

Preparing to Teach Mathematics with Technology: Examining Student Practices (PTMT-ESP)

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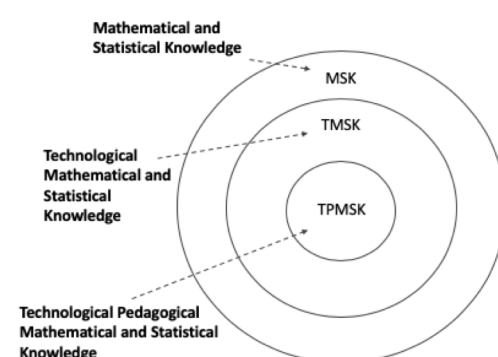
Project Overview

The Preparing to Teach Mathematics with Technology (PTMT) began with a grant awarded in 2005 to develop materials and support faculty in preparing future teachers to teach mathematics with technology. The first grant allowed for the development of materials for learning to teach Data Analysis and Probability with technology and to begin to build a community of Technology Using Mathematics Teacher Educators (TUMTEs). Subsequent grants allowed for the development of materials for Geometry and Algebra, further expansion and development of the TUMTE community, and an online portal making all of this work available for free. The current grant is utilizing design based research to create, refine, and study video-enhanced materials for prospective secondary mathematics teachers (PSMTs) to examine secondary students' authentic mathematical practices on technology-based algebraic tasks.

Project Goals

- Design and refine seven curriculum modules
- Conduct research to examine PSMTs' development related to understandings of students' technology-based algebraic practices and their own algebraic knowledge
- Expand and support the TUMTE community

An Approach for Preparing Teachers to Teach Mathematics with Technology

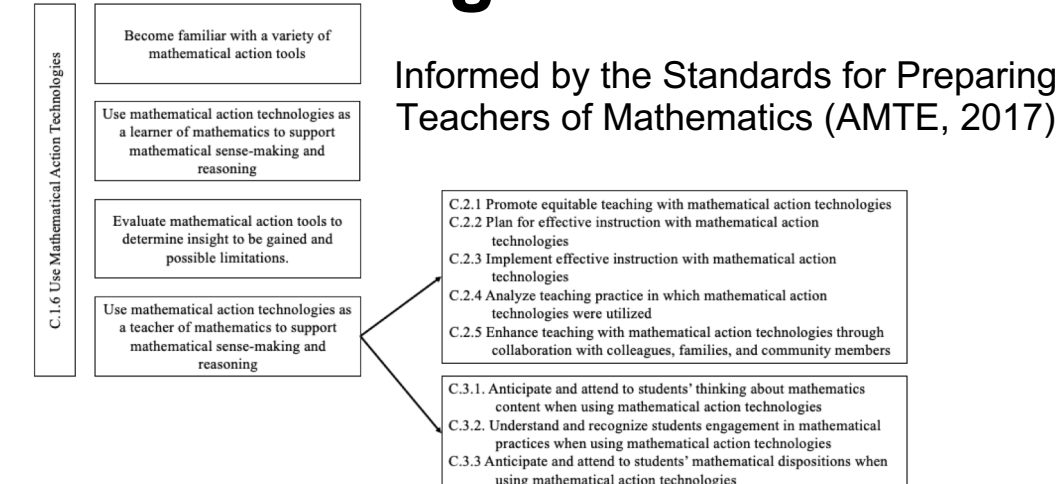


Lovett, J.N., McCulloch, A.W., Dick, L.K., & Cayton, C. (in press). Design principles for examining student practices in a technology-mediated environment. To appear in *Mathematics Teacher Educator*.

To integrally develop prospective teachers' understandings of technology, pedagogy, and content by having prospective teachers:

- Engage in mathematics tasks using technology
- Reflect on their own work with the technology as a learner of mathematics
- Consider the pedagogical implications of their own experience as it relates to the teaching and learning of mathematics using technology

Framing our Work

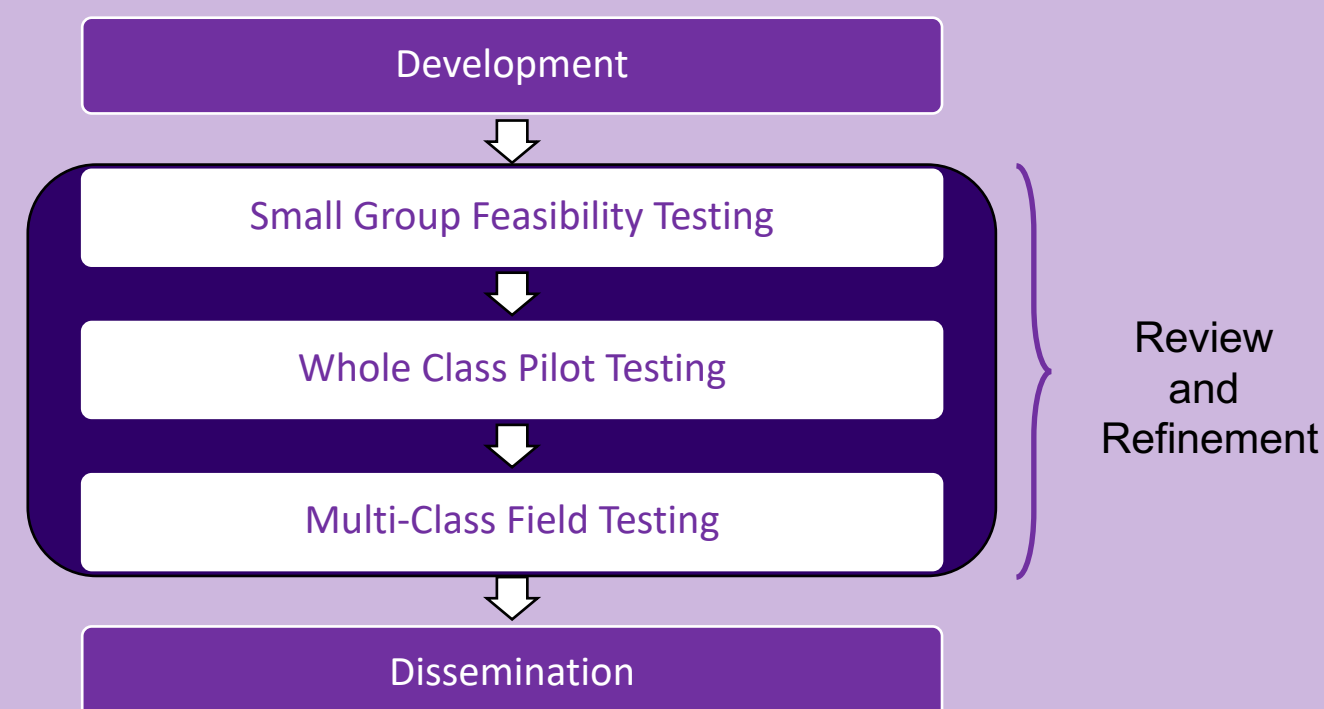


McCulloch, A.W., Leatham, K., Nickell, J., Bailey, J., & Reed, S. (accepted). How we are preparing secondary mathematics teachers to teach with technology: Findings from a nationwide survey. To appear in *Journal for Research in Mathematics Education*.

Module Development

Module Topics:

- Sequences and Series
- Algebraic Equivalence
- Qualitative analysis of representations of functional relationships
- Comparing and Contrasting Linear, Quadratic, and Exponential Rate of Change
- The Function Concept - Functions and Non-Functions
- Characteristics of Function Families
- Connecting Trigonometric Operations and Trigonometric Functions

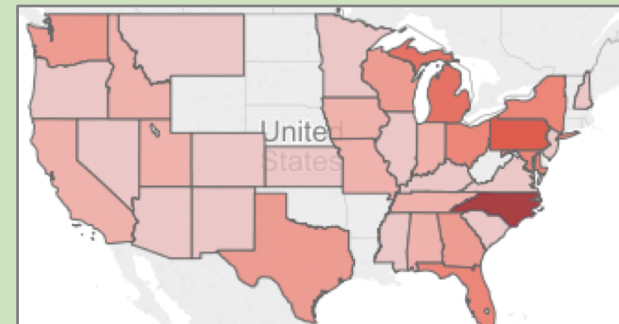


Faculty Development

The Reach

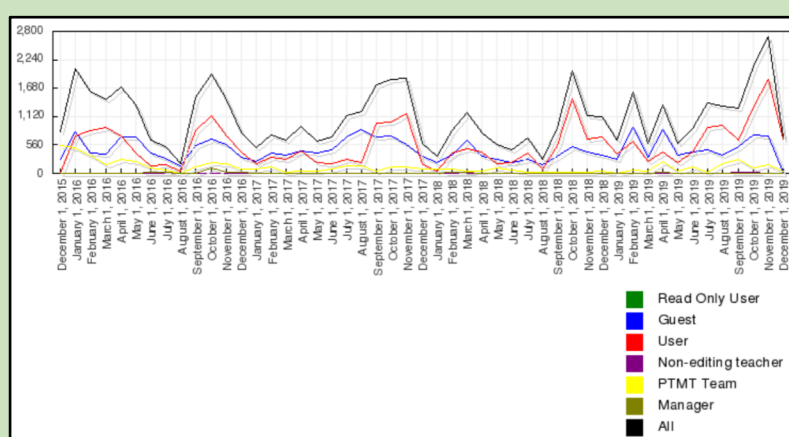
778 users in the PTMT Portal

University faculty, preservice teachers (university students), and district math supervisors and teachers



The Impact

6000+ teachers: Preservice teachers in university settings, practicing teachers in professional development, and online engagement through Portal and MOOCs



Newsletter

- Sent to the Technology Using Mathematics Teacher Educators (TUMTEs) community in December
- Dramatic increase in portal use after the first newsletter

The Future

- Professional Learning Seminars for new faculty and current TUMTEs during years 4 and 5 of the project.

Research

Professional Noticing of Students' Thinking in a Technology-Mediated Environment

Purpose: To consider how PSMTs notice students' mathematical thinking when asked to focus on both students' mathematical understanding as well as their engagement when working in a technology-mediated environment

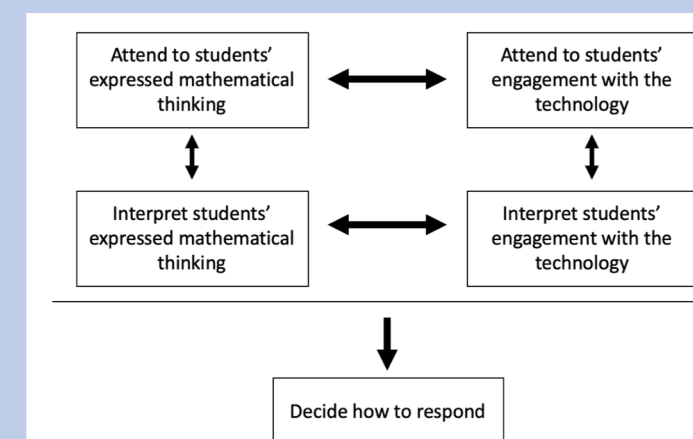
Methods

Participants: 37 PSMTs

Data: Written noticing assignment → students' working within a technology-mediated learning environment

Analysis: Coded statements for each component of the framework as well as the coordination among them.

Conceptual Framework



Findings and Implications

- It was easier for PSMTs to attend and interpret the students' mathematical thinking than for them to attend and interpret the students' engagement with the technology.
- It was even more difficult for PSMTs to coordinate the students' thinking and their engagement with the tool.
- Findings suggest the need for PSMTs to have more experiences developing the practice of noticing student work in technology-mediated environments.

Dick, L.K., Lovett, J.N., & McCulloch, A.W. (under review). Coordinating understanding and engagement: Noticing in a tool-mediated learning environment



Preparing to Teach Mathematics
with Technology

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