An Emerging Framework for Understanding the Development of Mathematical Knowledge for Teaching

Jeremy Strayer, Middle Tennessee State University, Jeremy.Strayer@mtsu.edu

Yvonne Lai, University of Nebraska-Lincoln, yvonnexlai@gmail.com

Alyson E. Lischka, Middle Tennessee State University, Alyson.Lischka@mtsu.edu

Cynthia Anhalt, University of Arizona, canhalt@math.arizona.edu

Improving the preparation of mathematics teachers is a "wicked problem" (Gomez, Russell, Bryk, LeMahieu, & Mejia, 2016, p. 10) requiring the participation of all stakeholders. One component of mathematics teacher preparation, attending to mathematical content knowledge and knowledge needed to teach mathematics (MKT), is complex and impacted by both mathematicians and mathematics educators. The MODULE(S^2) RAC aims to improve the mathematical preparation of teachers through the creation of curriculum materials for use in upper-level content courses for secondary mathematics teachers. With the goal of developing MKT within content courses through the use of simulations of practice, it becomes essential to have a working model for the development of MKT so that mathematics educators and mathematicians provide feedback on the work of prospective teachers. We will present an emerging framework that leverages the research on educative curricula and serves as a resource for writing, refining, and implementing educative curricula for teacher preparation. We base this framework in existing literature on MKT: Silverman and Thompson's (2008) framework for the development of MKT which proposes MKT as a consequence of decentering; Rowland and colleagues' Knowledge Quartet for dimensions of observable teaching-actions using MKT; and Ader and Carlson's (2018) framework for analyzing and observing decentering. We will describe how this framework aids in the creation of simulations of practice for use in developing MKT and then illustrate its effectiveness for understanding developing MKT through analysis of data gathered during pilots of curriculum materials.