

Mentoring Could Improve Diversity and Inclusion in STEMM But Needs More Attention in Colleges and Universities, Says New Report, Which Identifies Effective Mentoring Practices

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WASHINGTON – U.S. colleges and universities should take a more intentional, inclusive, and evidence-based approach to mentoring students in STEMM (science, technology, engineering, mathematics, and medicine) – a shift that could engage and help retain a broader group of students in these fields, says [a new report](#) from the National Academies of Sciences, Engineering, and Medicine.

Effective mentoring relationships have an overall positive effect on academic achievement, retention, and degree attainment, as well as on career success and satisfaction, the report says. Mentored students pursue graduate study more frequently than students without mentoring support and are more likely to stay in STEMM. Mentorship can also increase access, equity, and inclusion in STEMM. Studies have shown, for example, that effective mentorship for students from underrepresented groups enhances their recruitment into and retention in research-related career paths.

Despite its importance, mentorship rarely receives the focused attention, evaluation, and recognition given to other aspects of professional development such as teaching and research, the report says. With few exceptions, the nation's academic institutions have largely left mentorship to happen organically or on an ad hoc basis. Moreover, studies report that STEMM students from underrepresented groups typically receive less mentorship than their peers in well-represented groups.

“There is a gap between what we know about effective mentoring and how it is practiced in our nation's colleges and universities,” said Angela Byars-Winston, chair of the committee that wrote the report, and professor of medicine at the University of Wisconsin, Madison. “A growing body of evidence exists about how to create and sustain successful, inclusive mentoring relationships. We hope that our report can catalyze institutions' use of that evidence to create affirming environments and more effectively foster the talents of all of their students.”

The report was released along with an [online interactive guide](#) to support institutions, departments, and faculty members in implementing the report's recommendations.

Multiple Mentors, Culturally Responsive Mentoring Can Benefit Students

While every mentoring relationship is different, the report says, there are core behaviors of mentors and mentees that are more likely to yield effective mentoring relationships – such as aligning expectations, building rapport, maintaining open communication, and facilitating the agency of mentees. Mentorship is a learned skill, and programs developed to foster mentorship skills have been shown to help mentors and mentees advance their skills in multiple areas, the report says.

Typically, mentorship in STEMM is assumed to occur between one mentor and one mentee. While these “dyads” serve an important role, mentorship has expanded conceptually and operationally. Effective mentorship structures include triads, collective or group mentoring, mentoring networks, and emerging online and e-mentoring communities. These structures can provide additional benefits, the report says, including varying perspectives.

Many STEMM faculty mentors may downplay or de-emphasize cultural and social diversity in mentoring relationships and believe that “colorblindness” is desirable, neglecting the fact that important cultural and social identities shape their mentees’ academic experiences. Culturally responsive mentoring -- in which mentors, regardless of their race or gender, show interest in and value students’ cultural backgrounds and social identities -- may help students navigate invalidating experiences in academia, affirm their belonging in STEMM contexts, and reinforce their belief in their own ability to be successful in STEMM.

Many underrepresented students prefer to have mentors of the same race and/or gender, but the opportunity to maximize same-race, same-gender mentorship is challenged by the scarcity of underrepresented faculty in STEMM. Prior research is limited regarding the importance of demographic matching between mentor and mentee to mentee academic or career development, but at least some research supports the notion that shared beliefs, values, and interests are more predictive of relationship quality and desirable mentee outcomes than are shared demographic characteristics. Having a mentor of the same gender and racial/ethnic background is not necessarily associated with differences in outcomes such as grade point average, self-efficacy, or confidence about their fit in science. Growing evidence confirms that mentors of different identities can work intentionally to be culturally responsive and to understand power dynamics and oppression, and consequently can be well positioned to successfully meet the mentoring needs of underrepresented students.

Building a Culture of Inclusive, Effective Mentorship

The report offers recommendations to encourage a shift away from a culture of ad hoc mentorship and toward a culture of intentional, inclusive, and effective mentorship in all institutional contexts. Among the recommendations:

Institutions should adopt an evidence-based, operational definition of mentorship in STEMM, such as the one used by the committee in its work: *Mentorship is a professional, working alliance in which individuals work together over time to support the personal and professional growth, development, and success of the relational partners through the provision of career and psychosocial support.*

Evidence-based approaches should be used to support mentorship. For example, institutional and departmental leadership should support the use of evidence-based mentoring practices by providing tested mentorship education curricula, resources, and tools, as well as time for professional development and mechanisms for feedback, improvement, and accountability. Mentors should learn about and use evidence-based tools and strategies – such as mentoring compacts, individual development plans, mentor maps, and mentoring accountability mechanisms – and mentees should also acquaint themselves with these tools and strategies.

Structured feedback mechanisms should be established and used to improve mentorship at all levels. For example, institutional and departmental leadership should regularly and systematically review formal mentorship programs to support the development of mentorship skills and student success and well-being. Program leaders should systematically review formal mentoring programs and use other structured feedback systems to make decisions such as who is allowed to serve as a mentor, when to intervene if relationships are not effective, and how to help mentors improve their skills.

All participants in mentoring systems should recognize and respond to identities in mentorship. Institutional leadership should intentionally create cultures of inclusive excellence, and they should support mentorship initiatives that recognize, respond to, value, and build upon the power of diversity. Mentors should learn about and make use of inclusive approaches to mentoring such as listening actively, working toward cultural responsiveness, and reflecting on how their biases and prejudices may affect mentees and mentoring relationships.

Mentoring systems should support multiple mentorship structures. Institutional leadership should support policies, procedures, and other infrastructure that allow mentees to engage in mentoring relationships with multiple individuals. Mentors should support their mentees' efforts to build mentoring relationships with other individuals who can provide complementary or supplementary functions that support mentees' progress and success. And mentees should consider developing a constellation of mentoring relationships, using tools such as mentoring maps and individual development plans.

Effective mentorship should be rewarded. Institutional leadership should reward and visibly recognize mentors for documented, effective, and inclusive mentorship. Department chairs should use promotion, tenure, and performance appraisal practices to reward effective mentorship.

Steps should be taken to mitigate negative mentoring experiences. Institutional leadership should appoint and make visible one or more neutral third parties to serve as a point of contact to identify, investigate, and address negative mentoring experiences. Mentors should recognize that negative mentoring experiences can occur even with well-intentioned mentors and be open to addressing unintended negative mentoring experiences with a neutral third party.

The study – carried out by the [Committee on Effective Mentoring in STEMM](#) -- was sponsored by the Howard Hughes Medical Institute, the Alfred P. Sloan Foundation, the Burroughs Welcome Fund, and the Gulf Research Program of the National Academies of Sciences, Engineering, and Medicine. The National Academies of Sciences, Engineering, and Medicine are private, nonprofit institutions that provide independent, objective analysis and advice to the nation to solve complex problems and inform public policy decisions related to science, technology, and medicine. The National Academies operate under an 1863 congressional charter to the National Academy of Sciences, signed by President Lincoln.

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