Mathematics Teachers' Circles as Professional Development Models Connecting Teachers and Academics

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Short Description of the Workshop: Aims and Underlying Ideas

Math Teachers' Circles (MTC) are professional development communities of mathematics teachers and professors who meet regularly to work on rich mathematics problems. Ongoing research has begun to demonstrate the benefits of MTC for teachers' confidence, knowledge, and teaching of mathematics. Mathematics professors gain an opportunity to share their enjoyment of mathematics with teachers, contribute to teacher education and enrichment, and become more involved in the local education community. During this workshop we introduced participants to MTC professional development models, engaged them in MTC-type mathematics, shared some results of MTC interventions, and opened the discussion to further ideas and/or questions on implementing MTC in various contexts.

Structure of the Meeting

Introductory comments provided ICME participants with information on the MTC model being used in the US. An engaging "Brownie Problem" was shared with participants in order to simulate a typical MTC meeting. The specifics of this activity and how it can be used is described in further detail at <http://www.mathteacherscircle.org/resources/mathematical-materials/>.

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ICME participants reported enthusiasm for being challenged mathematically, genuine enjoyment of the group discussions following the initial challenge and frustrations of making little headway on their own. The workshop allowed us to make connections among existing MTCs and generate interest in starting new circles where they do not yet exist through guidance and experience-based advice.

Key questions and issues that participants were asked to consider include: (1) In what ways can Math Teachers' Circles contribute to the increase of mathematics content knowledge of teachers? (2) How can participation in Math Teachers' Circles impact the type of experiences or level of mathematics that teachers share with students? In other words, is there transfer to the classroom and what form does such transfer take? What resources used in professional development are particularly conducive to this transfer?

Unfortunately, workshop participants' demographics were hardly representative of ICME's varied and international flavor as the group consisted mostly of American mathematics educators. It would be very interesting to discuss this model and others similar to it from an international perspective. Still, we were able to share some initial research results with the group. Some categories have emerged from our data collection regarding what participants identify as areas of growth through participation in a MTC which somewhat overlap findings from prior studies. However, the role of resources used by the collective has not been studied fully, even though that is a stated goal of MTC interventions. We fill this gap in the research and emphasize how selected resources create a nature of mathematical practices. We are looking at the strategies that carry over into the classroom not only through instructional changes but also through teachers adapting their involvement with the Mathematics to engage students more meaningfully. In particular when participants were asked how MTC involvement can help them build upon existing resources, teachers' responses are varied, but consistently offer a picture of how they adjust their pedagogy after taking part in MTC sessions by letting students struggle more through inquiry-based activities and by adjusting the time they spend on problem solving. In other words, exposure and time to integrate new learning are key to sustained changes in practice. Participation in MTC does impact the type of experiences or level of mathematics that teachers share with students, especially when it comes to problem solving practices.

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