Dana Center Mathematics PATHWAYS

Implementing new math pathways through AB 705 and EO 1110

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www.dcmathpathways.org

"Retrofitting equity practices to systems not designed for them is a Sisyphean task. When new practices are put into place, we have an opportunity to ensure that they are designed and implemented in equity-minded ways."

-- Uri Treisman

Two issues converged





Broad Definition

Course structures that allow students who are underprepared to enter directly into a college-level course that will meet degree requirements with appropriate supports.

States Implementing Co-Requisites at Scale



Mathematics PATHWAYS

Co-Requisite Success in Large Scale Implementations

% Underprepared Community College Students Earning College-Level Math Credit



In one year for corequisite models



Tennessee

"There was essentially no achievement gap: 73 percent of minority students and 72 percent of low income students achieved passing grades."

Dana Center **Mathematics** PATHWAYS



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Tennessee



Dana Center Mathematics PATHWAYS

Tennessee



Dana Center Mathematics PATHWAYS

What does the evidence tell us?

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- Acceleration with support results in large increases in success
- Traditional placement does not predict who will benefit
- Need to examine for equity implications

How will we serve students who are not successful in corequisites?

- Learn more about students' needs
- Improvement and refinement of models, course design and instructional practice
- Better ways to identify students who need different supports

Does changing prerequisites limit opportunity?

- Few underprepared student are successful in Calculus in the current system
- Relatively rare for students to change from nonalgebraically intensive program to algebraically-intensive

New structures create opportunities to address equity:

- Greater success in entry-level courses in pathway to Calculus
- Success is more likely to motivate than failure
- Course redesign creates opportunity to modernize and improve

Myra Snell



Completion and Equity

CSU Graduation 2025 Initiative and CCC Vision for Success lay out ambitious goals for increasing degree attainment and achieving equitable outcomes.

Placement and remediation reform are essential components to reaching these goals.



Game Changers for Completion and Equity

CSU Executive Orders 1100/1110 and AB 705 are aligned on game changer strategies:

- Use high school grades in placement; no more placement testing
- Eligibility for direct enrollment in college math for (almost) all students with relevant concurrent support if needed; no more required remedial math course sequences
- Math appropriate to major or program



Why these strategies?

- Placement testing has low predictive validity; overall high school GPA is a better predictor of performance in college math.
- Large body of evidence shows that remedial math sequences produce poor outcomes.
- Placement is destiny and drives inequity.
 - lower placed are less likely to complete math for a degree
 - large proportion of students of color in lower levels of remediation



A Structural Issue: (Predictably) poor outcomes in the remedial math pipeline

Where students start in remedial sequence	% of students successfully completing college-level math in 3 years				
	At LMC	In California	In AtD study of 5 states		
Intermediate Algebra (Algebra 2)	37%	35%	27%		
Elementary Algebra (Algebra 1)	18%	15%	20%		
Pre-algebra or Arithmetic	10%	6%	10%		



A Structural Issue: (Predictably) poor outcomes in the remedial math pipeline

Where students start in remedial	% of students successfully completing college-level math in 3 years			Predicted: Assume 70% success and
sequence	At LMC	In California	In AtD study of 5 states	persistence
Intermediate Algebra (Algebra 2)	37%	35%	27%	34%
Elementary Algebra (Algebra 1)	18%	15%	20%	17%
Pre-algebra or Arithmetic	10%	6%	Across CA, more half of Black and Hispanic students	than 8%
Cali	fornia Accelerat	ion Project	remedial math begin here	

N.P.RO

Early evidence of the promise of AB 705

PPIC study released August 16, 2018

First study to provide a comprehensive look at multiple measures and corequisite remediation in California community colleges prior to AB 705.

"Early implementers" are the four colleges implementing reforms synergistic with AB 705 in fall 2016

Highlights from this study ...



Share of students starting in college-level math correlates strongly with higher one-year college-level math completion





Increased access to college math strongly linked to increases in college math completion



Change in the share of first-time math students starting directly in transfer-math (pp)



"Early implementers" of AB 705 types of reforms had the highest oneyear completion of college-level math statewide in 2016.

- Statewide: 28%
- College of the Siskiyous 58%
 - Embedded lab support in Statistics: 4 hours a week of contact changed to 6 hours by replacing a lecture hour with three lab hours
 - All students eligible for Statistics
- Cuyamaca College 57%
 - All students eligible for Statistics, some with required 2-unit concurrent support
 - Algebra 2 completers eligible for Precalculus/Trig and Applied Calculus, some with a required 2-units of concurrent support.



At "early implementer" colleges one-year college math completion for low income students and students of color is substantially higher than the statewide average

- Low-income: 49% vs. 23%
- Latinx: 48% vs. 19%
- African American: 46% vs. 13%

And equity gaps are smaller, e.g. 1 vs 17 percentage points for African American students.



Challenges

Beliefs are reflected in traditional remedial structures and pedagogy, and these norms are incongruous with new placement and remediation reforms.

- Students need to learn decontextualized procedures before they can engage in more complex critical thinking, so remediate "foundational" facts and procedures first.
- Fairly sophisticated procedural algebra knowledge is required for an educated citizenry and should be required for a college degree.
- All students should be prepared for college-level STEM math so that they have this as an option.



Sonja Manor

HUMBOLDT STATE UNIVERSITY

MATHEMATICS

Background

Humboldt State's original model

- Up to 2 semesters of remediation (elementary and intermediate algebra) then a baccalaureate level course.
- Students in the Arts and Humanities who just needed one semester of remediation could take one course
 - Liberal Arts math plus remediation

Pilot in '17-'18

NO INTERMEDIATE ALEGEBRA

Students who needed **one** semester of remediation (intermediate algebra level)

- Went straight to their general education (GE) level math course (College Algebra, Statistics, Finite Math (Business) or Liberal Arts Math)
- Took additional 2 unit quantitative reasoning/remediation course-Math 43
 - •One day in the classroom with quantitative reasoning problems
 - Worked on ALEKS independently
- Students were co-mingled in their GE math class with general population

No specialized section of Math 43

Lessons

- •Higher overall success rate
- •64% finishing GE course compared to 46% with original model
- Students did not feel relevance of their supplemental course and their GE course.
- Material was not necessarily "helping" them with GE class content.
- Remediation was not always "just-in-time."

System Level Sorting after EO1110

Students are sorted into 4 categories based on multiple measures

- Category I: GE math class satisfied though depending on major may need more
- Category II: GE math ready
- Category III: Optional support
- Category IV: Required support and Early Start

New Model 18'-19'

NO ELEMENTARY OR INTERMEDIATE ALGEBRA

•Four pathways, depending on major.

 Each pathway has a supported (5 days a week) and a non-support version (3 days a week).

 Students needing two semesters of remediation take a 3 unit-bearing GE course + a 1 pre-bac unit co-requisite

small enrollment (capped at 25)

same instructor, 5 days a week

Just in time remediation

inclusive pedagogy

 Students with recommend support (Cat III) choose between the supported and regular GE course

Supplemental Instruction sections available

4 Pathways



Equitable and Culturally Responsive Pedagogy

- All students in every pathway have equal access to the same curriculum.
- Curriculum Inquiry-based, interdisciplinary, quantitative reasoning
- Small class size creates inclusion and engagement
- Faculty development: bi-weekly meetings, Hispanic Institute Trained Faculty-Escala
- Speaking directly to growth mind set and promoting math as a process
- Assessment through common final questions in supported and unsupported classes to test major learning objectives

Challenges

- Placement (both under and over-placed students)
- Extending support for students beyond first semester
- Keeping College Algebra rigorous or redefining rigor.
- Ensuring that students with the lowest skill set have equity to the STEM degree

Structural Challenges

- Advising practices, registration systems, placement
- \circ Staffing

Cultural Challenges

- Faculty and staff attitudes and beliefs, student math identity
- Using data to understand student success

Discussion

- What research is most needed to support effective (and equity-oriented)) implementation?
 - What is the best role for policy (state and/or system) to support effective implementation that reduces equity gaps?