Transforming Post-Secondary Education in Mathematics: Mobilizing for Action

Carnegie Corporation of New York
June 20, 2016

Opportunities for Transformation and the Role of TPSE Math

• Transforming Mathematics from Barrier to Gateway
• Opportunities for Change
• Formation of TPSE Math
• A Role for TPSE Math
• The Goals of TPSE Math
• Strategic Planning
Vision for Post-Secondary Math

Post-secondary education in mathematics will enable any student, regardless of his or her chosen program of study, to develop the mathematical knowledge and skills necessary for productive engagement in society and in the workplace.

We believe that a collective effort by the math community will be required to achieve that vision.

Our Mission

TPSE Math will facilitate an inclusive movement to strengthen post-secondary education in mathematics by working closely with — and mobilizing when necessary — faculty leaders, university administrations, membership associations, and relevant disciplinary societies in the pursuit of mathematically rich and relevant education for all students, whatever their chosen field of study.

TPSE Math will identify innovative practices where they exist, advocate for innovation where they do not, and work with and through partners to implement and scale effective practices.
Strategic Priorities

Coherent Pathways (lower division)
The challenge: Disjointed pathways among institutions create barriers to college completion for an increasingly mobile student population.

Enhanced/Alternative Pathways (upper division)
The challenge: The ever expanding use of mathematics in the workplace creates a need for new course offerings, developed in partnership with other disciplines, to better meet students’ academic and career goals.

New Teaching Strategies
The challenge: Economic pressures on students and institutions create the imperative for new instructional strategies to improve student success rates and deliver education cost-effectively without sacrificing quality.

Graduate Education
The challenge: Modifications to graduate education are needed to better prepare students for careers in an evolving environment.
Redesigning introductory collegiate mathematics: From scaling pilots to working at scale

State-level systemic reform initiatives:
- Arkansas
- Colorado
- Georgia
- Indiana
- Maryland
- Massachusetts
- Michigan
- Missouri
- Montana
- New Mexico
- Nevada
- New York
- North Carolina
- Ohio
- Oklahoma
- Texas
- Tennessee
- Washington
- West Virginia

Three Dimensions of Reform

1. Course redesign
   - Relevance
   - Acceleration/intensification
   - Systematic integration of student supports
   - Context-sensitive improvement strategies

2. Wraparound enabling policies and practices
   - Transfer and applicability policy
   - Professional learning and related human capital strategies
   - Redesign of advising, orientation, placement

3. Linkage to Higher Ed Reforms
   - Guided pathways approach to increasing completion
   - Links to broader institutional student success strategies
Results

TPSE Math’s Roles

- Faculty mobilization
- Advocacy/Legitimation
- Linkage to disciplinary infrastructure (professional associations, institutes, networks...)

Our North Star

- Narrow the gap between today’s mathematics and the mathematics students study in college—curricular modernization
- Make mathematics departments an essential partner in improving quantitative education in all disciplines
- Ensure that mathematics education is a reliable support for students’ upward social and economic mobility rather than a barrier to achieving their aspirations.

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Tumor Profiling by Array Analysis


from Luca Cavalli-Sforza
Genes, Peoples and Languages
Attracting new investigators to neuroscience from the quantitative disciplines (physics, statistics, computer sciences, mathematics, and engineering), and training graduate students and postdoctoral students in quantitative neuroscience, should be high priority goals for the BRAIN Initiative.

--NIH BRAIN 2025: A Scientific Vision
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“Higher education continues to be one of the most important avenues of opportunity in American society”

(American Academy President Jonathan Fanton, on the formation of The Commission on the Future of Undergraduate Education, Nov 2015)

In our math classes, then, we must persist to

• Narrow the gap between how math is experienced in our classrooms and in the workplace, and

• Ensure our classes and programs give all students a platform for success (toward college completion and post-graduation).
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“The United States is the preeminent global hub for academic training.”

(Senior Policy Analyst Neil G. Ruiz of the Brookings Institution in The Geography of Foreign Students in U.S. Higher Education)
Enhancing Graduate Training

Initial steps
• Chicago regional meeting
• Strategic Plan
• More community input needed

Long range goals include
• Partnerships with Professional Societies (AMS, MAA, SIAM, ASA)
• Professional development opportunities for graduate students

Key Activities: Progress
• Regional meetings
• Strategic Plan
• Inaugural MAG meeting
• Organizational set-up
Key Activities: Next Steps

→ Chairs' meetings

Initial implementation of the four strategic priorities:
• Partnership development: APLU/AASCU, NASH, AACC, Dana Center (Priority 1); MAA/SIAM (Priority 2); ITHAKA (Priority 3); AMS/CBMS (Priority 4)
• Data collection & analysis
• Identification & scale-up of existing promising initiatives; development of new ones
• Workshops
• Advocacy within math departments, colleges/universities, agencies
• Fund raising (Foundations, NSF, etc.)

Hotspot / Sweet spot

Department chairs are in the hotspot, and for this reason they constitute the sweet spot to effect change. Chairs:
• Promote and defend departmental interests
• Provide incentives to faculty (salary & teaching schedules)
• Address budgetary & staffing issues
• Act to improve the environment for faculty & students
Chairs’ Relevant Roles

Activities relevant to TPSE’s agenda for a typical department chair include:

- Identifying departmental priorities
- Regular and direct contact with faculty
- Determination of teaching assignments and recipient of teaching evaluations
- Recruitment of teaching staff
- Management of departmental instructional budget

Objectives for Chairs’ Meetings

TPSE will convene a broad spectrum of departmental chairs nationwide in one or two meetings whose objectives include:

- Insuring that change in teaching effectiveness is high on the list of priorities of chairs
- Developing capacity for change – broadening participation of those who can constructively influence change – and encouraging leadership
- Providing guidance for change, by providing recommendations, materials, and examples of successful efforts
- Giving chairs a broader perspective through contacts with administrators, funders, and employers
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Funding Timeline

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- Funding received/expected
- Funding sought
- Total funding sought

TPSEMath