Pathways to STEM Careers

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CBMS
External Pressures

PCAST report.

Change is DEMANDED!
Response

- Post-secondary mathematics education is of paramount importance to our society.

- Mathematical sciences community is greatly interested in improving outcomes.

- There are a great many local efforts to renew and improve the delivery of mathematics education.

- Organizations such as CBMS are giving renewed attention to post-secondary education.
Ingredients for improved mathematics education

- **Curricular reform** leading to well-planned PATHWAYS.
- **Cooperation** with client departments.
- **Teaching methodologies** promoted on the basis of measured outcomes.
- **(Online) technology** adopted to complement, not replace personal education.
Challenges

My informal survey of undergrad directors at Northwestern, UT-Austin, USC, UW-Seattle.

(Not a representative cross-section.)

Limited resources, pressures from client departments.

Expectations that Math Depts teach math skills.
Shared objectives

- **EDUCATE** our students, providing them with understanding of the mathematics they might need.
- **ENCOURAGE** our students’ appreciation of Mathematics.
- **ENCOMPASS** the diversity of our students
- **EQUIP** our students with RELEVANT training.
New PATHWAYS

- **ALTERNATIVES** to Calculus
- Early focus on **APPLICATIONS**
- Recognition of the growth of **BIOLOGICAL** sciences students
- Methods of **Modelling**
- Include experience with **coding**
We need to redesign our “gateway” courses to interpolate between K-12 education and basic courses in Science, Technology, and Engineering.

“Gateway courses in mathematics need to be aligned with those of other disciplines” as well as with what we recognize as important to the careers and basic education of our students.

Inputs include the Common Core Standards and the dramatic growth of the biological sciences.
Scaling local effort

How do we extend local successes to broader constituencies? Answer is not a common core for post-secondary education.

Although additional resources are scarce, we need to enlist the help of academic administrators, government and non-profit groups, and business leaders.

We need to establish networks of like institutions, creating communities which can share resources and experiences.

Most important: there should be much more direct communication among chairs and DUG’s.

We need better organization, well-documented course materials for new curricula, sound evaluation of innovations.
Our constraints

- More students and fewer regular faculty (students often need more personal attention) and shrinking budgets.

- Weak mathematical background of many students (e.g., role of Calculus in high schools)

- Competition with mobile devices, etc for our students’ attention.

- Fitting our goals with those of educators of other STEM fields. Don’t tread on toes!

- MOTIVATING faculty to innovate.