), institutional transformation (a growing institutionalization of gender equity policies), particular academic cultures (mathematically intensive engineering careers in different areas of STEM) and individual gendered identities. It shows that gender and sex become visible in different discourses: in narrating negative personal experiences in female students, in perceiving negative female peer experiences in male students and in describing women and their value in the STEM culture in male lecturers. We discuss how this visibility is linked with how mathematics and engineering is constructed in the particular case and how these discourses can be reproductive or become a vehicle of change.

Discussion: 20:30- 20:38

14. Time: 20:40-20:52

Title of the Paper: Gender issues and consequences for Undergraduate Mathematics Women Students

Author(s): WEVERTON ATAIDE PINHEIRO, Vanessa Franco Neto

Institution(s) (to school/department/research center) and Country/Region: Indiana University, Brasilia, BR

Short abstract of the paper (20 lines maximum): The field of mathematics is still men dominated. This fact has strong consequences on women who pursue mathematics endeavors. While trying to understand how undergraduate mathematics students build their mathematicians identities, this research finds that the discourses presented by students from different genders were very different. In particular, women's experiences converged to isolation in the field, and consequently feelings of not belonging. This qualitative life story interview study shows the perceptions of women in mathematics and what is needed the most for these women: gender inclusion. The ultimate goal of this study is to advocate for inclusion, achieving a less unbalanced workforce in mathematics and mathematics-related fields, which are still men dominated.

Discussion: 20:52- 21:00

Session 3 **Additional session** 16th July 2021 Class B

Chair: Constantinos Xenofontos

Time: 21:30-21:32 Introduction by Constantinos Xenofontos

15. Time: 21:32–21:57 Invited Paper 2

Title of the Paper: Cultural Power and the fabrication of Race Difference in the Mathematics Classroom

Author: Luz Valoyes-Chavez

Institution(s) (to school/department/research center) and Country/Region: CIAE-University of Chile, Santiago, CL

Short abstract of the paper (20 lines maximum): In this paper, I analyze the fabrication of race difference within the context of mathematics education reform efforts in Chile, a country where a white identity fiction is used to portray its racial identity. I adopt Halls approach to race as a discourse that operates like a language. As a discourse, race sets up regimes of truth to think and talk about the students and their mathematics learning as well as to regulate teachers and students interaction. As a language, race produces meanings to establish and maintain in place racial symbolic orders in school mathematics. By using an interpretative approach, I focus on the representational practices of two Chilean teachers participating in professional development to enhance their mathematics instruction in marginalized schools. The study locates in the intersection of race and reform efforts in mathematics education and aims to contribute to the critical conversation in the field about issues of oppression and exclusion of Black children in worldwide racialized systems of mathematical practices.

Discussion: 21:57- 22:15

16. Time: 22:18–22:30

Title of the Paper: History of Whose Mathematics for Teaching: Raising the Caste Question in Mathematics Education in India

Author: Jayasree Subramanian

Institution(s) (to school/department/research center) and Country/Region: SRM University, Amaravati, Andhra Pradesh, India

Short abstract of the paper (20 lines maximum): In July 2020, the Hindu right-wing party elected to power introduced the New Education Policy. The policy seeks to draw from what it calls the Indian heritage in knowledge production and integrate the traditional knowledge as part of the liberal arts education. In mathematics, the policy makes strong claims about Indian achievements in mathematics and says Indian contributions to knowledge and the contexts in which they were discovered must be incorporated into the school curriculum. Using history of mathematics in teaching and learning of mathematics has received considerable attention in mathematics education. However, the complexities of socio-political hierarchies and cultural hegemony involved in using history of mathematics for learning mathematics have not received necessary attention. Even though the National Education Policy does not refer to existing literature on using history of mathematics in curriculum, this paper seeks to engage with and problematize the question of incorporating certain history mathematics in school curriculum in a caste-based society that has historically divided labor by birth, thereby excluding a majority from certain kinds of knowledge.

Discussion: 22:30- 22:38

17. Time: 22:40-22:52

Title of the Paper: From Invisible to Domestic Gender in Mathematics Textbooks in India

Author: Kishorkumar Darak

Institution(s) (to school/department/research center) and Country/Region: Tata Trusts, Pune, India

Short abstract of the paper (20 lines maximum): In India, textbooks are considered as the most valid and authentic source of knowledge in the world of schools. Examinations based on rote memorisation of textbooks have historically raised their status to sacrosanct reservoirs of knowledge. Textbooks of social sciences and languages are considered to be sites of tension, contestation, negotiations and also to be tools of reproducing socio-cultural inequality and patterns marginalisation. Large body of research on textbook-content focuses on these textbooks but mathematics textbooks are seldom considered as sites of social reproduction. Due to the perceived notions of objectivity, accuracy and precision with Mathematics as a discipline, content of its textbooks is mainly analysed along

dimensions like pedagogies and algorithms. The present paper attempts to analyse word problems in Mathematics as social text. It analyses specific textbooks from the state of Maharashtra in western India and argues that over years, overt prejudices against the feminine gender have slipped into subtler prejudices that are difficult to identify. Drawing attention to the hindrance such textbooks may produce in larger aim of attaining gender equality.

Discussion: 22:52- 23:00

.....

Session 4 17th July 2021 Class A

Chair: Darinka Radovic

Time: 21:30-21:32 Introduction by Darinka Radovic

18. Time: 21:32–21:57 Invited Paper 3

Title of the Paper: Challenging the Abyssal Line Between Roma and Non-Roma, In and Out of the (Mathematics) Classroom, Through Common Spaces

Author: Charoula Stathopoulou

Institution(s) (to school/department/research center) and Country/Region: University of Thessaly, Volos, Greece

Short abstract of the paper (20 lines maximum): Roma people are a marginalized group all around the world. Despite many discussions, research and an international rhetoric of Roma integration, they still today experience the consequences of being on the other side of abyssal line (Santos, 2007). Drawing on our experience of working for Roma childrens (mathematics) education, and realizing the complexity of Roma discrimination issues, we discuss our experience using theoretical perspectives about why and how people make up other people issues of power relationships that serve a coloniality spirit. As a possible response to the above, we share a current EU Roma Integration project.

Discussion: 21:57- 22:15

19. Time: 22:17–22:28

Title of the Paper: Teaching Practices in Diverse Mathematics Classrooms of The Republic of Cyprus: Equitable or Not?

Author: Constantinos Xenofontos

Institution(s) (to school/department/research center) and Country/Region:

University of Stirling, Stirling, Great Britain

Short abstract of the paper (20 lines maximum): Equity in mathematics education is often concerned with actions taken for the elimination of the ability to predict (using marginalization criteria such as gender, social class, ethnicity, home language, etc.) the performance and participation of students. The focus on marginalization and equity appears to be different across countries. In the Republic of Cyprus, much of the discussion is concerned with immigrant students and particularly those whose home language is other than that of formal schooling. In this paper, I revisit a previous work of mine from that context, in which I examined elementary teachers perceptions of their immigrant students as mathematics learners, teachers self-reported practices and professional needs. Here, I discuss the extent to which Cypriot teachers perceptions and self-reported practices can be seen as equitable or not.

Discussion: 22:28- 22:36

20. Time: 22:37-22:49

Title of the Paper: Micro-exclusions as a Challenge to Dialogue among Deaf and Hearing Students

Author: Amanda Queiroz Moura

Institution(s) (to school/department/research center) and Country/Region: University of Klagenfurt, Klagenfurt, AT

Short abstract of the paper (20 lines maximum): This article presents some results of a research project whose focus is on the teaching and learning of mathematics in environments where deaf students and hearing students are together. In this context permeated by tensions, the complexity of teaching and learning processes becomes more evident due to the use of two languages for communication and the presence of the interpreter of sign language. In order to contribute to a better understanding of the microexclusion in inclusive environments, this chapter discusses some episodes from mathematics classes, highlighting the patterns of microexclusions present in this context. Microexclusions confront essential aspects of dialogue and hinder the learning of students who experience them. Being aware of the existence of microexclusions can contribute to the fight against oppressive practices, thus favoring the existence of a dialogue.

Discussion: 22:49- 22:57

Closing Remarks 22:57-23:00