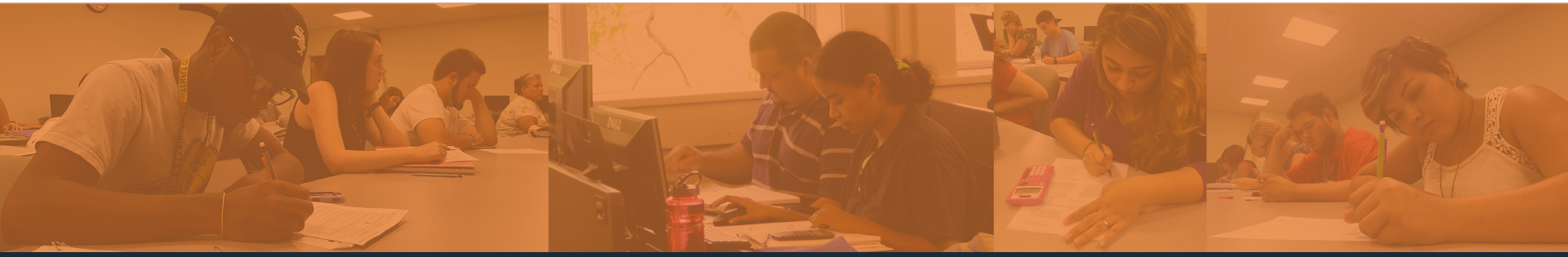
Dana Center
Mathematics
PATHWAYS

HB2223
Co-Requisite Mathematics Breakout

Frank Savina, Dana Center
Becky Moening, Ivy Tech

February 8, 2018

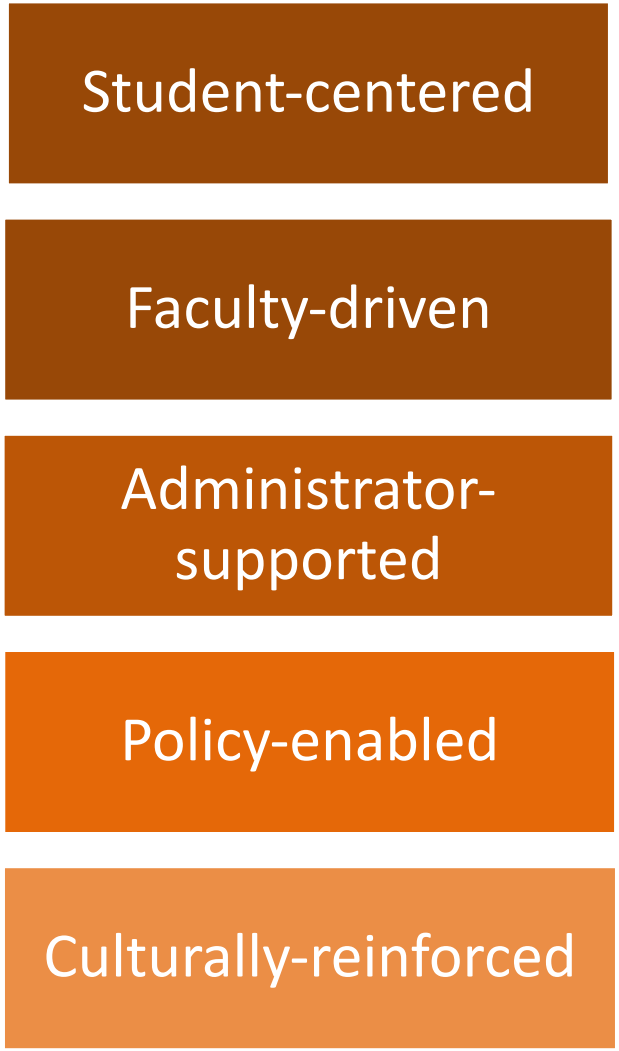


DCMP Vision

All students have equitable access to and the opportunity for success in rigorous mathematics pathways that are aligned and relevant to their future aspirations, propelling them to upward economic and social mobility.

The DCMP seeks to ensure that **ALL** students in higher education will be:

- **Prepared** to use mathematical and quantitative reasoning skills in their careers and personal lives,
- **Enabled** to make timely progress towards completion of a certificate or degree, and
- **Supported** and **Empowered** as mathematical learners.


Student-centered
Faculty-driven
Administrator-supported
Policy-enabled
Culturally-reinforced

Introduction to the Dana Center's Role

- Provide information from successful programs.
- Support planning by facilitating structured discussions among campus teams.
- Foster cross-institutional learning and collaboration.
- Surface questions and concerns.

Outcomes

Participants will:

- Have opportunities for cross-institutional sharing and learning.
- Start to build a network with other faculty and institutions to share information and provide mutual support.
- Assess implementation readiness and have access to human capital to support team problem solving.
- Develop a broad vision for co-requisite implementation at their institution for 2020.

Setting a Vision

In order to meet the requirements of HB2223, take some time to reflect:

- What will successful co-req implementation look like in your math department in 2020?
- **Write a short vision statement.**

Institution: **Vision:**

Institutional Readiness

In order to gauge your institution's readiness, consider your levels of confidence.

Levels of Confidence

Purpose:

- Identify needs for support
- Identify potential sources for support

Levels of Confidence

6 Categories

- Math faculty understanding of and support for co-req
- Administrator understanding and support for co-req
- Student services understanding and support for co-req
- Plans for co-req structures (schedule, staffing, policies)
- Mathematics content for co-req supports courses (identifying, sequencing)
- Learner strategies content for co-req supports courses (identifying, sequencing)
- Other: write on the poster

Levels of Confidence

Instructions

- *As a team*, rate level of confidence for a category on a scale of 1 to 5.
  - 1 – serious concerns, do not know how to start
  - 5 – feel confident moving forward, might not have it all figured out, but have a plan, know resources
- On a poster, write each category and its corresponding rating.
- Add comments summarizing your level of confidence.

Institution: **Vision:**	
	Rating
1.	
2.	
3.	
4.	
5.	
6.	

Discussion

Purpose

To foster cross-institutional learning and collaboration, and provide mutual support.

***As a team*, please share the following:**

1) Overall, why did you rank your institution the way you did?
2) More specifically, where are you:
   - Most confident? Why?
   - Least confident? Why?
3) What else did you consider?

Working Lunch

Choose an affinity group by category:

- Math faculty understanding of and support for co-req
- Administrator understanding and support for co-req
- Student services understanding and support for co-req
- Co-req structures (schedule, staffing, policies)
- Course content for co-req supports (identifying, sequencing)

Instructions:

Send one person from your team to a category that you identified as a strength, and one person to a category in which you need support.

Affinity Groups Check-in

- What questions still remain?

Case Studies

- Ivy Tech Community College System
- Cuyamaca College
- Southeast Missouri State

Case Study 1:
Ivy Tech Community College System

Ivy Tech Community College System (Indiana)

Ivy Tech is one of the nation's largest singly accredited statewide community college systems and Indiana's largest public postsecondary institution.

- 26 campuses
- 19 instructional sites
- More than 150 different programs of study
- Nearly 180,000 students annually
- Open admissions policy

Major Initiative Implementation

- Co-Requisite model of instruction
- Mathematics Pathways
- Multiple placement measures

Co-Requisite in the Non-STEM Pathway

STATEWIDE CONSISTENT IMPLEMENTATION

- Quantitative Reasoning (Math 123)
- Mathematics Principles (Math 080)

Timeline

- Pilot on 2 campuses Fall 2012
- Expand pilot to 4 campuses Spring 2013
- Statewide implementation Fall 2013
- Full implementation Spring 2014 (statewide)

Faculty Development

- Faculty training took place in *summer of 2014*…
- Statewide Committee meets minimum of once per academic year
- Statewide leads for:
  - Math 123 (face to face)
  - Math 123 (online)
  - Math 080
  - Online homework (Webwork)
  - Statewide Common Assessment

Student Demographics		
Variable	**College Wide**	**Co-Requisite Model**
Age		
Age 19 – 24	52%	38%
Age 25 and older	48%	62%
Gender		
Male	41%	31%
Female	59%	69%
Ethnicity		
White/Asian	69%	63%
Black	14%	21%
Hispanic	6%	6%
Other	11%	10%
Pell Eligibility		
Pell Eligible	52%	80%
Not Pell Eligible	48%	20%

Co-Requisite Students			
Semester	**Number Passed**	**Number Enrolled**	**Pass Rate**
Fall 2013	534	1027	52%
Spring 2014	1219	2218	55%
Fall 2014	1265	1978	64%
Spring 2015	1241	2035	61%
Fall 2015	1446	2038	71%
Total	5705	9296	61.2%

Co-Requisite Students: Fall 2013 – Fall 2015 (n = 9296)

Questions?

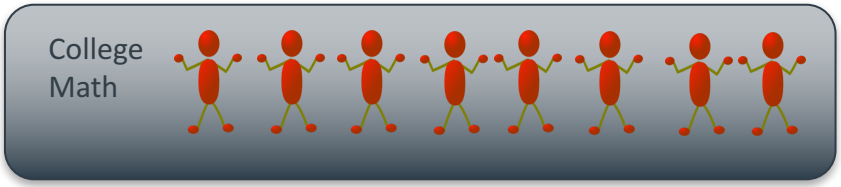
Case Study 2:
Cuyamaca College

“Cuyamaca College Offers Case Study In Eliminating The ‘Math Pipeline Of Doom’”
http://www.kpbs.org/news/2017/aug/31/cuyamaca-college-offers-case-study-eliminating-mat/

Cuyamaca College

Just In Time Embedded Support: College-level classes with the developmental content embedded.

Cohorted model: Designating certain sections of college-level courses exclusively for underprepared students. Additional supports may be embedded or separate.



Cuyamaca College

Redesign uses student-centered learning environment in all courses with co-requisite support. In addition, the following CAP Design Principles are used:

- Backward design
- Relevant, thinking-oriented curriculum
- Just-in-time remediation
- Low-stakes, collaborative practice
- Intentional support for students' affective needs

http://accelerationproject.org/

Cuyamaca College

Co-requisite: MATH 160 Elementary Statistics
MATH 060 support content

- Developmental course
  - 2 developmental credit
  - Grading: pass/no pass
- Transfer credit-bearing course
  - 4 college level credits
- Six contact hours
- Same instructor
- Meets twice a week

Cuyamaca College

Success Rates Disaggregated by Placement (First-Time Students)

Initial Placement	Fall 2013 Cohort Transfer Math in Two Years		Fall 2016 Cohort Transfer Math with Support	
Three+ Levels Below	79	4%	27	56%
Two Levels Below	281	19%	101	70%
One Level Below	216	36%	99	66%
All	**576**	**23%**	**227**	**67%**

Cuyamaca College

Success Rates Disaggregated by Ethnicity (First-Time Students)

Incoming Students	Fall 2013 Cohort Transfer Math in Two Years		Fall 2016 Cohort Transfer Math with support	
Black	16	6%	29	55%
Hispanic	173	15%	144	65%
White	141	16%	142	76%
All	**360**	**15%**	**356**	**69%**

Cuyamaca College

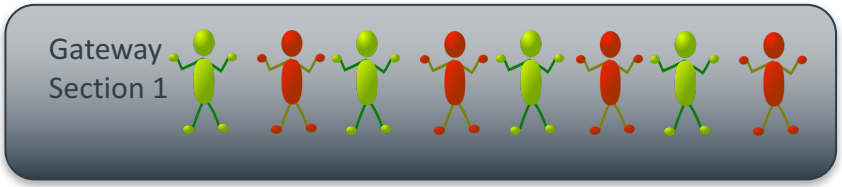
Overall Transfer Math Success Rates (2016 – 2017)

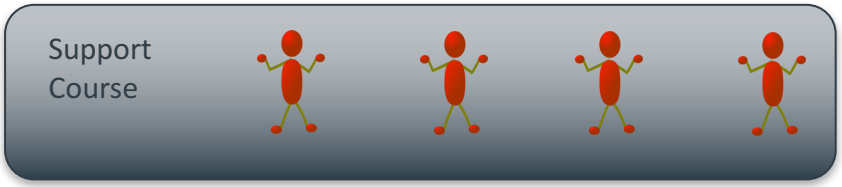
	Number of Students	Success Rate
First-Time Students w/support	356	69%
First-Time Students w/o support	1533	64%

Case Study 3:
Southeast Missouri State University

Southeast Missouri State University Models

Co-mingled model: Mixing college-ready and underprepared students in the same class. Underprepared students are provided additional supports.





SEMO's Four Co-Requisites

- MA128: Number and Operations for Educators (childcare, early childhood, elementary ed majors)

+ MA018: Number and Operations for Educators lab

- MA123: Survey of Mathematics (liberal arts majors)

+ MA023: Survey of Mathematics lab

- MA155: Statistical Reasoning (nurses, comm disorders, cj)

+ MA055: Statistical Reasoning lab

- MA129: College Algebra with Integrated Review (co-req)

Southeast Missouri State University

- Gateway and developmental math are:
  - Co-mingled
  - Both co-taught by instructor and GA
  - Approximately 60 students
    - ~35 on-level and ~25 developmental
  - Taught in computer classrooms
  - Separate course registrations
  - Separate grades
  - Using one platform for all courses in the redesign

Southeast Missouri State University

Gateway Mathematics Course Component:

- 3 credits
- Mini lectures with time for homework
- Daily quizzes from homework

Developmental Math component:

- 1 credit hour, 2 contact hours
- Counted as 1 hour in faculty load; changing to 2 hours next fall
- Mini lectures with time for homework in class
- "Just-in-time" support
- Time for 1-1 help
- Study skills integrated into the class

Results…

- 78% of all students enrolled in both courses (dev & gateway) were successful in one semester
- 88% success in dev math labs
- Freshmen – Sophomore retention increased to 74% (1.3% increase in one year)
- Students are spending less TIME and less MONEY in dev math classes
- Dev students are more engaged with instructors
- Using ONE platform (Pearson - MLP) for all dev math and gateway courses
- Happier students!

SOUTHEAST MISSOURI STATE UNIVERSITY · 1873

Contact Information

Ivy Tech Community College System

Becky Moening: bmoening@ivytech.edu

Cuyamaca College

Tammi Marshall: Tammi.Marshall@gcccd.edu

Southeast Missouri State University

Tammy Randolph: trandolph@semo.edu

Reputation Builders

- Clear delineation between college-level and co-req content (faculty adhere to agreed-upon college-level syllabus)
- Measurable student learning outcomes in each portion of the course (not study hour)
- Use outcomes to build the course calendar
- Backmap to build the co-req calendar
- Consider common exams or common questions
- Invite classroom observations

Planning Time

Instructions

1) Seek answers to remaining questions from other institutions or from facilitators
2) Revisit your vision statement and revise accordingly
3) Consider **reputation builders** for your co-requisite model(s) and plan accordingly

Planning Time

Planning activities include:

1) **Creating course syllabi**
   - Sample Syllabi folder
2) **Backmapping to build the co-req calendar**
   - Backmapping Template
   - Example: Roane State (in Sample Syllabi folder)
3) **Allocating staff resources:**
   - Staffing template

Access Materials at:

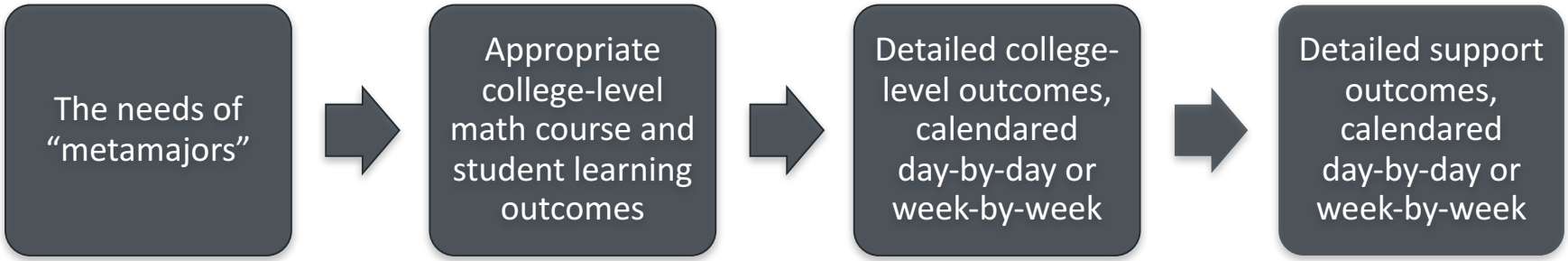
https://tinyurl.com/UTDC-Resources

Planning Time

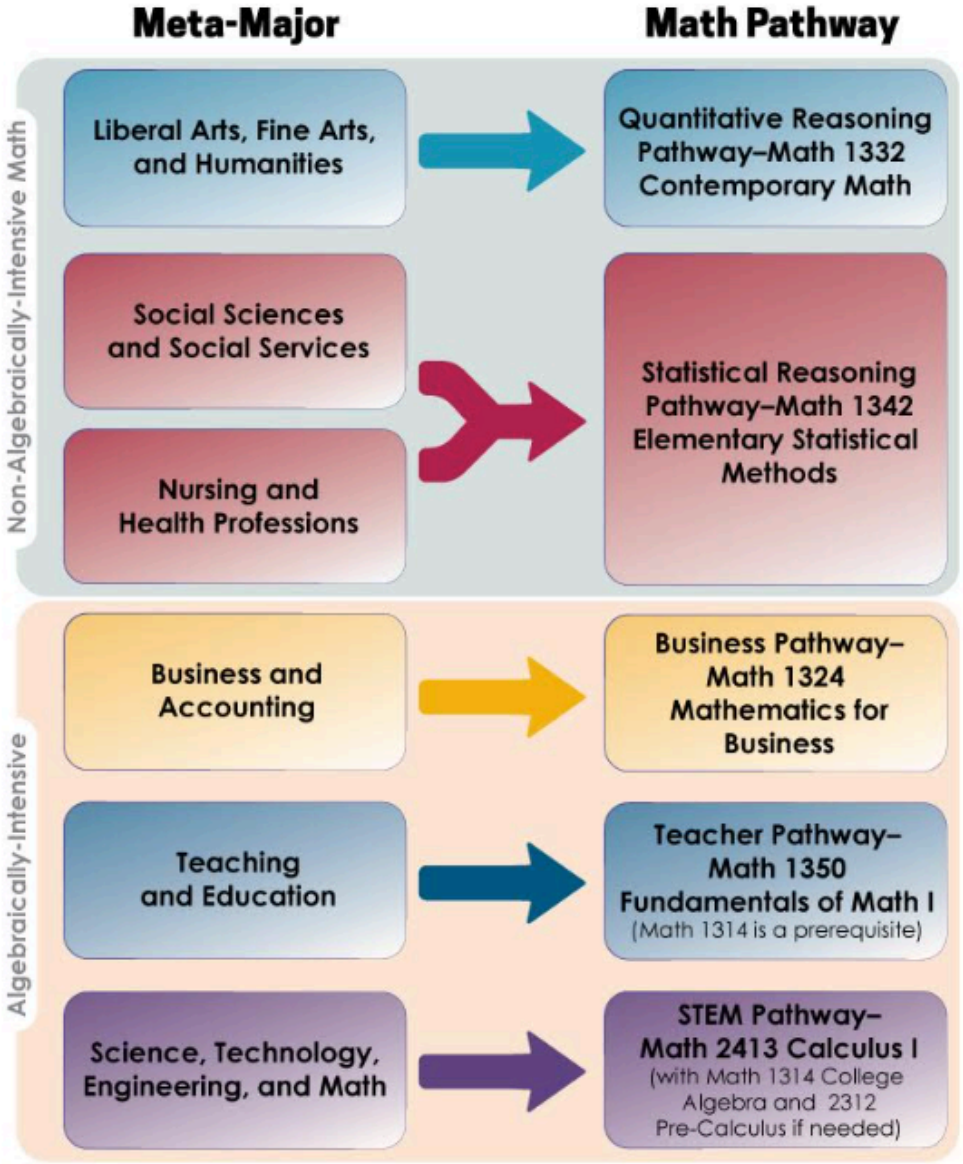
Additional Printed Resources

- Coordinating Board FAQ's
- Coordinating Board – Additional information
- **Dana Center's Co-requisite Supports Document**
- Southeast Missouri State Case Study
- Backmapping Example
- Staffing Template (paper version)

Backward mapping to define content



Emerging Texas Math Pathways



Backward mapping to define content

Defining the Content:
Content Backmapping Example

Dana Center Mathematics PATHWAYS

The content of support courses (prerequisite or co-requisite) should be selected based on the skills that students need to be successful in the college-level course. This tool is designed to facilitate the process of backmapping learning outcomes for the support course from the readiness competencies of the college-level course.

To identify learning outcomes for support courses, list the specific skills from the learning outcomes of the college-level course in the first column. In the second column, identify the competencies needed in order to successfully engage in activities that develop the skills in the first column. Those competencies become the descriptors of the learning outcomes of the pre/co-requisite course.

For prerequisite course structures, consider carefully which skills may need to be reinforced in the college-level course or may even be best saved for initial introduction in the college-level course.

An example from a Quantitative Reasoning course is shown below.

Demonstrate procedural fluency with real number arithmetic operations.				
In the college-level course, students will:	**Therefore, they need the ability to:**	**These skills should be:**		
		Taught in support course	**Reinforced in college level**	**Taught in college level**

Backward mapping to define content

For prerequisite (e.g. boot camp) course structures, consider carefully which skills may need to be reinforced in the college-level course or may even be best saved for initial introduction in the college-level course.

An example from a Quantitative Reasoning course is shown below.

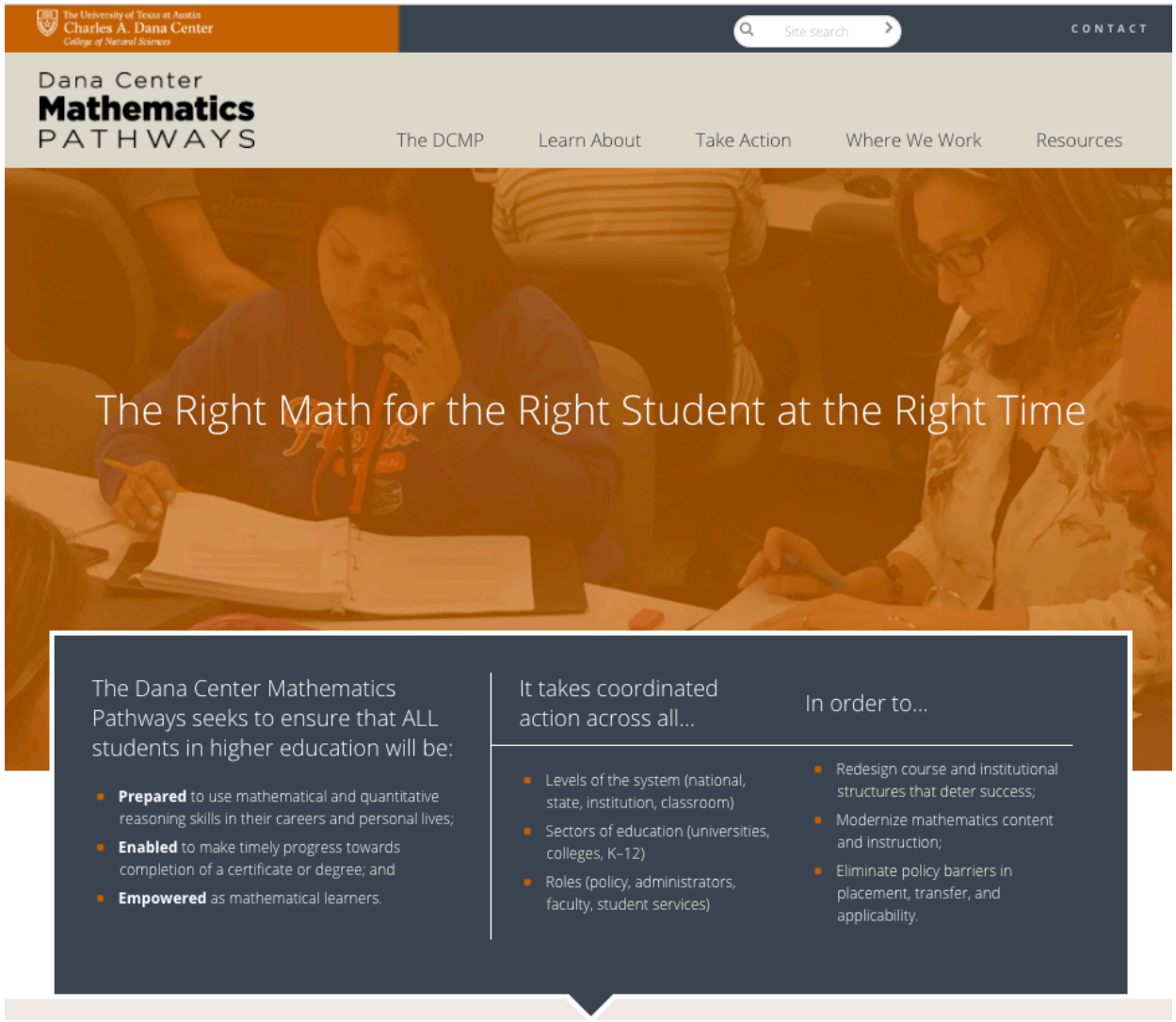
Demonstrate procedural fluency with real number arithmetic operations.				
In the college-level course, students will:	**Therefore, they need the ability to:**	**These skills should be:**		
		Taught in support course	**Reinforced in college level**	**Taught in college level**
Calculate absolute change.	Select and perform the four basic operations.	X		
Calculate relative change.	Calculate a percentage.	X		
	Interpret a percentage.	X	X	
Compare two budget categories over time.	Calculate absolute and relative change.			X

Activity: Practice

What background skills would prepare students to engage successfully in activities related to this SLO?

Choose, create, and use models for bivariate data sets.				
In the college-level course, students will:	**Therefore, they need the ability to:**	**These skills should be:**		
		Taught in support course	**Reinforced in college level**	**Taught in college level**
Create a graphical display.				
Analyze data to determine appropriate model.				
Create the model.				
Use model for prediction.				

dcmathpathways.org



Finding resources on dcmathpathways

General supports for co-req

Resources → Search for “co-requisite"

Select filter for “Classroom” if you do not want reports

Two webinars:

- Co-Req Design
- Defining the Content of Support Courses

Curricular Options

Carnegie Math Pathways (now housed at WestEd)

- Statway and Quantway
- No Path to Calculus courses
- Stretch and co-requisite options
- Integrated productive persistence activities
- Institution joins the Network for a fee:
  - Faculty training and support
  - Implementation support
  - Access to curriculum

Curricular Options

Commercial products

ALEKS, MyMathLab

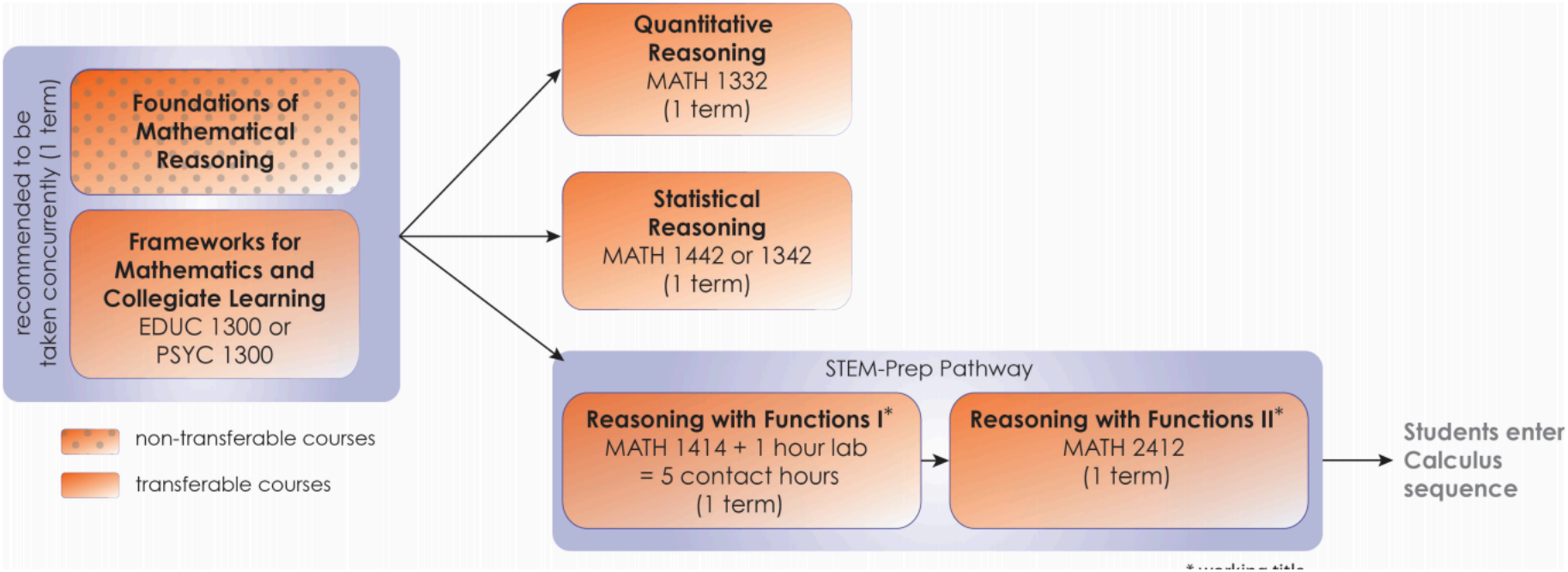
Commercial textbooks for a ”QR-based” dev ed course

- Pearson: Math Lit by Kathleen Almy and Heather Foes
- McGraw Hill: Pathways to Math Literacy by David Sobecki and Brian Mercer

Curricular Options

Dana Center Mathematics Pathways (DCMP) Courses

Co-Requisite materials will be released for Fall 2018



Staying Informed

Sign up for Dana Center InBrief

- Monthly newsletter focused on math pathways
- Announcements of new DCMP resources and events
- DCMP opportunities
- Links to research and news

How

- Sign up today
- Use Contact button on Resource Site
- Email: dcmathpathways@austin.utexas.edu

Contact Information

- Frank Savina: fsavina@austin.utexas.edu

- General information about the Dana Center
  www.utdanacenter.org

- The DCMP Resource Site
  www.dcmathpathways.org

- To receive monthly updates about the DCMP, please go to
  http://tinyurl.com/DanaCenterInBrief

About the Dana Center

The **Charles A. Dana Center** at The University of Texas at Austin works with our nation's education systems to ensure that every student leaves school prepared for success in postsecondary education and the contemporary workplace.

Our work, based on research and two decades of experience, focuses on K–16 mathematics and science education with an emphasis on strategies for improving student engagement, motivation, persistence, and achievement.

We develop innovative curricula, tools, protocols, and instructional supports and deliver powerful instructional and leadership development.

2016

The University of Texas at Austin
Charles A. Dana Center