



DIVERSITY IN SCIENCE

A recipe for change: Creating a more inclusive academy

Using data, selecting leaders, and changing rules

By **Beth Mitchneck**,¹ **Jessi L. Smith**,²
Melissa Latimer³

Although there has been a welcome increase in discussion about gender disparities in science, technology, engineering, and mathematics (STEM), broad participation of women from all backgrounds in academic STEM will not be achieved until institutions are transformed. A long-range view is needed to change the rules of the game, such that institutional culture and practices create work-

places where all scientists and engineers want to be. We lay out a six-point plan of what needs to change, who should participate, and how actors outside of the academy should have direct involvement in the process.

We focus on gender but recognize the importance of attending to gender identity, ability, race and ethnicity, class, sexual orientation, and other important intersections.

Changes that bring about inclusion for one group, we argue, can have far-reaching benefits for everyone.

Learn the social science research. The entire campus community must be better informed about hurdles to hiring, retaining, and promoting women, especially women of color. Decades of social science research

show processes through which explicit and subtle bias operate (1, 2) including within academic science (3, 4). Subtle bias is especially problematic, as it operates without awareness, particularly when people are cognitively taxed and busy (2). Biases must be disrupted in order to prevent the status quo from inevitably reproducing itself. Yet even with the best intentions, the bias “habit” is hard—but not impossible (5, 6)—to break. Breaking the habit at one level does not necessarily mitigate bias at another level of evaluation or experience (7).

You cannot stop at just documenting bias, as those data can be met with suspicion (8); arm yourself with an understanding of the myriad ways in which bias contributes to stereotype threat, belonging uncertainty, work-life imbalance, and a host of other negative outcomes (9, 10). Transformation cannot begin until people understand that bias in all shapes and sizes exists within faculty, leaders, and the structures therein (for a list of resources about bias in all its guises, see: wiseli.engr.wisc.edu/library.php).

Leaders must understand the context and be accountable for diversity and inclusion. It is not a good idea to try to change an institution with which you are not highly familiar. Outside consultants and new leaders have a place, but the unique history and sociopolitical dynamics of an academic institution must be considered when selecting and enacting change strategies (11). We need to select leaders from all levels of the institution who understand the context, are accountable for implementing change, and make it their mission to promote diversity and inclusion. Leaders must be ready for and able to withstand pushback. A president or provost does not have to lead the transformation but does need to be a visible, vocal part of the change process and set up an accountability system (e.g., including successful diversity outcomes as part of how their effectiveness as leaders is evaluated).

Every type of leader should be represented in change efforts. Inclusion of faculty members and thought leaders from all genders and backgrounds makes for a more effective process, because people are more likely to process information with an open mind if the communicator is someone with whom they typically agree or identify (12). It is essential to have leaders who communicate in ways that faculty can hear.

Seek external catalyzing resources. Funding agencies and private foundations that partner with universities add legitimacy to institutional transformation. The U.S. National Science Foundation (NSF) has committed well over \$130 million to increase the participation and advancement of women in academic science and engineering careers

¹University of Arizona, Tucson, AZ 85721, USA.

²Montana State University, Bozeman, MT 59717, USA.

³West Virginia University, Morgantown, WV 26506, USA.
E-mail: bethm@email.arizona.edu

through the ADVANCE program alone toward funding gender-equity change initiatives. Private foundations, such as Sloan and Elsevier, provided partnerships and incentives to leaders undertaking institutional transformation. The European Commission takes institutional transformation around gender equity so seriously that its Horizon 2020 program has an expert group on gender to help promote research and innovation. Universities, however, must feel an intrinsic desire to transform, and many changes should be made even without funding. Ultimately, universities must make their own investments to ensure that activities lead to sustained institutional change.

Focus at the department level. Many barriers to cultural change are embedded in institutional practices [e.g., recruiting and promotion and tenure (P&T)] and manifested at the academic-unit level. Thus, efforts to address departmental climate and social interactions are critical (13). A helpful, fair, inclusive department where faculty speak daily with colleagues about research prospects and interests increases their likelihood of having clear perceptions of P&T

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evaluation (7). Departmental interventions to promote inclusive decision-making and effective communication improve key aspects of climate critical to women’s success (13). Intervening with department-level faculty search committees in ways that meet their basic psychological needs of competence, relatedness, and autonomy resulted in changes to search processes and outcomes (6). There are many other inputs into department-level climate to target, including teaching and committee assignments, conflict management, mentoring and networking activities, and so on (see www.colorado.edu/eer/research/strategic.html).

Collect and publicly share data. As institutional changes occur, development of a new narrative about the success of institutional change engages people to attempt more change. Construct and maintain “change narratives” as a way to initiate and sustain the change momentum and focus on gender equity (14).

Public discussions of where an institution is, where it wants to be, and how to get there means taking a hard look at data. Systematically collecting and actively sharing data about the change process creates necessary

visibility for assessing short- and long-term impacts of initiatives (15) that can bring the university community on board. Beyond the Integrated Postsecondary Education Data System (IPEDS) data sets available through the U.S. National Center for Education Statistics, many NSF ADVANCE institutions have developed publicly available data sets on faculty diversity that are lacking at other universities. Dedicated institutional research staff can be accountable for collecting, analyzing, exhibiting, and engaging stakeholders with equity data.

When funders require data as an award condition, universities usually comply. Funding agencies could require data on gender and racial equity as part of proposal submissions. Some professional associations work successfully with the university community to collect data on diversity, like the Computing Research Association and the Collaborative on Academic Careers in Higher Education (COACHE) at Harvard. Partnerships help to promote visibility and institutional change. What it takes is devoting resources—time, effort, and accountability—to oversee data collection and public sharing.

Policy change is critical. A move toward all-inclusive multiculturalism requires using inclusive language in all communication and work policies (16) and is associated with positive changes in the work climate. One area in which policy change has occurred is work-life support. For example, changing the stop-the-tenure-clock policy to be “opt-out” instead of “opt-in” increases use of the tenure extension and reduces the burden and stigma of having to ask for an accommodation (10).

Work-life policies are essential in recruiting, retaining, and advancing high-quality faculty (10) so long as there is not a “flexibility stigma” in which people are subtly or blatantly penalized for using work-life friendly policies (16). Such policies provide flexibility to balance work and life obligations and to ensure career progress for all faculty, regardless of sex, marital status, sexual orientation, race and/or ethnicity, or academic discipline (10). After showing success with simpler policy changes—such as work-life support—change agents must turn to policies that target a system filled with gender-biased and racialized barriers to inclusion.

Status quo P&T policies might be the single greatest hurdle to change. Although the professoriate has changed dramatically over the past 20 years, many embedded values and expectations for what counts and the timeline for when things count toward advancement have remained fairly static. P&T policies are often inflexible and largely reduced to an exercise of counting publications, external funding, and impact factors. This reductionist evaluation can hurt women faculty, who

are often drawn to collaborative teams and interdisciplinary research (17). Although such team-based science is increasingly necessary for innovative success, the P&T process is more likely to reward sole authorships published in mainstream journals funded by primary investigator-led grants. Women’s contributions to team science are disproportionately discounted (18), and team science projects may take longer and be published in less traditional outlets. What is good for science is for faculty and professional societies to work together to consider how P&T policies could be changed to acknowledge and reward various pathways to success.

Innovation and global competitiveness are compromised by excluding women and minorities from the professoriate (19). True transformational change means changing what it means to be an academic and who belongs in the academy. The barriers and those cultures, practices, and structures that require transformation are well researched as are remedies. Now it’s time to act.

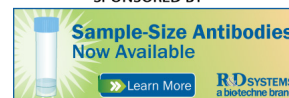
REFERENCES AND NOTES

1. G. W. Allport, *The Nature of Prejudice* (Perseus Books, New York, 1954).
2. J. F. Dovidio, P. Glick, L. A. Rudman, *On the Nature of Prejudice: Fifty Years After Allport* (Wiley-Blackwell, Hoboken, NJ, 2005).
3. P. J. Boyle, L. K. Smith, N. J. Cooper, K. S. Williams, H. O’Connor, *Nature* **525**, 181 (2015).
4. C. A. Moss-Racusin, J. F. Dovidio, V. L. Brescoll, M. J. Graham, J. Handelsman, *Proc. Natl. Acad. Sci. U.S.A.* **109**, 16474 (2012).
5. M. Carnes *et al.*, *Acad. Med. J. Assoc.* **90**, 221 (2015).
6. J. L. Smith, I. M. Handley, A. V. Zale, S. Rushing, M. A. Potvin, *Bioscience* **65**, 1084 (2015).
7. M. F. Fox, *Sci. Technol. Human Values* **40**, 487 (2015).
8. I. M. Handley, E. R. Brown, C. A. Moss-Racusin, J. L. Smith, *Proc. Natl. Acad. Sci. U.S.A.* **112**, 13201 (2015).
9. K. A. Griffin, M. T. Pifer, J. R. Humphrey, A. M. Hazelwood, *Am. J. Educ.* **117**, 495 (2011).
10. J. Williams, *Unbending Gender: Why Family and Work Conflict and What To Do About It* (Oxford Univ. Press, New York, 1999).
11. A. D. Anderson, *Engaging Resistance: How Ordinary People Successfully Champion Change* (Stanford Business Books, Stanford, CA, 2011).
12. W. Wood, *Annu. Rev. Psychol.* **51**, 539 (2000).
13. M. Latimer, K. Jackson, L. Dilks, J. Nolan, L. Tower, in *Advances in Gender Research: Gender Transformation in the Academy*, V. Demos, C. W. Berheide, M. T. Segal, Eds. (Emerald Group, Bingley, UK, 2014) pp. 333–353.
14. R. J. Ely, D. E. Meyerson, *Organization* **7**, 589 (2000).
15. R. Marschke, S. Laursen, J. M. C. Nielsen, P. Rankin, *J. Higher Educ.* **78**, 1 (2007).
16. F. G. Stevens, V. C. Plaut, J. Sanchez-Burks, *J. Appl. Behav. Sci.* **44**, 116 (2008).
17. D. Rhoten, S. Pfirman, *Res. Policy* **36**, 56 (2007).
18. N. Torres, *Harvard Business Review*, 9 February 2016; <https://hbr.org/2016/02/proof-that-women-get-less-credit-for-teamwork>.
19. National Research Council, *Seeking Solutions: Maximizing American Talent by Advancing Women of Color in Academia: Summary of a Conference* (National Academies Press, Washington, DC, 2013).

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