



Modernize the Mathematics Transition from High School to College

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July 10, 2019



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About the Dana Center

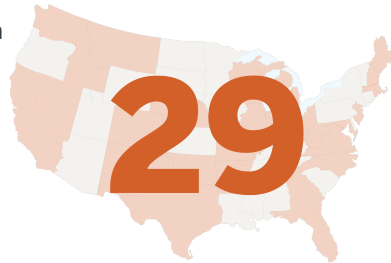
— Equity — Access — Excellence —

Dana Center by the Numbers



Dana Center by the Numbers

By the close of 2017, the Dana Center had contributed to the **implementation of math pathways** in higher education systems, institutions, and campuses in **29 states**.



Dana Center by the Numbers



We engaged with **118 districts in 23 states** to provide middle and high school math courses of the **highest quality**, as recognized by rigorous national and state reviews, including EdReports.org, Louisiana Department of Education, and Texas Education Agency panels.

Agenda

- **Introductions**
- **Current Context of Higher Ed Pathways**
 - Alignment
 - Acceleration
- **Implications for K-12**
 - Redefine College Ready
 - Modernize High School Math
- **Q&A**
- **Closing**

Terminology

- **Program of Study or Pathway:** a program that leads to a certificate or degree
- **Gateway course:** first credit-bearing course that meets the requirements of a program (different from general education)
- **Remedial or developmental courses:** courses for students who are determined to be under-prepared for college-level courses, not credit-bearing
- **Pre-Requisite Models:** Underprepared students take one or more developmental courses before entering into the gateway course.
- **Co-Requisite Models:** Underprepared students enter directly into a gateway course and also receive some type of supplementary instructional supports.

Why Worry About Alignment?

Mathematical Association of America's 2004 CUPM Curriculum Guide

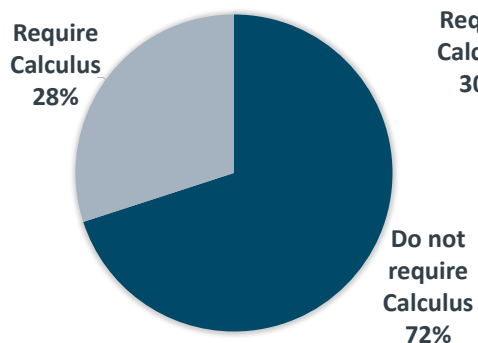
“Unfortunately, there is often a serious mismatch between the original rationale for a college algebra requirement and the actual needs of the students who take the course.”

Endorsed by

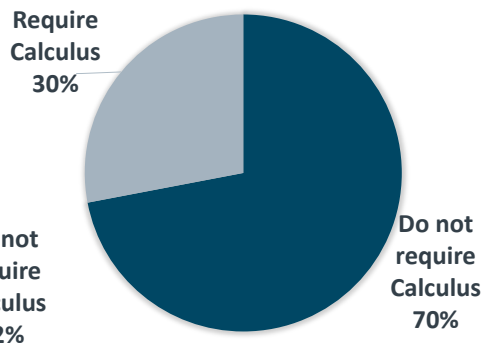
- American Mathematical Association of Two-Year Colleges
- American Mathematical Society
- American Statistical Association
- Society for Industrial and Applied Mathematics

Alignment – College Algebra and Calculus

2-YEAR COLLEGE STUDENT ENROLLMENT
INTO PROGRAMS OF STUDY



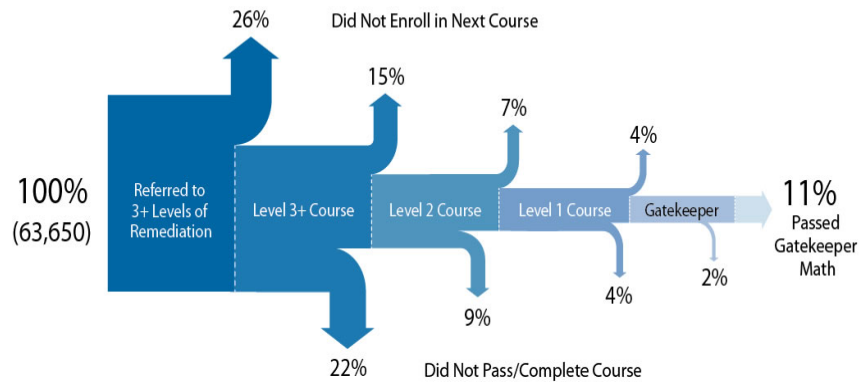
4-YEAR COLLEGE STUDENT ENROLLMENT
INTO PROGRAMS OF STUDY



Source: Chen & Soldner, 2013

Developmental Math Success Rates

Student Progression Through the Developmental Math Sequence²¹



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The Move to Mathematics Pathways

- In 2015, the MAA, along with four major mathematical professional associations, called for multiple mathematics pathways that are aligned to fields of study.
- Some colleges and universities have begun to respond by implementing math pathways, such as quantitative reasoning, statistics, technical mathematics (for certificate programs), and a redesigned algebraic-intensive/or Calculus pathway.

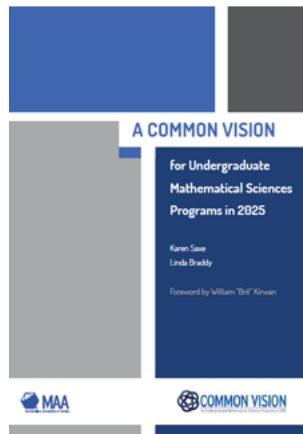
Charles A. Dana Center. (2016). *DCMP Call to action: The case for mathematics pathways*.
Austin, TX: Author.

<https://dcmathpathways.org/sites/default/files/resources/2016-11/The Case for Mathematics Pathways.pdf>

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A Common Vision for Undergraduate Mathematics



The primary goal of the initiative is to develop a shared vision in the mathematical sciences community of the need to modernize the undergraduate mathematics program, especially the first two years.



Dana Center Mathematics Pathways

The Dana Center defines *high-quality* mathematics pathways as those that:

- Are aligned to students' goals;
- Accelerate student progress toward completion;
- Integrate student learning supports; and
- Use evidence-based curriculum and pedagogy.

Modernizing Mathematics Pathways (Dana Center)

“For students majoring in programs such as social or behavioral sciences, the most important mathematics is statistics, not algebra. For liberal arts students, who typically need to take one core math course to graduate in their majors, quantitative reasoning is likely to be more relevant to their future lives and careers.”

Kazis, R. & Cullinane, J. (2015). *Modernizing Mathematics Pathways at Texas Universities: Insights from the New Mathways Project Transfer Champions*. Austin, TX: The Charles A. Dana Center at The University of Texas at Austin. p.4.

Pedagogy and Social-Emotional Learning

Growing acknowledgement that quality instruction matters:

“...we call on institutions of higher education, mathematics departments and the mathematics faculty, public policy-makers, and funding agencies to invest time and resources to ensure that effective active learning is incorporated into post-secondary mathematics classrooms.”

- Conference Board of Mathematical Societies

Conference Board of Mathematical Sciences position statement on Active Learning in Post-Secondary Mathematics Education, <https://www.cbmsweb.org/2016/07/active-learning-in-post-secondary-mathematics-education/>

Recent Shifts in Policy

- Ohio (2015) removed language requiring Intermediate Algebra as the threshold course. They now have Quantitative Reasoning, Statistics and STEM transfer pathways.
- Michigan State (2016) dropped the college algebra requirement.
- California State University (2017) dropped intermediate algebra as a universal prerequisite.

[https://www.ohiohighered.org/sites/ohiohighered.org/files/uploads/math/Memo Announcing Endorsed Changes to the OTM Mathematics Guidelines.pdf](https://www.ohiohighered.org/sites/ohiohighered.org/files/uploads/math/Memo%20Announcing%20Endorsed%20Changes%20to%20the%20OTM%20Mathematics%20Guidelines.pdf)

<https://www.insidehighered.com/news/2016/07/06/michigan-state-drops-college-algebra-requirement>

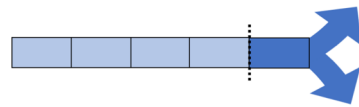
<https://edsource.org/2017/cal-state-drops-intermediate-algebra-requirement-allows-other-math-courses/585595>

Recent Shifts through Legislation

- CA (2017): AB705 - Colleges cannot require remedial courses unless “placement research” shows that students will be highly unlikely to succeed.
- TX (2017): HB2223 – Co-requisite models are required.
- TX (2015): HB5 – Endorsements and Transition Courses
- WA (2019): Pathways to graduation and Transition Courses

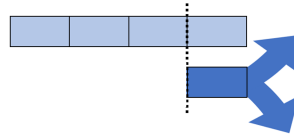
Seymour-Campbell Student Success Act of 2012: matriculation: assessment. California Assembly Bill 705, (2018). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB705
Texas House Bill 2223 (2017) <https://capitol.texas.gov/tlodocs/85R/billtext/html/HB02223I.htm>

An oversimplified, yet illustrative picture:

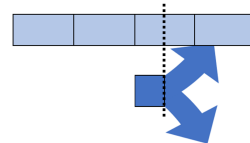


K12 and college systems are structured for a clean line between high school and college. After four years of high school mathematics a student is ready for college.

Really, though, colleges teach much of the same mathematics as high schools, and the “college ready” bar (content-wise) often overlaps with HS mathematics.



With college pathways the “college ready” line becomes even more ambiguous.



Implications for K-12

What math is right for students in high school?

As colleges expand to include alternatives to College Algebra for initial college credit bearing courses, **high school must broaden the pathways** they offer as preparation.

College AND Career Ready

As students decide on a pathway in high school, they should consider that a majority of careers will require some sort of post-secondary education. **Rigorous mathematics is not reserved for college bound students.**

The Need for Structural Changes

“Improving teacher practice is always valuable and important. If we want change at scale, too, then we need to address structure.”

-P. Uri Treisman

National Research Council. (2013). The mathematical sciences in 2025. *National Academies Press*. p. 10, Available at <https://www.nap.edu/catalog/15269/the-mathematical-sciences-in-2025>.

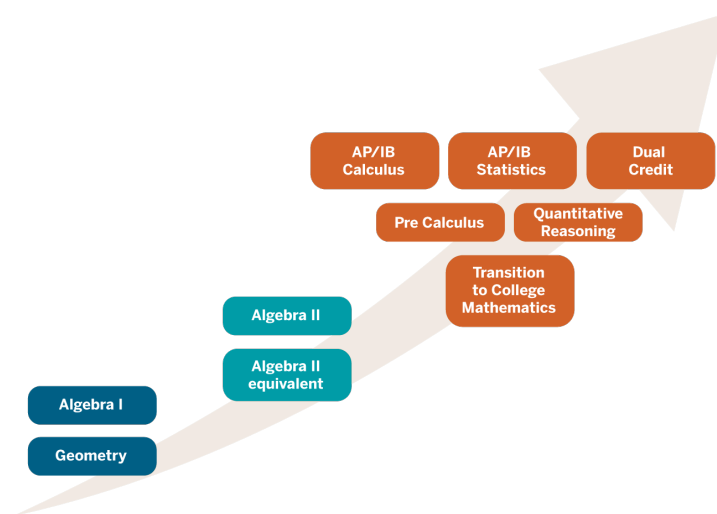
Modernize the Definition of College Readiness

- Too few students demonstrate college readiness in mathematics with the current measures.
- The definitions of college ready used in K-12 mathematics is outdated and needs to be modernized.
- The pathways between high school and college needs to be seamlessly connected.

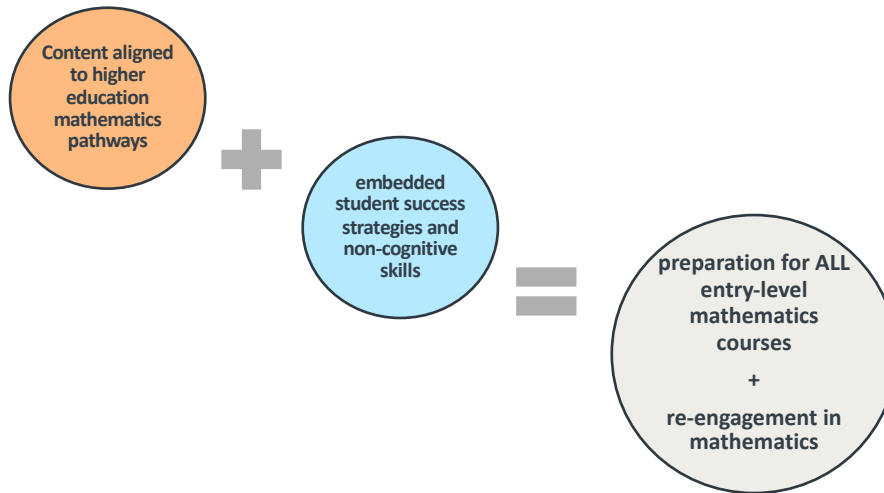
Modernize the Definition of College Readiness

- Course offerings
- Graduation requirements
- Participation requirements (NCAA)
- College readiness assessments, multiple measures
- College admissions
- Placement into college level courses
- Financial aid eligibility

Readiness for Mathematics Pathways



Ideal Mathematics Transition Course Design



Texas Transition Course as Example

- Texas legislation 2013 mandated districts to offer the College Prep Mathematics course in collaboration with at least one institution of higher education.
- The Texas Success Center, part of the Texas Association of Community Colleges, convened a mathematics task force to create a statewide framework of student learning objectives that define a course addressing multiple mathematics pathways
- The Framework is a resource available to K–12 districts and higher education institutions.

Discussion and Questions



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Conference Hashtag: #gotmath

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