



TPSEMath

Transforming Post-Secondary Education in Mathematics

CBMS Executive Committee Meeting

December 2, 2016

www.tpsemath.org

Creation of TPSE Math - 1

- The problem: Undergrad math ed doesn't meet the needs of students – or the nation
- Outdated course materials & teaching techniques haven't provided students with quantitative skills required for employment & good citizenship

Creation of TPSE Math - 2

- NRC's *Math 2025* called for math teaching better aligned with current state of mathematical sciences
- PCAST's *Engage to Excel* documented that undergrad math is more of a barrier than a gateway to academic success
- Preparation for jobs in today's economy requires math training that's multidisciplinary & flexible

Early Steps - 1

- 2013 gathering at CCNY prompted formation of TPSE
- Initial funding from CCNY & Sloan
- Information gathering: series of meetings
- Leaders inside & outside math community identified the most urgent issues & how some were already being addressed
- Experiments were mostly on small scale, isolated & local; difficult to scale up

Early Steps - 2

Consideration of...

- Demand side of the equation
- New teaching technologies & methods
- Evolving economic model, from relatively homogeneous to mix of research faculty, temporary faculty & faculty no longer research active
- Need to increase diversity of participants: mathematicians from underrepresented institutions, ethnicities, races, gender

Early Steps - 3

Led to...

- Formation of Mathematics Advisory Group (MAG):
 - Math Department Chairs (situated at nexus between faculty & administration)
 - Middle management
- Chairs +1 concept & first meeting, October 2016

Strategic Priorities

- Multiple pathways & improved completion rates: sync pathways with student interests & employer needs
- Upper-division “routes of relevance”: offer more diverse, relevant & flexible programs
- New teaching & learning technologies & methods: ITHAKA partnership
- Graduate education: broaden preparation for diverse careers

TPSE Math & CBMS

- Mutual desire for partnership
 - CBMS member associations have signaled support for TPSE
 - Each has designated a TPSE liaison
- Value of Common Vision project (five professional associations; “spur grassroots efforts to improve undergrad ed”); strong support of CBMS
- A TPSE function: help develop implementation strategy for Common Vision recommendations

Current Activities - 1

- Develop action partnerships with math department chairs
- Partner with APLU, AASCU & New Mathways/Dana Center on lower-division pathways
- Understand how to develop pathways more relevant to careers
 - Demand for wider menu of inter- and multi-disciplinary courses
 - Potential of joint majors, minors, certificates

Current Activities - 2

- Build closer relationship with community colleges
 - 2-year colleges crucial to success of this effort
 - Closer involvement with AMATYC
- Importance of communication, outreach, networking

Next Meeting Topics

Chairs +1 Meeting #2, March 2017:

- How lower-division pathways can grow to scale
- Develop “routes of relevance” in upper-division curricula that reflect growing importance of math in STEM & non-STEM fields
- Successful technologies & techniques of teaching & learning
- Design more specific strategies for improving preparation of grad students

Next Steps - 1

- Help math societies act together on areas of broad agreement
- Form partnerships with professional organizations representing social sciences, humanities, etc.
- Act in partnership with other disciplines to create more routes of relevance

Next Steps - 2

- Help public higher ed institutions collaborate in testing & implementing reforms generated elsewhere, e.g. Maryland, Ohio
- Through RFP's & partnerships, develop resources for experimentation, scaling up, coordination

Medium Term - 1

- Analytical studies on the demand side
 - Systematic analysis of what other departments want for their students who take math
 - Understand what math backgrounds employers look for
 - Analyze career outcomes for students who take specific math courses, and who don't
- Expand MAG into MAG networks, possibly including BIG Math (Business-Industry-Government)

Medium Term - 2

- Test our theory of action: If we do X, can we expect Y to follow?
- With math organizations, recruit/develop speakers to give pedagogy seminars, including success (and non-success) stories
- Develop a “Math plus X” initiative
 - Network with non-math STEM areas of high demand
 - Add modeling to curricula
 - Emphasize realistic, interesting problems

Challenges

- Approach math reform as a systems problem: study all components in relation to one another; strive to extend conversation, bring about cultural change
- Halt perception that success is achieved by lowering standards
- Learn how to evaluate reforms, beginning with existing initiatives

Conclusion: Role of TPSE Math

- TPSE is asked by members of the math community to help with:
 - Talking points chairs can use with their provosts
 - How to frame decisions in terms of university needs
 - How to demonstrate success in ways administrations can see
- How can TPSE serve as messenger & facilitator for faculty & administration? What might change look like, how could it benefit all sides?