

OPENING DOORS THROUGH MATHEMATICS

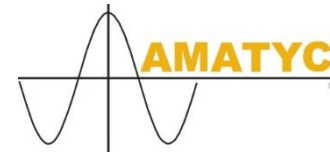
Mathematical Pathways of 'Haves' and 'Have Nots' with Ripple Effects

**2019 NADE Conference
8:00 am – 8:50 am M303**

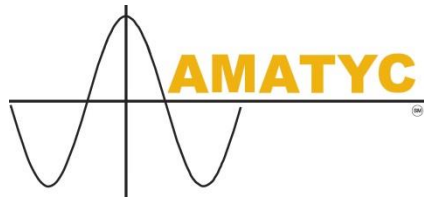
Welcome!



Paula A. Wilhite, Ed.D.
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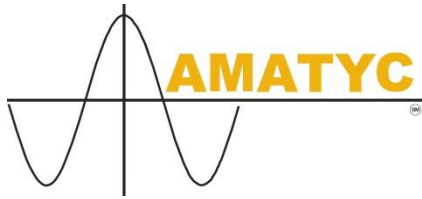
Developmental Mathematics
Committee, *Chair*
2016 - 2019



OPENING DOORS THROUGH MATHEMATICS

AMATYC Developmental Mathematics Committee strives to

- 1) Provide opportunities for professional development for faculty**
- 2) Share best practices for curriculum and instruction**
- 3) Increase involvement with national policy-making boards**
- 4) Communicate the issues of mathematics reform**



Mathematics Pathways Redesigns of Developmental Courses

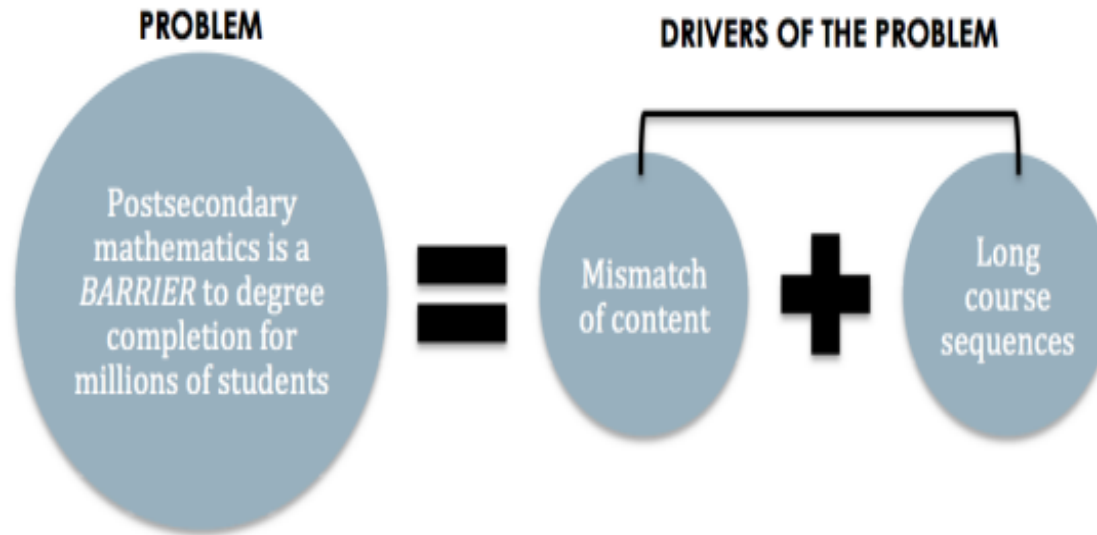
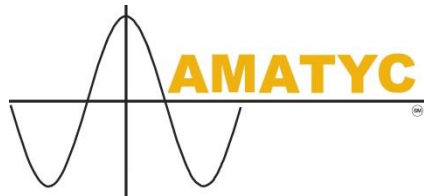


Figure 1. Drivers that create barriers for students.



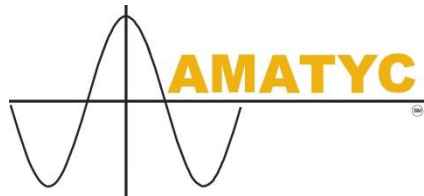
Mathematics Pathways Redesigns of Developmental Courses

60% two-year college students placed into developmental mathematics each year

33% of these students successfully complete the developmental mathematics sequence

20% of these students successfully complete a college-level mathematics course

(Bailey, Jeong, & Cho, 2009) <https://files.eric.ed.gov/fulltext/ED503962.pdf>



Mathematics Pathways Redesigns of Developmental Courses

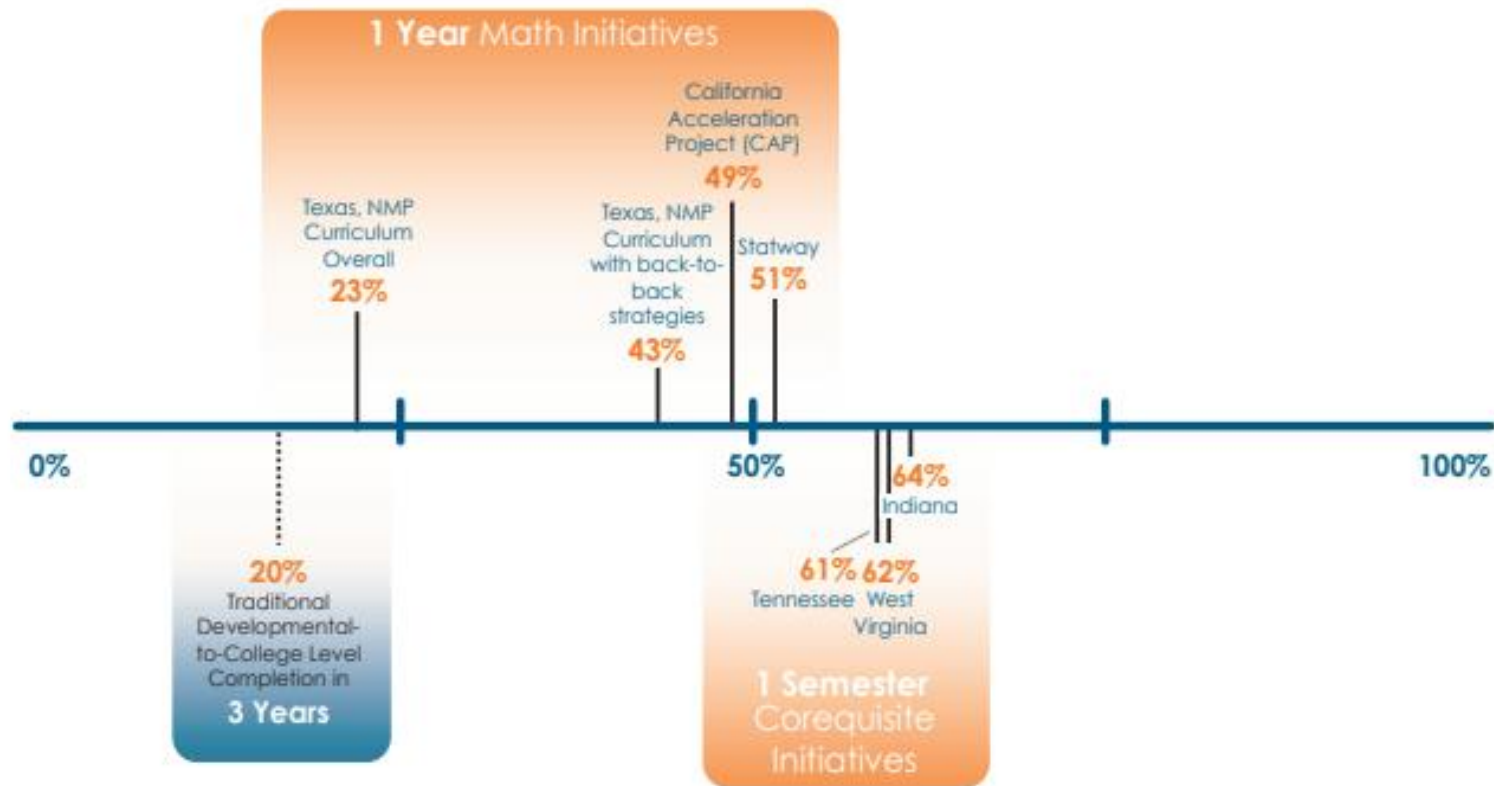
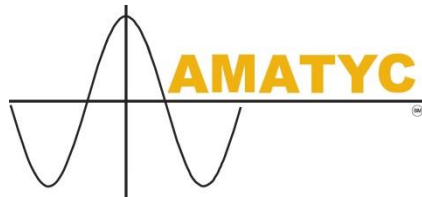


Figure 2. Percentage of developmental students who earn college-level math credit. (Time frame is indicated for the traditional sequence and the one-semester and one-year models.)

<https://dcmathpathways.org/learn-about-mathematics-pathways>



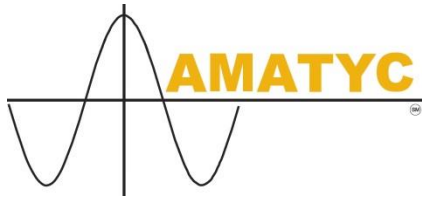
Mathematics Pathways Redesigns of Developmental Courses

³ **Corequisite** refers to the practice of placing students directly in college-level courses, regardless of preparation, and providing these students with supports for just-in-time instruction. For more information about corequisite models, see *Developmental Education Structures Designed for the Readiness Continuum: Aligning the Co-requisite Model and Student Needs* (2012).

⁴ See *Back-to-Back Math: Strategies for Ensuring Successive Semester Enrollment* (2015).



www.dcmathpathways.org



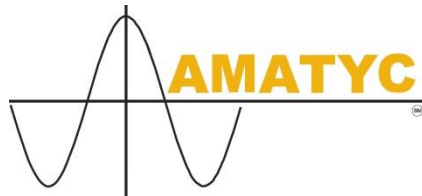
Mathematics Pathways Redesigns of Developmental Courses

Focused on acceleration

Focused on student learning and completion

Focused on the needs of client disciplines

Focused on accessible and equity for all students



Mathematics Pathways Redesigns of Developmental Courses

☐ Focused on acceleration

Table 2

2015 Mathematics Course Enrollments and Percent Change since 2010^a

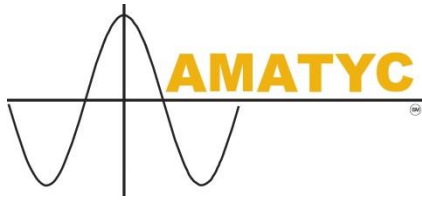
<u>Course</u>	<u>Enrollment</u>	<u>Percent Change Since 2010</u>
Arithmetic	71,000	- 52%
Prealgebra	127,000	- 44%
Elementary Algebra	277,000	- 35%
Intermediate Algebra	299,000	- 13%
Precalculus ^b	445,000	23%
Calculus ^c	119,000	11%
Statistics	279,000	104%
Liberal Arts Math	97,000	7%

^aCBSM 2015 Survey, Table TYE.2 (Blair, Kirkman & Maxwell, 2018, p.164)

^bIncludes Colleges Algebra (Above Intermediate Algebra), Trigonometry, Combined College Algebra and Trigonometry, Intro to Math Modeling, Precalc/Elem Functions/Analytic Geometry

^cIncludes both mainstream and non-mainstream Calculus (e.g., business calculus)

<http://www.ams.org/profession/data/cbms-survey/j-cbms2012-surv-chapter6.pdf>



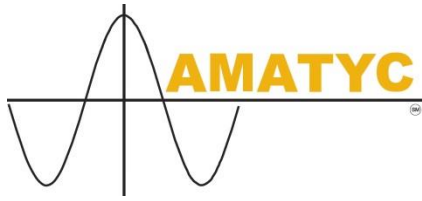
Mathematics Pathways Redesigns of Developmental Courses

❑ Focused on student learning and completion

“The external pressure to develop acceleration models might be construed as emphasizing student completion over student learning.” (Burn H., *IMPACT* on Mathematical Pathways and Course Redesign, Submitted *MathAMATYC Educator*, 2018)

Views of rigor are frequently based on mastery of advanced algebraic skills that are necessary for 1) readiness to proceed to the calculus sequence and/or 2) college-level critical thinking and problem-solving.

<https://www.utdanacenter.org/sites/default/files/2019-02/what-is-rigor-in-mathematics.pdf>



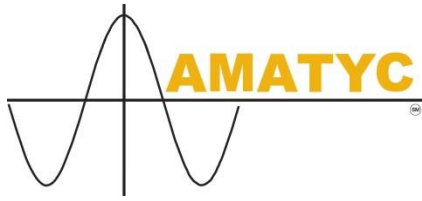
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Definition of Rigor in Mathematics: K-12 & Higher Ed

“Rigor in mathematics is a set of skills that centers on the communication and use of mathematical language.”

- ✓ **Recommendation: Professional development opportunities for faculty and instructional leaders**
- ✓ **Recommendation: Revisions to curricula that utilize technology and embrace the curricula of rigor**

<https://www.utdanacenter.org/sites/default/files/2019-02/what-is-rigor-in-mathematics.pdf>



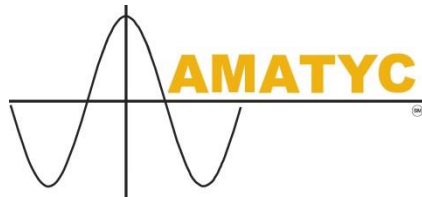
Mathematics Pathways Redesigns of Developmental Courses

Trends in Enrollment Data + Prerequisite Changes

Instructional staffing will decrease at the developmental level and increase in college-level Mathematics Pathway courses.

Co-requisite enrollments surge in fall semesters and level or minimize in the spring semesters.

This will impact colleges with large numbers of part-time faculty who tend to teach primarily at the developmental level.



Mathematics Pathways Redesigns of Developmental Courses

☐ Focused on the needs of client disciplines

Table 2

2015 Mathematics Course Enrollments and Percent Change since 2010^a

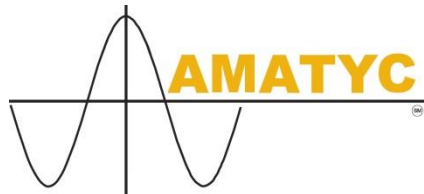
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<http://www.ams.org/profession/data/cbms-survey/j-cbms2012-surv-chapter6.pdf>

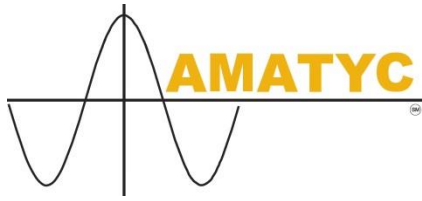


Mathematics Pathways Redesigns of Developmental Courses

Focused on the needs of client disciplines

Redesigned developmental courses in Mathematics Pathways will force changes to instruction that will only be possible if proper attention is given to faculty professional development.

Considering that our field already is challenged to find qualified statistics instructors, preparing instructors to teach statistics using a just-in-time approach to remediation will require even more intensive professional development efforts.



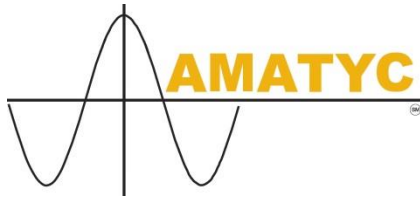
Mathematics Pathways Redesigns of Developmental Courses

Ideally, a department considering hiring or selecting someone to teach an introductory statistics course should require a candidate to have at least a master's degree with the following:

1) Two statistical methods courses including content knowledge of data collection methods, study design and statistical inference

2) Experience with data analysis beyond material taught in the introductory class. This experience could come from advanced courses, projects, consulting or research.

<https://www.amstat.org/asa/files/pdfs/EDU-TeachingIntroStats-Qualifications.pdf>



Mathematics Pathways Redesigns of Developmental Courses

☐ Focused on accessible and equity for all students

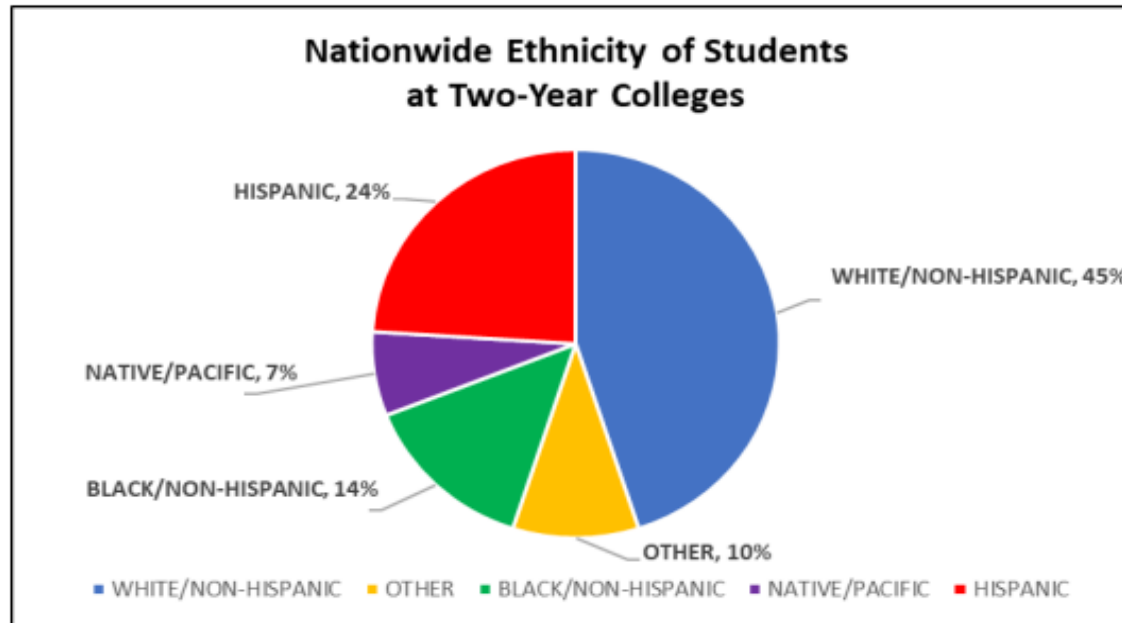
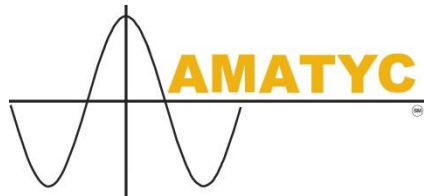


Figure 1. Nationwide student ethnicity of two-year college students (AACC, 2017).

<http://myamatyc.org/index.php/impact-document/chapter-2-who-are-we>

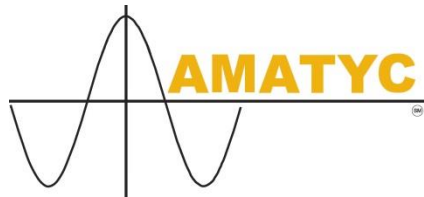


Mathematics Pathways Redesigns of Developmental Courses

40% of 17 million students were enrolled at two-year colleges in fall 2015 (*IMPACT, AMATYC 2018, p.10*)

Two-year colleges attract many students who historically have been underrepresented in science, technology, engineering, and mathematics.

These students are more likely to face severe obstacles to success.



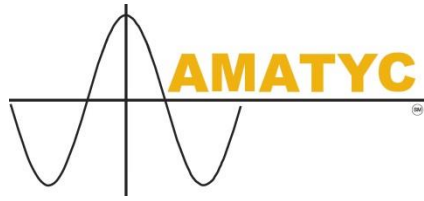
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“YOU have a tremendous IMPACT on shaping mathematics education in first two years of college!”

“YOU have a tremendous IMPACT on the mathematical literacy of a large number of students!”

“YOU have a tremendous IMPACT on the quantitative capacity of workers in workplace!”

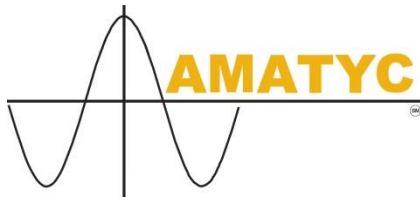
IMPACT, AMATYC 2018, p.7



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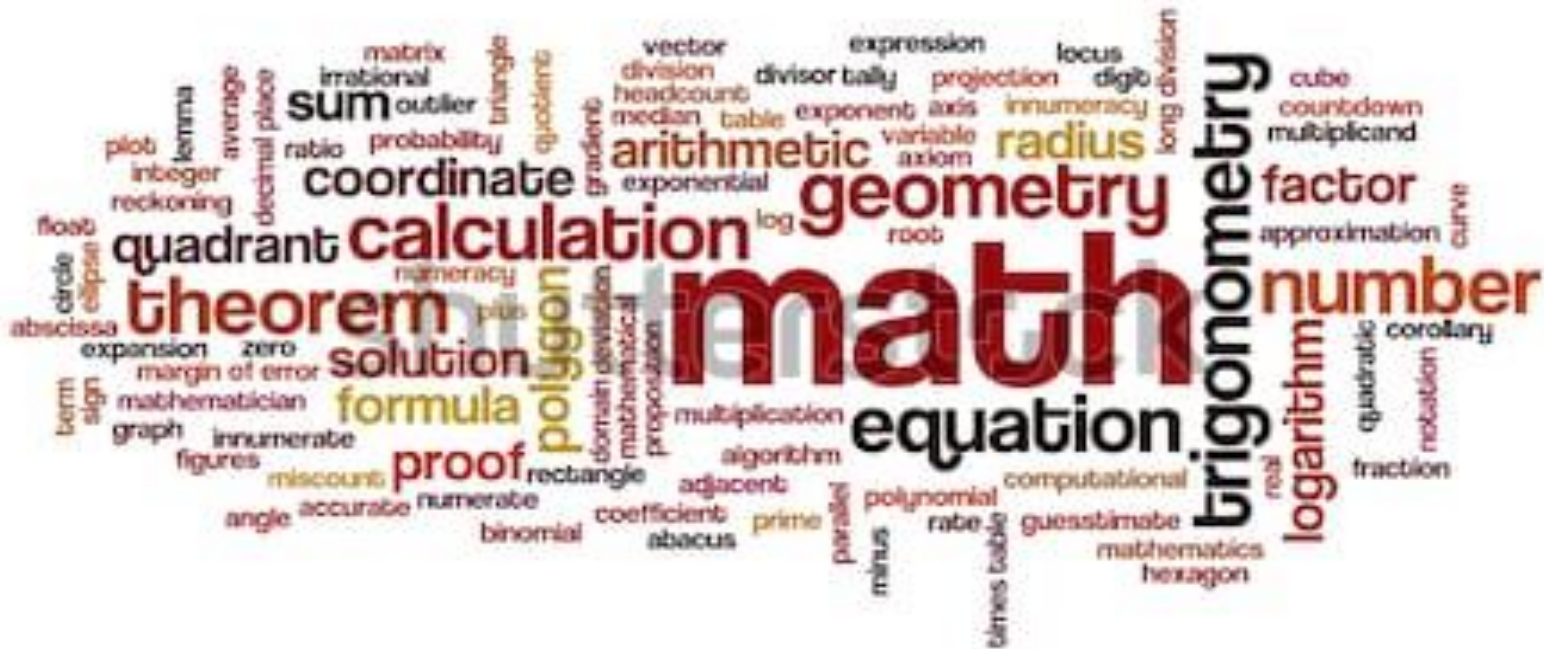
**You think you're just a
drop in the ocean... but
look at the ripple effect
one drop can make!
~Anonymous**

IMPACT, AMATYC 2018, p.7



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Thank you!



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