Dana Center
Mathematics
PATHWAYS

Scaling Mathematics Pathways: What Have We Learned from Statewide Efforts

Paula Talley, Manager, Professional Learning, Higher Education Strategies, Policy, and Services, Charles A. Dana Center

Mike Leach, Executive Director, Student Success Center, Arkansas Community Colleges (ACC)

JFF, January 30, 2019

What brings you here?

Let your fingers do the talking:

- 5 fingers: We've implemented and want to improve.
- 4 fingers: Started implementation and have challenges.
- 3 fingers: Want to know how to implement.
- 2 fingers: Deciding whether to implement.
- 1 finger: Gathering information about general concept.

Definition of *Math Pathway*

. . . a mathematics course or sequence of courses that students take to meet the requirements of their programs of study.

The concept of math pathways applies to college-ready and underprepared students.

Dana Center Principles for Pathways

Institutions implement structural and policy changes quickly and at scale.

Institutions and departments engage in continuous improvement to ensure high-quality, effective instruction.

Dana Center Principles for Pathways

Institutions implement structural and policy changes quickly and at scale.

Mathematics pathways are structured so that:

1) All students, regardless of college readiness, enter directly into mathematics pathways aligned to their programs of study.
2) Students complete their first college-level math requirement in their first year of college.

Dana Center Principles for Pathways

Institutions and departments engage continuous improvement to ensure high-quality, effective instruction.

Students engage in a high-quality learning experience in math pathways designed so that:

3) Strategies to support students as learners are integrated into courses and are aligned across the institution.
4) Instruction incorporates evidence-based curriculum and pedagogy.

Where we Work

Dana Center Mathematics Pathways has contributed to the implementation of math pathways in higher education systems, institutions, and campuses **over 30 states.**

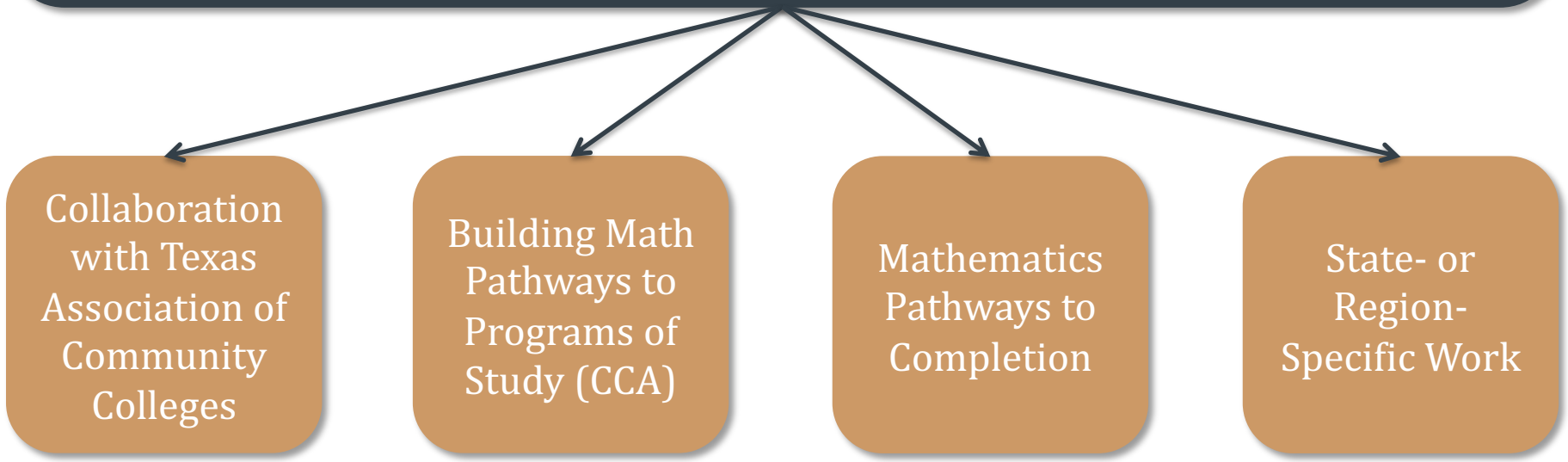
Coordinated efforts across all levels of the system

Change at scale requires work at multiple levels of the system.

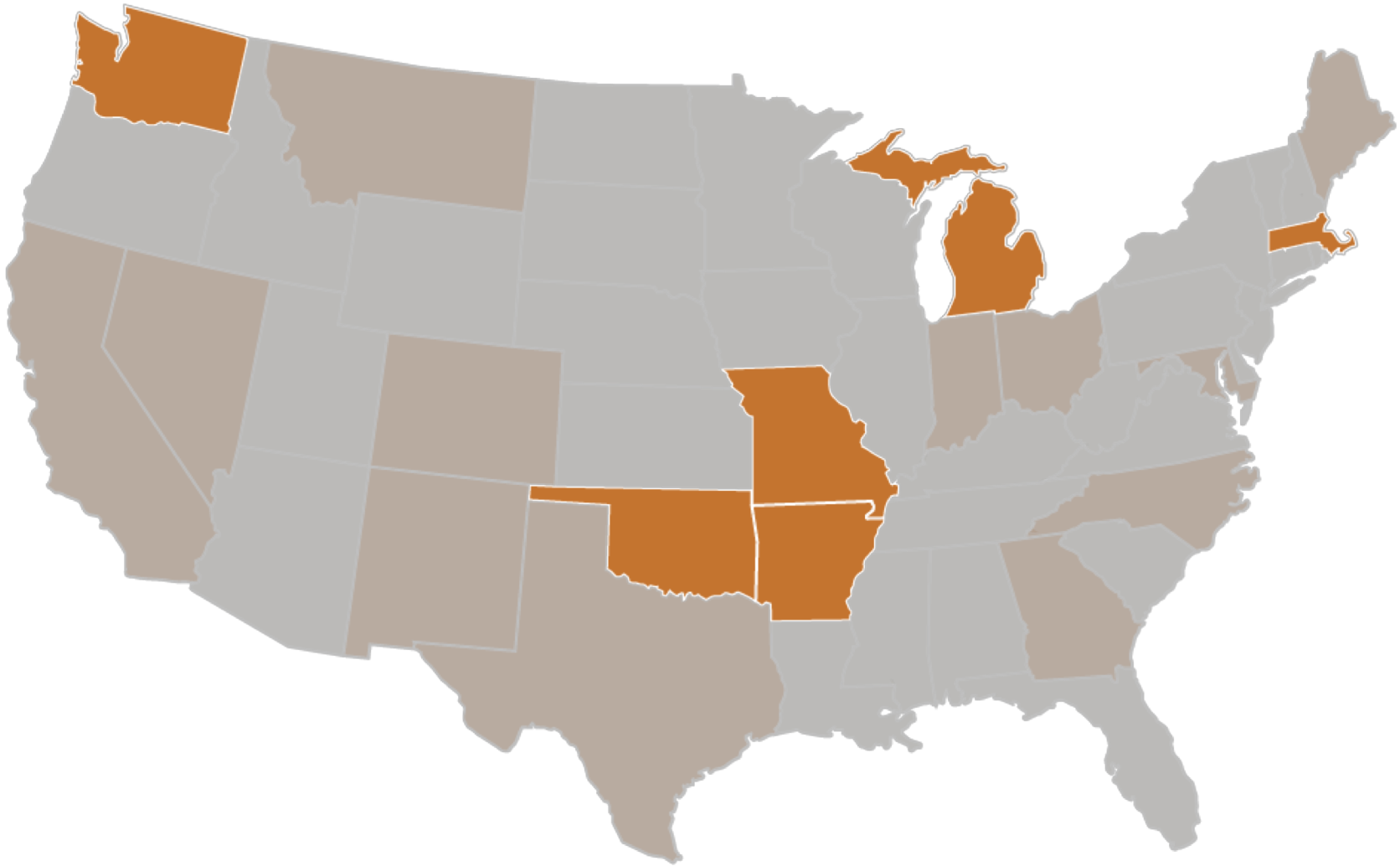
Umbrella of the DCMP Projects

The Dana Center Mathematics Pathways (DCMP) establishes:

- A model for implementing math pathways, and
- Characteristics for how the Dana Center works that inform several different projects.



Mathematics Pathways to Completion - MPC



System Implementation Process

Each state, region, system has a customized plan and timeline.

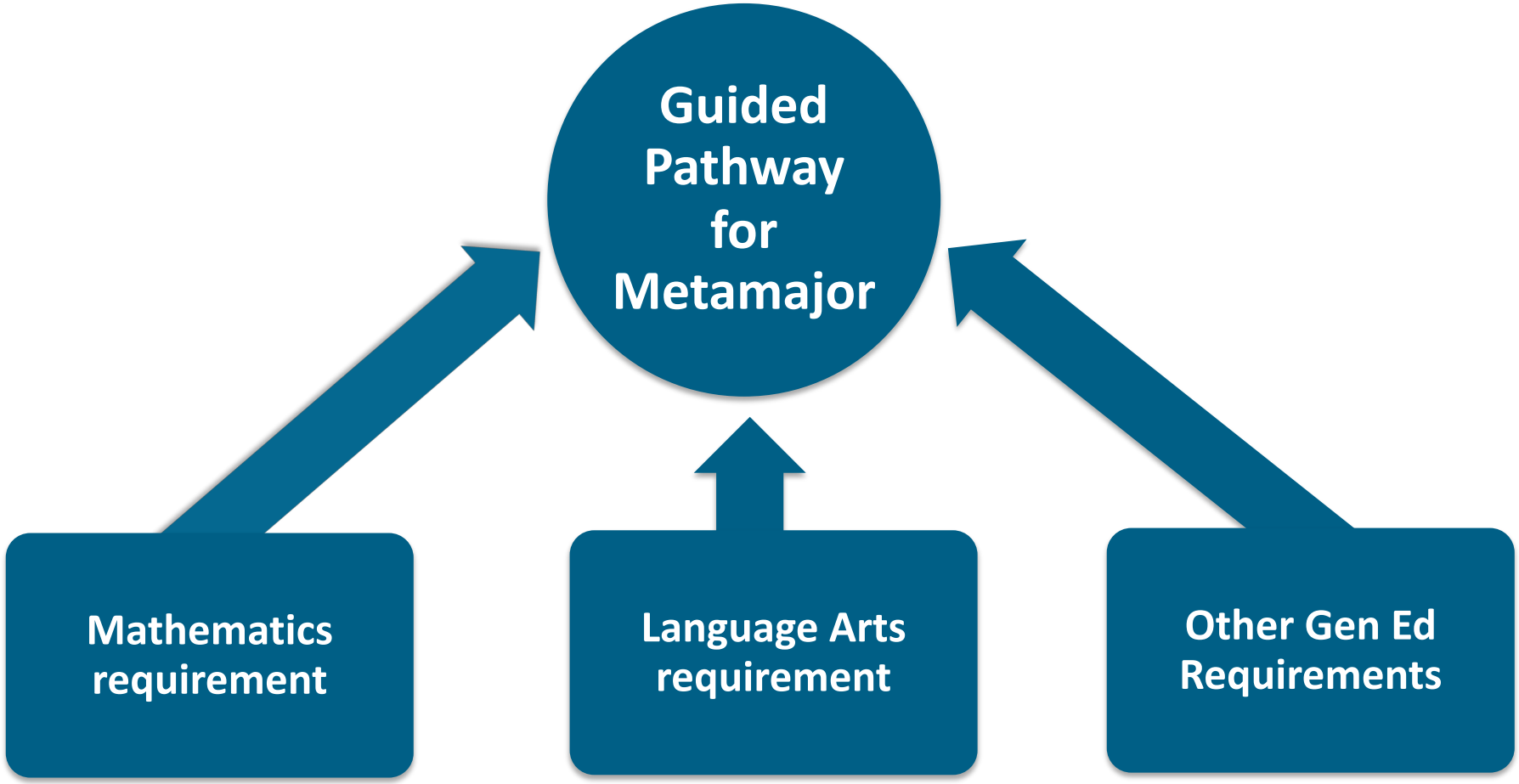
Phase 1: Build urgency and intrinsic motivation for change

Phase 2: Enable scale by creating the policy and practice conditions for statewide implementation

Phase 3: Enact the DCMP at institutions by building faculty and institutional

Consulting, tools, and services support each phase.

Math Pathways: a dimension of guided pathways



Math has special significance

- Has potential to be greatest obstacle for a large proportion of the student population

- Creating high quality math pathways aligned to programs can require significant changes.

→Requires early and strategic planning.

Aligning Math with Pathways: A Case Study - Arkansas

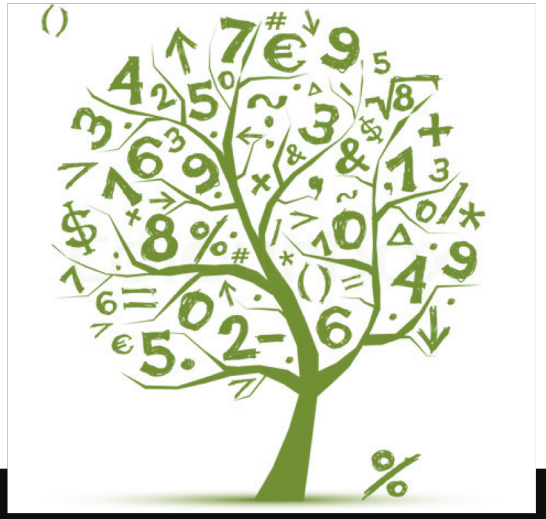
Formal Charge

The Governor's Office charged Arkansas Department of Higher Education with creating a strategic plan to improve state higher education outcomes. As a part of that plan, ADHE identified the Mathematics Pathways to Completion (MPC) project as a vehicle for helping the state achieve those outcomes, charging the Arkansas Math Pathways Taskforce (AMPT) to develop expectations and processes that result in each two-year and four-year public higher education institution in the state to offer pathways in mathematics that will:

Formal Charge

- Increase student success.
- Allow more students the opportunity to complete degree programs.
- Increase transferability of credits between institutions of higher education.

Arkansas Math Pathways Task Force



Task Force

Arkansas
Math Pathways
Task Force

- Organized by ADHE and ACC to implement math pathways project in Arkansas.
  - Dr. Jessie Walker (ADHE)
  - Mike Leach (ACC)
  - Dr. Charles Watson (UCA)
  - Valerie Martin (NACC)
  - Dr. Linus Yu (UAFS)

Task Force

Arkansas
Math Pathways
Task Force

- Includes a least one math faculty member from every two year and four year public college in Arkansas (and several private institutions).

Task Force

Arkansas
Math Pathways
Task Force

- Met more than ten times since February 2016.
- Issued recommendations for the state higher education system to adopt and scale math pathways.

Task Force

Arkansas
Math Pathways
Task Force

- Recommendation #1: All public institutions of higher education in Arkansas adopt multiple math pathways as needed based on the math course requirements of the programs of study offered at their institution.

Task Force

Arkansas
Math Pathways
Task Force

- Recommendation #2: Academic disciplines identify math competencies needed for specific programs of study and use competencies to recommend a common transferable math course requirement for each program of study. (Statistics, College Algebra, Quantitative Reasoning, Calculus)

Task Force

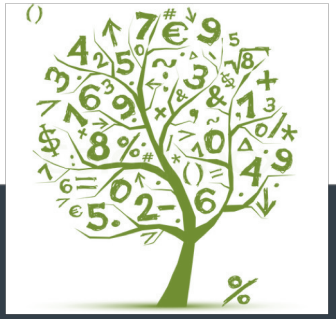
Arkansas
Math Pathways
Task Force

- Recommendation #3: All public institution of higher education adopt a co-requisite approach to preparing underprepared students for their required college-level math courses.

Task Force

Arkansas
Math Pathways
Task Force

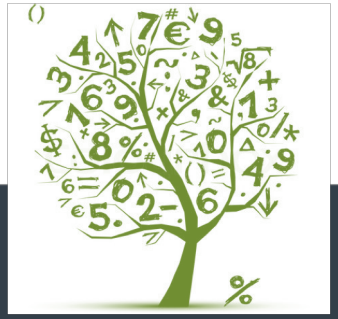
- Recommendation #4: Provide professional development to: 1) support faculty in designing and teaching required college-level math courses and co-requisite approaches, 2) educate faculty, staff and students about the content and benefits of new math pathways, and 3) help advisors understand and be able to advise students into multiple math pathways, and help registrars implement multiple math pathways including co-requisite approaches.



Task Force

Arkansas
Math Pathways
Task Force

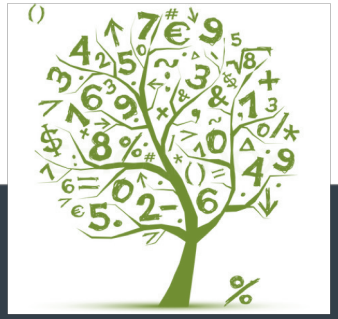
- Recommendation #5: Provide technical assistance to support faculty and staff in developing multiple measures for student assessment and placement into math pathways.



Task Force

Arkansas
Math Pathways
Task Force

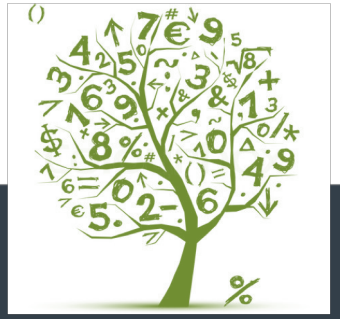
- Recommendation #6: Review ACTS language related to recommended pre-requisites for college-level introductory statistics, and identify mathematics skills needed to best prepare for college-level introductory statistics.



Task Force

Arkansas
Math Pathways
Task Force

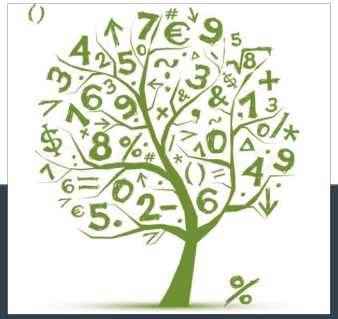
- Recommendation #7: Develop, identify and disseminate strategies and best practices for transitioning students between math pathways should students change majors and encounter a new math course requirement.



Task Force

Arkansas
Math Pathways
Task Force

- Recommendation #8: Gather and disseminate data that indicate the impact of multiple math pathways and co-requisite approaches on student outcomes.



Recommendations

Quick structural change

Mathematics pathways are structured so that:

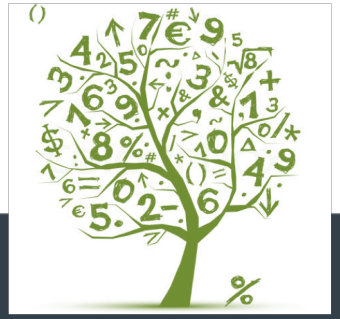
1) All students, regardless of college readiness, enter directly into mathematics pathways aligned to their programs of study.
2) Students complete their first college-level math requirement in their first year of college.

Continuous improvement

Students engage in a high-quality learning experience in math pathways designed so that:

3) Strategies to support students as learners are integrated into courses and are aligned across the institution.
4) Instruction incorporates evidence-based curriculum and pedagogy.

Continuous Faculty and Staff Professional Development



Arkansas
MATH PATHWAYS
Task Force

PROFESSIONAL TRAINING

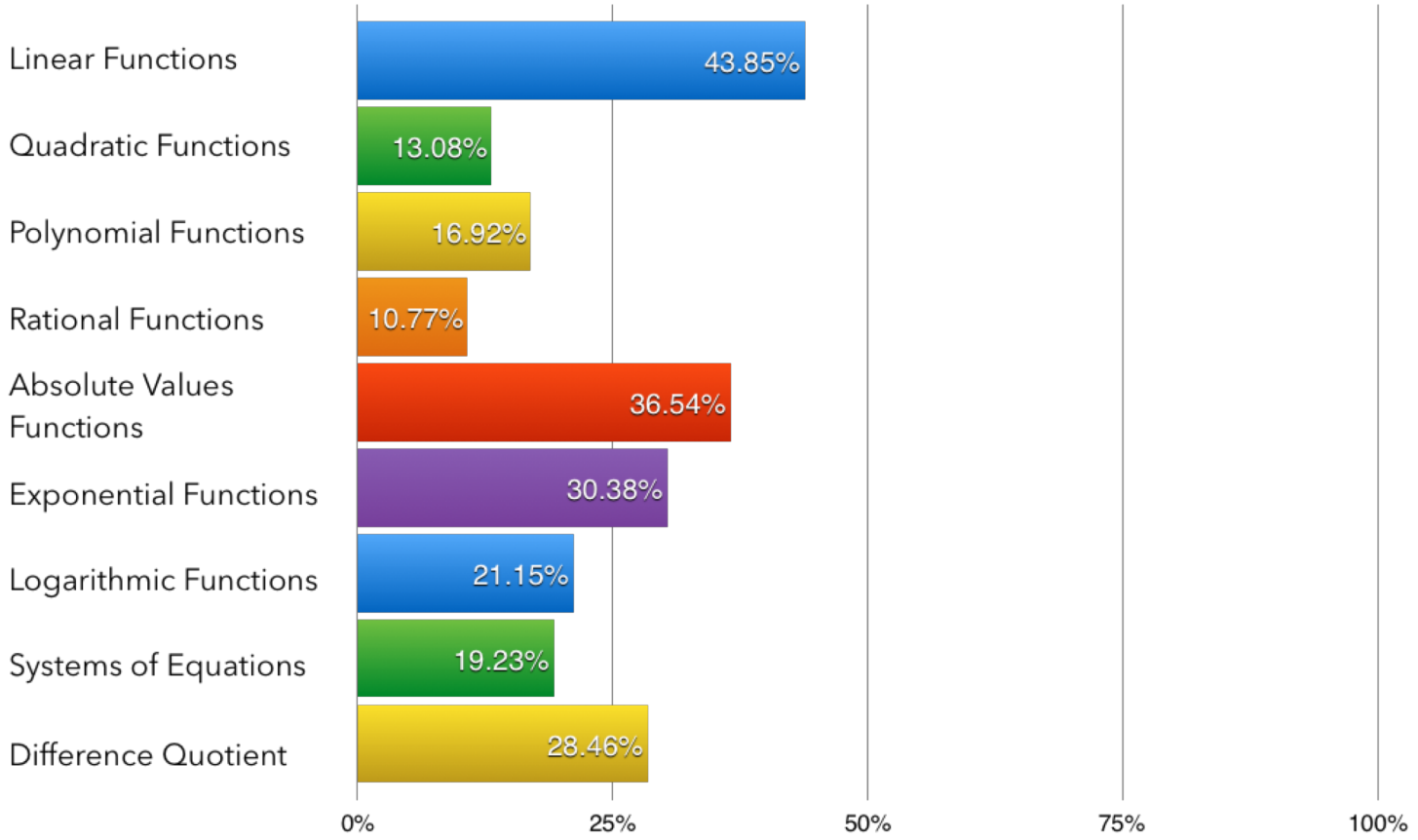
- Math Pathways Implementation Training
- Multiple Measure Workshop
- AR/OK Pathway to Calculus Convening
- Math Pathways Advisor Training with Dana Center
- QR/QL Professional Development
- Co-Req Training (SStF)

Applicability – The Elephant in the Room

Arkansas
MATH PATHWAYS
Task Force

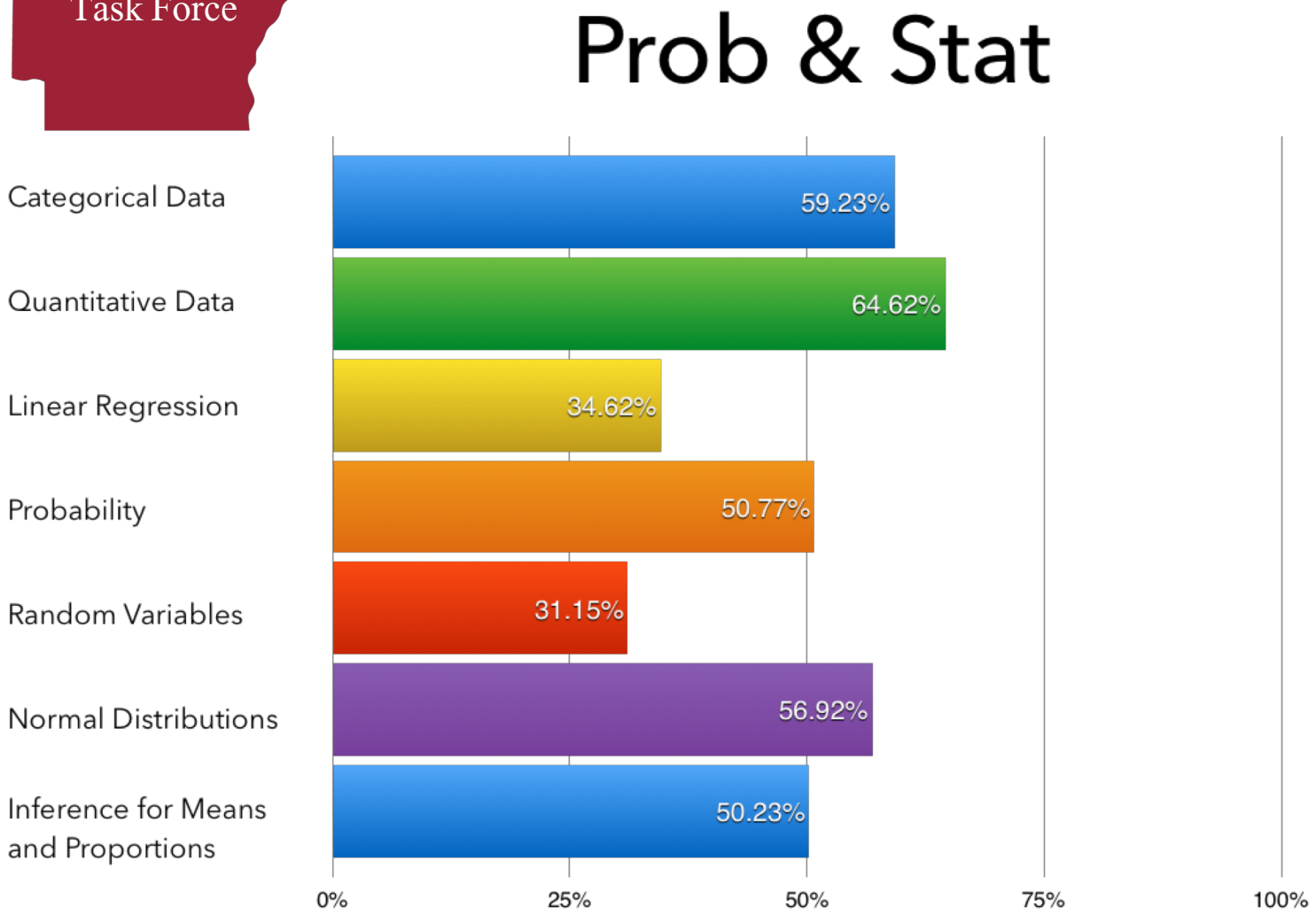
MATH COMPETENCY SURVEY FINDINGS

College Algebra



Survey Findings

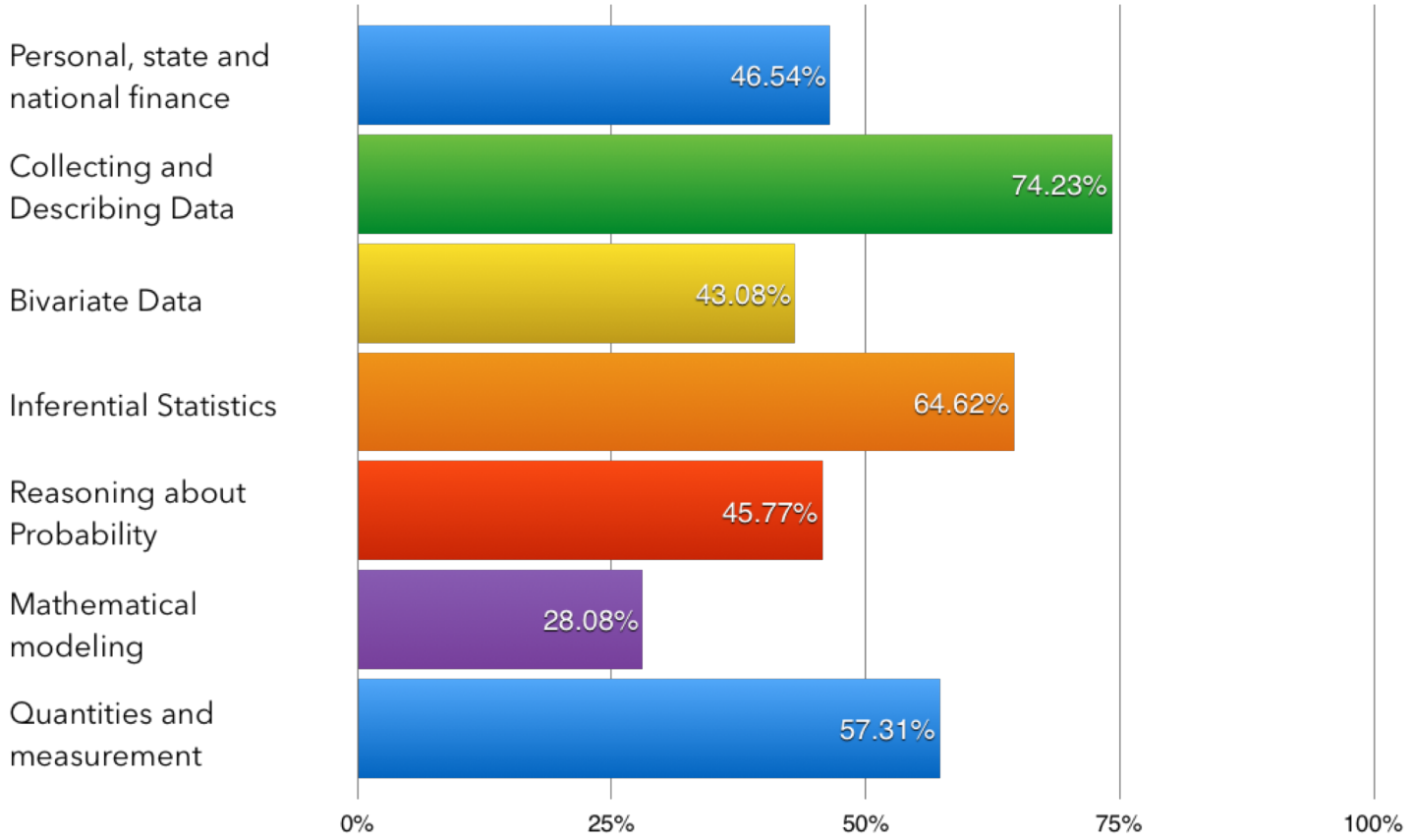
Arkansas
Math Pathways
Task Force



Survey Findings

Arkansas
Math Pathways
Task Force

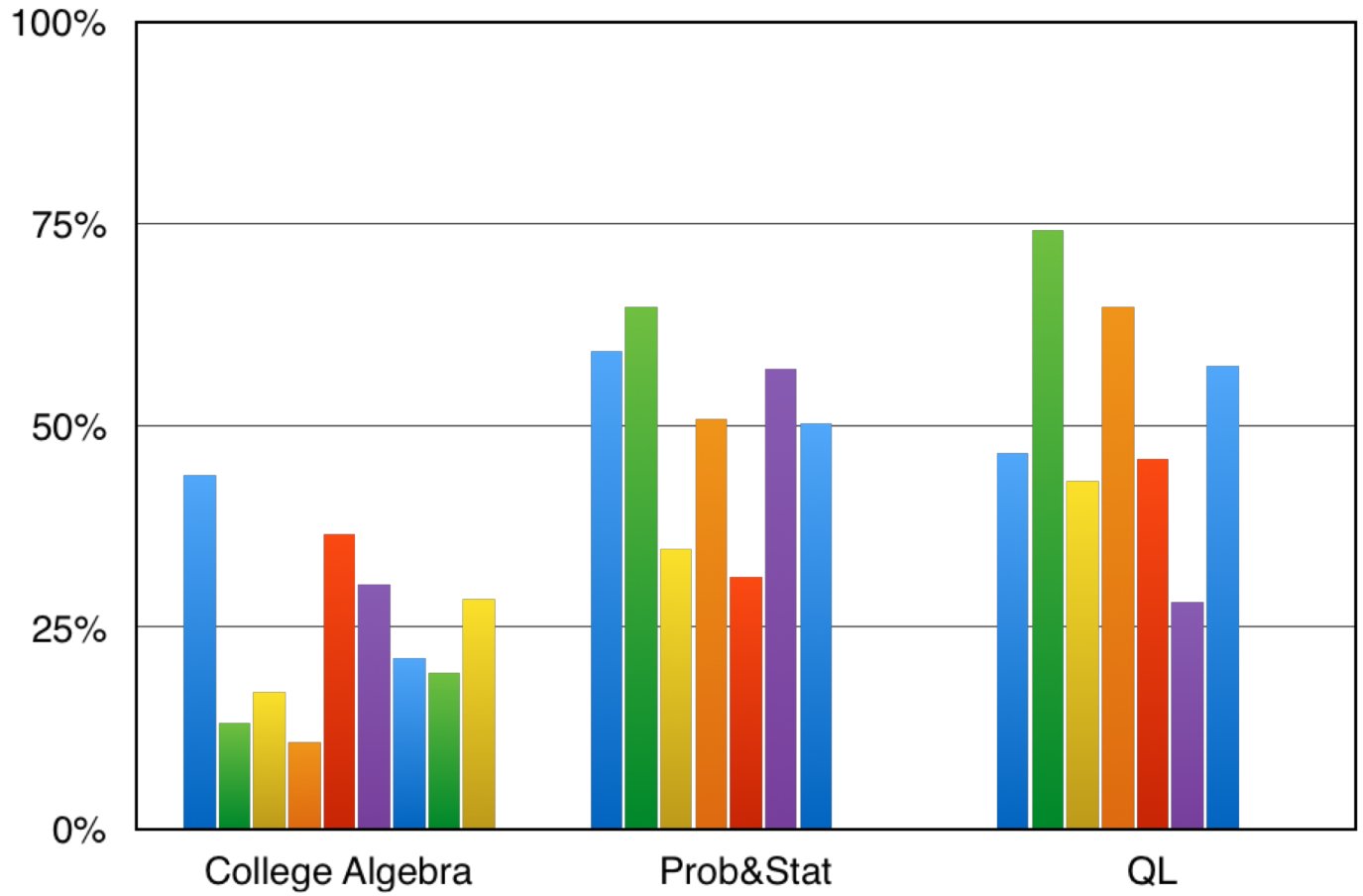
Quantitative Literacy



Arkansas
MATH PATHWAYS
Task Force

SURVEY FINDINGS

Overall



PROFESSIONAL TRAINING

Arkansas
MATH PATHWAYS
Task Force

The University of Texas at Austin
Charles A. Dana Center

Forging Relevant Mathematics Pathways in Arkansas

Deborah Korth
Director of Fulbright Student Success, University of Arkansas

Linus Yu
Department Head Mathematics, University of Arkansas, Fort Smith

Charles Watson
Associate Professor of Mathematics, University of Central Arkansas

Marla Strecker
Senior Associate Director for Academic Affairs & Research, ADHE

Valerie Martin
Department Chair of Math, Science, and Agriculture, North Arkansas College

> "We believe faculty in disciplines that do not require Calculus should not require students to take College Algebra. Instead, students should be required to take Quantitative Literacy or Introduction to Statistics, which are courses more relevant to their degree programs, future careers, and civic responsibilities."

ACTS Review Committee

Arkansas
Math Pathways
Task Force

Arkansas Department of Higher Education

423 Main Street, Suite 400 • Little Rock, Arkansas • 72201-3818 • (501) 371-2000 • Fax (501) 371-2001

Asa Hutchinson
Governor

Maria Markham, Ph.D.
Director

April 11, 2018

Dear Colleagues,

I am pleased to endorse the recommendations of the ACTS Math Review Committee regarding the applicability of Quantitative Literacy/Mathematical Reasoning toward the fields and degrees described herein. The Committee issues these recommendations after much thoughtful consideration and faculty lead debate. I ask that you, as institutional leaders, implement these recommendations in the upcoming academic year and move our state toward better alignment of mathematics pathways and stronger transfer of courses between institutions.

Sincerely,

Maria Markham

Maria Markham, Ph.D.
Director

Dana Center
Mathematics
Pathways

ACTS Review Committee

Arkansas
Math Pathways
Task Force

Recommended QL/MR Fields
Communication, Journalism, and Related Programs
Foreign Languages, Literatures, and Linguistics
English Languages, Literatures, and Linguistics
Liberal Arts and Sciences, General Studies, and Humanities
Homeland Security, Law Enforcement, Firefighting and Related Protective Services
Public Administration and Social Services
Visual and Performing Arts
History
Sociology, Political Science
Elementary Education K-6
Special Education
Middle Level Education (Language Arts & Social Sciences)

QL Recommendations Next Steps

Arkansas
Math Pathways
Task Force

ACTS cmte meetings with faculty from other disciplines (nursing, etc)

Tools for math faculty to meet with non- math colleagues

Regional Transfer Meetings

CAO meetings

Future Work

Arkansas
Math Pathways
Task Force

- Recommend QL for more majors including "undecided" students
- Follow-up regional transfer meetings
- More training for faculty and staff (focus on co-req in 2019~2020)

Future Work

Arkansas
Math Pathways
Task Force

- Work with K-12 partner to recognize Math Pathways
- Monitor and support full scale institutional implementation
- Collect evaluation data on implementation for Year 2 and Year 3

Arkansas
MATH PATHWAYS
Task Force

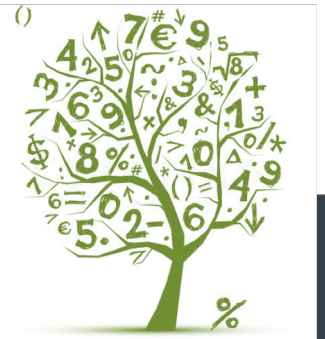
WHAT WE THINK WE DID RIGHT

Faculty Driven – All colleges
Right Faculty/State Leadership
Constant Communication, Activity
Followed DC Strategy – Patience/Trust
Proactive Outreach to Non-Math Disciplines
Direct Attack on Applicability Issue

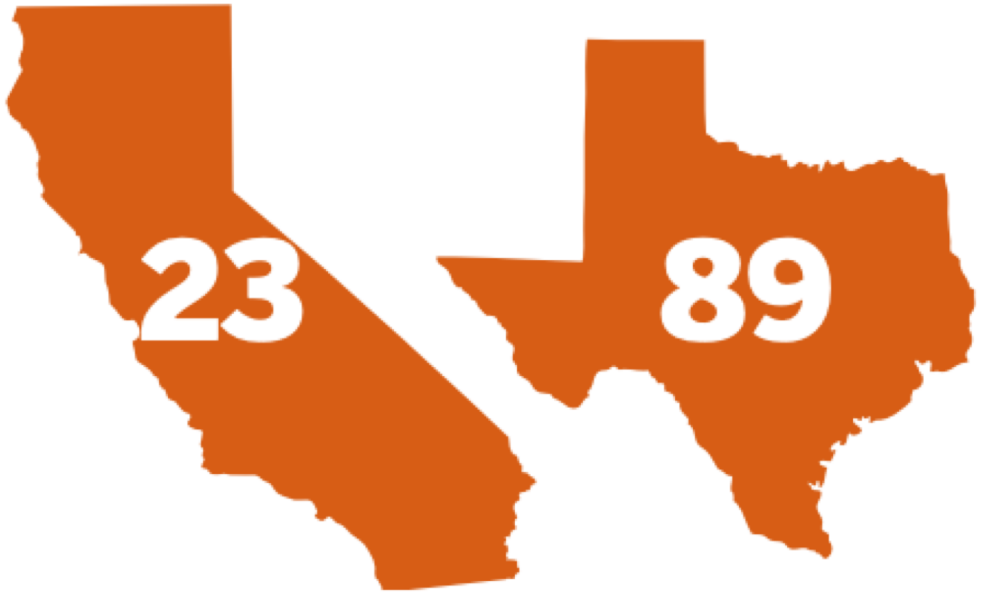
Classroom Impact: Student Voices

Arkansas
Math Pathways
Task Force

Video



Co-requisite Implementation – Arkansas is Next!



In Texas, California, and several other states, DCMP facilitated co-requisite course development that will impact hundreds of thousands of college students. Stakeholders from 89 Texas campuses and 23 California State University System campuses attended meetings and workshops on co-requisite implementation.

http://www.utdanacenter.org/dc-helps-launch-co-requisites-in-cali/

http://www.utdanacenter.org/higher-education/hb2223-implementation-support/

Discussion:

- What are some strengths and assets you possess to support the implementation of multiple mathematics pathways?
- What are some of the challenges you face supporting students with multiple math pathways.

- Brainstorm strategies, effective practices and resources related to the challenge.

DCMP Resource Site

http://www.dcmathpathways.org/

State Mathematics Task Force Summary

Informational Brief

- Summarizes State Mathematics Task Force Progress and Accomplishments
- Highlights the Dana Center's intentional and innovative approach to improving student success

Important Features

Examples of State Progress:

- Policy Changes: Colorado now allows institutions to differentiate placement for multiple math pathways
- Transfer and Alignment: Arkansas alignment of programs to QL pathway as part of ACTS revision
- Voluntary Commitments: Oklahoma secured commitments from 26 out of 27 institutions to offer an entry-level course for at least one alternative pathway

APPROACH	STATE EXAMPLES
Policy Changes	**Colorado:** • Updated placement policy to allow institutions to differentiate placement for multiple math pathways, and revised statewide transfer agreements to better align math requirements for programs of study. **Michigan:** • Secured $1 million in legislative appropriations in 2018 to support multiple mathematics pathways work by expanding the Michigan Transfer Network, which is tasked with aligning mathematics courses to programs of study. **Missouri:** • Passed legislation that created "the CORE 42," a core transfer curriculum that allows students to "seamlessly" transfer a block of general education credits, including credits earned in multiple mathematics pathways, to all public four-year institutions in the state.

BUILDING AND MAINTAINING MOMENTUM:
STATE TASK FORCE PROCESS AND PLANNING

The Dana Center first set out to address these issues across institutions in Texas. That work helped to inform the Center's strategy in Georgia to empower faculty to lead a state-level process for implementation at scale. As work expanded to include more states, the Dana Center developed a theory of scale based on four phases.

Phase 1 Build momentum for change through the establishment of the task force, utilizing an intentional process to guide meaningful discussions and planning.

Phase 2 Create enabling conditions through addressing policy issues, and provide resources and technical assistance for implementation.

Phase 3 Enact the DCMP principles at institutions by building faculty and institutional capacity and aligning institutional structures and policies. Provide supports at the institutional, regional, and state levels.

Phase 4 Support institutional implementation based on a process of continuous improvement until the mathematics pathways are part of the normative practice of the institution.

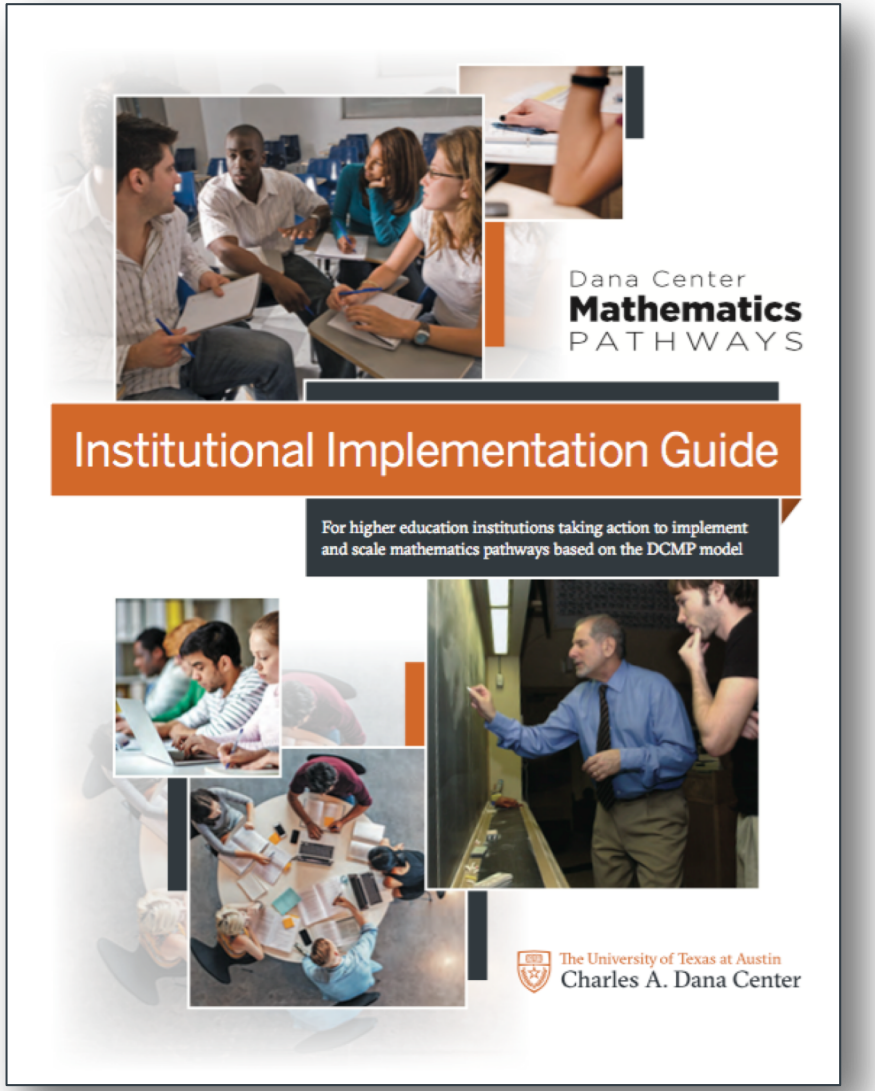
Institutional Implementation Guide (Print)

Print version can be downloaded from Dana Center Mathematics Pathways Resource Site.

Concise summary of 10 Essential Actions.

Click on button at upper right on **dcmathpathways.org**

or use direct link: **www.dcmathpathways.org/implementation-guide**

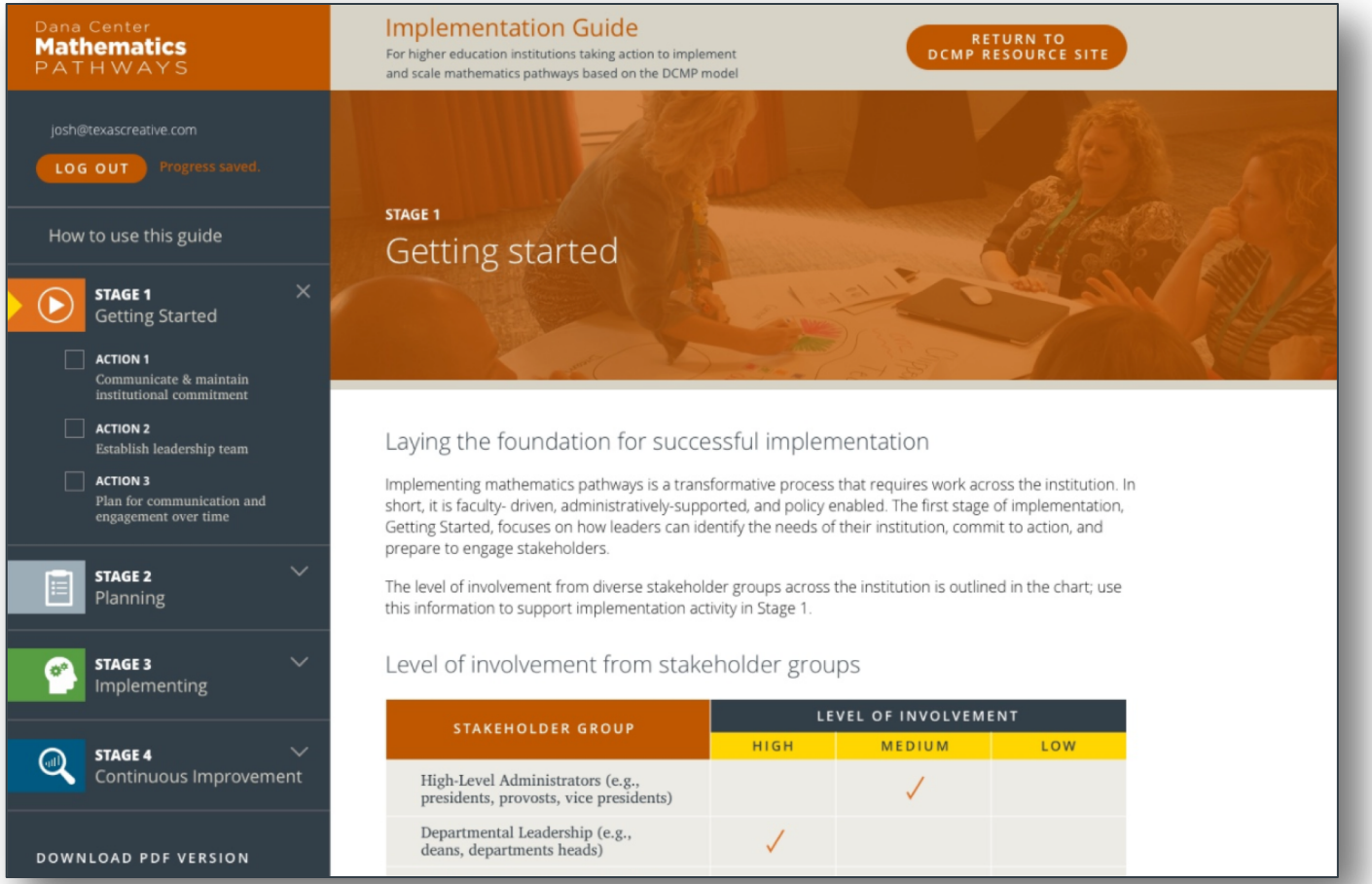


Institutional Implementation Guide (Online)

Online version includes additional information and links to resources.

Click on button at upper right on **dcmathpathways.org**

or use direct link: **www.dcmathpathways.org/implementation-guide**



Contact Info

- Paula Talley, paula.talley@austin.utexas.edu
- Mike Leach, mleachaatyc.org