

MENTORING UNDERREPRESENTED STUDENTS IN STEM

Committee on the
Science of Effective Mentoring in STEMM

*The National
Academies of* SCIENCES
ENGINEERING
MEDICINE

Participatory Workshop on Metrics,
Models, and Identities in STEMM Mentoring Relationships:
What Works & Why?

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Presentation Outline

Intentional Focus on Mentoring Graduate Underrepresented Students

- Assumed mentoring from PI/academic advisor relationship
- Mentoring was pivotal for underrepresented minoritized (URM) students to enter graduate programs
- URM students often had trouble finding a mentor

STEMM - Climate and Culture

- Racialized hierarchy of presumed STEMM achievement makes it difficult for URM to develop and sustain mentoring relationships



Four Mentoring Domains

Mentor assesses academic and career goals by evaluating mentee's strengths, weaknesses, and abilities

SUPPORT FOR GOAL-SETTING & CHOOSING A CAREER PATH

PSYCHOLOGICAL & EMOTIONAL SUPPORT

Mentor encourages mentee, helps with problem-solving, uses active-listening techniques

Mentor guides and shapes mentee's behavior, values, and attitudes

Requires mentee's identification with the mentor

ROLE-MODELING

More effective for mentees who share an identity with the mentor

ACADEMIC SUBJECT KNOWLEDGE SUPPORT

Mentor educates, evaluates, and challenges mentee academically
Focuses on subject learning, uses tutoring skills



Good for Mentees, Not So Good for Mentors of Color

(mostly undergraduate studies)

Faculty of color pay a high emotional, professional, and financial price for doing undergraduate research

Navigate academic culture, through personal or family problems, or finding financial resources to stay in college took an **emotional toll** on faculty.

Mentoring can be considered an additional responsibility that falls outside existing structures for traditional student advising

University did not value their mentoring and it took time away from teaching and publications, which could **impede the faculty member's career**



ESSENTIAL COMPONENTS of a Mentoring Program in STEMM for URM College Students



1. A meaningful, positive relationship with a mentor who supports and challenges the student
2. **Culturally appropriate & diverse instruction**
3. Development of a scientific identity
4. Institutional support (e.g., financial aid including financial assistance, recruitment strategies)
5. Engagement in research
6. Peer and other faculty support
7. Presence of a role model from a similar cultural background and academic program
8. Relationships with other minoritized staff
9. Advice from advanced students of the same ethnic group
10. An ongoing process for choosing and retaining Black students



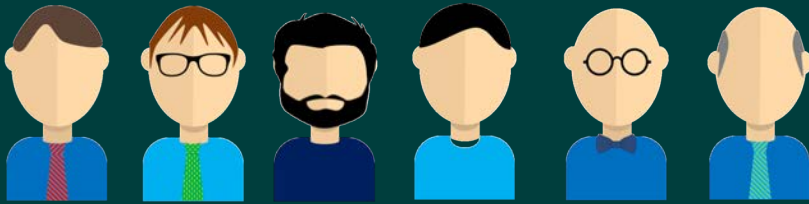
Mentoring of African American Graduate Students in all Academic Disciplines



How does having a mentor with the **same or different race and/or gender identities** affect the outcomes of the mentoring relationship for URM doctoral STEM students



Advisors/Mentors that were *not* of minoritized status



- Lab mates and principal investigators did not recognize their competence students even as they performed scientific research competently
- Social identities were largely ignored thus, dismissing their impact
 - maintained separate social and academic peer networks, minimized their raced and gendered identities
 - compartmentalized rather than integrated these critical identities with their science identities (McCoy, Winkle-Wagner, & Luedke, 2015).

Advisors/Mentors that were of minoritized status (race-matched STEM mentoring)



- Increased overall benefit especially in terms of psychosocial & emotional support
- Recognizing students' abilities and validating their multiple identities
- gaining a sense of self-efficacy and confidence that they too will succeed

PSYCHOSOCIAL SUPPORT

versus

INSTRUMENTAL SUPPORT

SAME RACE **PS** MENTORING

Greater trust and comfort and provides role-modeling

- More likely to be able to engage a student holistically
- Stronger science identity because seeing oneself as a scientist

Limited Availability and Access of URM STEM Faculty:
Relied on each other or receive mentoring from a more-advanced peer (step-ahead mentoring).

DIFFERENT RACE **IS** MENTORING

IS Better from White males

- MBA graduates protégés who had had White males mentors (regardless of their own race) earned significantly more than those who had had a mentor with a different demographic profile
- More research needed in STEM

Cross-Racial Mentoring aka Diversified Mentoring

CROSS-RACIAL MENTORING RELATIONSHIPS

White Mentors with Black students at a PWI reported...



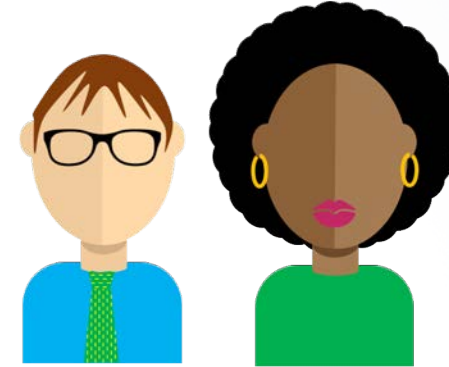
having a heightened awareness of the **unique challenges** facing Black students,



Gained an emergent **holistic understanding** of the student, and



engaging in **reciprocal** relationship-building.



Thus, **diversified mentoring relationships** (different-race, different-gender mentors) can succeed when mentors engage the students' personal histories and goals as well as their professional goals.



The Other URM



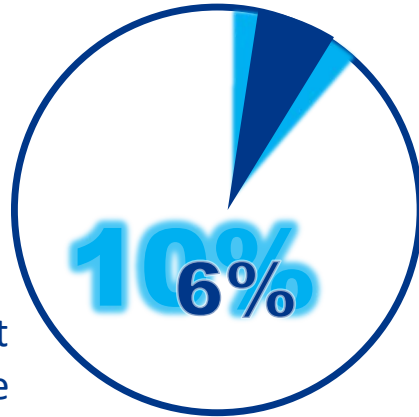
Students with Disabilities

The number of students with disabilities in STEM programs has decreased from 10% to 6% from 2004 to 2011

Factors include lack of support and accommodation in college settings

Inadequate preparation from special education programs.

Peer tutoring, lab communities, improved recruitment strategies, self-advocacy programs, professional development, mentoring programs, and e-mentoring (Gregg et al., 2017) may help students with disabilities in STEM.



LGBTQ+

Sexual orientation can be more concealable than race and gender

LGBTQ+ faculty may not disclose their orientation, but feelings of invisibility, isolation, and rejection can result. Hiding one's identity can contribute to stress and negative mental health outcomes

(Meyer, 1995, 2003).

Concealment of identity is expected to reduce workplace productivity even without active discrimination (Human Rights Campaign, 2014; Patridge et al., 2014;

Ragins et al., 2007).

THANK YOU!

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Please Hire Them 😊

More info at our website below:



BlackEngineeringPhD.org