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Regional Educational Laboratory at Education Northwest

Thank you for joining us! The webinar will begin promptly at 10 am PT.

Feel free to introduce yourself in the chat window!

REL NORTHWEST
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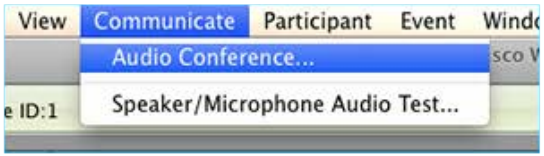
Changing Developmental Math from a Gatekeeper to a Bridge: The Promise of New Math Pathways

Wednesday, May 18, 2016
10-11am PST

Using WebEx

To join the audio conference, locate the ***Communicate*** dropdown menu and follow the instructions for computer or telephone



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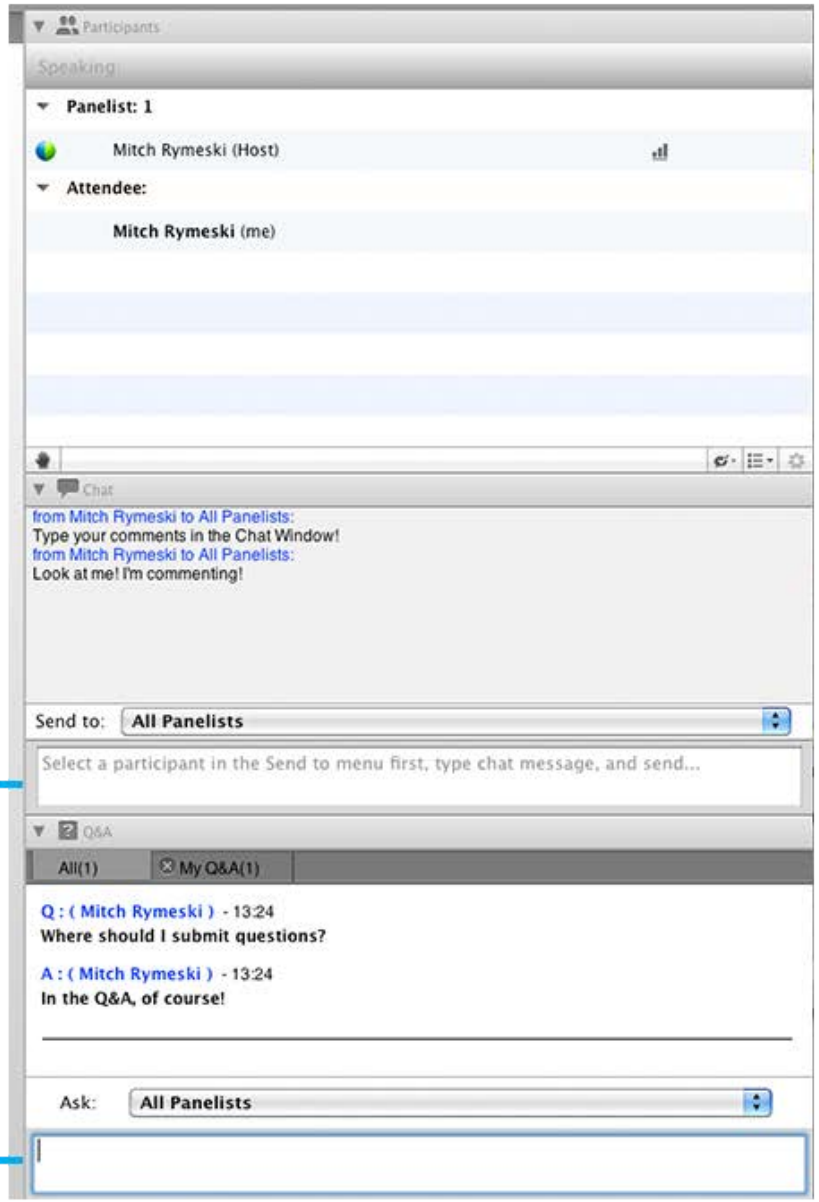
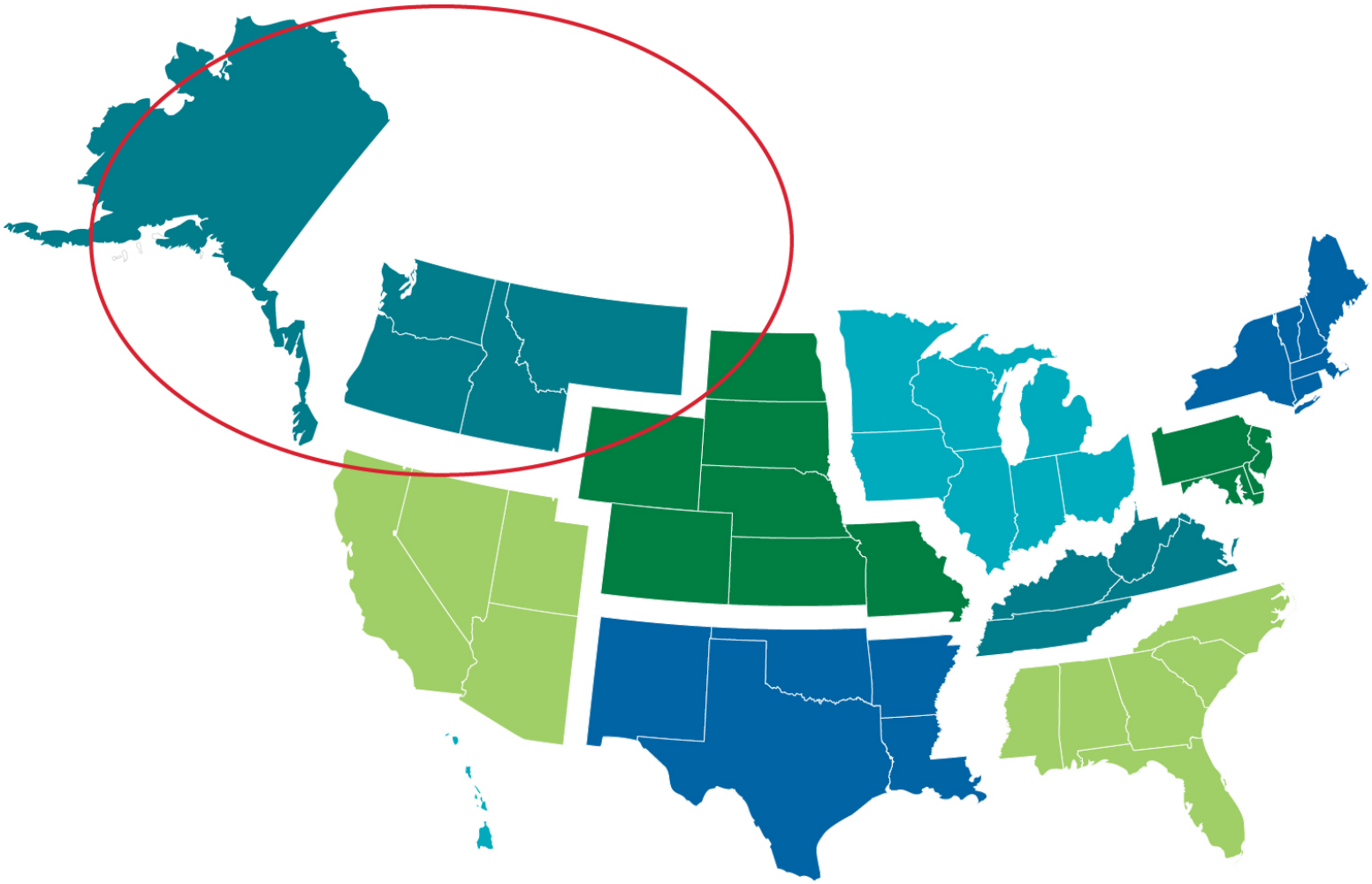
Type your **questions** in the ***Q&A Window***



REL Northwest Region



Today's Presenters

Dr. Michelle Hodara
Senior Researcher,
Education Northwest

Dr. Jenna Cullinane
Higher Education
and Strategy Lead,
Charles A. Dana
Center, University
of Texas at Austin

Doug Nelson
Math Faculty,
Central Oregon
Community College

Agenda

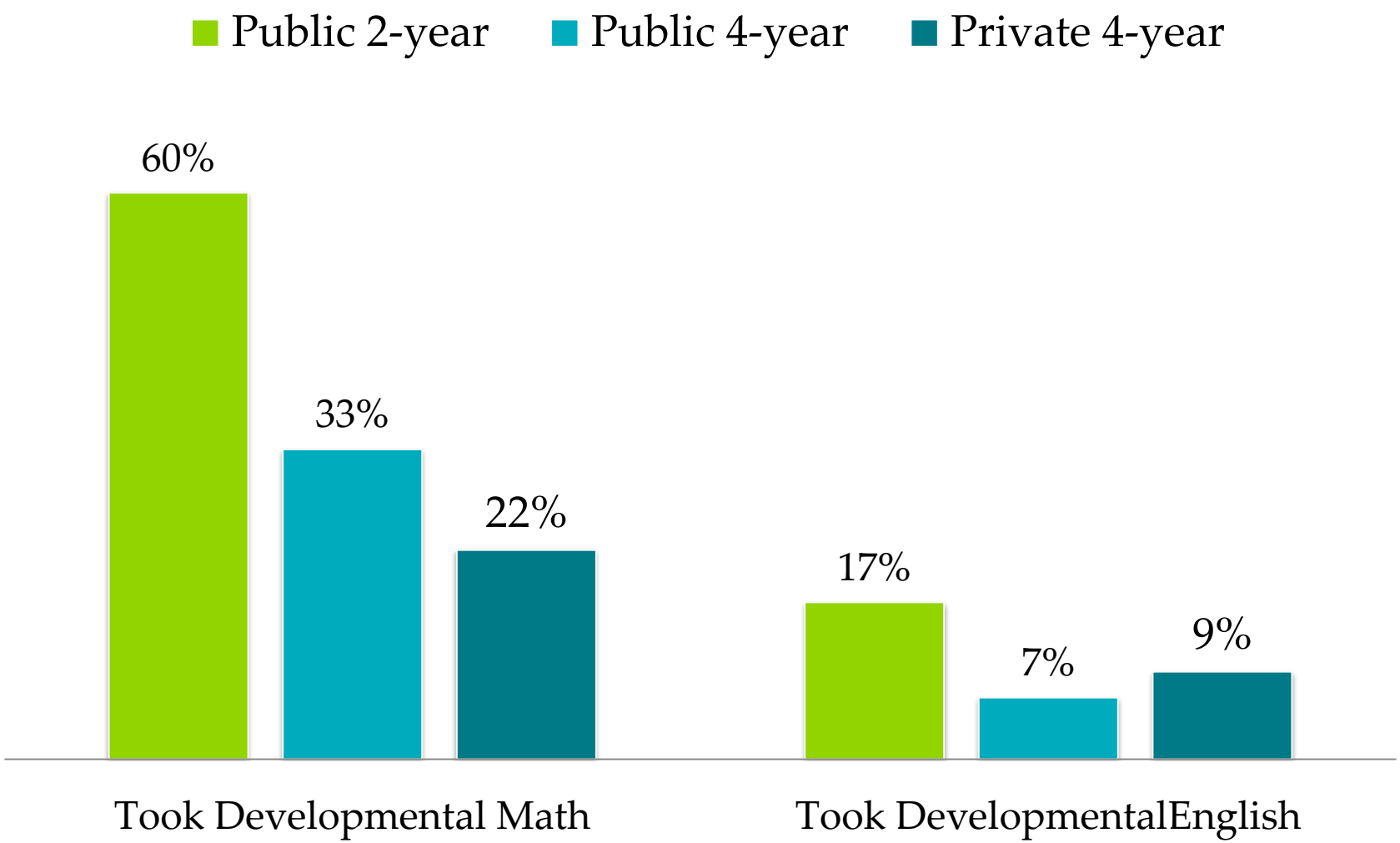
- Webinar Goals
- Research Overview
- Keynote Presentation – New Mathways project
- Keynote Presentation – Math pathways in Oregon
- Q&A
- Wrap Up

Webinar Goals

- Understand the gaps in math knowledge and self-confidence of incoming college students and how the traditional delivery of developmental math does not meet the needs of all students

- Learn about math pathways, a new strategy to improve college math learning and persistence

What percentage of U.S. students took a developmental course in college?



The problem of high developmental math participation

- ✓Attrition from sequences is high
- ✓Completion is low
- ✓Costs are high

Oregon example

April 2015

What's Happening

What predicts participation in developmental education among recent high school graduates at community college? Lessons from Oregon

Michelle Hodara
Education Northwest

Key findings

- Nearly 75 percent of recent high school graduates who enrolled in an Oregon community college took at least one developmental education (that is, non-credit-bearing prerequisite) course.
- Recent high school graduates who started at a lower level of developmental education at community college were less likely than their peers who started at a higher level to stay in college and earn a degree.
- For recent high school graduates, individual academic achievement in high school influences participation in developmental education at community college more than sociodemographic characteristics and school-level factors.
- Students who took dual-credit courses in high school in certain subject areas were less likely to participate in developmental education at community college.

ies NATIONAL CENTER FOR EDUCATION EVALUATION AND REGIONAL ASSISTANCE
Institute of Education Sciences
U.S. Department of Education

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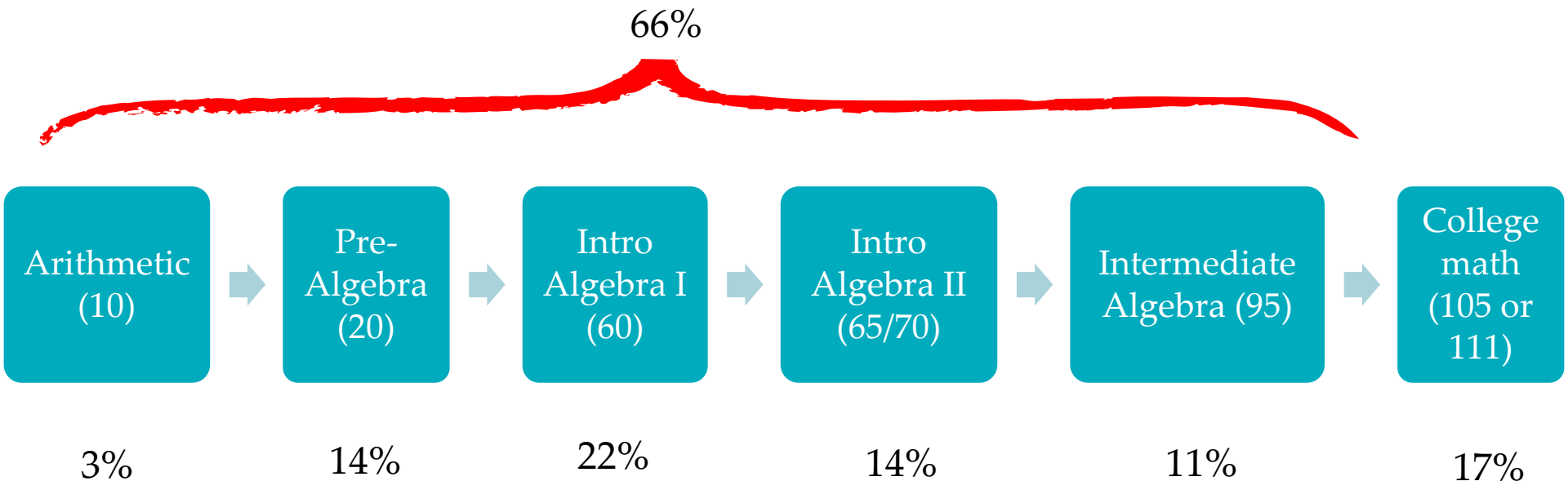
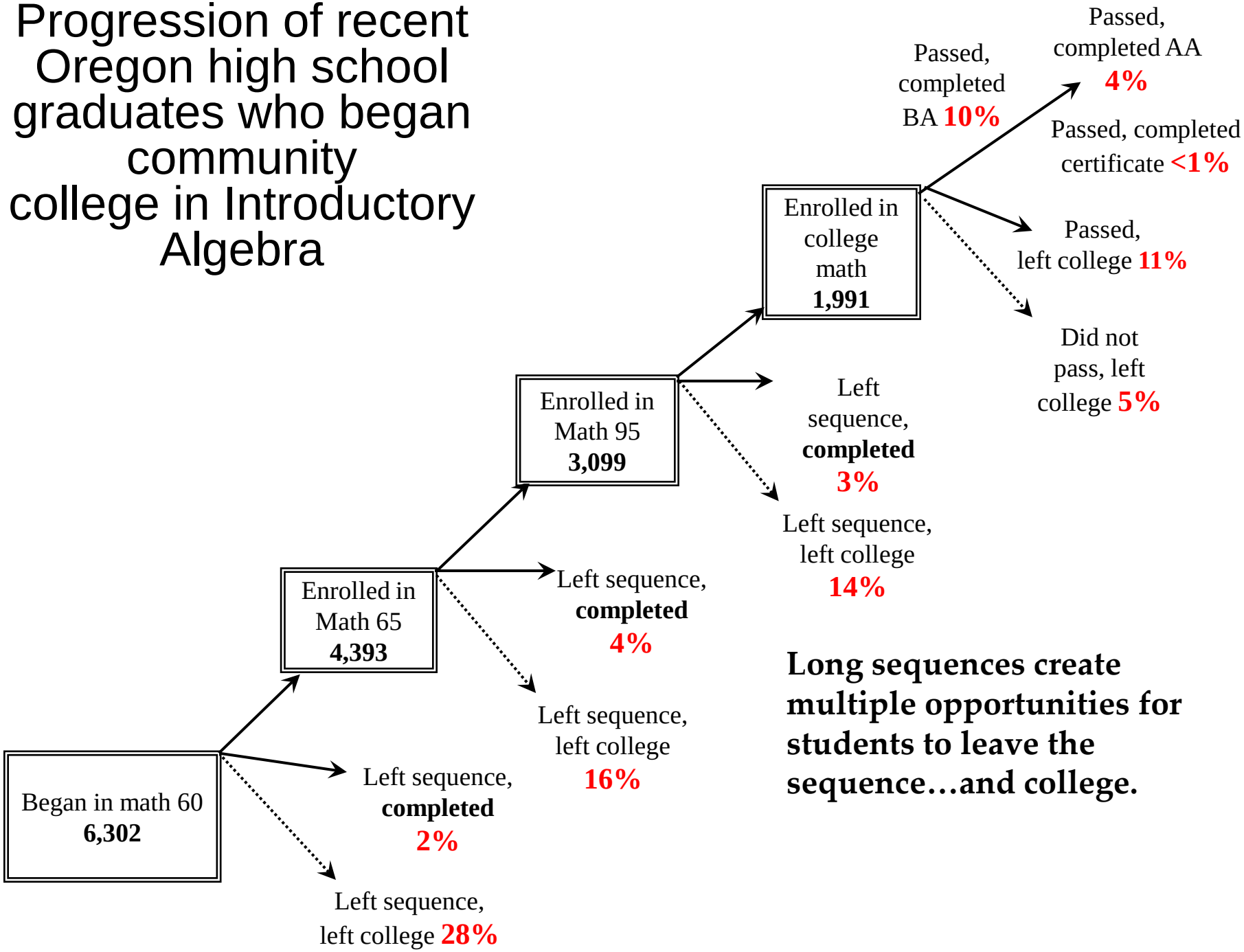
Recent high school graduates' enrollment in developmental math at the Oregon community colleges



Progression of recent Oregon high school graduates who began community college in Introductory Algebra



Long sequences create multiple opportunities for students to leave the sequence…and college.

What math do students need to be college and career ready?

- Many of the most popular community college programs leading to well-paying careers require middle school-level content in:
  - **Mathematical modeling, statistics, probability**
  - These concepts are not included in mainstream high school mathematics programs
  - Mastery of these concepts is more important for college and career readiness than mastery of Algebra II

-National Center on Education and the Economy (2013)

Scaling Math Pathways

THE
New Mathways
PROJECT

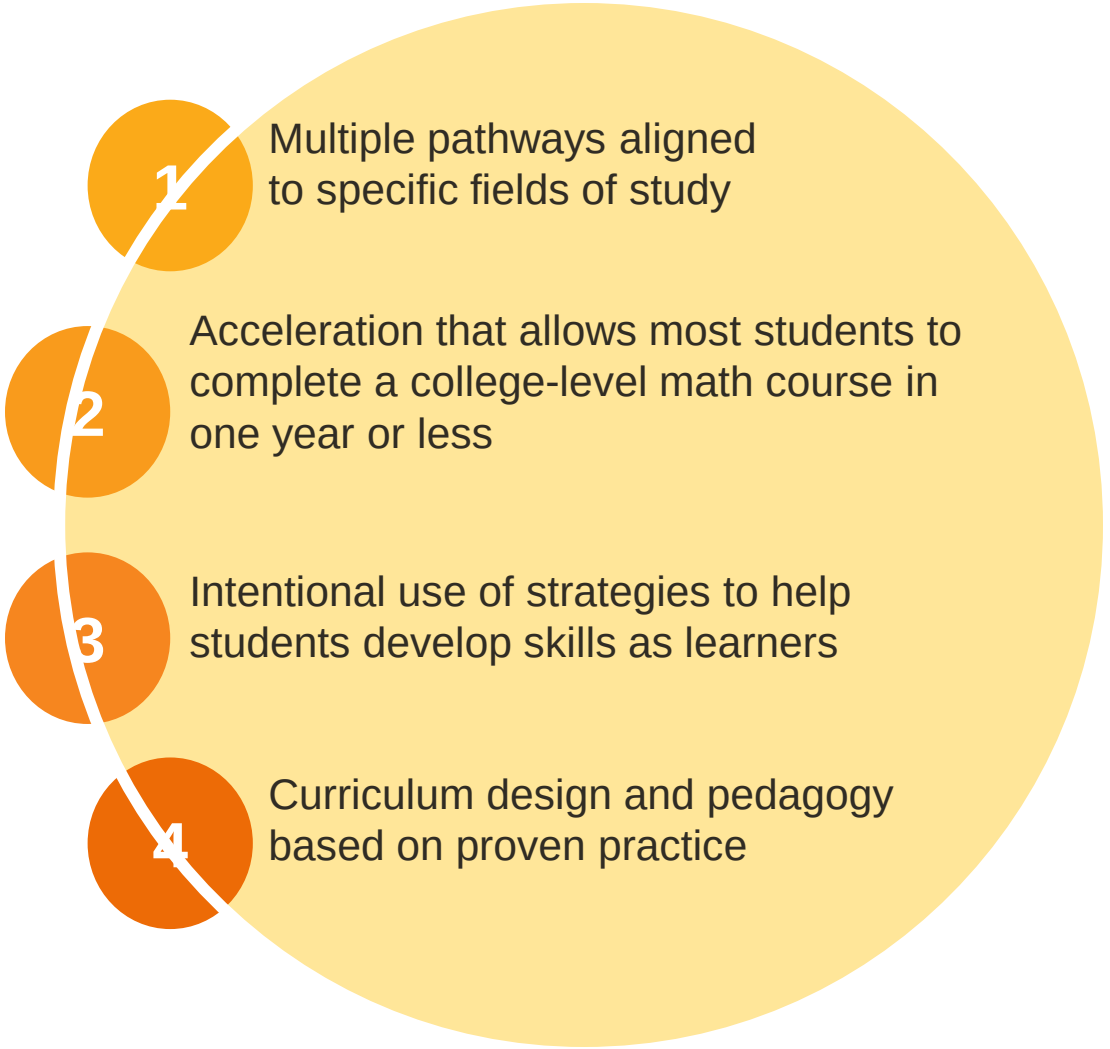
a Charles A. Dana Center higher education initiative

The New Mathways Project

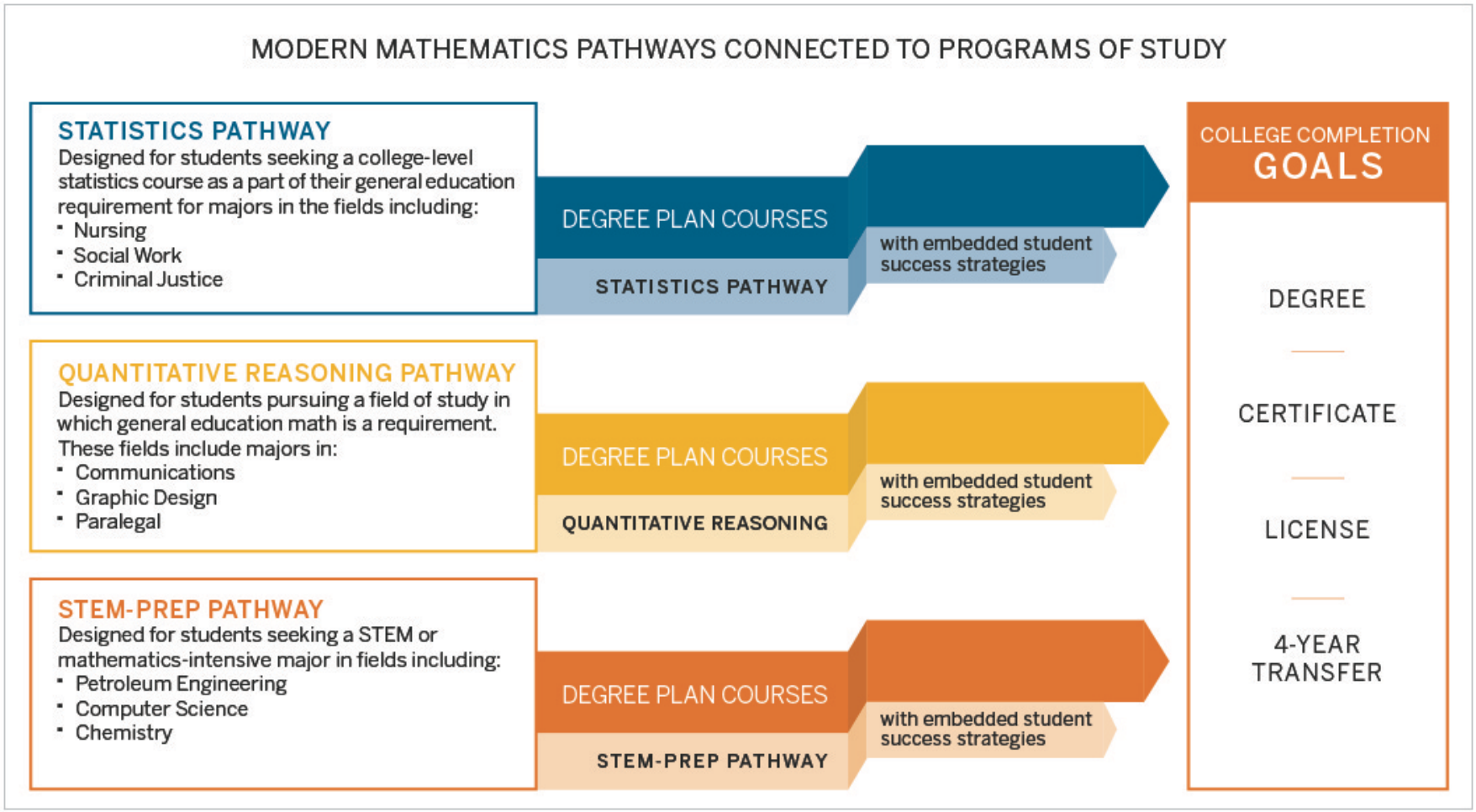
A systemic approach to improving student success and completion by reforming **developmental** and **gateway** mathematics based on four principles.

A new vision for the student experience in math...

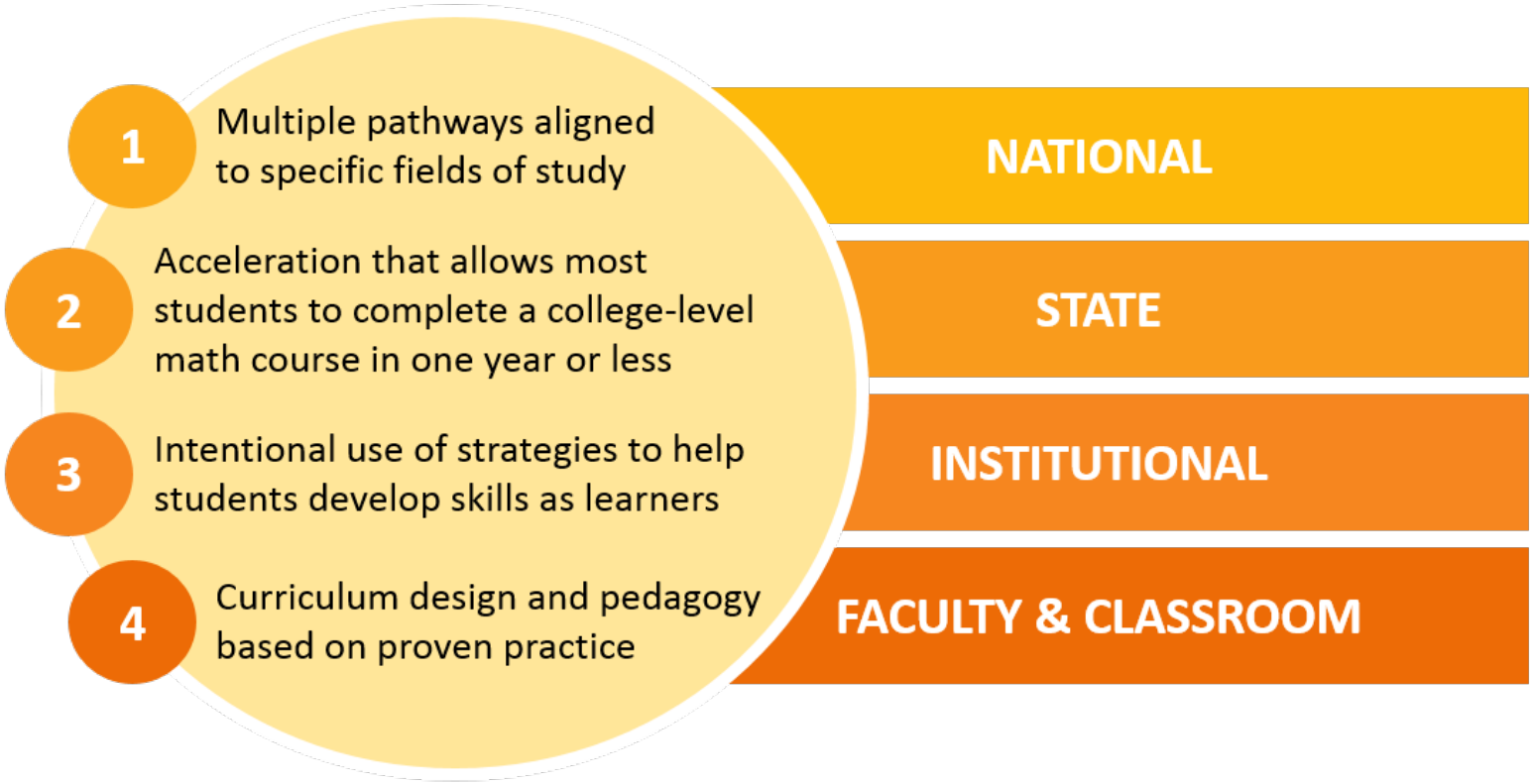
THE
New Mathways
PROJECT



Multiple math pathways



Coordinated efforts across all levels of the system



Advocates of Mathematics Pathways

Mathematics Association of America, Committee on the Undergraduate Program in Mathematics, 2004

"Unfortunately, there is often a **serious mismatch between the original rationale for a college algebra requirement and the actual needs of students who take the course**. A critically important task for mathematics sciences departments at institutions with college algebra requirements is to clarify the rationale for requirements, determine the needs of students, and ensure that department's courses are aligned with these findings."

Advocates of Mathematics Pathways

A Common Vision for the Undergraduate Mathematics Program in 2025, all guides call for multiple math pathways

"Mathematics courses are the **most significant barrier to degree completion in both STEM and non-STEM fields.** For example, each year only 50 percent of students attain a grade of A, B, or C in college algebra, and fewer than 10 percent of the students who pass this class enroll in a calculus course."

MAA
MATHEMATICAL ASSOCIATION OF AMERICA

AMS
AMERICAN MATHEMATICAL SOCIETY

AMATYC

SIAM
Society for Industrial and Applied Mathematics

ASA
AMERICAN STATISTICAL ASSOCIATION

Advocates of Mathematics Pathways

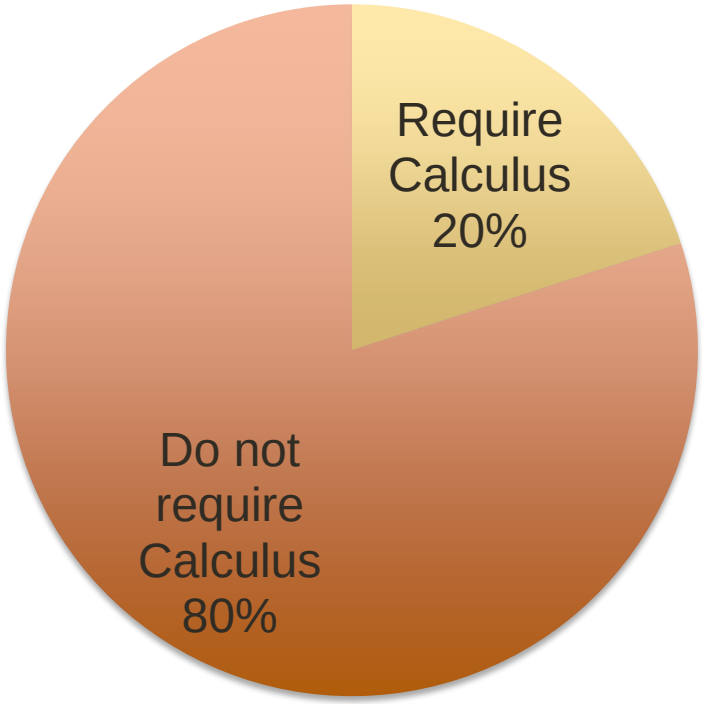
National higher education organizations

AASCU American Association of State Colleges and Universities
Delivering America's Promise

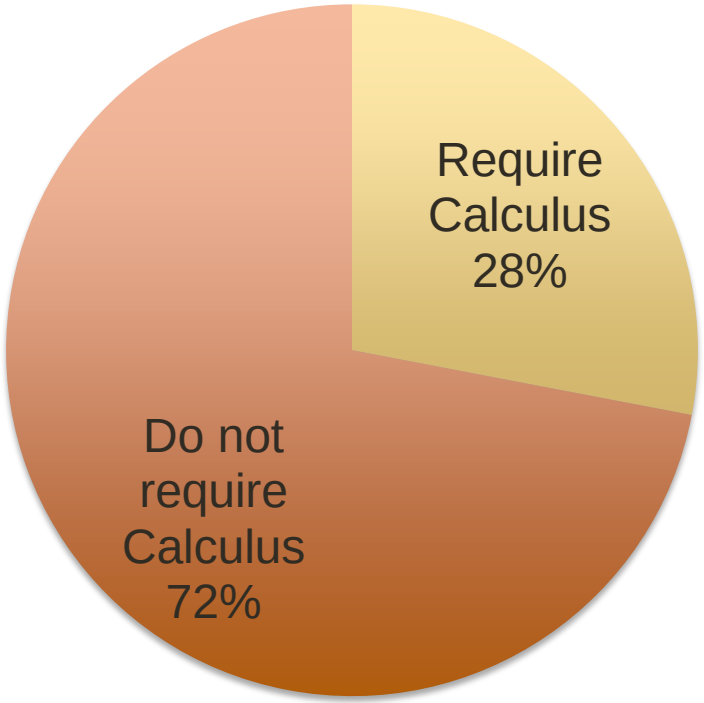
Association of Public & Land-grant Universities

What is the “right math”?

Community College Student Enrollment into Programs of Study

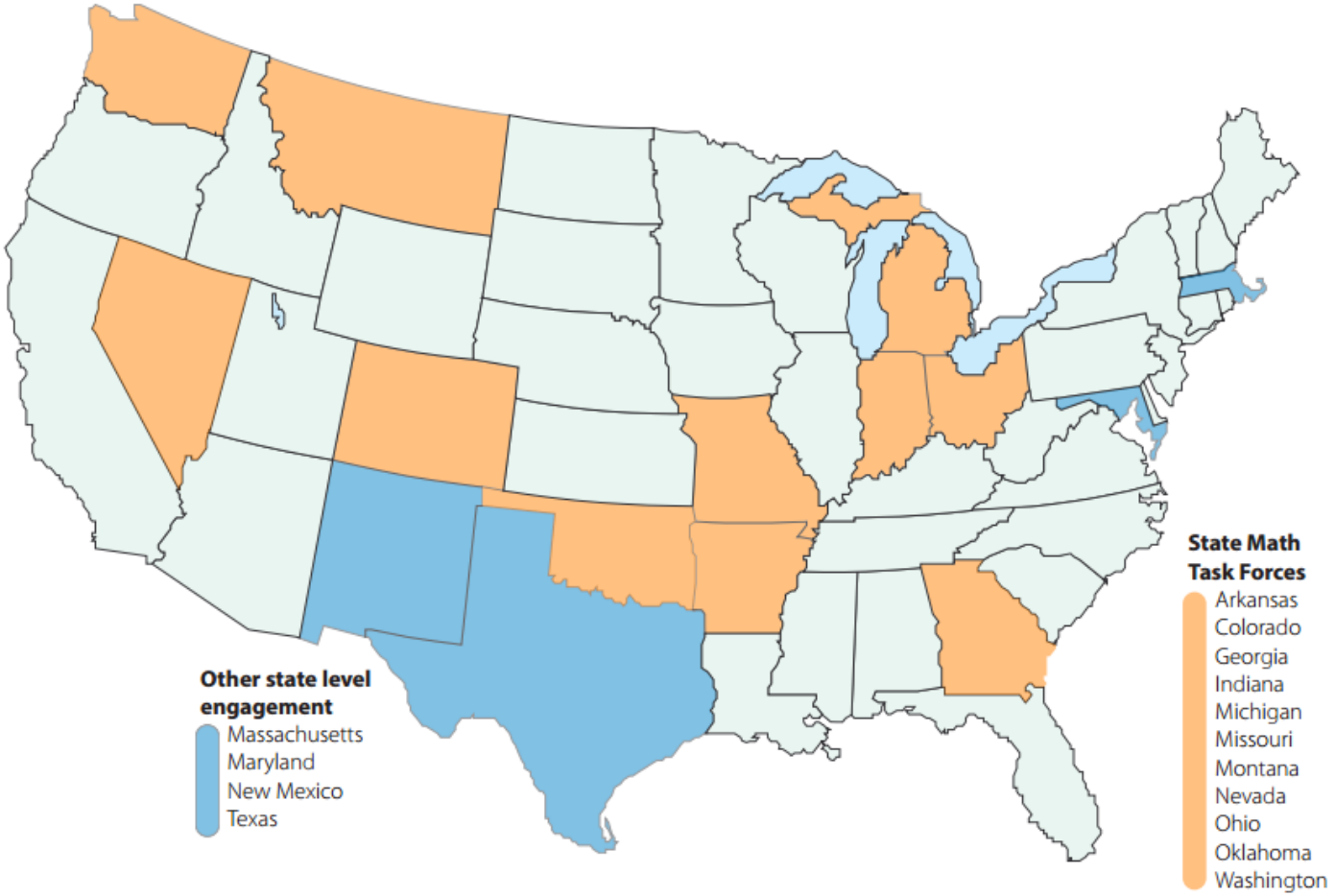


Four-Year Student Enrollment into Programs of Study



Burdman, P. (2015). *Degrees of freedom: Diversifying math requirements for college readiness and graduation.* Oakland CA: Learning Works and Policy Analysis for California Education.

Dana Center's state mobilization



State Mobilization Process

Each state has a customized plan and timeline.

Phase 1: Build urgency and intrinsic motivation for change

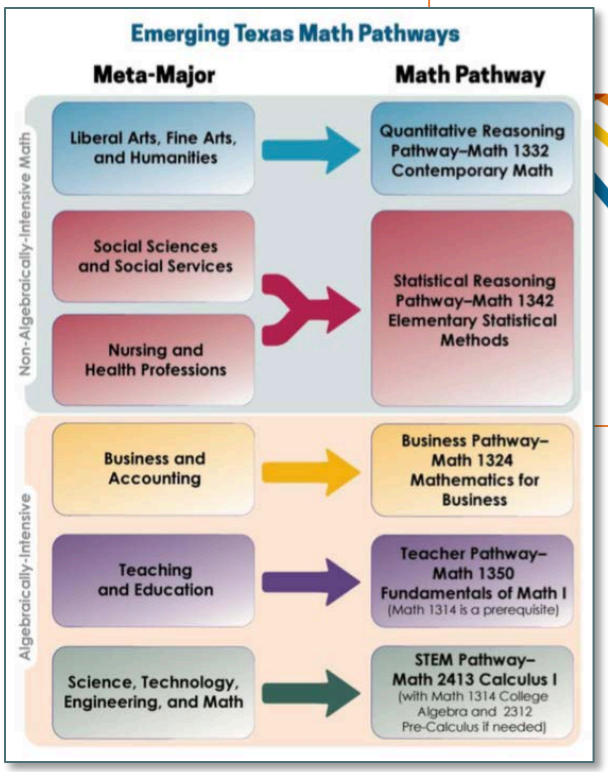
Phase 2: Enable scale by creating the policy and practice conditions for statewide implementation

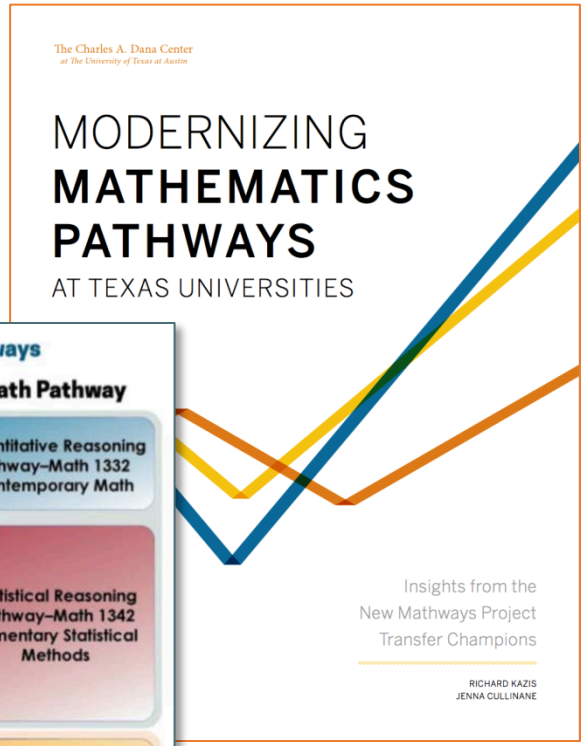
Phase 3: Enact the NMP at institutions by building faculty and institutional

Consulting, tools, and services support each phase.

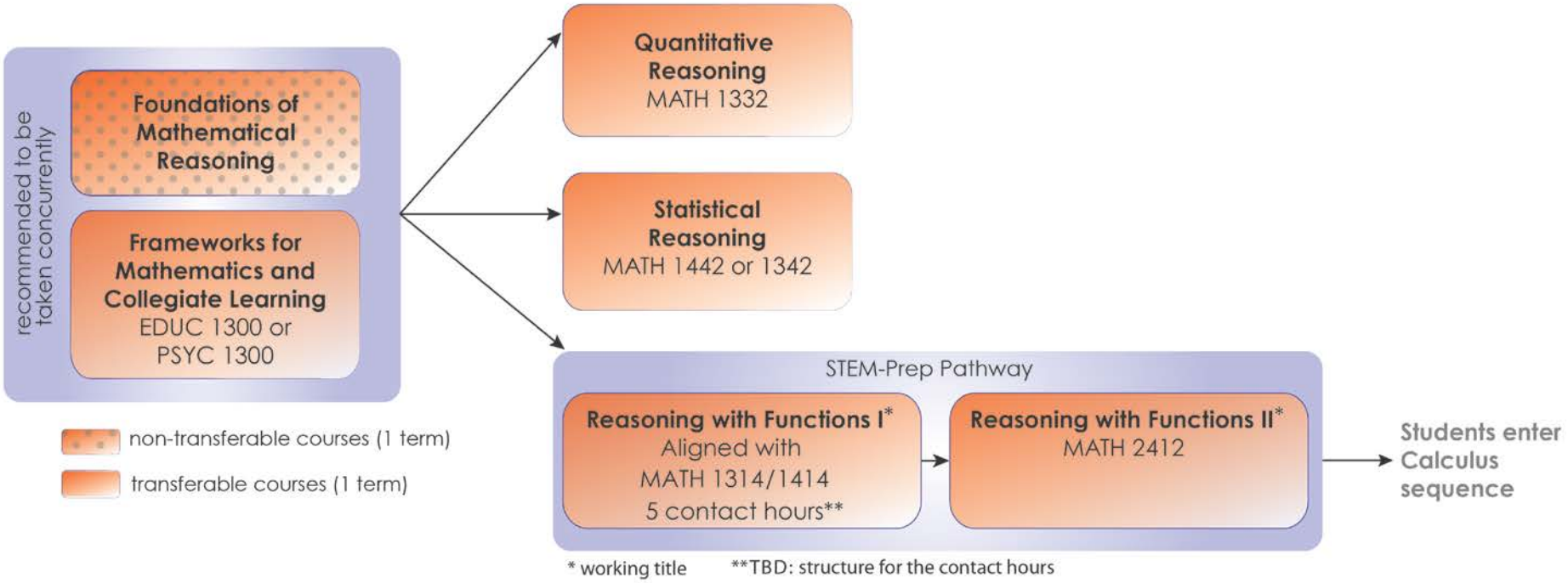
Dana Center's policy work

- Transfer
- Applicability
- Definitions of College Readiness
- Acceleration Structures
- Placement





Dana Center's curriculum work



Standard DE courses vs. NMP Foundations

NMP Foundations	Curricular Design Principle	*Non-NMP Class*
Coursework framed in real-life examples	**Context & interdisciplinary connections**	*Solve for "X"*
Use of authentic texts in coursework	**Reading**	*Reading from textbook*
Organized by concept	**Structure & organization of course materials**	*Organized by skill or procedure*
Students work through challenges with faculty scaffolding	**Constructive perseverance**	*Faculty spoon feed answers*
Students required to explain their work in writing	**Writing**	*No explanatory writing required*
Many ways to solve a problem	**Problem solving**	*One way to solve a problem*
Consistent use of technology in and outside the classroom	**Use of technology**	*Little/moderate use of technology*
Intentional instruction around terminology, symbols	**Use of discipline-specific terminology**	*Understanding of terminology, symbols is assumed*
Learning in small groups with some lecture	**Active learning**	*Upfront lecture with individual practice*

Early results from MDRC evaluation, Feb. 2016

What students say…

- *"I don't see a math problem and go, 'this is completely impossible' anymore. I look at the problem and actually try to solve it."*

  -NMP Student

- Generally very positive perceptions, especially about contextualized content

- Some mixed feedback about active learning pedagogy

Early results from MDRC evaluation, Feb. 2016

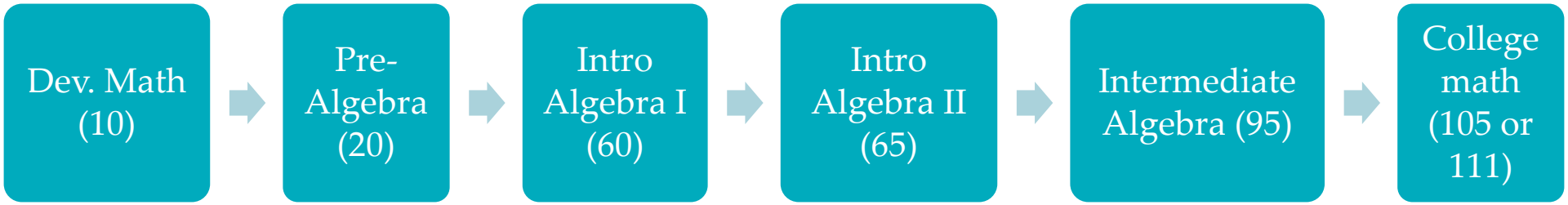
New math pathways at Oregon two-year colleges

Doug Nelson,
Central Oregon Community College

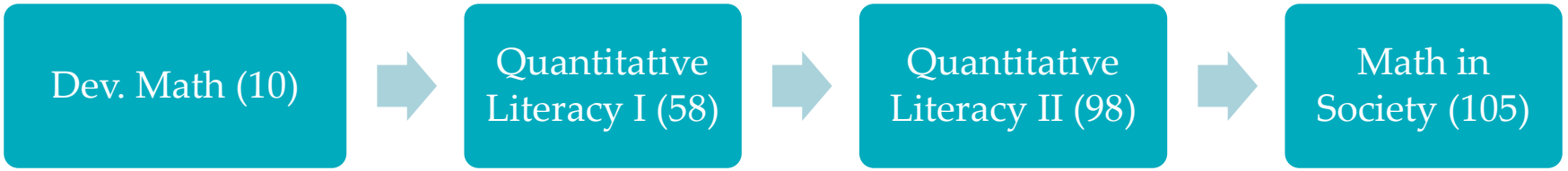
Oregon's math faculty were motivated to develop a new math pathway

- ✓ Want to **increase percentage of students** that achieve their academic goal.
- ✓ **Too many exit points** in traditional developmental math sequence.
- ✓ Want students to **learn mathematics relevant to their career goals**.
- ✓ College Algebra course **primarily for students heading for Calculus** (STEM students).

Traditional math pathway at COCC



New math pathway at COCC



Statewide convenings were held to develop Mth 98 and Mth 105

Mth 105, Math in Society: Fall 2014

Mth 98, Quantitative Literacy: Winter 2015

Math faculty from all 17 community colleges, 7 public universities, and representatives from the Community Colleges and Workforce Development, Oregon Community College Association, Oregon Department of Education, and the Higher Education Coordinating Commission came together.

Mth 105: Math in Society major topics

- ✓ Logical Reasoning and Problem Solving
- ✓ Probability on Statistics
- ✓ Financial Literacy
- ✓ 30% of course from additional topics (graph theory, modeling growth, applied trigonometry, math in music, etc.)

Mth 98 vs. Mth 95

Mth 98 Outcomes	Mth 95 Outcomes
✓ Number Sense	✓ Review Lines and Quadratic Equations
✓ Applied Algebraic Reasoning/Modeling	✓ Introduction of Functions
✓ Graphical Sense	✓ Learning the Graphing Calculator
✓ Measurement	✓ Solving Linear and Quadratic Applications
✓ Statistical Reasoning	✓ Solving Systems of Equations

Mth 98 teaches the math that you would want your neighbor to know, while Mth 95 continues developing the algebra tools necessary for success in future math courses associated with STEM fields.

State policy language related to math requirements needed to change

Old language

"A math course for which Intermediate Algebra is a prerequisite."

New language

"One course in college-level mathematics designated by the college as meeting statewide criteria for mathematics."

Early outcomes of new math pathways are positive

- Students are being more appropriately advised into math courses, and we have increased the number of sections offered.
- Mth 105 students are better prepared to think critically.
- We are reviewing our STEM pathway sequence and tweaking curriculum to best meet STEM field needs.

Oregon's community colleges and high schools are also coordinating

- Considering offering Mth 105, Math in Society, as a CollegeNow dual credit course

- Early dialog regarding developing alternative non-STEM coursework at high schools.

- High school math teachers and college math faculty are working together to align high school curriculum to higher education.

Q & A

Dr. Jenna Cullinane

Doug Nelson

Please type in questions you have for our panelists

For more information

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To receive monthly updates about the NMP, contact us at: **mathways@austin.utexas.edu**

Michelle Hodara
Michelle.Hodara@educationnorthwest.org

Thank you!

We, and the U.S. Department of Education, value your feedback!

Please go to:
http://tinyurl.com/NewMathPathways
to take the event survey.

The online survey is completely anonymous and takes less than five minutes.