School of Mathematical and Statistical Sciences
Arizona State University

M E M O R A N D U M

DATE: 02/07/2023

TO: Faculty and Students

FROM: Professor(s) Marilyn Carlson
Chair/Co-Chairs of Abby Rocha
Defense for the PhD in Mathematics Education
Committee Members Patrick Thompson
Naneh Apkarian
Michael Tallman
April Strom
Alan O'Bryan

DEFENSE ANNOUNCEMENT

Candidate: Abby Rocha

Defense Date: April 14, 2023

Defense Time: 12:00 PM

Virtual Meeting Link: https://asu.zoom.us/j/86430252401

Attend in Person: ECA Engineering Center, A-Wing, Room 385

Title: An Investigation into the Relationships Among Teachers' Mathematical Meanings for Teaching, Commitment to Quantitative Reasoning, and Decentering Actions

Please share this information with colleagues and other students, especially those studying in similar fields. Faculty and students are encouraged to attend. The defending candidate will give a 40 minute talk, after which the committee members will ask questions. There may be time for questions from those in attendance. But, guests are primarily invited to attend as observers and will be excused when the committee begins its deliberations or if the committee wishes to question the candidate privately.

ABSTRACT
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Abby Rocha

ABSTRACT

Over the past thirty years, research on teachers' *mathematical knowledge for teaching* (*MKT*) has developed and grown in popularity as an area of focus for improving mathematics teaching and students' learning. Many scholars have investigated types of knowledge teachers use when teaching and the relationship between teacher knowledge and student performance. However, few researchers have studied the sources of teachers' pedagogical decisions and actions and some studies have reported that advances in teachers' MMT does not necessarily lead to a teacher conveying strong meanings to students. It has also been reported that a teacher's *ways of thinking* about teaching an idea and actions to decenter can influence the teacher's interactions with students.

This document presents three papers detailing a multi-case study that constitutes my dissertation. The first paper reviews the constructs researchers have used to investigate teachers' knowledge base. This paper also provides a characterization of the first case's mathematical meaning for teaching angle measure and the impact of her meaning on her interactions with students while teaching her angle measure lessons. The second paper examines another instructor's meaning for angle and its measure and illustrates the symbiotic relationship between the teacher's mathematical meanings for teaching and decentering actions. The paper also characterizes how an instructor's commitment to quantitative reasoning influences the teacher's instructional orientation and instructional actions. Finally, the third paper includes a cross-case analysis of the two instructors' mathematical meanings for teaching sine function and their enacted teaching practices, including their choice of tasks, interactions with students, and explanations while teaching their sine function lessons.