

Optimizing Math Pathways and Corequisites Holistic Supports for Students at the Institution, Department, and Classroom Levels

Connie Richardson – Manager, Higher Ed Course Services, Charles A. Dana Center April 07, 2022

@dcmathpathways

#mathpathways

@utdanacenter





The Who

- Institution
- Department
- Classroom

- Structures (e.g., math pathways and corequisites)
- Services/Resources
- Content and pedagogy





DCMP Vision

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.





Mathematics Pathways Celebration



- What is going well?
- What is not going as well?
- What are your next-generation questions and concerns about math pathways (and corequisites)?





The Who

- Institution
- Department
- Classroom

- Structures (e.g., math pathways and corequisites)
- Services/Resources
- Content and pedagogy





- Structures (e.g., math pathways and corequisites)
 - Are all students in the right math pathway?
 - Is your institution at 100% coreqs for identified students?
- Services/Resources
 - Are the services offered in a coherent manner?
 - Are faculty and students aware of them?
- Content and pedagogy





Optimizing Mathematics Pathways and Corequisites

Holistic Supports for Students at the Institution, Department, & Classroom Levels

In what ways did the pandemic:

- Reveal an area of the student support network that was working great?
- Reveal gaps in your student support network?
- How did you respond to the revelation of those gaps?





Optimizing Mathematics Pathways and Corequisites

Holistic Supports for Students at the Institution, Department, & Classroom Levels

From CCCSE:

- About 1/3 of students report financial situation has worsened.
- About 1/2 report their college does not have services to help students deal with stress



https://cccse.org/sites/default/files/CCSSE_COVID.pdf



Keeping Students on Their Path







- What support services does your campus provide?
- Do you know where they are?
- Are they all in one place?
- Are they equitably utilized?





Optimizing Mathematics Pathways and Corequisites

Holistic Supports for Students at the Institution, Department, & Classroom Levels

From the Hope Center and Amarillo College:

- Culture of caring
- One stop shop for services
- Shared responsibility

https://hope4college.com/supporting-community-college-completion-with-a-culture-of-caring-a-case-study-of-amarillo-college-2/







Instead of students going to multiple offices for different purposes, Georgia State consolidated "all those resources under *one request process* so that students *only have to tell their story one time* and then we can connect them with all of the resources that they may need."

AVP for Student Engagement at Georgia State

CCA Webinar July 2020

https://www.youtube.com/watch?v=85k2bKGuWAU



Keeping Students on Their Path



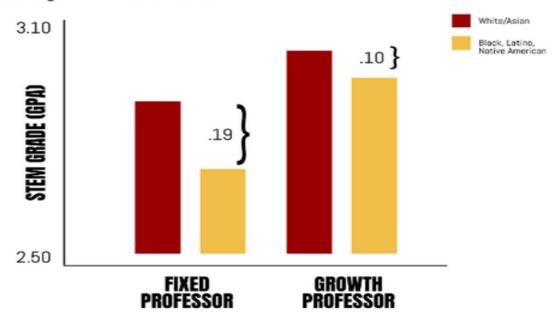
- Structures (e.g., math pathways and corequisites)
 - Are all students in the right math pathway?
 - Is your institution at 100% coreqs for identified students?
- Services/Resources
 - Are the services offered in a coherent manner?
 - Are faculty and students aware of them?
- Content and pedagogy
 - Are faculty working together?
 - Does content include success strategies and how to access resources?



Effect of faculty fixed mindsets

The findings:

While all students perform better when STEM professors endorse a growth mindset belief, the racial achievement gap is almost halved when professors endorse a growth-mindset belief.



SCIENCE ADVANCES | RESEARCH ARTICLE

SCIENTIFIC COMMUNITY

STEM faculty who believe ability is fixed have larger racial achievement gaps and inspire less student motivation in their classes

An important goal of the scientific community is broadening the achievement and participation of racial minorities in STEM fields. 'Pet, professors' beliefs about the fixedness of ability may be an unwitting and overlooked barrier for stigmatized students. Results from a longitudinal university-wide sample: 109 STEM professor and more than 13,000 students) revealed that the racial achievement gaps in courses taught by more fixed mindset faculty were yond any other faculty characteristic, including their gender, race/ethnicity, age, teaching experience, or tenure status. These findings suggest that faculty mindset beliefs have important implications for the classroom experiCopyright © 2019 The Authors, some rights reserved; exclusive licensee American Association for the Advancement for the Advancement of Science. No claim to original U.S. Government Works. Detributed under a Creative Commons Attribution NonCommercial License 4.0 (CC BY-NC).

aimed to understand and ameliorate the underrepresentation of diwhich students might those be? Pervasive cultural stereotypes sugverse individuals in the STEM (ocience, technology, engineering, and
get that White and Asian students are more naturally glifted
mathematics) pilenies, Back, Listino, and Native American students (unthan Black, Latino, and Native American students (unthan Black, Latino, and Native American students). derrepresented racial/ethnic minorities (URM)) continue to underper

American cultural stereotypes impugn the intellectual abilities of form academically relative to their White peers (1). While these racial

URM students, we predicted that faculty who endorse fixed mindset

lity are fixed, innate qualities that cannot be changed or develped much. In contrast, faculty who espouse growth mindset beliefs endorse the idea that ability is malleable and can be developed endorse the idea that ability is malitable and can be developed through persistence, good strategies, and quality mentoring. Fixed mindset professors are more likely to judge a student as having low ability based on a single test performance (9) and to use unhelpful ped-agogical practice, like encouraging students to drop difficult courses (e.g., "not everyone is meant to pursue a STEM career") (9).

Canning et al., Sci. Adv. 2019; 5 : eaau4734 15 February 2019

Faculty who endorse fixed mindset beliefs think that some stu-dents have strong, innate intellectual abilities, while others do not Which students might those be? Pervasive cultural stereotypes sugform academically relative to their White peers (1). While does nead achievement gas are determined by mudgle (e.g. comornic, and arts sheet and arts sheet and arts sheet and arts sheet arts sheet arts sheet are sheet as a sheet arts sheet are sheet arts sheet are sheet arts sheet are sheet are

ability acrestypes, resulting in a low of motivation, inellectual under-performance, and larger racial achievement gaps in STEM deads uses (5-7). This study cumtines the role of a novel situational cue to stems-tope underperformance—STEM college protector beliefs about the flandsens or malleability of shilly (6)—and explores whether these flexibly beliefs are associated with URM students' movivation and their academic achievement in those professor's STEM courses. People's mindeed to lose known as implicit thors los of lyst of ser belief about the functions or malleability of human char-teristical like infollences or personality (8). Equily meeting the services in the lose that the functions of the services of the service acteristics like intelligence or personality (8). Faculty members who the primary indicator of stereotype threat (2, 7, 13, 14). Drawing on espouse fixed mindset beliefs endorse the idea that intelligence and this theoretical framework, the present study examines the role of college professors' mindsets as a situational cue that triggers URM underperformance in STEM courses. We argue that if STEM faculty who endorse fixed mindset beliefs engender stereotype threat amon URM students, we should observe lower student motivation an

URM students, we should observe lower student motivation and substantially larger racial achievement gaps in those professors' courses compared to courses taught by STEM professors who endonse growth mindest beliefs.

The present study investigates undergraduate STEM faculty's self-reported mindest beliefs and their implications for student motivation and performance. Previous research has examined students' perceptions of faculty beliefs (15), yet no study, to our knowledge, has examined actual self-reported mindset beliefs of STEM faculty as a predictor of student performance. Furthermore, the effects of

Canning, Muenks, Green, Murphy, Science Advances, 15 Feb 2019



Next Steps



The Who

- Institution
- Department
- Classroom

- Structures (e.g., math pathways and corequisites)
- Services/Resources
- Content and pedagogy





Connie Richardson

cjrichardson@austin.utexas.edu









Corequisites – Distinguishing Factors of Success

Regardless of race/ethnicity, gender, math pathway, preparation level, etc.:

- 2 or 3 hours of support are better than 1 hour
- Cohort model has better results, likely due to alignment issues in the co-mingled models
- Academic mindsets

https://completega.org/usg-corequisite-virtual-workshop-reviewing-progress



Keeping Students on Their Path



DCMP Principles - Empowering Students as Learners

The DCMP advocates for instructional practices and curricular design that

- Help students develop the skills, attitudes, and beliefs necessary to be successful, independent learners
- Help students develop persistence and skills over time. Further, students develop communication skills and have opportunities to build relationships with peers and faculty

The design standards and their research base can be found on our resource site:

www.dcmathpathways.org

