Prepared to Teach Mathematics with Technology:
Expanding, Transforming, and Building Capacity (PTMT-ETC)

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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 (DAP) 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 most recently an online portal making all of this work available for free.

Project Goals

- Develop and evaluate materials for preparing teachers to teach mathematics with technology
- Develop faculty expertise, create, and sustain a network of TUMTEs using our materials and approach across the country
- Research impact on
  - Pre- & inservice teachers’ beliefs, knowledge, & practices for using technology to teach mathematics;
  - Faculty beliefs and practices related to their teacher education courses
  - Students’ understandings of mathematics when using new approaches with dynamic technologies.
- Network of 200 faculty, 115 different institutions in US & Puerto Rico
- 4000+ undergraduates impacted
- Fall 2016: MOOC parts of all 3 modules through NC State

An Approach for Preparing Teachers to Teach Mathematics with Technology

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

Development of Materials

Curriculum Development Process

Development

- Expert Review & Revision

Pilot Test

Local Field Test

National Field Test

Publication

We began each module by identifying:

- Key mathematical statistical ideas
- Appropriate technological tools
- Research on student learning
- Video samples of middle/high school students

The Modules

- Data Analysis & Probability
  - Topics include: distributions, variability, bivariate relationships, probability, simulations
- Geometry
  - Topics include: properties of polygons, transformations, similarity, symmetry
- Algebra
  - Topics include: variable, equality & equivalence, rate of change, function

Development of Faculty

- Summer Institutes 2009 - 2013
- AMTE Workshops 2010-2011, 2013-2016
- Webinars in 2014 (3) & 2015 (2)
- Collaborative research
- TUMTE Wikispace to share resources
- Quarterly newsletters

Research on Teaching and Learning

Focus:

- Pre- & inservice teacher learning
- Secondary students’ learning of mathematics in dynamic mathematical-statistical environments

Outcomes:

- 32 Publications
- 54 Presentations
- 2 NTLI Awards
- 4 Dissertations / Theses

Highlights from A Recent Study: Prospective Teachers’ Incorporation of Technology in Mathematics Lesson Plans

Participants, Context, & Data Sources

- 45 PMTs at a public university
- Teaching Math w/ Technology Course and PTMT materials

Results

- 69 lessons used technology (See Fig 1)
- Conveyance: Partner, n=14; Servant, n=30; Partner/Servant, n=2

Conclusions

- Opportunities for Partner were missed.
- Introducing PMTs to the Servant/Partner relationship might improve positioning of technology in lessons.

Goals of the PTMT Web Portal

- Sustain material availability & use
- Increase ease of access to the materials
- Capitalize on the availability of interactive formats on the web

Materials Available on Web Portal

- Downloadable chapters for each module
- Embedded technology tasks (ALG); downloadable technology files for all modules
- Embedded transcribed video clips
- Instructor resources (guiding framework, solutions, annotated lists of suggested readings, common core alignment)

Expanding the Reach of PTMT - The PTMT Web Portal

Portals Utilization

- Users enrolled: ~76 instructors, 80 students
- Portal use to date:
  - ALG Page Views: 346
  - DAP Page Views: 89
  - GEO Page Views: 94

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