

Faculty and Undergraduate Students' Challenges When Connecting Advanced Undergraduate Mathematics to School Mathematics

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When implementing lessons connecting advanced undergraduate mathematics to school mathematics, challenges arise for faculty and for the undergraduate students. The Mathematical Education of Teachers as an Application of Undergraduate Mathematics (META Math) project has created, piloted, and field-tested lessons for undergraduate mathematics and statistics courses typically part of a mathematics major that leads to secondary mathematics teacher certification. Lessons in calculus, discrete mathematics, algebra, and statistics explicitly link topics in college mathematics with high school mathematics topics prospective teachers will eventually teach. The goal of this poster presentation is to discuss our preliminary observations of the challenges faced by faculty and undergraduate students when implementing or using these lessons. We also wish to gather feedback and suggestions on the study design and potential directions for further research.

Keywords: Pre-service secondary teachers, Undergraduate mathematics, Curriculum modules

Based on recommendations in the Mathematical Education of Teachers II (MET II) report (Conference Board of the Mathematical Sciences, 2012) and the Statistical Education of Teachers report (American Statistical Association, 2015), the *The Mathematical Education of Teachers as an Application of Undergraduate Mathematics* (META Math) project integrates applications of advanced mathematics to high school mathematics and high school mathematics teaching into courses that are part of typical mathematics course sequences taken by mathematics majors intending to teach. The lessons enable faculty to maintain a focus on advanced mathematics topics while simultaneously integrating connections to high school mathematics.

After piloting lessons developed by META Math and monitoring faculty implementation of the lessons, preliminary data analysis and observations suggest that lesson development may need to address more scaffolding for faculty and students to strengthen their understanding of connections highlighted. Discussion with RUME attendees will assist us in identifying additional methodological and design components to strengthen the research team's goal in understanding: (1) How do faculty perceive connections between advanced mathematics and high school mathematics? (2) What connections do undergraduate students make between the advanced mathematics they are studying and the high school mathematics linked in the lessons? (3) How should faculty perceptions and undergraduate students' connections influence lesson design?

Lessons have been piloted at several universities across the United States. We apply a qualitative case study approach, in which each content area is a case. Data consists of in-depth qualitative observations of faculty using modules in their classrooms, preliminary and follow-up interviews with faculty, and cognitive interviews with students. This poster will provide preliminary findings from the field-testing of six lessons.

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References

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