Corequisite Design that Supports Strong & Equitable Completion of Transfer-level Math

CMC³ Fall 2021

Tammi Marshall, Ed.D. - Math Department Chair

Multiple Measures Placement

Redesigned Placement Process

Step Two - Placement Questionnaire

Information on Math and English or ESL Questionnaire

Please read the following information carefully about the series of questions that will give you a placement in Math and English or ESL. Below is a PREVIEW of four of the questions to help you prepare.

At the bottom of this page is a link that will take you to the actual questionnaire.

Which of the following is the closest approximation of your overall **UN-WEIGHTED** grade point average (GPA) in high school?

a) Under 2.6.
b) Between 2.6 and 2.79
c) Between 2.8 and 2.99
d) Between 3.0 and 3.29
e) 3.3 or higher
f) No high school GPA

** Note: You will find it easier to answer this question if you have your high school transcript handy. If you do not have a high school transcript, or if you attended the majority of your schooling in another country, and you are uncertain about your GPA we are happy to help.*

Of the courses listed below, which is the **HIGHEST** you have completed in high school or are currently passing with a C or better?

a) Algebra I
b) Algebra II
c) Integrated Math II
d) Integrated Math III
e) PreCalculus
f) Calculus

** Note: This question is asking you to tell us the HIGHEST level math from the list you completed in high school, which may not necessarily be the most recent class. If you are unsure how to answer this question, we are happy to help.*

What is/was your grade in the HIGHEST level math course identified above?

a) A
b) B

Redesigned Placement Process

You can only take this questionnaire once.

If you are NOT ready, click on one of the links below for assistance.

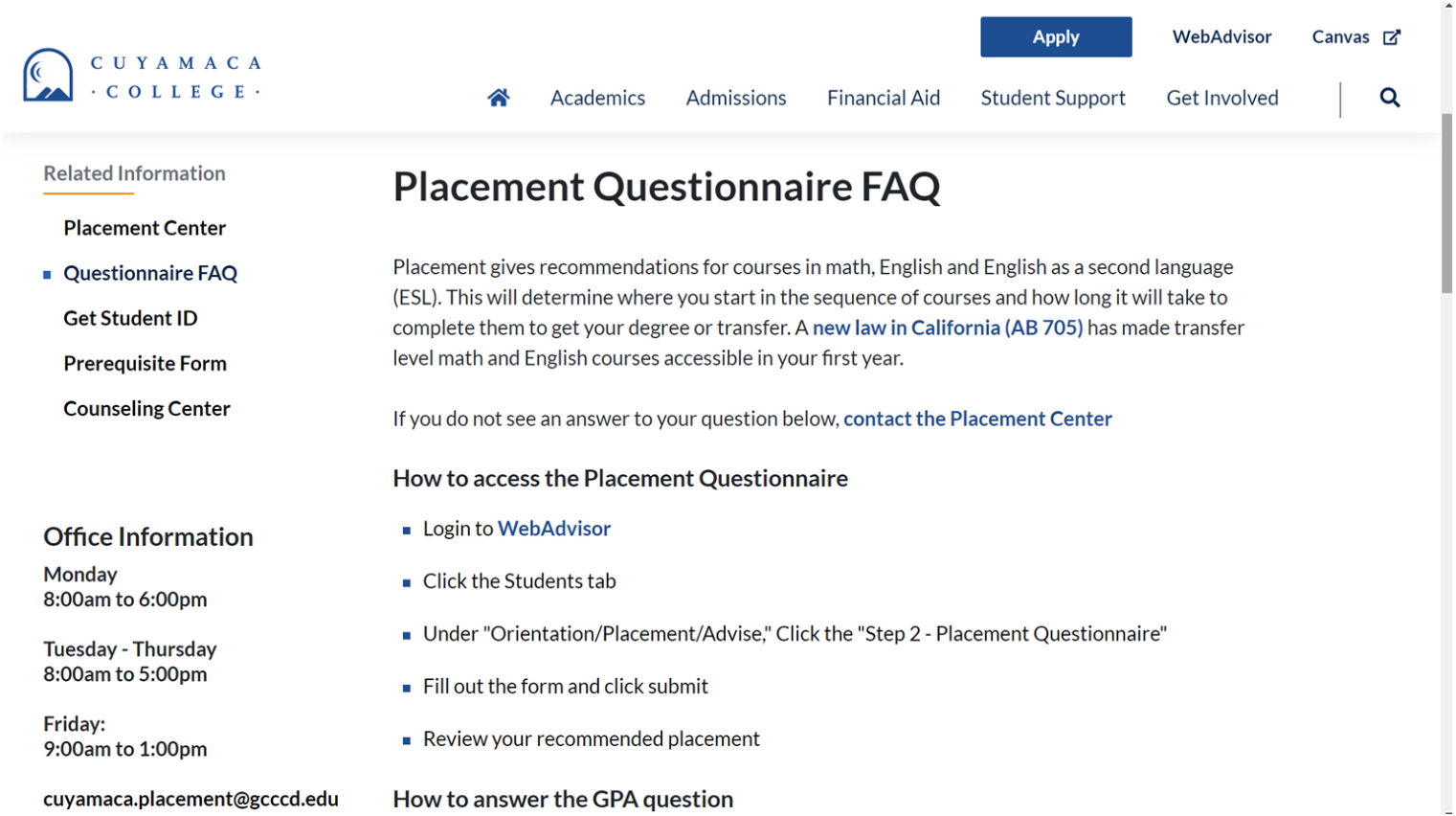
Grossmont Placement

Cuyamaca Placement

If you ARE ready to answer the questions click below.

Placement Questionnaire (link to questionnaire)

Redesigned Placement Process



CUYAMACA COLLEGE

Apply | WebAdvisor | Canvas

Academics | Admissions | Financial Aid | Student Support | Get Involved

Related Information

- Placement Center
- Questionnaire FAQ
- Get Student ID
- Prerequisite Form
- Counseling Center

Placement Questionnaire FAQ

Placement gives recommendations for courses in math, English and English as a second language (ESL). This will determine where you start in the sequence of courses and how long it will take to complete them to get your degree or transfer. A new law in California (AB 705) has made transfer level math and English courses accessible in your first year.

If you do not see an answer to your question below, contact the Placement Center

How to access the Placement Questionnaire

- Login to WebAdvisor
- Click the Students tab
- Under "Orientation/Placement/Advise," Click the "Step 2 - Placement Questionnaire"
- Fill out the form and click submit
- Review your recommended placement

How to answer the GPA question

Office Information

Monday
8:00am to 6:00pm

Tuesday - Thursday
8:00am to 5:00pm

Friday:
9:00am to 1:00pm

cuyamaca.placement@gcccd.edu

Redesigned Placement Process

Step Two - Placement Questionnaire

Please answer the following questions. Once you have submitted your answers, your placement score will be calculated and you will not be permitted to respond again.

* = Required

You have previously submitted this questionnaire and cannot re-submit it. Please contact the Assessment Center at (619) 644-7200 (Grossmont College) or (619) 660-4426 (Cuyamaca College) for assistance.

* 1. Did you attend a U.S. high school for three or more years?

* 2. Which of the following is the closest approximation to your overall **UN-WEIGHTED** grade point average (GPA) in high school?

* 3. Is English your native or primary language?

* 4. Do you sometimes have trouble reading and writing in English because English is not your native or primary language?

* 5. Of the courses in this selection, which is the **HIGHEST** you have completed or are currently passing with a C or better?

* 6. What is/was your grade in that course?

* 7. In which of the following areas are you thinking of majoring (studying)?

SUBMIT

Redesigned Placement Process

Question 7: Guided Pathways/ Math Pathways Placement

In which of the following areas are you thinking of majoring (studying)?

- Engineering/Math/Computer Science/ Science (Physics, Chemistry, Biology, Pre-Med, etc.)
- Teaching (Elementary Education)
- Social Science/Allied Health (Nursing, Social Work, Administration of Justice, Psychology, Sociology)
- Business (Accounting, Economics, Finance, Management, Marketing, etc.)
- Arts & Humanities (History, English, Literature, Languages, Philosophy, Communication, etc.)
- I am thinking of something else

Redesigned Placement Process

Placement Results

Please answer the following questions. Once you have submitted your answers, your placement score will be calculated and you will not be permitted to respond again.

Recommended courses:

Submitted:	28 Feb 2019
Recommended Math:	Math 180
Recommended English:	Engl 120
Recommended ESL:	

You were placed in math and English classes or are recommended to take the ESL placement based on the answers you provided. Your math placement in these classes was also partially based on your field of study.

If you are unsure which course(s) to enroll in, we are happy to help.

Ask a Counselor (Grossmont)
e-Counseling (Cuyamaca)

If you believe you were placed incorrectly, contact the appropriate campus below.

Grossmont Placement
Cuyamaca Placement

Open Access

Removing Structural Barriers

What percentage of students place into transfer - level math?

	Pre-implementation		Post-implementation
African American/ Black Students	9%	→	100%
Latinx Students	21%	→	100%
White Students	27%	→	100%

Schedule

How Students Placed

Math recommended placement and scores

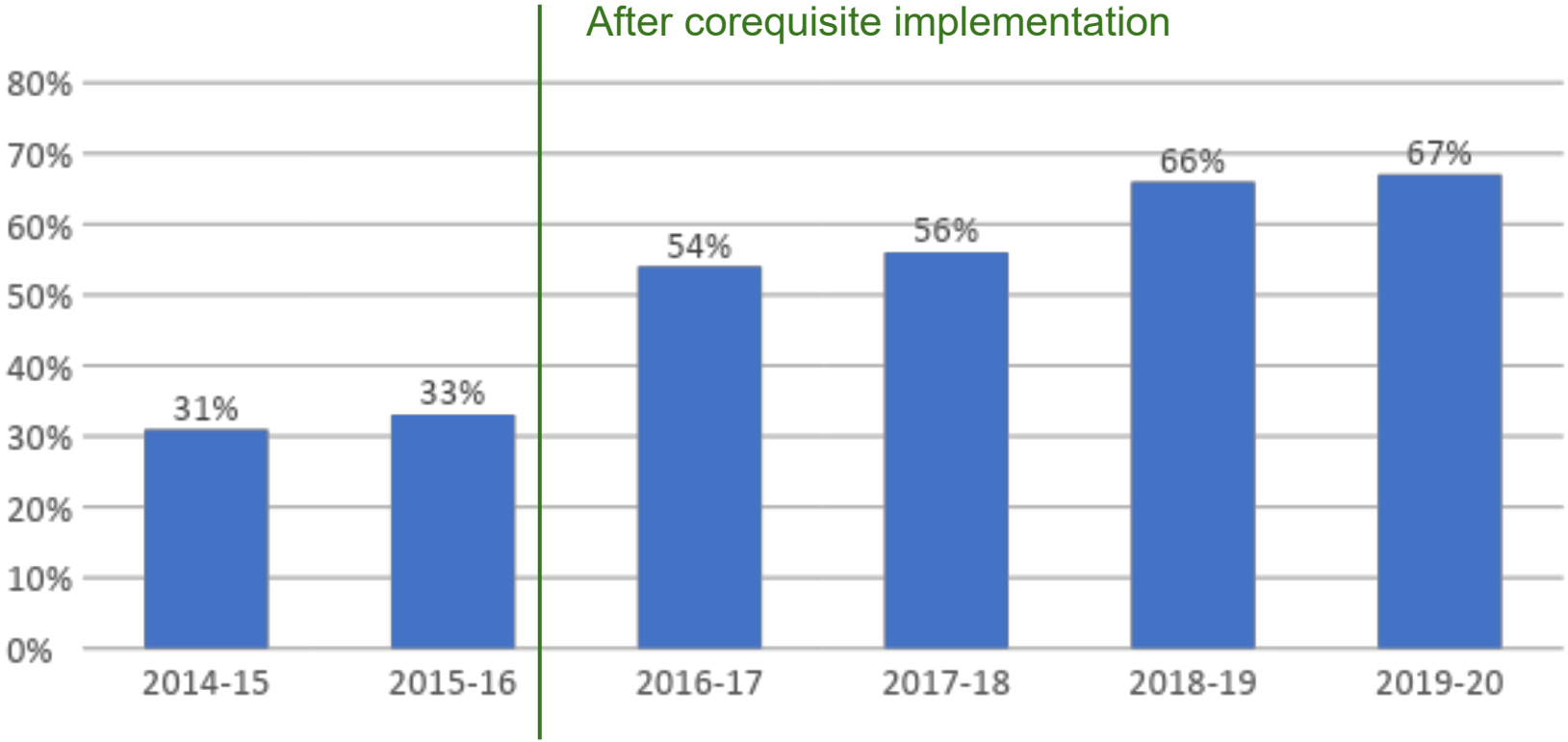
Recommended	Orientation Ind	Ed Plan Ind	Total
⊞Math 110			66
⊞Math 120 OR Math 160			299
⊞Math 120+020 OR Math 160+060			48
⊞Math 125			37
⊞Math 160 OR PSY 215			128
⊞Math 160+060 OR PSY 215+Math 060			14
⊞Math 176 OR Math 175 AND Math 170			80
⊞Math 176+076 OR Math 175+075 followed by Math 170			51
⊞Math 178 followed by Math 160			69
⊞Math 178+078 followed by Math 160			30
⊞Math 180			87
Total:			909

Changes in the Schedule

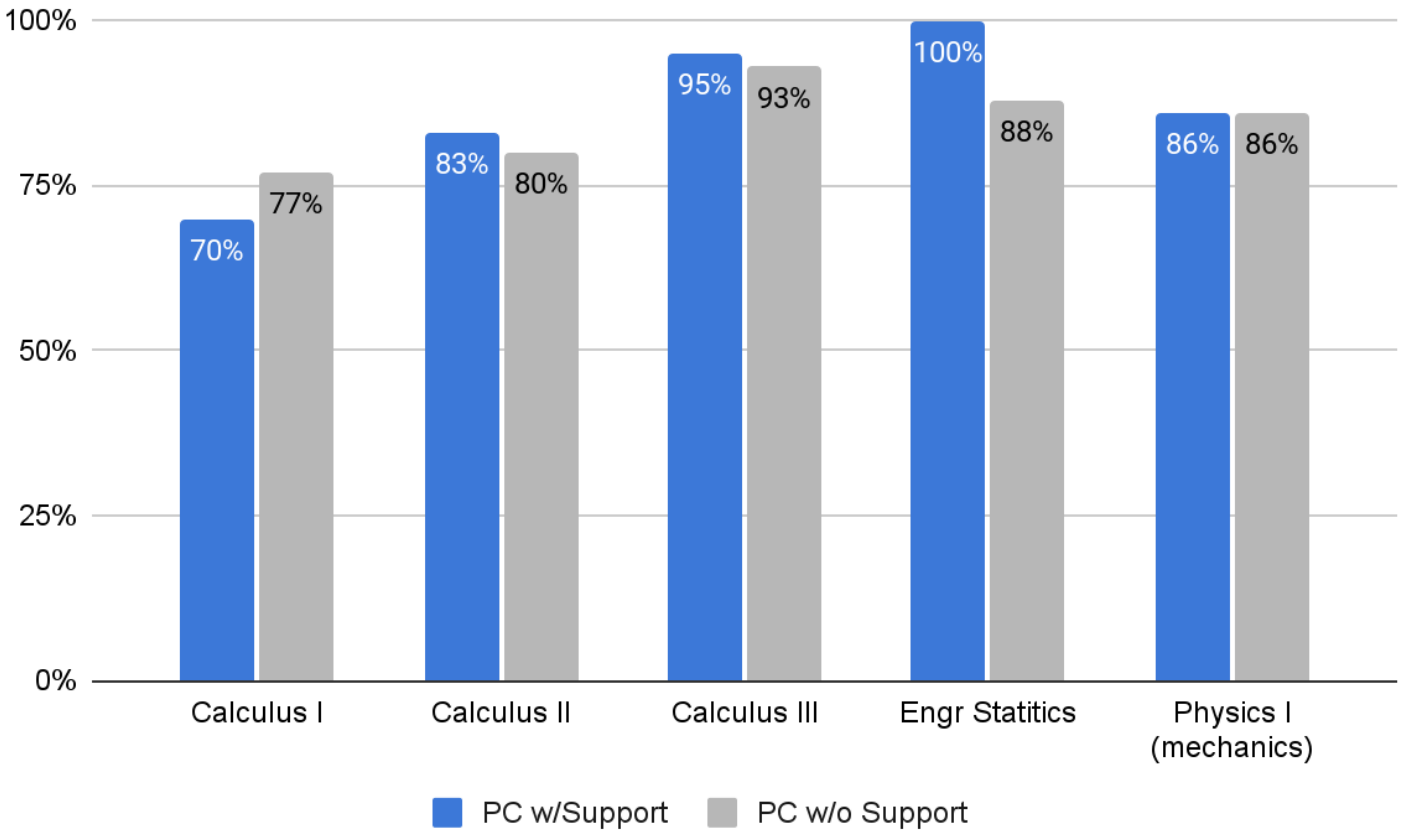
Course	Fall 2015	Fall 2021
Quantitative Reasoning	2	3
Statistics	11	17
Business	2	3
PreCalculus	5	9
Calculus and above	9	14

What Happened?

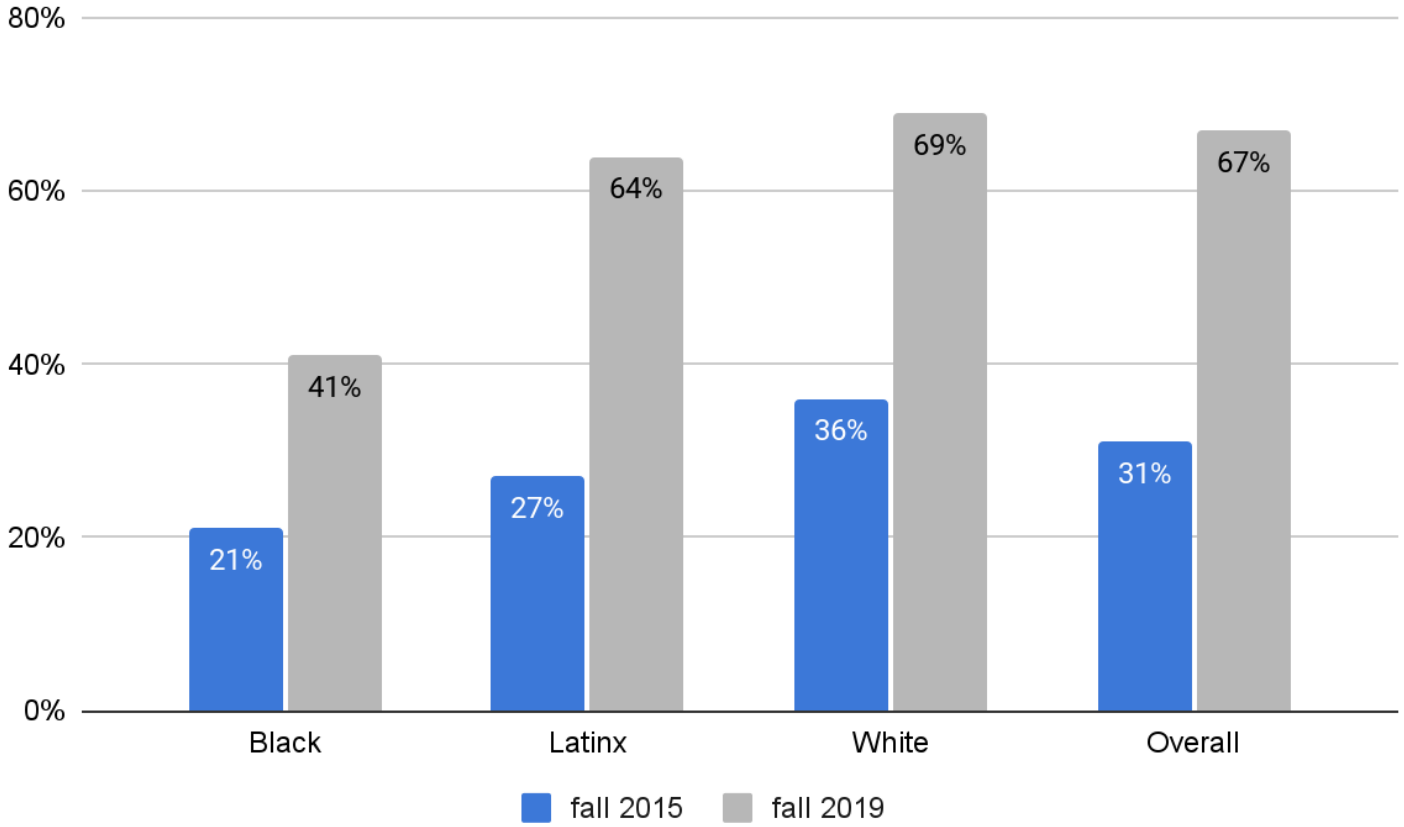
First-time students' one-year throughput



STEM Data


100%
75%
50%
25%
0%
70%
77%
83%
80%
95%
93%
100%
88%
86%
86%
Calculus I
Calculus II
Calculus III
Engr Statitics
Physics I (mechanics)
PC w/Support
PC w/o Support

Equity Gaps Persist



Equity Interventions

Interventions

2016-2019

- Community of Practice meetings
- Professional Development conferences/workshops
- First use of disaggregated instructor-level data
- Second group to participate in the college's Equity-Minded Teaching and Learning Institute (EMTLI)
- Slightly "moved the needle" on math equity gaps

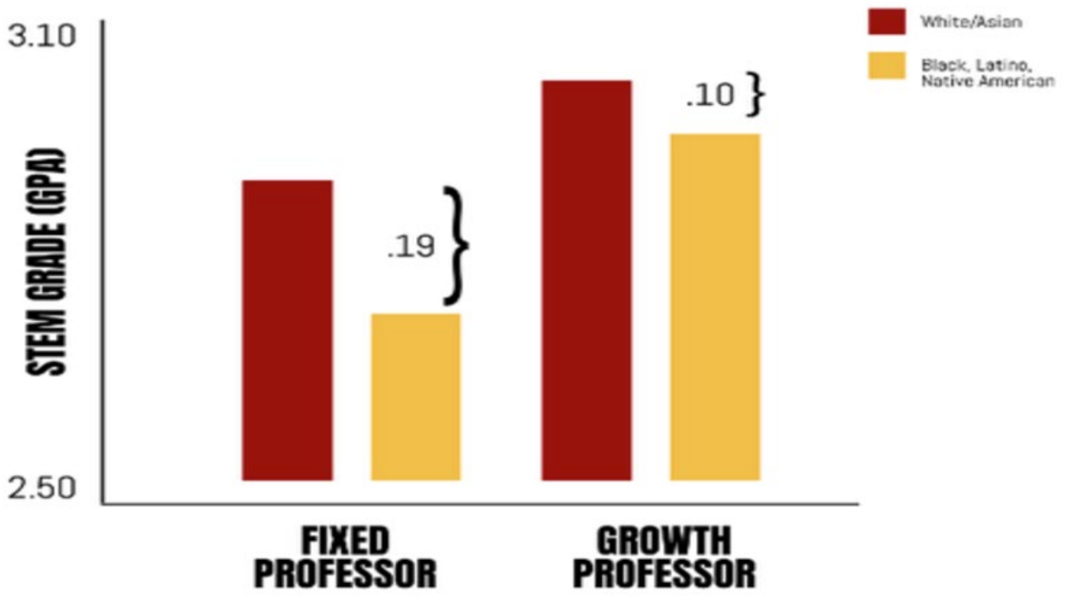
2019 - present

- Community of Practice to focus on closing equity gaps
- Professional Development conferences/workshops with a focus on equity
- Updated disaggregated instructor-level data
- Participation in updated EMTLI
- Structural approaches to course fundamentals and instructor mindsets

Specific Work on Faculty 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

Elizabeth A. Canning*, Katherine Muenks†, Dorainne J. Green, Mary C. Murphy*

An important goal of the scientific community is broadening the achievement and participation of racial minorities in STEM fields. Yet, professors' beliefs about the fixedness of ability may be an unwitting and overlooked barrier for stigmatized students. Results from a longitudinal university-wide sample (150 STEM professors and more than 15,000 students) revealed that the racial achievement gaps in courses taught by more fixed mindset faculty were twice as large as the achievement gaps in courses taught by more growth mindset faculty. Course evaluations revealed that students were demotivated and had more negative experiences in classes taught by fixed (versus growth) mindset faculty. Faculty mindset beliefs predicted student achievement and motivation above and beyond 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 experiences and achievement of underrepresented minority students in STEM.

INTRODUCTION

Despite decades of research and millions of dollars in federal funding aimed to understand and ameliorate the underrepresentation of diverse individuals in the STEM (science, technology, engineering, and mathematics) pipeline, Black, Latino, and Native American students [underrepresented racial/ethnic minorities (URM)] continue to underperform academically relative to their White peers (*1*). While these racial achievement gaps are determined by multiple (e.g., economic and structural) factors, they may be exacerbated by subtle situational cues from STEM professors that reinforce racial stereotypes about which social groups are more or less likely to have ability in STEM (*2*).

The cues hypothesis suggests that threatening situational cues in STEM settings, such as the diagnosticity of a test (*2*–*4*), can cause URM students to become concerned about being judged in terms of ability stereotypes, resulting in a loss of motivation, intellectual underperformance, and larger racial achievement gaps in STEM classes (*5*–*7*). This study examines the role of a novel situational cue to stereotype underperformance—STEM college professors' beliefs about the fixedness or malleability of ability (*8*)—and explores whether these faculty beliefs are associated with URM students' motivation and their academic achievement in those professors' STEM courses.

People's mindsets (also known as implicit theories or lay theories) are their beliefs about the fixedness or malleability of human characteristics like intelligence or personality (*8*). Faculty members who espouse fixed mindset beliefs endorse the idea that intelligence and ability are fixed, innate qualities that cannot be changed or developed much. In contrast, faculty who espouse growth mindset beliefs endorse the idea that ability is malleable 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 pedagogical practices, like encouraging students to drop difficult courses (e.g., "not everyone is meant to pursue a STEM career") (*9*).

Faculty who endorse fixed mindset beliefs think that some students have strong, innate intellectual abilities, while others do not. Which students might those be? Pervasive cultural stereotypes suggest that White and Asian students are more naturally gifted in STEM than Black, Latino, and Native American students. Because these American cultural stereotypes impugn the intellectual abilities of URM students, we predicted that faculty who endorse fixed mindset beliefs may be particularly demotivating to URM students, resulting in lower performance among URM students in courses taught by fixed (versus growth) mindset faculty. Classic findings regarding the influence of teacher beliefs on students' performance demonstrate that when teachers have lower expectations for their students, those students become less motivated and perform more poorly in those teachers' classes (*10*). These Pygmalion effects are even stronger for URM students (*11*, *12*).

We hypothesized that STEM professors' fixed beliefs about intelligence and ability would lead URM students to experience lower motivation and to underperform relative to their non-stereotyped peers—a pattern consistent with stereotype threat theory. Classic studies that document stereotype threat underperformance effects typically manipulate threatening (versus nonthreatening) situational cues in the learning environment, such as an experimenter's race/ethnicity/gender, and assess students' intellectual performance as the primary indicator of stereotype threat (*2*, *7*, *13*, *14*). Drawing on 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 among 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 endorse growth mindset beliefs.

The present study investigates undergraduate STEM faculty's self-reported mindset 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

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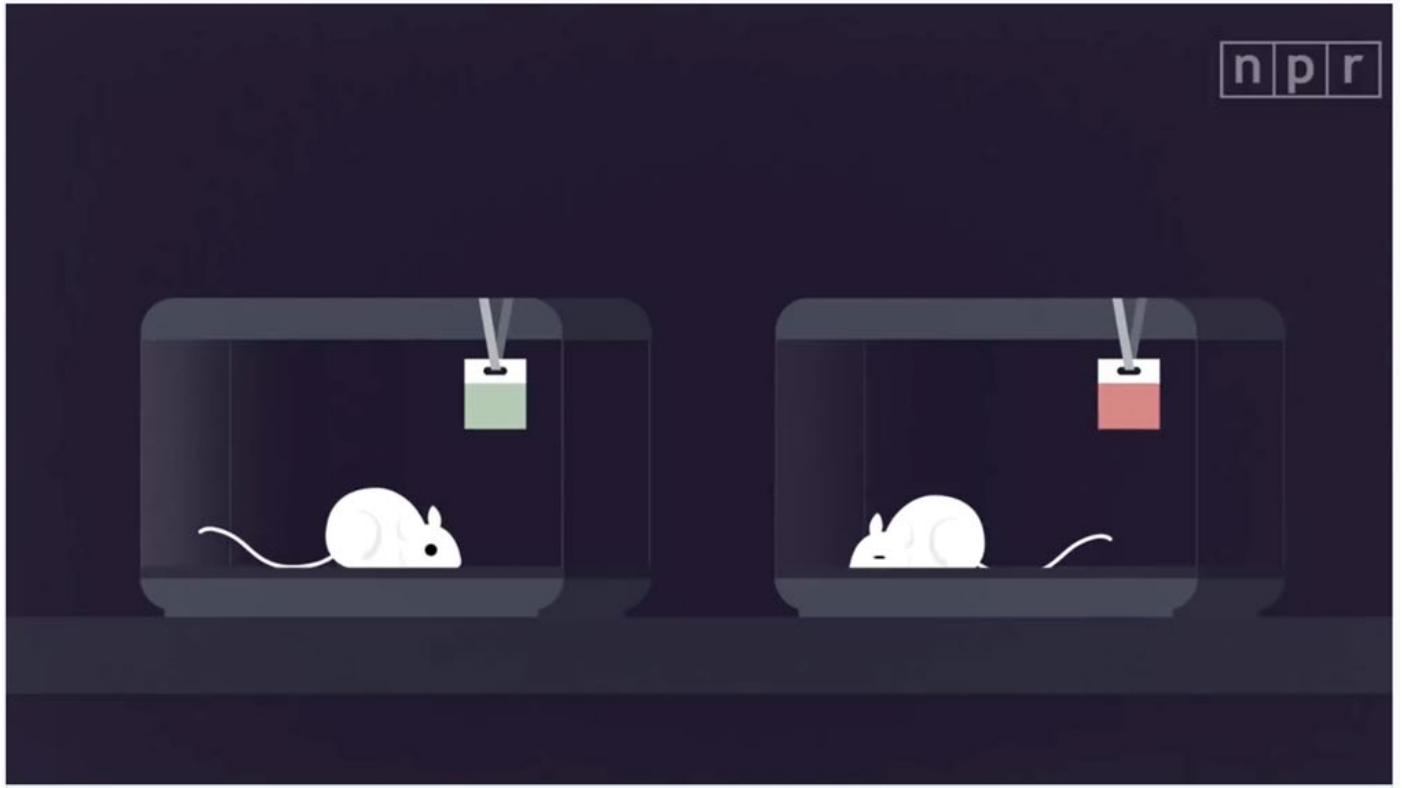
Faculty Mindsets



A Caution related to Mindsets

It’s not “You can do anything!”

It’s not *just* about effort.

Anyone can get better at anything with consistent and effective effort.

- What examples of interactions with students can you think of that could impact their motivation and performance?
- What interventions are you making to support equitable student outcomes in your programs?

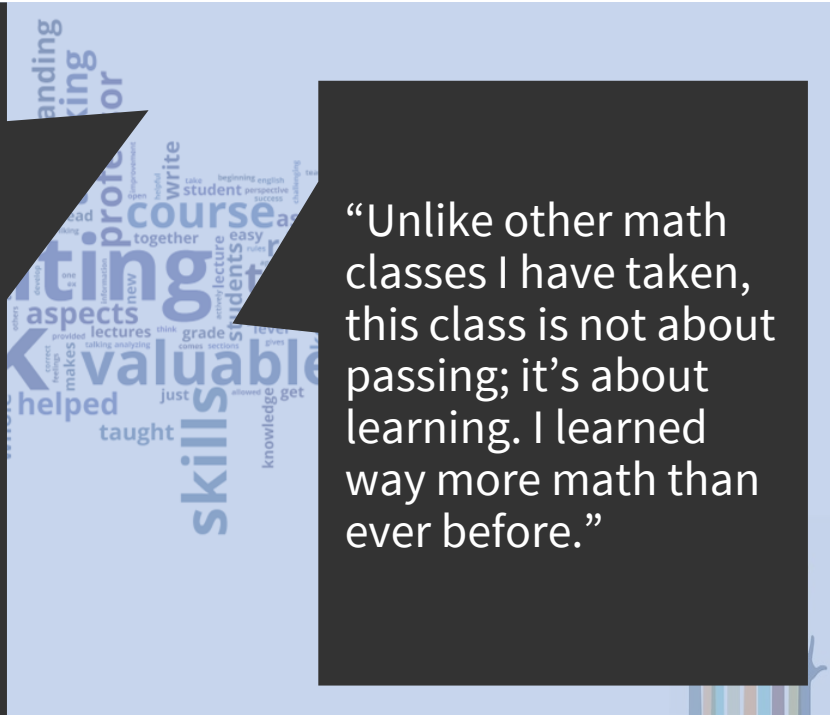
Sharing Ideas

Student Perspectives on Corequisite Courses

Students See the Value

We asked students: **What aspects of the co - req course have been most valuable?**

"A lot of people underestimate themselves. They put up walls and say, 'I can't do it' and 'I'm not good at that.' I got bad grades in math during high school. To see myself now means anyone can succeed in math, if they work and get the right support."



"Unlike other math classes I have taken, this class is not about passing; it's about learning. I learned way more math than ever before."

What We Have Learned

Continuous Cycle of Improvement

- Make structural changes alongside cultural changes.
  - Address instructor mindsets
- Secure access to quality equity-minded PD
- Clarify messaging to students about placement, resources, etc.
  - Adopt structural interventions rather than a "cafeteria style" approach.
- Engage with students about their experiences and perspectives in creating program improvements.

Q & A

Thank you!

Tammi Marshall
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Citations/Reports

- Maximizing Math Throughput of Students who Did Not Complete Algebra 2 in High School
- STEM Faculty Who Believe Ability is Fixed Have Larger Racial Achievement Gaps and Inspire Less Student Motivation in Their Classes
- Corequisite Works: Student Success Models at the University System of Georgia
- Mindset Video