



### ***Creation, Evolution, and Strategic Plan***

TPSE Math aims to effect constructive change in mathematics education at community colleges, 4-year colleges and universities. Its work is coordinated by a Board of Governors chaired by Phillip A. Griffiths, Institute for Advanced Study, with members Eric Friedlander, University of Southern California; S. James Gates, Jr., University of Maryland at College Park and PCAST; Mark Green, UCLA; Tara Holm, Cornell University; Karen Saxe, Macalester College; and Uri Treisman, University of Texas at Austin. William (Brit) Kirwan, Chancellor Emeritus and Regents Professor of Mathematics at the University System of Maryland, serves as Executive Director. In June 2016, the University System of Maryland became TPSE's administrative home.

The following summary describes TPSE in four phases: (1) origins; (2) information gathering and sharing; (3) strategic planning; and (4) implementation of the strategic plan.

**Origin:** TPSE's formation was a response to major changes in the field of mathematics itself, demands on the field from STEM and non-STEM departments, economic pressures, and technological changes throughout higher education. Additional impetus came from two influential reports: the NRC's *Math 2025*, which called for mathematics teaching that better aligns with other disciplines; and PCAST's report *Engage to Excel*, which reported dissatisfaction in how undergraduate mathematics is taught to students outside the mathematics major. Outdated course materials and teaching techniques have not provided students with the quantitative skills required for employment and good citizenship.

These challenges led in 2013 to a gathering at Carnegie Corporation of New York (CCNY) of a small group representing the mathematics community, higher education, and positions outside mathematics, especially those calling for stronger quantitative skills of graduates in the workforce. This meeting, in turn, prompted the formation of TPSE, which received initial funding from CCNY and the Alfred P. Sloan Foundation.

**Information gathering:** After early discussions, TPSE reached out to gather and share additional information through a national-scale meeting and a series of regional meetings. The intent was to work with the mathematics community to identify the most urgent issues, how they were being addressed, and how early experiments and models might be scaled up and used by others. TPSE also sought opinions from the "demand" side of the equation, including employers and disciplinary partners, and heard about new teaching technologies and the evolving economic models of mathematics departments. Over the course of these meetings, TPSE has become aware of the need to increase the diversity of those involved in the discussion, reaching out to mathematicians from underrepresented institutions, ethnicities, races, and gender.

**Strategic plan:** From information gathered at the regional meetings, TPSE identified a strong consensus in the mathematics community about the need to address these pressing issues across the country. In planning for action, TPSE engaged the consulting firm Parthenon EY, which gathered and synthesized additional opinions and experiences of mathematicians, math educators, federal and state agencies, funders, and others involved in building the strength of post-secondary mathematics education. Based on input from these stakeholders, TPSE identified an end vision for its efforts:

*Post-secondary mathematics education 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.*

It further articulated its own mission relative to this vision:

*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 up effective practices.*

A near-term plan of concrete actions emerged from this vision and mission, beginning with the formation of a Mathematics Action Group (MAG). In March 2016, TPSE convened a diverse MAG consisting of some 30 department chairs and others engaged in working for change. This core group is now seen as TPSE's primary action and implementation partner, advising on grassroots issues from the departmental level and exchanging details of potentially valuable reform models.

Informed and supported by the MAG, TPSE planned two larger meetings for department chairs and other leaders to share information and extend the partnership committed to reform in undergraduate mathematics education. The first of these meetings, supported by the National Science Foundation, took place in October 2016, and the second is scheduled for March 2017. Their agendas center around TPSE's action priorities, including:

- Multiple curriculum pathways: TPSE will function as an advisory partner of APLU/AASCU/the Dana Center (UT-Austin) in developing multiple pathways in lower-division mathematics to increase completion rates and better align coursework with students' programs of study.
- Routes with relevance (formerly "Enhanced alternative pathways"): TPSE will promote reform of upper-division curricula in response to evolving career opportunities and demand from other departments for mathematics courses.
- Educational and economic outcomes of new teaching technologies: TPSE will advise ITHAKA, a research group that studies the uses of technology to improve teaching and learning.
- Broader training for graduate students: TPSE will promote preparation of the next generation of faculty as teachers of undergraduates and advisers of undergraduates on career development.

**Implementation of the strategic plan:** TPSE Math is now entering its implementation phase, beginning with administrative changes, including the arrival of William (Brit) Kirwan as Executive Director and an administrative base at the University of Maryland. To support the priorities listed above, TPSE has received grants from the Sloan Foundation and Carnegie Corporation to support early activities of the MAG and to prepare a multi-donor, multi-year project portfolio to carry out, scale up, and evaluate the effectiveness of major reforms. This action phase will signal the beginning of sustained efforts to enhance mathematics teaching and learning, increase the diversity of the mathematics community, and devise methods to better assess needs and evaluate the outcomes of reform.

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