

Working Group 3: Teacher Education **Summary by Agnes Tuska**

As the report of the previous conference has stated, “this working group was launched in Brno in 2003 in the context of a worldwide increased emphasis on high level thinking, reasoning, and communication in mathematics classrooms in order to increase students' abilities to solve problems, think and reason in flexible, critical, and creative ways, and to gain conceptual, meaningful understanding of the mathematics they are learning.”

A group of papers has focused on developing the communication and reasoning skills of teachers:

1. The Growth of the Dynamic Figural Concept – Sense-making strategies applied to conceptions of shape (Doris J. Mohr, Crystal Walcott & Signe Kastberg)
2. Reasoning Algebraically about Operations: Developing early algebraic thinking by examining the generalizations that underlie young student’s mathematical thinking. What do teachers and those who prepare teachers need to understand? (Virginia Bastable)
3. Investigating Properties of Isosceles Trapezoids with the GSP: The case of a pre-service teacher (Adalira Saenz-Ludlow & Anna Athanasopoulou)
4. Mathematics Education Candidates’ Orientations toward the Infusion Approach in Teaching Mathematics and Thinking Skills (Hanan Innabi)
5. Developing the Deductive Reasoning of BS Mathematics Students (Marliza E. Rubenecia)

Emerging questions:

- What are effective ways of improving the reasoning and communication skills of students at various levels?
- How can teacher preparation programs incorporate early field experiences and observations of young students into mathematics content enhancement courses?
- What are the beliefs and attitudes of pre-service teachers towards teaching thinking skills?

Other papers have discussed models for implementing desired changes in teaching practices:

1. A Sustained Professional Development Partnership in an Urban Middle School (Cathy Liebars)
2. Critical Mathematics Pedagogy: Transforming Teachers’ Practices (David W. Stinson, Carla R. Bidwell, Christopher C. Jett, Ginny C. Powell & Mary M. Thurman)
3. A Continuum of Secondary Mathematics Teacher Leadership (Jan A. Yow)
4. Penpals, Children’s Books, and Learning Mathematics (Virginia Ginny Keen)
5. The Effects of Participating in Lesson Studies on Practices of Teaching Mathematics (Agnes Tuska & Rajee Amarasinghe)
6. Examining the Influence of Learner-Centered Professional Development on Elementary Mathematics Teachers Enacted and Espoused Practices (Drew Polly)
7. Teachers’ Perceptions of a Learning Community (Na-Young Kwon)

Emerging questions:

- What are effective ways of developing knowledgeable practitioners and teacher leaders?
- How can partnerships between universities and schools transform teaching practices?
- What are the obstacles of learning mathematics for various learners?

Several talks presented examples of curricular and educational reforms in teacher preparation programs and experimentation with the incorporation of technology:

1. A Non-Standard Course for Future High School Mathematics Teachers (Michel Helfgott)
2. Helping Students Understand Technical Calculus via an Online Learning Supplement and Group Learning (David A. Miller)
3. The Modern Geometry Course Works Overtime: Preservice Teachers Learn Content and Technological Pedagogical Content Knowledge with Geometer's Sketchpad (Kathryn G. Shafer)
4. The Use of Research-Based Methods and Materials for Preparing to Teach Mathematics with Technology (Hollylynne Stohl Lee, Karen F. Hollebrands & P. Holt Wilson)
5. Preparing Qualified Middle School Mathematics Teachers (Sharon M. Gronberg)
6. Including Awareness of Assessment Issues in Teacher Content Preparation (Judith H. Hector)
7. I Think I Can, I Think I Can: Impacting pre-service teachers' dispositions toward mathematics (Nancy Cerezo, Sylvia Rockwell, Carol Walker, Valerie Wright & Monica Vo)
8. Student Teachers' Experiences with Mathematics Curriculum Materials: Issues of Autonomy and Teacher Learning (Stephanie L. Behm & Gwendolyn M. Lloyd)
9. Mathematics Education Program in Malaysian Universities: Curriculum emphasis and preparedness of students to become teachers (Aida Suraya Md. Yunus, Ramlah Hamzah & Habsah Ismail)

Emerging questions:

- How should the preparation of teachers differ in the 21st century from preparations in the 20th century?
- What is the desired balance between content and pedagogy in a teacher preparation program?

The majority of the above papers have introduced innovations and practices in the United States of America. The exceptions were only Hanan Innabi's work from the United Arab Emirates, Marliza E. Rubenecia's study from the Eastern Philippines, and the joint paper of Aida Suraya Md. Yunus, Ramlah Hamzah and Habsah Ismail from Malaysia. The internationality of teacher education issues was emphasized in the following papers:

1. The Family Maths Programme – Developing inquiry-based teaching (Pam Austin & Paul Webb)
2. Findings from Two Countries Regarding Prospective Teachers' Knowledge of Addition and Division of Fractions (R. Elaine Carbone & P. Eaton)
3. Retaining Beginning Mathematics Teachers in the United States (Molly H. Fisher)
4. Professional Competence in Teaching of Mathematics in Selected High Schools of India and U.S.: The interplay of cognition, conceptions, and context (Renu Ahuja)

Emerging questions:

- What can educators from different countries learn from each other?
- What are the country/culture-specific problems in mathematics instruction, teacher education, and teacher retention in various countries?