Moving Towards a Research Agenda in Community College Mathematics Education

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Moving from the anecdote to evidence: The need for a research agenda in community college mathematics education

Mathematics education research has, until recently, focused primarily on issues of teaching and learning in K-12 mathematics. A decade ago, RUME was founded to "foster research on learning and teaching undergraduate mathematics." Although community college mathematics intersects both K-12 and undergraduate mathematics, there are phenomena unique to community college mathematics that remain largely under investigated. For example, community college mathematics teachers often find themselves re-teaching content that students have encountered in previous mathematics courses, yet little is known about how students arrive at an understanding when they re-learn the material. Other issues, such as how adult students learn the content compared to students who are reviewing the content, are largely unknown. Furthermore, Science, Technology, Engineering, and Mathematics (STEM) majors at community colleges are as capable as their counterparts at four-year colleges and universities, but their transition to university mathematics after several years at a community college presents unique challenges. Research questions within the context of community college mathematics certainly overlap with other research in mathematics education, but the community college context presents itself as a unique setting in which most of what we know is contested.

Currently, national attention on community colleges has provided a necessary spotlight for investigating mathematics education. President Obama's recent White House Summit on Community Colleges was preceded by a flurry of papers related to community college mathematics (e.g., Bailey, 2009; Rosenbaum, Stephan, & Rosenbaum, 2010; Stigler, Givven, & Thompson, 2010). Most of these authors are outside the field of mathematics education research and most have little, if any, experience teaching mathematics at community colleges. In addition, this scholarship refers to aspects of community colleges that, even though important (e.g., economic considerations, access, retention) leave unexplored the one aspect that may determine students' success: their experiences in the classroom (Mesa, 2007).

There is an emerging body of scholarship among community college faculty who are trained in research and who have been collaborating with other researchers interested in studying teaching and learning of community college mathematics. The American Mathematical Association of Two-Year Colleges (AMATYC) chartered its own research committee in 2008, *Research in Mathematics at Two-Year Colleges* (RMETYC). Discussions about mathematics education at two-year colleges are transitioning from anecdote to evidence, and the RMETYC committee has recognized the need to start the work of outlining a research agenda.

Report from the working group

Members of the Research Committee of AMATYC hosted a Working Group session at the 14th Conference on Research in Undergraduate Mathematics Education. The session, titled *Research on Community College Mathematics*, focused on bringing together mathematics education researchers and practitioners interested in investigating questions of mathematics teaching and learning at community colleges. The main goal of the working group was to begin outlining a research agenda to further the field of mathematics teaching and learning at community colleges around issues unique to this context.

Participants included community college faculty-researchers, university researchers, and mathematics and higher education graduate students. The session engaged participants in three types of activities: (1) presentation of historical underpinnings of research movements in mathematics education; (2) discussion of ongoing research on specific areas that are fundamental for community colleges; and (3) guided discussion with the goal of establishing a research agenda for this work.

The group proposed the following four emerging strands of research that were viewed as critical for understanding the teaching and learning in community college mathematics:

- *Strand 1:* Mathematics Teaching: Investigating Practice, Classroom Culture, and Faculty Development
- *Strand 2:* Mathematics Curriculum: Searching for Coherence and Connections
- *Strand 3:* Mathematics Students and Diversity: Understanding the Issues and Affordances
- *Strand 4:* Distance Education and Technology: Exploring the Implications for Learning and Instruction

Next steps

Participants from the working group divided themselves into subcommittees vis-à-vis the four strands and are currently compiling rationales for each strand. These rationales are intended to communicate to both the mathematics education community and stakeholders in mathematics education at community colleges the need for research in these domains. In addition, the subcommittees are generating a preliminary set of research questions in each of the four domains. Over the next several months, the subcommittee work will be shared among the working group participants and will serve as the foundation for another working group proposal at the 15th RUME Conference.

In addition to this report for the RUME Proceedings, the discussion outcomes include a report for AMATYC's Research Committee and a paper for a major journal. Taken together these activities will allow us to advance the following goals: (1) outline a research agenda for community college mathematics; (2) identify specific research domains and sub-domains so that community college research will become more integrated within the mathematics education research community; (3) increase the visibility of research being conducted at two-year colleges, which will allow us to better identify those researchers who are conducting this research and increase collaborations and partnerships between two- and four-year institutions; (4) outreach to other research domains that have also been engaged in understanding the phenomenon of community college instruction in mathematics, to inform our work and to infuse theirs with insights that come from studying classroom practices, attending to the work that is close to those who are directly responsible for success, namely the instructors, teachers, and designers of curricula.

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