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Teaching Skills Study Award Report, Winter 2012
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Conference attended: Joint Mathematics Meetings, January 4-9, 2012

Conference Goals: I originally had two main goals in attending this conference: (1) to enhance my ability to teach problem-based courses and my theoretical understanding of the process to enhance our programs, and (2) to expand my knowledge of the Common Core State Standards and how universities are modifying their instruction to accommodate these standards. My teaching assignment changed after this application, so I added a session on capstone courses, as I was assigned to teach one for the first time in Spring 2012.

Capstone Courses for Mathematics Teaching Track Majors In Spring 2012 I will be teaching Math 599, which is a capstone course for teaching track majors in mathematics. This session yielded several good ideas to enrich the course:

- A major component of our capstone course is a portfolio which includes entries representing the spectrum of courses taken in the major. For many mathematics majors, compiling portfolio entries is difficult, and many mathematics faculty find it challenging to improve students' writing and analytical skills in this area. In this session, one of the talks discussed a booklet that has been compiled with explicit instructions for writing as well as rubrics for scoring such portfolios. The rubrics are based on the NCATE process standards, and should be useful to our students as well, since they are on the brink of entering the teaching profession at that point. The presenter is making this booklet available to session participants, and I intend to adapt it to my Math 599 course.
- Students tend to try to avoid mistakes – but mistakes can be a major learning tool. Another talk in this session described sources for problems that elicit important mistakes, thus uncovering misconceptions that serve as significant blocks to student learning. Assigning “mistake-eliciting” problems in a capstone course can help students both further their own understanding and learn how to address student mistakes and misconceptions in their teaching careers. The presenter provided a number of excellent resources for such problems.
- Students often think of proof as boring and technical, and those who teach it in K-12 frequently use only 2-column proof format – thus reinforcing this impression. However, proof can be intuitive and beautiful, and this course provides a venue to explore a variety of proof styles. One talk in this session provided suggestions for “proofs without words” which allow students to explore ideas in ways that engage a variety of learning styles and approaches to mathematics. Sources for these were also provided.

Problem-Based Learning This mini-course provided an opportunity for the participants to engage in problem-based learning as students, and then analyze the process to gain a better understanding of how students learn, and how we can help them persevere in solving a complex problem. The presenters provided a well-crafted sequence of problems, with varied levels of difficulty. Some were fairly simple, and others provided a significant challenge– not because of specific mathematical skills required, but because they require “thinking outside the box” – a skill not often asked of our students. These and other sequences are freely available for use, and I expect to use at least some of them in Math 604, a graduate problem-solving seminar in the MA program.