SUPPORTING STUDENT SUCCESS IN STEM: STRATEGIES THAT WORK

A FOCUS ON UNDERSERVED STUDENTS OF COLOR

J Luke Wood Frank Harris III
San Diego State University
Community Colleges and STEM
Examining Underrepresented Racial and Ethnic Minorities

Edited by ROBERT T. PALMER and J. LUKE WOOD

STEM Models of Success
Programs, Policies, and Practices in the Community College

edited by
J. Luke Wood
Robert T. Palmer
Community Colleges
Who Are Our Black and Latino STEM Students?

Latino
- 42% delayed enrollment into college
- 83% are first-generation Students
- 47% are low-income
- 64% of all Latino students in need of remedial education
- 65% of all Latino students in public postsecondary education

Black
- 51% delayed enrollment into college
- 75% are first-generation Students
- 64% are low-income
- 49% in need of remedial education
- 68% Attend college less than full-time

Source: National Postsecondary Student Aid Study
Black Male Community College Students in STEM

39.4% Attain a certificate, degree, or transfer in six years

14.5% Black men who major in STEM

When student entered STEM field
- 71.6% first year of college
- 14.4% between years two and four
- 14.0% between years four and six

What happened to those who left STEM major?
- 52.4% Dropped out
- 47.6% Changed major

Popular STEM Majors
- Computer and Information systems
- Engineering Technologies
- Engineering
- Biology and Bio-medical Sciences

Data from the Beginning Postsecondary Students Longitudinal Study and National Postsecondary Student Aid Study. Data are restricted to domestic African American men.
What is $M^2C^3$?

$M^2C^3$ partners with community colleges to build the institutional capacity necessary to facilitate student success for men who have been historically underrepresented and underserved in postsecondary education.

- Partnered with over 100 colleges across the nation to support capacity building efforts around assessment and development
- Conducted campus-level assessment at over 60 colleges using the Community College Survey of Men (CCSM) and Community College Insights Protocol (CCIP)
- Host the National Consortium on College Men of Color (NCCMC) – a capacity-development initiative
- Published over 50 scholarly works, including books and peer-reviewed journal articles on Black, Latino, Southeast Asian, and Veteran men in community colleges
- Designed instruments that comprehensively assess the experiences and outcomes of college men of color. These free instruments are used by colleges around the country, they include the:
  - Community College Student Success Inventory (CCSSI)
  - Male Program Assessment for College Excellence (M-PACE)
  - Community College – Instructional Development Inventory (CC-IDI)
CCIP
A focus group protocol for understanding the perceptions and experiences of students that shape their outcomes in community college settings.

MPACE
An outcomes-based assessment tool for programs and initiatives serving men of color.

CC-IDI
An institutional-level inventory to inform professional development programming for instructional faculty who teach underserved students.

CCSM
An institutional-level needs assessment tool for identifying factors influencing the success of college men of color.
Theoretical Perspectives
“Every system is perfectly designed to achieve the results it gets.”

(attributed to W. Edward Deming and Paul Batalden)

“It is futile to dwell on students’ past experiences. It is also harmful if inequalities are rationalized as beyond the control of practitioners. Instead we must focus on what is within the control of educators in terms of changing their own practices to meet the needs and circumstances” of our students.

(Harris, Bensimon & Bishop, 2010)
“What the heck is wrong with these students? Why aren’t they doing what it takes for them to be successful here?”
“What are we doing (or not doing) as a college, campus, or department that results in our STEM students not doing as well as they should?”
Strategies Advocated: The M2C3 Perspective
Institutional Level Change

- **Professional development** for all faculty and staff (including part-timers)
- Hire *faculty with proven track record* and training in teaching historically underserved populations
- Greater representation of *full-time faculty in key gatekeeper courses*
- Complete *overhaul of basic skills* and assessment testing
- *Redesign of curricular pathways* – stackable credentials
- Implement a *college/district-wide early alert system*
- *Intrusive services*, resources, practices
Online Certificate Program

TEACHING MEN OF COLOR IN THE COMMUNITY COLLEGE

PROGRAM FEATURES

- Designed for community college instructors
- One-week long program
- Fully online program delivery
- Live interactive dialogue with instructors
- Tangible solutions for real challenges

LEARNING FORMAT

- e-Learning videos
- Virtual discussion board
- Real-time conferencing with instructors
- Practical readings

LEARN MORE at www.coralearning.org  CONTACT at bherrin@coralearning.org

TARGET AREAS OF INTERVENTION

- Racial Microaggressions
- Collaborative Learning
- High Expectations
- Validation
- Personal Relationship
- Challenge
- Support
- Culturally Relevant Teaching
- Culturally Relevant Materials
- Empowerment Strategies
- Intrusivity
- Performance Monitoring

This is a non-credit, non-CEU professional development training program
## Results from CORA Program

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean Pre</th>
<th>Mean Post</th>
<th>Higher Mean</th>
<th>Sig 1-tail</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro-Aggressions</td>
<td>6.33</td>
<td>6.83</td>
<td>.50</td>
<td>=.003</td>
<td>Medium</td>
</tr>
<tr>
<td>Collaborative Learning</td>
<td>20.37</td>
<td>22.14</td>
<td>1.76</td>
<td>&lt;.001</td>
<td>Large</td>
</tr>
<tr>
<td>Personal Relationships</td>
<td>32.65</td>
<td>34.42</td>
<td>1.76</td>
<td>&lt;.001</td>
<td>Large</td>
</tr>
<tr>
<td>Validation</td>
<td>36.31</td>
<td>38.95</td>
<td>2.64</td>
<td>=.101</td>
<td>-</td>
</tr>
<tr>
<td>Challenge</td>
<td>25.47</td>
<td>28.14</td>
<td>2.67</td>
<td>=.019</td>
<td>Medium</td>
</tr>
<tr>
<td>CR Teaching</td>
<td>21.90</td>
<td>23.39</td>
<td>1.48</td>
<td>&lt;.001</td>
<td>Large</td>
</tr>
<tr>
<td>CR Materials</td>
<td>22.02</td>
<td>23.61</td>
<td>1.58</td>
<td>&lt;.001</td>
<td>Large</td>
</tr>
<tr>
<td>Empowerment</td>
<td>26.86</td>
<td>29.40</td>
<td>2.54</td>
<td>=.002</td>
<td>Medium</td>
</tr>
<tr>
<td>Intrusive</td>
<td>37.66</td>
<td>41.37</td>
<td>3.71</td>
<td>&lt;.001</td>
<td>Large</td>
</tr>
<tr>
<td>Performance Monitoring</td>
<td>31.33</td>
<td>34.00</td>
<td>2.67</td>
<td>=.042</td>
<td>Medium</td>
</tr>
</tbody>
</table>
Challenges
Math - Emerging Thematic Categories

- **Structural Concerns (derived from student focus groups)**
  - Too few offerings of requisite courses
  - Limited tutoring services
  - Lack of consistency across courses
  - A focus on coverage, not learning
Lack of Consistency

Yeah some teachers don’t teach from the book. They don’t do the same thing the book does and then when you get to another class, all the stuff you were doing before is completely different.

They might even cover different stuff. Like one teacher might focus on proofs in Cal 2 and somebody else just might focus on problem solving. If you took Math 7 with him you’d be good on proofs but if you didn’t then you’d get screwed in Math 8 because you never did it before.

They skip over stuff and you miss out on stuff and then the next class what was skipped, was emphasized heavily and now you’re like done.
Math - Emerging Thematic Categories

• **Perceptional Barriers (derived from student focus groups)**
  – Lack of motivation from faculty
  – Stereotyped as being incompetent (and other microaggressions)
  – Faculty who “don’t care”
  – Faculty motivation
  – Approach me first, prove yourself first
  – Faculty making students feel uncomfortable (“less than”) for asking questions

• **Perceptional Barriers (derived from faculty focus groups)**
  – Students are not interested
  – Some students are just lazy
  – “They don’t interact much”
  – They don’t seek out help
  – Culturally relevant teaching isn’t applicable “math is its own language”
Faculty Motivation

I actually dropped my first Math 20 class...she didn’t explain anything at all. It was really hard because she wasn’t passionate about it. She didn’t wanna be there. It was really frustrating.

When you see the teachers motivated. When you see the passion in them, we get that same motivation.

I love when my teachers are passionate.
Messages Communicated

DROP [they communicate] do not take this class, at all. Don’t even try to take this class. It’s not the same as you did in high school. I took a Math 20 class, which is algebra and the professor emphasized multiple times that if you’re not getting it, drop the class. No ways on how I could fix or improve. Just drop the class.

LOW EXPECTATIONS “There are some teachers that will tell you,. “I’ve probably given just one A in the last 3 years’.” That’s bulls^!t. Because you even get to class you know you can’t get an A.

STEREOTYPES ABOUT INTELLIGENCE Alright, I’m going to take more of a personal standpoint looking from inside out. Appearance. How I look towards a classmate, teachers. Asking too many questions. That right there has been a huge challenge. Um there have been times when I’ve answered a question and then I get responses like “Wow, I didn’t expect you to know that”.
Math - Emerging Thematic Categories

- **Curricular-Andragogical Barriers (derived from student focus groups)**
  - Time limitations during exams
  - Class structures that include 3 to 4 exams for an entire course
  - Classroom delivery that is lecture based (only)
  - Lack of test review or scaffolding via quizzes or tests
Math - Emerging Thematic Categories

- **External Barriers (derived from student focus groups)**
  - Familial responsibilities
  - Balance between work and school
  - Financial hardship due to purchasing course materials
External Pressures

I would put my academics behind my real world problems. Like a job, or personal family obligations, or mainly work as well. Trying to find the balance between a class that requires as much time as mathematics. Most of the upper division math classes, while trying to work full time or at least half time is not easy... When you’re behind, you’re done.

I have to take my stepdad to work or I gotta pick up my mom from somewhere. That takes up time. Especially when they work its rush hour. Things like that accumulate. Sometimes that inhibits me from going to class.
Math - Emerging Thematic Categories

- **Recommendations (derived from student focus groups)**
  - Personal
    - Taking course sequences with one faculty
    - Prove them wrong
    - Comraderie among other STEM majors of color
    - Get into a program
  
  - Institutional
    - Workshops on ‘Life After Transfer’
    - Interactive software
    - Enhanced tutoring infrastructure
Enhanced Tutoring Infrastructure

I actually think we need more tutors. Sometimes you wait 30 minutes just to get one question answered. Sometimes you have one tutor in the classroom and that’s not enough.

You put your name on the list. Sometimes they answer your questions, sometimes they don’t. I’ve had a couple of tutors that are stumped.

And sometimes the tutor is not really good at explaining.
Interactive Software

Yeah so then what happened was, we had to buy a program access code. It helped because in some of those chem classes there was algebra. And to construct...Its one of the main things I always hear. Let alone math is difficult but having word problems was difficult. Not only was it able to niche do the work, but I was able to redo it. It showed how to solve it later on. It also gives you points. In the end it was about a quarter of my grade just to do the homework. So again I think that’s a good way so if the professors can get. Where are my students struggling? So if its automated. Professors can say, I can see where my students are struggling because I know some of my students are not gonna talk to me. This would be my way to know that. For me I would say to a peer is to see if you can find a program. A computer program. Because otherwise, people can say oh go to YouTube but some of that is junk. How can you differentiate when you’re learning it?
Comradery

A program like STEM for example you get to meet people that are interested in science. People that want to become engineers. So sometimes when you like a little bit low, when you’re not doing good in those classes, you always have a friend that in the same program that will tell you “We’re gonna get through this. We’ll transfer. Go on and get a degree. Like study habit.
Following a Sequence with One Faculty

What I try to do for example is like, taking the same teacher for the class. If I have a teacher for Cal 1, I take the same teacher for Cal 2 and I’m trying to stay with the same guy again and again. I already know his way of doing things and I don’t have to adjust.
Recommendations from the STEM Books

Professional development for faculty and staff

- Culturally responsive/relevant science instruction
  - Culturally relevant (Mayan concept of zero, costs of braiding hair)
- Activities that engage a STEM identity
- In and out of class engagement practices
- Strategies for building an internal locus of control
- Conveying high expectations
- Fostering collectivity in the classroom
- Stereotype threat
- Curriculum and course changes
- Unconscious bias and colorblind ideology
- Use data to focus on disparate Asian/PI outcomes
Recommendations from the STEM Books

Direct instructional strategies

– Cooperative experiential learning (Particularly faculty led)
– Collaborative learning (e.g., rearrange room in groups)
– Culturally responsive/relevant science instruction
– Build into labs activities that promote: how to use textbook, learning styles, using the library
– Peer led team learning sessions built in
– Leverage software
  • Providing online notes in advance of class
  • Online quizzes that supplement face to face
Recommendations from the STEM Books

• Recruitment
  – Using dual enrollment to spur interest in STEM since students usually enter STEM early
  – Create an academy that familiarizes family and community members about admissions and financial aid

• Advising and counseling strategies
  – Strategic advising that highlights connections between academics and future economic stability
  – Gender identity built in to program serving men
  – Build transfer capital and culture
  – Accurate information about STEM careers
Recommendations from the STEM Books

Structural strategies

• Don’t allow students to avoid taking dev ed.
• Learning communities
• Research opportunities with faculty
• Stackable credentialing
• Individualized educational plans
• Ensure fluid pathways in articulation between two and four-year institutions
• Faculty diversity
Contact Us

Minority Male Community College Collaborative
M2c3.org

J. Luke Wood, PhD
Luke.wood@sdsu.edu

Frank Harris III, EdD
Frank.harris@sdsu.edu

CORA Professional Development Program on Teaching Men of Color
Coralearning.org

Bridget Herrin, EdD
bherrin@coralearning.org