

Strategic Plan

Executive Summary

July 16, 2015

Math is Becoming More Central to Our Lives

As the world around us continues to evolve and become more complex, quantitative literacy and analytical skills are becoming an increasingly important part of our everyday lives, no matter what the student's major in college and the chosen professional path post-graduation. Key stakeholders interviewed as part of the TPSE Math strategic planning process (math faculty, heads of professional societies, university administrators, and funders) call into question the United States' ability to compete globally if the next generations of citizens are not adequately prepared to participate in and contribute to ongoing knowledge creation in an increasingly complex world that relies more and more on big data, analytics, problem-solving skills, and informed citizenry. They point to a number of major systematic issues that need to be addressed:

- K12 Preparation
- Effectiveness of Developmental Education
- Disjointed Pathways Among Institutions
- Insufficiently Differentiated Math Pathways
- Potentially Misaligned Incentives
- Rising Economic Pressures on Students and Financial Pressures on Postsecondary Institutions

While the last three issues listed above are central to TPSE Math's mission, the list taken together provides a context that has helped to inform TPSE Math's work.

An Opportune Moment in Time

A number of forces—increased focus on educational outcomes, growing consensus that mathematics capability is a determinant of upward mobility, growing activism both inside and outside of academia on curricular matters, and increased involvement of the math community in developing solutions—are reshaping the way the public and the math community (faculty, departments, professional societies) perceive the role of math in today's society and in the future. The alignment of these forces positions the teaching and learning of mathematics at the nexus of great change.

There is considerable alignment around the range of issues affecting undergraduate math education and potential solutions to these issues. However, there is also growing recognition that there is not necessarily sufficient infrastructure or capacity in the field to enact, at scale, the changes on which there is consensus. **An initiative such as Transforming Postsecondary Education in Mathematics (TPSE Math) has the potential to be the catalyst that is needed for a major transformation**—in part by providing some new capacity to the field, but, perhaps most importantly, by leveraging existing capacity across postsecondary institutions and professional societies, and helping to galvanize efforts in a common direction.

Why TPSE Math?

The symbolic power of the group of six scientists and educators getting together to focus on improving undergraduate math education has garnered attention from the mathematics field. Since its inaugural meeting in June 2014, TPSE Math has demonstrated convening authority and is a magnet for rising leaders in the math community. While its members are formally affiliated with a number of math professional societies and initiatives, TPSE Math is designed to be neutral and objective, unaffiliated with any of the existing societies, but working in close partnership with these societies to effect large-scale change.

TPSE Math Has Undergone a Rigorous Strategic Planning Process to Formulate Its Next Phase

As part of a systematic planning process undertaken during May-July 2015 with the help of Parthenon, TPSE Math went through a period of intense self-reflection, which incorporated input from a wide group of stakeholders that involved members of the math community, university administrators, heads of non-profit organizations that have engaged in significant change efforts, and public and private funders (a full list of stakeholders interviewed by Parthenon as part of the strategic planning process is provided in Appendix A). As a result of these inputs and self-reflection, TPSE Math was able to formulate its end vision, mission, and strategies to carry out its mission.

First, in order to anchor its efforts to a meaningful goal, TPSE Math identified the end vision for the collective efforts of the broader math community, based on input from a wide group of stakeholders during the strategic planning process:

Postsecondary 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.

Second, TPSE Math articulated its own mission relative to the end vision:

TPSE Math will facilitate an inclusive movement to strengthen postsecondary 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.

Third, TPSE Math considered where significant activity is already happening in the field and where the largest gaps still are, and overlaid this with an assessment of its own strengths and capabilities. As a result, from a programmatic perspective TPSE Math is choosing to focus primarily on three of the six systemic issues listed earlier.

- **Insufficiently differentiated math pathways**, which stems from the fact that students are not always prioritized; math departments are relatively rigid in the area of instruction and serve as service departments rather than true partners to other disciplines; and implementation of cross-

departmental efforts requires a different “collective action and responsibility” approach rather than just innovations limited to individual classrooms.

- **Potential misalignments in current incentive structures at the institutional and departmental levels**, which tend to reward individual actions rather than collective actions (thus reducing incentives for collaboration) and research productivity rather than high quality teaching offerings (in research-oriented institutions).
- **Rising economic pressures on students and financial pressures on postsecondary institutions.** These pressures have led institutions to pay more attention to issues of efficiency and cost effectiveness. This has implications for math departments and how math could be taught as well. One possible solution could be the use of technology to deliver education more cost effectively without sacrificing the quality of learning outcomes.

TPSE Math acknowledges that there are already a number of strong organizations and initiatives focused on the two remaining areas—effectiveness of developmental education models and removing barriers to seamless pathways among institutions—and therefore will look to other organizations to continue to lead in these areas from a programmatic intervention perspective. TPSE Math of course recognizes these two areas for what they are—vital building blocks—and looks forward to lending the collective support, voice, and credibility of its leadership to these efforts. For example, TPSE Math could identify people from the mathematical community to review curricular materials developed by organizations focused on developmental education.

Fourth, TPSE Math formulated the “what”—the kinds of programmatic goals it might pursue in support of improvements in the three focus areas listed above:

- **Curriculum Pathways:** Curriculum changes to improve completion, including at 2-year colleges; to bring math closer to its uses in client disciplines; and to offer students more economically relevant quantitative skills. This would include development and implementation of enhanced alternative pathways (improved, more relevant curriculum, differentiated by student need/chosen discipline of study). It could also include the use of technology advances to deliver math education.
- **Graduate Training:** Design and delivery of improved training for the next generation of faculty (graduate students) to better prepare them to teach in an evolving environment (e.g., enhanced alternative pathway context, use of technology advances to deliver math education).
- **Leadership and Capacity Development:** Growing the number of those within the mathematics community—through involvement in designing and implementing curriculum pathways, through participation in advisory committees, and through vehicles such as TPSE Math Ambassadors—who are willing to take leadership roles in effecting change. This would also include design and delivery of improved training for the next generation of faculty (graduate students).

Fifth, TPSE Math formulated the “how”—five types of enabling activities or strategies that it might pursue to achieve the programmatic goals listed above:

- **TPSE-Influenced Networks:** Among institutions with comparable goals, and within those institutions, between mathematicians and client departments.
- **TPSE Ambassador Networks:** Among math faculty and math departments with comparable goals—enabling changes at scale.
- **Convenings of the Math Community:** National convening possibly in partnership with professional societies and regional convenings related to the networks described above.

- **Advocacy and Policy Shaping Efforts:** Serving as a catalyst for change by collaborating with governmental, non-profit, and academic organizations to help shape policies that support improvements in the teaching and learning of mathematics, and by advocating for the adoption of these policies.
- **Coordination of Learning:** Across TPSE-Influenced Networks, Ambassadors, and Convenings

Finally, TPSE Math also formulated two criteria to help it evaluate what specific projects it might pursue to further the programmatic goals above (so as not to lose focus and spread itself too thinly):

- **Addresses a real gap in the field:** The primary guiding principle under which TPSE Math will operate is to avoid duplication of efforts in the field. For example, in the case of networks, TPSE Math would conduct a more thorough landscape analysis first to determine whether there are existing networks of institutions that TPSE Math can tap into to advance curricular improvements/enhanced alternative pathways) rather than creating entirely new networks.
- **Is a strong fit with TPSE Math capabilities:** As an example, TPSE Math might not directly lead projects that involve redesign of developmental math content or delivery methods, but it could lend its voice to advocate for certain kinds of changes or to support interventions that are proving effective. Similarly, while TPSE Math might not manage the operations and coordination of a network of institutions, it could identify partners to do so and focus on establishing a dialog between TPSE Math and university, school, and department leadership in those networks.
- **Catalyzes existing participants around an issue:** Stimulates innovation if it is needed (e.g., to address gaps) and brings individuals/organizations together around a common issue.
- **Has the potential to reach scale:** Supports efforts that hold the promise of large-scale impact (e.g., curricula that could be applied to many graduate training programs across the country, with some small amount of customization).

TPSE Math Will Collect Data to Measure Its Impact

These activities represent a significant investment in time, personnel and money, and thus TPSE Math will use three kinds of measures to assess its impact on the field – periodic surveys to track both quantitative and qualitative measures, leading indicators of scale and reach, and lagging indicators of performance focused primarily on student outcomes.

TPSE Math Proposes to Incubate the Organization as a University System-Based Center

To move forward and effect change, TPSE Math has to have an organizational structure, governance model, financial resources and a detailed implementation plan. A TPSE Math Board of Directors will be established that at first consists of the six faculty members who constitute the existing TPSE Math leadership, but over time may add several members to the Board to ensure broader representation from the field.

The Board will be charged with hiring an Executive Director and four to five additional staff with expertise in nonprofit management and operations to support and advance the TPSE Math mission. The Board will maintain ultimate authority over strategic decisions for the organization, at least during the critical incubation period (three or so years). Over time, the Board members' role is expected to evolve from a management oversight role to an advisory role as the organization establishes itself and gains

momentum, and as full-time staff gain experience and begin take more direct control of TPSE's activities, goals, and strategies.

As part of the strategic planning process TPSE Math identified and considered four organizational structure scenarios:

- Merging with an existing organization,
- Operating as a distinct program housed within an existing organization,
- Operating as a separate center within a university system,
- Functioning as a separate independent 501 (c)(3) organization.

While the fourth option was appealing for many reasons, TPSE Math decided to proceed with the third option—incubating TPSE Math as a program or center within a University system (assuming a public university within a state-wide system). In order to create a separate center or program structure within the university system that ensures a high degree of independence, flexibility, credibility, and influence, TPSE Math identified the need to carefully assess fit and negotiate terms of agreement with the host university system in four key areas: cultural fit, financial arrangements, independence and credibility, and autonomy.

TPSE Math Has Developed a Preliminary Budget Estimate and Implementation Plan

TPSE Math is seeking \$14.5 million over a five-year period to support the proposed set of activities and potential issue-specific projects.

Critical near-term implementation activities include fundraising, hiring of key staff (starting with the Executive Director), refining project descriptions and activities, and launching the initial phases of selected projects.