

Advancing Antiracism, Diversity, Equity, and Inclusion in STEMM Organizations

Beyond Broadening Participation

Every individual, regardless of race, ethnicity, or country of origin deserves the opportunity to pursue an education or career in science, technology, engineering, mathematics, and medicine (STEMM) in a welcoming, supportive, and antiracist environment. Yet, despite considerable investments to increase diversity, equity, and inclusion in STEMM organizations, substantial barriers continue to produce systematically inequitable opportunities and outcomes.

Across racial and ethnic backgrounds, people show equal interest in STEMM fields at the onset of undergraduate education. By graduation, that equality is gone, resulting in a lack of diversity in those who complete both undergraduate and graduate STEMM degrees. That lack of representation is also reflected in STEMM careers.

To address these challenges, the Alfred P. Sloan Foundation; Fred Kavli Endowment Fund; Gordon and Betty Moore Foundation; Heising-Simons Foundation; National Institutes of Health; National Science Foundation; Ralph J. Cicerone and Carol M. Cicerone Endowment for NAS Missions; Rita Allen Foundation; and The Shanahan Family Charitable Foundation asked the National Academies of Sciences, Engineering, and Medicine to convene a committee with expertise in social psychology, industrial and organizational psychology, business, human resources, diversity science, higher education, public policy, history, sociology, and demography.

The committee's report, *Advancing Antiracism, Diversity, Equity, and Inclusion in STEMM Organizations*, synthesizes the existing body of research on antiracism, diversity, equity, and inclusion (A DEI) in STEMM organizations and provides guidance for stakeholders across the STEMM enterprise to build A DEI into existing systems.



INFLUENCES ON ANTIRACISM, DIVERSITY, EQUITY, AND INCLUSION IN STEMM ORGANIZATIONS

Like all organizations in the United States, STEMM organizations operate within the overall context of the nation's history, policies, and contemporary societal norms. The connections between organizations and that context are foundational to the culture and climate of educational and professional environments. In turn, the culture and climate of an organization can influence the working environment for a specific group or team, which may have its own microculture and microclimate that directly impacts the individuals in that unit.

Historical Context

Systemic racism in the United States both historically and in modern-day society encompasses both written laws and policies as well as informal practices and beliefs harming Black, Indigenous, Latine, Asian American, and people from other minoritized racial and ethnic groups.

This history provides critical context for understanding the unequal representation of people from minoritized groups in STEMM higher education and workplaces (Conclusion 2-1).

Structural, institutional, and systemic racism has existed across multiple sectors of society and continually reinforces a false hierarchy based on race and ethnicity. Examples of racism in U.S. structures, institutions, and systems can be seen in the unequal outcomes that people from minoritized groups experience in housing, education, and health. These barriers do not exist in isolation, and they can compound in ways that cause significant barriers to the provision of basic needs and the foundation for a healthy, financially stable life. They also can reduce entry and accessibility into STEMM higher education and the workforce.

In addition to the layers of inequity that people from minoritized racial and ethnic groups face, barriers to STEMM education, training, and career opportunities exist in the ways organizations admit, hire, promote, and reward students and employees. The reduced representation of Black people, Indigenous people, and people from other minoritized racial and ethnic groups

in STEMM organizations also can lead to environments with fewer in-group role models and peers. This lack of community can lead to feelings of isolation and deprive people of the social support needed to thrive in STEMM environments.

Lived Experience and Other Ways of Knowing

To complement and add depth to the research base, the committee gathered information on the lived experiences of Black individuals with successful STEMM careers by conducting structured interviews. Interviewees included members of the National Academies Roundtable on Black Men and Black Women in STEMM as well as members of the National Academies who identify as Black or African American. Themes that emerged included experiences of belonging (or not), specific biased or racist incidents, sources of support from others, and their own sources of resilience.

Oral history and other means of exploring the lived experiences of scholars from historically and systemically minoritized groups in STEMM offer valuable insights that supplement findings from other kinds of research. These methods should be continued and expanded (Conclusion 4-1).

“...racism, it’s a tough thing, tough issue ... even in this year—not directed to me personally, but even on our campus within science and engineering buildings, I mean, there have been a number of incidents where students who were legitimately supposed to be inside buildings and **people called police on them**. And these are students trying to do research and mind their own business ... you see that and, wow this is still going on. Something that I thought yeah, I shouldn’t have to see that again, and it’s happening.”

– Anonymous, interview conducted by L.M. on June 30, 2022

Organizational Culture

An organization's culture is made of its structures and behaviors, while the climate is participants' perceptions and experience of a given context. Together, culture and climate impact how people access and experience educational and professional STEMM settings. Those experiences are consequential for performance, persistence, belonging, and wellbeing.

Understanding how standard functions of an organization can produce and reinforce inequality helps to illuminate the changes needed to advance ADEI. Decisions about resource distribution that have implications for racial inclusion and equality take place across multiple areas in an organization, including:

- Recruitment (Where you search for talent)
- Hiring (Whom you select and through what methods)
- Evaluation criteria (How people and their performance are assessed)
- Rewards (Who gets key assignments, recommendations, leadership positions, promotions, and higher compensation)
- Resources (Who gets access to career development, mentorship and sponsorship, support systems, and peer and professional networks)

Most organizations do not operate in a “neutral” or unbiased way. The methods organizations use to distribute resources; hire, advance, retain, promote, and reward individuals; and enforce policies may occur in racialized ways. Leaders can show the depth of their commitment to ADEI by putting these values at the center of policies and practices, thereby disrupting the status quo to create more equitable and inclusive environments.

Teams

STEMM culture has historically been characterized by individualism and competition with others. Increasingly,

however, many STEMM fields rely on individual researchers training or working together in teams of varying sizes. Thus, improving teamwork is often a priority in STEMM organizations.

The evidence from research on team diversity suggests that simply having a numerically diverse team does not automatically result in positive performance outcomes. In fact, many negative emotions and experiences related to interracial anxiety may impede the interpersonal process of team dynamics and reduce subsequent performance. Moreover, a numerically diverse team does not ensure that the team will also be antiracist, equitable, and inclusive.

For these reasons, *Advancing Antiracism, Diversity, Equity, and Inclusion in STEMM Organizations* concludes for teams in STEMM organizations, increased numeric representation of people from minoritized groups is critical; however, numeric diversity alone is an insufficient condition to yield positive team performance. Conditions that foster inclusion are also essential (Conclusion 7–1).

STEMM Gatekeepers

Racism at the individual and interpersonal levels impedes STEMM careers for people from minoritized groups. This racism is often perpetuated by gatekeepers through stereotypes, prejudice, and discrimination.

Gatekeepers, including managers, supervisors, principal investigators, heads of laboratories and research groups, and others, are individuals who are in a position to permit or prevent access to resources. Gatekeepers often have status and resources, can define boundaries, decide admissions, and can directly influence STEMM contexts. In these ways, gatekeepers have the power to shape the extent to which people from minoritized groups gain access, are included, and thrive in STEMM. Because the underrepresentation of people from minoritized groups in STEMM continues and is amplified in the higher levels of an organization's hierarchy, the population of people in gatekeeping roles does not reflect the diversity of the nation.

Like other people, gatekeepers often have attitudinal biases, cognitive mechanisms, and social motives that keep the status quo, which often privileges White people, intact. Racial bias is not only more automatic, but also more ambivalent and ambiguous than most people think. That means that individuals, including gatekeepers, may not be able to monitor their own bias impartially, and may unwittingly perpetuate it (Conclusion 6-1).

CHANGING THE CULTURE IN STEMM ORGANIZATIONS

As the United States seeks to recognize the full potential of all its residents, STEMM organizations have sought guidance on advancing change regarding ADEI. However, ADEI are not a single set of goals that organizations can work toward, achieve, and declare the work concluded. Instead, these efforts demand sustained attention, leadership, and resources to flourish. To these ends, the recommendations outlined in *Advancing Antiracism, Diversity, Equity, and Inclusion in STEMM Organizations* call on actors and stakeholders across the STEMM enterprise to:

- Develop and implement an inclusive, multi-faceted plan to support people from minoritized groups at all levels of STEMM organizations.

- Create inclusive and equitable team conditions that support positive outcomes by reducing interpersonal bias.
- Promote a culture that is accessible and supportive to all and address norms that impede diversity.
- Anticipate resistance to ADEI efforts and investigate the impacts of training on ADEI outcomes.
- Redress individual bias and discrimination as well as organizational processes that reproduce harm for people from minoritized groups.
- Fund grants to understand and translate policies, programs, and practices of Minority Serving Institutions to predominantly White institutions.
- Collect data on gatekeeper decisions, include ADEI responsibilities in job descriptions for leadership roles, develop systems for more inclusive decision-making processes and shared authority over resource allocation.
- Collect data on the demographics and educational outcomes of college students who seek STEMM degrees.

COMMITTEE ON ADVANCING ANTIRACISM, DIVERSITY, EQUITY, AND INCLUSION IN STEMM ORGANIZATIONS GILDA A BARABINO

(Co-Chair), NAE/NAM; Olin College of Engineering; **SUSAN T. FISKE** (Co-Chair), NAS; Princeton University; **DAVID J. ASAI**, Howard Hughes Medical Institute; **FAY COBB PAYTON**, North Carolina State University; **NILANJANA (BUJU) DASGUPTA**, University of Massachusetts–Amherst; **MICA ESTRADA**, University of California, San Francisco; **MIRIAN M. GRADDICK-WEIR**, AT&T Corporation; **GIOVANNA GUERRERO-MEDINA**, Yale University; **CAMARA P. JONES**, NAM; Morehouse School of Medicine; **SAMUEL R. LUCAS**, University of California–Berkeley; **JULIE POSSELT**, University of Southern California; **VICTOR E. RAY**, The University of Iowa; **JOAN Y. REEDE**, NAM; Harvard Medical School; **KARL W. REID**, Northeastern University; **CYNTHIA N. SPENCE**, Spelman College; **KECIA M. THOMAS**, University of Georgia; **M. ROY WILSON**, NAM; Wayne State University; **SWEENEY WINDCHIEF**, Montana State University

STUDY STAFF **LAYNE SCHERER**, Study Director; **EMILY VARGAS**, Program Officer; **KENNE DIBNER**, Senior Program Officer; **ANDRÉ PORTER**, Senior Program Officer; **JACQUELINE L. COLE**, Senior Program Assistant; **DANIEL WEISS**, Director, Board for Behavioral, Cognitive, and Sensory Sciences

SPONSORS Alfred P. Sloan Foundation, Fred Kavli Endowment Fund, Gordon and Betty Moore Foundation, Heising–Simons Foundation, National Institutes of Health, National Science Foundation, Ralph J. Cicerone and Carol M. Cicerone Endowment for NAS Missions, Rita Allen Foundation, The Shanahan Family Charitable Foundation

FOR MORE INFORMATION

The Report Highlights was prepared based on the Consensus Study Report *Advancing Antiracism, Diversity, Equity, and Inclusion in STEMM Organizations: Beyond Broadening Participation* (2023). Copies of the Consensus Study Report are available from the National Academies Press at <https://nap.nationalacademies.org/catalog/26803/advancing-antiracism-diversity-equity-and-inclusion-in-stemm-organizations-beyond>. Recordings of the open sessions organized by the committee are available on the National Academies website at <https://www.nationalacademies.org/our-work/advancing-anti-racism-diversity-equity-and-inclusion-in-stem-organizations-a-consensus-study>.

The study was sponsored by the Alfred P. Sloan Foundation, Fred Kavli Endowment Fund, Gordon and Betty Moore Foundation, Heising–Simons Foundation, National Institutes of Health, National Science Foundation, Ralph J. Cicerone and Carol M. Cicerone Endowment for NAS Missions, Rita Allen Foundation, and The Shanahan Family Charitable Foundation. Any opinions, findings, conclusions, or recommendations expressed in this publication do not necessarily reflect the views of any organization or agency that provided support for the project.

Division of Behavioral and Social Sciences and Education

**NATIONAL
ACADEMIES** Sciences
Engineering
Medicine

Copyright 2023 by the National Academy of Sciences. All rights reserved.