

Connecting Advanced Undergraduate Mathematics to School Mathematics

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The Mathematical Education of Teachers as an Application of Undergraduate Mathematics (META Math) is a project to create, pilot, and field-test modules for use in undergraduate mathematics and statistics courses taken by pre-service teachers. Materials in calculus, discrete mathematics, algebra, and statistics showcase vital connections between college mathematics and the mathematics taught in high school. Drawing on recommendations in the Mathematical Education of Teachers II and the Statistical Education of Teachers, the project puts attending to the needs of pre-service teachers on par with attending to the needs of other undergraduate students by focusing on applications related to high school mathematics teaching.

Keywords: Pre-service Secondary Teachers, Undergraduate Mathematics, Curriculum Modules

The Mathematical Education of Teachers II (MET II) report (CBMS, 2012) calls for a future in which secondary school students engage in substantive mathematical inquiry, solve non-routine problems, and make deep mathematical connections. The project, “The Mathematical Education of Teachers as an Application of Undergraduate Mathematics” (META Math), draws on the expertise of mathematicians and mathematics education researchers to address the content knowledge needs of undergraduate pre-service teachers, providing faculty with tools to better prepare teachers to contribute to the vision outlined in the MET II report.

The project team developed modules, focusing on four content areas: Calculus, Statistics, Algebra, and Discrete Mathematics. Each module is self-contained and textbook-independent, comprised of materials to assist faculty in seamlessly incorporating content into existing undergraduate courses to meet the specific needs of future teachers and foster deep examination of school mathematics content from the advanced perspective of undergraduate content. We plan to recruit and train a cohort of mathematics faculty to pilot test these modules during the 2018-2019 academic year, collecting research data from their implementation of the modules.

We will test the modules for effectiveness in promoting student understanding of the connections between 7-12 and undergraduate mathematics, investigate effective practices for using these modules, and provide insight into how module usage affects a faculty member’s own understanding of school mathematics content from an advanced perspective. To do this, we will employ a qualitative case study approach, in which each content area is a case. We plan to conduct: (1) in-depth qualitative observations of faculty using modules in their classrooms, (2) a preliminary and a follow-up interview with faculty, and (3) cognitive interviews with students.

META Math not only focuses on enhancing pre-service teachers’ understanding of the vertical connections from school mathematics through advanced undergraduate mathematics but also awareness of these connections among mathematics majors not intending to teach as a career. This poster presents an overview of the META Math project, including examples of the modules and ways faculty can participate in the field-testing of modules.

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