Presenters

• W. Gary Martin, Auburn University
• Emina Alibegovic, University of Utah
  – Sub: Alyson Lischka, Middle Tennessee State University
• Ed Dickey, University of South Carolina
• Marilyn Elaine Strutchens, Auburn University
Session Goals

• To update participants on the progress of the partnership, including its design and specific improvement efforts related to secondary mathematics teacher preparation.

• To discuss challenges in scaling improvements to support overall transformation of secondary mathematics teacher preparation.
Session Outline

• Overview of the Partnership
  – Design
  – Current research efforts:
    • Clinical experiences
    • Mathematical knowledge for teaching
    • Recruitment
  – Panel discussion

• Problems with scale
  – The challenge
  – Panel discussion
  – Small/full group discussion

• Next steps
Project Overview
Problem

• New secondary mathematics teachers need to be prepared differently in light of the Common Core State Standards and other college- and career-ready standards, the Mathematical Education of Teachers II, and NCTM’s Principles to Actions.

• Across the nation, there is a shortage of secondary mathematics teachers.
MTE-Partnership

Organized by the Association of Public and Land-grant Universities (APLU) under the auspices of their Science and Mathematics Teacher Imperative (SMTI):

- “a research, policy, and advocacy organization representing 230 public research universities, land-grant institutions, state university systems, and related organizations.”
MTE-Partnership Membership

• Consists of 39 partnership teams that include:
  – An APLU/SMTI institution as the lead
  – At least one K-12 district
  – At least one other organization (e.g., collaborating university, college, or community college; regional inservice center; state department of education)

• Teams must demonstrate continuing involvement of:
  – Mathematics educators
  – Mathematicians
  – K-12 educators
39 Partnership Teams – 31 States:
- 103 universities and 9 community colleges
- Over 100 school systems
Networked Improvement Community (NIC) Design

• Developed by the Carnegie Foundation for the Advancement of Teaching

• Four major features:
  1. Focused on a common aim
  2. Guided by deep problem analysis
  3. Disciplined inquiry based on continuous improvement
  4. Networked to accelerate progress
#1. Focused on a Common Aim

The partnership is focused on the twin aims of:

- producing mathematics teacher candidates who meet a “gold standard” of preparedness to address the Common Core and other college and career-ready standards
  - Common observation protocol (MCOP$^2$)
  - Candidate self-assessment
- increasing the quantity of well-prepared candidates
  - 40% increase by 2020
#2. Guided by Deep Problem Analysis


• Identification of particular problem areas impeding progress towards the aim, based on the *Guiding Principles*
Creating a “gold standard”
Programs document that their graduates are capable of providing the ambitious instruction and deep learning compelled by CCSSM, based on benchmarks to be developed by the MTE-Partnership

More and better new teachers
To prepare <target number> of graduating secondary mathematics teachers with an emphasis on increasing diversity.
#3. Disciplined Inquiry Based on Continuous Improvement

- Organization of “Research Action Clusters” (RACs) to address particular problems of practice.
- The use of evidence to guide the development of solutions ensures that changes being developed by a RAC are actually improvements.
- Moreover, an iterative cycle of prototyping, testing, and refining has the potential to lead to timely solutions to important problems.
  - “Plan-Do-Study-Act”
#4. Networked to Accelerate Progress

- Teams within a Research Action Cluster collaboratively develop, test, and refine interventions and their use in varied educational contexts.
- Rather than trying to “control” variation, the partnership embraces variation to study how interventions might be responsive to differing conditions under which they might be used.
Projected Outcomes

• A variety of validated products, programs and approaches addressing important issues in secondary mathematics teacher preparation

• Incorporate sensitivity to the conditions affecting their success throughout the developmental process
MTE-Partnership’s Research Action Clusters (RACs) in Progress

• Developing Effective Clinical Experiences -- Mentor professional development; alternative models

• Actively Learning Mathematics -- Improving instruction in introductory university mathematics classes

• MODULES²: Mathematics of Doing, Understanding, Learning and Educating for Secondary Schools – Developing materials to address specific mathematical needs of math teachers

• MATH: Marketing for Attracting Teacher Hopefuls -- Moving beyond advertising to attract candidates

• STRIDES: Secondary Teacher Retention & Induction in Diverse Educational Setting – Retaining new math teachers in the profession
Clinical Experiences Research Action Cluster

AMTE Annual Meeting
January 29, 2016

Marilyn Strutchens
Auburn University
Structure of the Research Action Cluster

Developing Effective Clinical Experiences

- Methods
- Paired Placement
- Co-Teach/Co-Plan
Paired-Placement Internship
- Marilyn Strutchens, Auburn University
- David Erickson, University Of Montana
- Jennifer Whitfield, Texas A&M University
- Cathy Kinzer, Lida Uribe-Florez, and Jamie Baker, New Mexico State University

Co-Plan and Co-Teach
- Ruthmae Sears, University of South Florida
- Karen Hollebrands, North Carolina State University
- Pat Brosnan, Ohio State University
- Jennifer Oloff-Lewis, California State University, Chico
- Stephanie Biagetti, California State University, Sacramento
- Maureen Grady and Charity Cayton, East Carolina University
- Janet Andreasen, University of Central Florida

Co-Plan and Co-Teach
- Jami Stone, Black Hills State University
- Cathy Spencer, California State University San Bernardino
- Laurie Riggs, Cal Poly Pomona
- Julie Gainsburg - California State University Northridge

Methods
- Michele Iiams, University of North Dakota
- Greg Chamblee, Georgia Southern University
- Jan Yow, University of South Carolina
- Rebekah Elliot, Oregon State University
- Mark Ellis, California State University, Fullerton
- Jeremy Zelkowski, University of Alabama
The Carnegie Foundation for the Advancement of Teaching NIC Learning Lab Attendees

- Marilyn Strutchens
- Michele liams
- Ruthmae Sears
- Mark Ellis
- Cathy Williams
Initiation TEAM

• Paired Placement
  – Marilyn Strutchens (Sub-RAC Leader- Mathematics Teacher Educator)
  – David Erickson (Mathematics Teacher Educator)
  – Jennifer Whitfield (Mathematics Teacher Educator)
  – Brooke Barron (Mentor Teacher- School Partner)
  – Basil Conway (Mentor Teacher -School Partner)

• Co-teach/Co-plan
  – Ruthmae Sears (Sub-RAC Leader- Mathematics Teacher Educator)
  – Jennifer Oloff-Lewis (Mathematics Teacher Educator)
  – Stephanie Biagetti (Mathematics Teacher Educator)
  – Julie Wagner (District Person- School Partner)

• Methods
  – Michele Iiams (Sub-RAC Leader- Mathematician)
  – Mark Ellis (Sub-RAC Leader- Mathematics Teacher Educator)
  – Jan Yow (Mathematics Teacher Educator)
  – Rebekah Elliot (Mathematics Teacher Educator)
  – Julie Spykerman (Mentor Teacher -School Partner)
  – Cathy Williams (Mentor Teacher -School Partner)

• W Gary Martin (Hub)(Mathematics Teacher Educator)
Problem

Teacher preparation programs face significant challenges in providing secondary mathematics teacher candidates with quality clinical experiences.

• Inadequate supply of quality mentor teachers to oversee the experiences:
  – This is related to the quantity of teachers who are well versed in implementing the CCSS, especially embedding the standards for mathematical practice into their teaching of content standards on a daily basis.
Problem

There needs to exist a bidirectional relationship between the teacher preparation programs and school partners in which clinical experiences take place.

• This relationship should reflect a common vision and shared commitment to the vision of CCSSM and other issues related to mathematics teaching and learning.
Driver Diagram
### Aim Statement
During student teaching Teacher Candidates (TCs) will use each of the eight Mathematics Teaching Practices at least once a week during full time teaching.

<table>
<thead>
<tr>
<th>Primary Drivers (WHAT)</th>
<th>Secondary Drivers (WHERE)</th>
</tr>
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<tbody>
<tr>
<td>Transparent and coherent system of mentor selection and support</td>
<td>Increase the number of effective mentor teachers who are well versed in the CCSS and MTP</td>
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<td>Interdependency of methods course and early field experiences.</td>
<td>Deliberate focus on connecting coursework of the methods course to the field experience of the candidates.</td>
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<td>Student teaching as clinical training</td>
<td>Ensure Self Assessment - feedback from TC about student teaching experience.</td>
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<td>Shared vision about teacher development</td>
<td>Establish collaborative meetings to negotiate conflicting beliefs and constraints relative to each partner.</td>
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<tr>
<td>Focus on access and equity</td>
<td>Develop infrastructures and clinical experiences that best meet the needs of the candidates.</td>
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Mathematics Teaching Practices

1. Establish mathematics goals to focus learning.
2. Implement tasks that promote reasoning and problem solving.
3. Use and connect mathematical representations.
4. Facilitate meaningful mathematical discourse.
5. Pose purposeful questions.
6. Build procedural fluency from conceptual understanding.
7. Support productive struggle in learning mathematics.
8. Elicit and use evidence of student thinking.

(National Council of Teachers of Mathematics, 2014, p.10)
### Aim Statement
During student teaching Teacher Candidates (TCs) will use each of the eight Mathematics Teaching Practices at least once a week during full time teaching.

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# Change Ideas (HOW)

<table>
<thead>
<tr>
<th>The development of a professional development program related to mentoring mathematics teachers</th>
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<tr>
<td>Provide ongoing professional development and course work related to the Common Core State Standards and NCTM’s Mathematics Teaching Practices</td>
</tr>
<tr>
<td>Convene either face-to-face or online meetings to plan field experiences, articulate expectations, and reflect on norms and cultures within the class settings.</td>
</tr>
</tbody>
</table>
Common Measures Across Sub-RACs

• **MCOP2**—The Mathematics Classroom Observation Protocol for Practices in a K-16 mathematics classroom instrument

• **The MTE-P Completer Survey** will show how well prepared the teacher candidates feel based on the experiences that they had in their programs.

• **Mathematics Teaching Practices Survey**
For each practice the candidates check yes or no for the following choices:

• I have read about this practice.
• I have participated in a discussion about this practice in a workshop or class.
• I have seen this practice either in a classroom or video.
• I have planned for this practice in a lesson plan.
• I have tried this practice in a classroom.
• I have received feedback about my use on this practice.
Methods Sub-RAC Key Activities

• Engaged in PDSA cycle around the Standards for Mathematical Practice Module
  – 3 instructors implemented SMP Module for first time
  – 2 instructors implemented the SMP Module for a second time.
  – Implemented “exit slips” completed by methods students to assess impact of SMP Module on pre-service teachers.
  – Gathered detailed information about SMP Module implementation.
  – Revised SMP Module based on collected data.

• In process of developing a lesson planning module.
Co-Planning and Co – Teaching (CPCT) 
Key Activities

• Members of CPCT facilitated a professional development workshop at the University of South Florida.

• They have been accepted to present a paper at ICME 13 in Hamburg Germany.

• They have also begun work on a paper to be submitted to a research journal.
Paired Placement Sub-RAC
Key Activities

• Auburn, New Mexico State, Montana, and Texas A&M have implemented paired placements during the internship experiences. These implementations served as PDSA cycles.

• We are utilizing the Mathematical Teaching practices survey.

• Created syllabi and workshops related to the paired placement experiences.
MODULE($S^2$)
The problem

• Prospective teachers do not always have the opportunity to take coursework that builds deep understanding of the mathematics they will be asked to teach.

• Prospective teachers do not always see practice standards modeled in their undergraduate major courses.

• Appropriate courses and useful modules are developed and integrated school-by-school, independently, with little opportunity to share experience across institutions.
Response

• Mathematics of Doing, Understanding, Learning and Educating for Secondary Schools

• Improve content courses

• Mathematics applied to teaching
Aim Statement

• Develop four collaboratively-designed modules, and pilot at least one at each Partnership in our RAC (engaging 10 or more pre-service math candidates at each institution) by Spring 2016, that focus on building candidates’ deep understanding of the mathematics they will be asked to teach while engaging them in the Standards for Mathematical Practice.
Aim Statement

• Develop twelve collaboratively-designed modules, and pilot at least one at each Partnership in our RAC (engaging 10 or more pre-service math candidates at each institution) by Spring 2018, that focus on building candidates’ deep understanding of the mathematics they will be asked to teach while engaging them in the Standards for Mathematical Practice.
## Improvement Target

### Create a “gold standard”
- To develop shared measures and benchmarks for teacher preparation programs and their graduates.

### More and better new teachers
- To graduate secondary mathematics teachers who achieve these benchmarks, with an emphasis on increasing diversity.

## Primary Drivers

<table>
<thead>
<tr>
<th>I. Shared vision of preparation</th>
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<tbody>
<tr>
<td>Create shared understanding and commitment among mathematicians, mathematics educators, and K–12 partners.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>II. Clinical preparation</th>
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<tbody>
<tr>
<td>Improve teacher candidates' intern experiences by partnerships with mentor teachers and other stakeholders.</td>
</tr>
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</table>

<table>
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<tr>
<th>III. Mathematical preparation</th>
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</thead>
<tbody>
<tr>
<td>Develop teacher candidates' knowledge of mathematics needed to support student learning.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>IV. Recruitment and retention</th>
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<tbody>
<tr>
<td>Attract, retain, and graduate an adequate supply of teachers.</td>
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</tbody>
</table>

## Secondary Drivers

<table>
<thead>
<tr>
<th>A. Stakeholder involvement</th>
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</thead>
<tbody>
<tr>
<td>B. Institutional support</td>
</tr>
<tr>
<td>C. Focus on student learning</td>
</tr>
<tr>
<td>D. Building a learning mindset</td>
</tr>
<tr>
<td>E. Tools for collaboration</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>A. Mentorship.</th>
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<tbody>
<tr>
<td>B. Partnerships.</td>
</tr>
<tr>
<td>C. Evaluation.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>A. MET II recommendations.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Ways of knowing and learning.</td>
</tr>
<tr>
<td>C. Coherence of courses.</td>
</tr>
<tr>
<td>D. Assessment of knowledge.</td>
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</table>

<table>
<thead>
<tr>
<th>A. Recruitment to program.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Retention in program.</td>
</tr>
<tr>
<td>C. Retention in profession.</td>
</tr>
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</table>
AIM

Develop twelve collaboratively-designed modules, and pilot at least one at each Partnership in our RAC (engaging 10 or more pre-service math candidates at each institution) and replicate by Spring 2018, that focus on building candidates’ deep understanding of the mathematics they will be asked to teach while engaging them in the Standards for Mathematical Practice.

Primary Drivers

- Develop strong and supportive collaboration among stakeholders.
- Develop content for the modules that promotes deep understanding of secondary mathematics from an advanced perspective.
- Provide experiences that promote engagement in the standards for mathematical practices.
- Implement, improve, sustain, and replicate module use.

Change Ideas

- Continue periodic conference calls
- Fund/support collaborators (time, summer money, pd credit)
- Share information about MTEP, MET II and CCSSM with collaborators
- Identify content goals (e.g., what do we want to want SMPTS to learn about transformational geometry)
- Research/share existing materials
- Create materials
- Disseminate to reviewers
- Pilot and refine based on ongoing reflection posts
- Develop measurement items to assess understanding
- Provide teaching notes for the module that help instructors understand the CCSSM mathematical practices
- Develop activities that elicit multiple practices
- Provide ways for students to demonstrate evidence of engaging in the practices
- Create a teacher handbook with rationale and implementation suggestions
- Engage in ongoing evaluation as a team
- Suggest ways to use the modules (within an existing course, as a New course...)
- Co-teach/co-plan
Previous work

• Partnering institutions surveyed
• Resources shared
• Framework and draft template for modules formed
• Modules decided on and outlined:
  – Transformational geometry
  – Mathematical modelling
  – Statistics
  – Algebra
Objectives

• Create twelve collaboratively designed modules that focus on developing PSMTs’ MKT algebra, geometry, modeling, and statistics in grades 6-12.

• Pilot and support the implementation of the modules.

• Revise the modules based on implementation data, instructor feedback, and PSMTs’ work.

• Evaluate the effectiveness of modules with regards to their ability to develop PSMTs’ MKT.

• Disseminate the modules across multiple institutions, beginning with the more than 100 MTE-P institutions.
Framework

• The design principles ensure the materials attend to the entirety of MKT

• Materials
  – Student
  – Instructor
    • Assessment
    • Teaching guides
    • Teaching application
Important advantages

• Collaboration of mathematicians, mathematics educators, and secondary school partners
• Flexible format to allow implementation in variety of contexts and programs
• Cross content collaboration
• “Built-in marketplace” for dissemination and implementation
Future work

• Reflect, evaluate, revise
• Professional development, pilot
• Revise, pilot, disseminate
• Expand to other courses
• Conduct and disseminate research
Marketing to Attract Teacher Hopefuls
Models for developing and launching market campaigns that rebrand teaching to appeal to more students.

Purposeful and sustained marketing campaign to attract secondary mathematics candidates with special attention to diverse and underrepresented groups.
Who We Are: the Team

- Cynthia Anhalt, University of Arizona
- Diane Barrett & Linda Venenciano, University of Hawai’i
- Nancy Caukin, Middle Tennessee State University
- Laurie Cavey & Joe Champion, Boise State University
- Charity Cayton, East Carolina University
- Ed Dickey, University of South Carolina
- Maria Fernandez, Florida International University
- Dana Franz, Mississippi State University
- Margaret Mohr-Schroeder, University of Kentucky
MATH RAC Members

• Jennifer Whitfield, Texas A&M University
• California State System:
  – Nadine Bezuk & Randy Philipp, San Diego State University
  – Carol Fry Bohlin, Fresno State University
  – Kathy Hann, Julie McNamara & Julia Olkin, CSU-East Bay & Cheryl Roddick, San Jose State University
  – Andrea Medina, CSU-Bakersfield
  – Cheryl Ordorica, CSU-Chico
Module 1: Teacher Recruitment Campaign Overview

Welcome to the Secondary Mathematics Teacher Recruitment Campaign Implementation Guide. This nine-module guide is designed to help faculty members and others within mathematics or STEM teacher education programs maximize their impact on teacher candidate recruitment. Within the modules, you will find many ideas for identifying strategies, implementing specific tactics, or designing an entire campaign intended to increase enrollments and produce high-quality teachers for our nation’s schools. The ideas can be customized to the needs of your program and adapted to meet the needs of your student populations and the region that you serve.

Intended to serve as a universal campaign implementation manual for teacher recruitment both for mathematics or other STEM fields, the elements in this guide were compiled to address general principles of marketing, but augmented with specific recommendations and lessons learned by members of the Marketing to Attract Teacher Hopefuls (MATH) Research Action Cluster of the Association of Public Land-grant Universities (APLU) Mathematics Teacher Education Partnership. Each module was designed to stand-alone addressing a specific recruitment campaign topic but with sufficient knowledge carry-over from one module to the other to allow those interested in recruitment to implement a comprehensive campaign.
Implementation Guide

Modules for Recruitment of Mathematics Teachers

- Module 1 Teacher Recruitment Campaign Overview
- Module 2 Campaign Planning
- Module 3 Campaign Research
- Module 4 Branding
- Module 5 Social Media
- Module 6 Public Relations
- Module 7 Paid Broadcast Media
- Module 8 Web Site Identity
- Module 9 Lessons Learned/Evaluation
Implementation Guide

On behalf of the Mathematics Teacher Education Partnership and the MATH RAC:

Conditions for Access

In spirit of Improvement Science and our network:

• Complete brief survey
• Agree to respond to period surveys from MTE-Partnership or the MATH RAC
Program Transformation

• Ideas for Chico State
• Working with institutional offices and resources
• Program revision
Chico State

• Cheryl Ordorica
• PRISMS (Promoting Rural Improvement in Secondary Mathematics and Science) Grant
• Using guide to
  – Engage target audience through social media (Module 5)
  – Maximize results via paid media (Module 7)
  – Enhance web identity (Module 8)
  – Evaluate effectiveness (Module 9)
Analytics

Traffic Sources

- 56% Direct Traffic
- 8% Referring Websites (Including Social Media: 0.4%)
- 36% Search Engine Referrals
Public Relations

• Institutional professional in marketing, media, and communications
  – Media Relations
  – University Communications
  – Public Relations
  – Marketing

• School Partners

• Public Service Announcements
The Office of Communications is the official source of news and information at California State University San Marcos.

CSUSM is a vibrant community of students, faculty, staff and alumni and the Office of Communications seeks to capture and promote that vitality.

**SJSU’s Latest Communication Guidelines**

For the first time in SJSU’s history, the university has developed comprehensive communication standards that focus on telling the stories of Spartans.
Institutional Media Relations

• Both at institution and college level
• Mission to market and communicate with external audiences
• Partner to ensure effective messaging and appropriate branding
• Can provide valuable services
  – Preparing a Press Release
Press Release

For Immediate Release

FOR INFORMATION
Jean Triskett, Injeanious Media
803.361.3774
jean@injeaniousmedia.com

On National Teacher Appreciation Day, Two Universities Highlight the Importance of Science and Mathematics with Beyoncé-Approved Music Video

"STEM Teaching has a nice ‘ring’ to it in this parody dance video"

COLUMBIA, S.C. (May 5, 2015) -- STEM (Science, Technology, Engineering, and Mathematics) teachers received a boost to their “cool” factor with the “All the STEM Teachers” parody of Beyoncé’s hit song “All the Single Ladies... Put A Ring On It” released today in honor of National Teacher Appreciation Day.

The musical dance video, which can be found at www.TeachScienceandMath.org, features lyrics and choreography rewritten to focus on the importance of STEM teaching in the U.S., spotlighting the career choice as one that is fun, high-energy, and innovative. The producers of the video hope it will “go viral” and generate
Options involving Media Relations

• Ensure that institutional office has time and expertise to provide services
• Use the RFP to determine the scope of the work
• Outsourcing with a media firm might be a better option
• Ensure agree and establish collaboration with in institutional media relations office
Program Revision

• How to you change program to be more attractive?
• What program features appeal to particular audience or audiences of students?
• What institution barriers exist that negative impact recruitment?
NSF Noyce Track 4

- CAEP related program improvement
- NSF funding to research program features:

![Program Features Diagram]
Other RACs in Progress

STRIDES (Secondary Teacher Rentention in Diverse Educational Settings):

• *Induction into the school environment*
Other RACs in Progress

Active Learning Mathematics:

• *Improvement of instruction in introductory mathematics classes through use of active learning principles*

• *Aimed at increasing the supply of potential secondary mathematics candidates, as well as mathematical processes and practices needed for teaching (note – also useful for a broad range of mathematics-intensive majors.)*
Many K-12 students do not learn challenging mathematics

Talented math teachers leave the field

Teachers are left to their own devices in terms of continuing their mathematical education

Those same prospective teachers are apprenticed in classrooms of teachers who themselves know little mathematics

Those students enter college unprepared for math; the best-prepared don’t go into teaching

Math courses taken by secondary teachers do not prepare them to develop math knowledge for teaching

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Math courses taken by secondary teachers do not prepare them to develop math knowledge for teaching

STRIDES

STRI-DES

Clinical

MATH

ALM

MODULES$^2$
Panel Discussion

Questions from the audience
The Problem of Scale
Problems with Scale

• Across teams – spreading an improvement to additional contexts
  – The “typical” problem associated with scale

• Within an improvement – increasing intensity or depth of effort
  – Example: Going from one instructor implementing Active Learning in Calc 1 to all sections

• Across a program – increasing the breadth of improvements addressed
  – Example: A team may be focusing on Clinical Experiences. What about MKT?
Common Themes

• Issues with capacity:
  – Human capital – who is available to do the work?

• Issues with “will”:
  – What is the priority for improvement across stakeholder groups?

• Issues with institutional support:
  – What resources and support structures are provided?
Panel Discussion: Team Leaders

What would it take to scale up your improvement efforts to support overall program transformation?

What are particular challenges?
Small Group Discussion

What are your experiences with scaling improvements?

What challenges do you face?

What approaches might be most promising?
Proposed MTE-Partnership Strategy

• Teams will each create a strategic path to scale up incorporation of Partnership improvements with the ultimate aim of comprehensive program transformation, with a focus on building:
  – Capacity and infrastructure
  – Integration of K-12 and other stakeholders
  – Cross-team collaboration
Supporting Transformation

• Building knowledge about program transformation
  – Formation of Institutional Change Working Group
• Development of a roadmap for the Partnership’s continued development to support program transformation.
  – E.g., creating additional Research Action Clusters
For More Information

- www.MTE-Partnership.org