

JASME47 Plenary Program on Jan 28 2018

JASME Program Committee/Research Section

1. Theme

Professional competences required for mathematics teachers: Special focus on ‘What is the mathematical competence that math teachers should have?’

2. Abstract of the program

Currently, Japanese Course of Study is going to shift from content-based to competence-based organisation. In addition, MEXT of Japan is also developing a core curriculum for teacher training. The above theme has been talked about in JASME so far, so it is not necessarily a new topic. However, it is necessary to rethink this theme as the Society under these conditions. For this reason, we would like to take this opportunity to recapture the problems around mathematics teacher professional development not only from domestic discussions but also from international perspectives.

3. Panel

Keynote 1: **Dr Gabriel Matney**, Associate Professor of College of Education & Human Development, Bowling Green State University, USA



Keynote 2: **Dr Fou-Lai Lin**, Research Chair Professor, Department of Mathematics, National Taiwan Normal University, Taiwan



Organizer: **Tatsuya Mizoguchi**, Associate Professor of Faculty of Regional Sciences, Tottori University, Japan

4. Timeline intended [10:00-12:00 on Jan 28]

Opening remarks (*Mizoguchi*)

Keynote talk 1 including short Q&A (*Prof Gabriel Matney*)

Safe Spaces to Connect Student’s Mathematical Reasoning with Pedagogical Content Knowledge: Informal Opportunities to Grow in Teaching Competence

Keynote talk 2 including short Q&A (*Prof Fou-Lai Lin*)

Mathematical Grounding Activity as a Foundation for Developing Mathematical and Pedagogical Competencies

Panel Discussion (*Prof Lin, Prof Matney, & Mizoguchi*)

Open Discussion (*from the floor*)

Final Talks (*Prof Lin & Prof Matney*)

Closing Remarks & Acknowledgement (*Prof Ueda, President of JASME*)

Keynote talk 1

**Safe Spaces to Connect Student's Mathematical Reasoning with Pedagogical Content Knowledge:
Informal Opportunities to Grow in Teaching Competence**

Gabriel Matney

Associate Professor of Mathematics Education

Bowling Green State University

Abstract

One imperative aspect of developing students' mathematical proficiency is the act of problem solving. Students and professional mathematicians alike often find themselves making mistakes or heading down unhelpful pathways before ultimately finding a solution. It is inherent to the nature of problem solving that we must try something and test its veracity before we can more strategically reason and justify why a solution makes sense. This means that we must allow ourselves to make mistakes, recognize those mistakes, and revise our actions in ways that posit more reasonable pathways in the future. One hindrance to this in American classrooms is safety. Students who do not feel safe to make errors are less likely to engage in problem solving. Engaging students in meaningful problem solving requires the teachers' active negotiation of a set of complex phenomena involving personal, social, and mathematical interactions. As teachers work to mediate these interactions they are building competencies about how and why particular moves and mathematical ideas resonate or not with students. In this sense, teaching students to become mathematical problem solvers is reflexively, a problem for each teacher to constantly consider.

The major issue for discussion here is "how can we provide safe professional learning spaces that allow for teacher engagement in negotiating the complex personal, social, and mathematical interactions necessary to grow students' problem solving abilities?"

In this lecture I will present findings from research about safe spaces for growing teachers' competence for problem solving through informal learning experiences with students. I will connect informal learning experiences from research in Southeast Asia and the United States explaining how teacher educators and professional developers seek to overcome the challenges of changing the traditional format of teaching mathematics for procedural use to teaching mathematics for the improvement of problem solving ability.

**Mathematical Grounding Activity as a Foundation
for Developing Mathematical and Pedagogical Competencies**

Fou-Lai Lin

Research Chair Professor, Department of Mathematics
National Taiwan Normal University

Abstract

Derived from a national programme, “Just Do Math” (JDM), an integrated learning model, with participants ranging from educator, researcher, teacher, to student, will be presented here. This unique learning model will show how the intrinsic motivation in students and their mathematical performances are facilitated and transformed, via a series of Mathematical Grounding Activity (MGA). The core of the JDM programme is the development and implementation of MGA, which is a collection of manipulative, game-like activities designed for students to play any time before the formal lesson of the selected mathematical topic.

The major issue for discussion here is “to what extent and how MGA can contribute to teachers’ mathematical and pedagogical competencies?”. While participating in MGA, teachers can be playing various roles, such as:

- Teacher as a learner, who is enrolled in MGA workshops for teachers;*
- Teacher as a MGA-Teacher, who is actively running MGA camps for school students;*
- Teacher as a MGA-User, who integrates MGA into regular mathematical lessons;*
- Teacher as a MGA-Instructor, who is leading MGA workshops for teachers;*
- Teacher as a MGA-Designer, who engages in MGA-designing workshops.*

The above mentioned roles of a teacher in participating in MGA can be perceived as different learning stages for teachers and be presented as a MGA integrated learning model. Several teachers have gone through the above stages via different learning paths and have become math teacher educators. In this lecture, I will present their stories, with specific focus on the development of their mathematical competence and pedagogical growth.