POSITIONING SDSU AS A LEADER IN THE FUTURE OF STEM INNOVATION

THE ROLE OF DIVERSITY AND INCLUSION IN STEM

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Roadmap

• The science of why we need a diverse/inclusive STEM faculty
• National picture of representation/equity in STEM
• Current climate/status at SDSU (HERI survey)
• Recipe for change
There is a current and growing body of literature that provides clear evidence that to be a leader in STEM:

- Support collaborative/team science
- Create a diverse and inclusive faculty
- Leadership to this goal is shared responsibility
Collaborative/Team Science dominates

Collaborative/Team Science

Interdisciplinary, collaborative research in which team members integrate their perspectives and methods in a single research endeavor.

• Increasingly the norm in STEM (Wuchty et al. 2007; Englander 2014)

• Solve most complex and intractable scientific and social problems

• Needed to accelerate scientific and technological innovation, and provide a mechanism for translating scientific research into practices and policy (Uzzi et al. 2013).
Team science: measures of success

• Attracts more funding

• Yields greater pub productivity

• Leads to higher impact publications

Diverse STEM teams do more

- Diversity on teams has positive effects on **creativity, innovation, and productivity**
  
  Hong & Page 2004; Woolley et al. 2010; Bear & Woolley 2011; Campbell et al 2013

- Scientific **research enhanced** when informed by diverse (and thus often broader) viewpoints and research questions.
  
  Margolis & Fisher 2003

- **Women and URM scientists** have made scientific discoveries because of their particular gendered and racialized perspectives experiences.
  
  Melo-Martín & Intemann 2010; Freeman & Huang 2014

- Among ecology and environmental scientists, authorship teams with at least one woman received 34% more citations than publications produced by homogeneous teams, and that peers perceive the publications produced by gender-diverse groups to be of higher quality.
Women in STEM: A Gender Gap to Innovation

Why So Few?

Women in Science, Technology, Engineering, and Mathematics

(AAUW 2010)
HOW WELL IS SDSU POSITIONED TO BE A LEADER IN STEM SCIENCE AND INNOVATION?
Guided exploration of implicit bias and institutional climate

Collaborative, interdisciplinary, team science-based research has become increasingly central in scientific discovery.

Yet, women are less likely to participate in team science collaborations, and their participation in these networks develops later in their careers.

Elsevier New Scholars Program – Woman as Agents of Transformation in Academia
June 2014

Elsevier – CSU Transforming Academia
Sept 2014

UC Team Science – Asilomar
Sept 2015

NSF Advance Institutional Transformation – Supporting Women in Faculty Transformation
Jan 2016

HERI Survey
March 2016

UC/CSU Center for Research Excellence and Diversity in Team Science (CREDITS)
Oct 2016

UC/CSU Center for Research Excellence and Diversity in Team Science (CREDITS)

NSF Advance Adaptation ONE SDSU Faculty
Sept 2017

Identify equity gaps and promote and sustain a transformative change in equity for white women and women of color in STEM fields at SDSU.

Build observational, research, and analytical capacities—to assess and develop new collaborative knowledge about how to navigate leadership opportunities in their fields and on campus.
The HERI Faculty Survey provides institutions with a comprehensive, research-based picture of key aspects of the faculty experience. Since 1989 over 1,100 two-and four-year institutions have used results from this survey to connect faculty practices, values and priorities to institutional success and drive improvement efforts.

- Research and service activities
- Institutional and departmental climate
- Faculty experience
- Faculty’s engagement
- Faculty’s level of stress,
- Satisfaction with their institution
• Data shows that women in STEM spend .8 years longer at associate professor rank than their male colleagues.

• Women and URM are underrepresented in campus leadership and in STEM leadership

• Evidence of unequal salary advancement for more senior STEM women faculty
Have you been sexually harassed at this institution?

4.5% of respondents said yes
STRESS AS AN INDICATOR
Stress is indicator

• Negative impacts on advancement (Nelson et al., 1990)
• Negative impacts on productivity (Donald et al., 2005)
• Related to separation/attrition (DeTienne et al., 2012).
The question: “Please indicate the extent to which each of the following has been a source of stress for you during the past year:”
Discrimination (e.g., prejudice, racism, sexism, homophobia, transphobia)
Stress Due to Discrimination, by Race

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<thead>
<tr>
<th></th>
<th>SDSU</th>
<th>Comp institutions</th>
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<tbody>
<tr>
<td>White/Caucasian Faculty</td>
<td>6.5%</td>
<td>22.5%</td>
</tr>
<tr>
<td>Asian American/Asian Faculty</td>
<td>12.5%</td>
<td>25.0%</td>
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<tr>
<td>Traditionally Underrepresented Racial Minority Faculty</td>
<td>33.3%</td>
<td>44.4%</td>
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CREATING AND SUPPORTING A MORE DIVERSE AND INCLUSIVE ACADEMY
Creating a diverse and inclusive academy

Broad institutional change is a requirement and precondition for achieving diversity and inclusion
DIVERSITY IN SCIENCE

A recipe for change: Creating a more inclusive academy

Using data, selecting leaders, and changing rules

By Beth Mitchnick,
Jesi L. Smith,
Melissa Latiner

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 three-point plan: 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, race and ethnicity, POLICY 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 habit 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 these 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: wisel engineering, libdb.php).

Leaders must understand the content 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 (9). 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 (22). It is essential to have leaders who communicate in ways that faculty on how.

Seek external funding. Resource funding agencies and private foundations that partner with universities add legitimacy to institutional transformation. The US National Science Foundation (NSF) has committed well over $10 million to increase the participation and advancement of women in academic science and engineering careers.
A RECIPE FOR CHANGE FOR SDSU
Lead with the Science

• Replicability and rigor
• Increases effectiveness & likelihood of success
• Results in measures for visible success
• Framework helps to get people on board
• Contributes to the science of gender and diversity equity

Key literature
• Distrust of data (Handley et. al, 2015)
• Trust in the communicator (Wood, 2000)
Leadership is a shared responsibility

• Consistent, coherent messaging
• Demonstrable leadership support
• Diverse and strategic champions
Campus activity

- BIE/spousal hires
- Consistent messaging
- Coordinate activities across Dept.
- Work with UCSD, CSU San Marcos, UC Riverside for professional development/training opportunities for admin and faculty
- Women in Science seminar series
Department activity

• Diversity Plans (for BIE)
• Equity report cards
• Equity advisors
• Professional development
Individual activity

• Equity awareness & education
• Professional development
• Leadership training
• Engagement/joining the conversation
Collect and Share Campus Data

• Transparency
  • Demonstrates commitment to change
  • Show short term gains
• Track and monitor progress
  • Accountability
External Funds to support campus change

- Prestige speaks to academicians
- NSF, NIH, private foundations (Elsevier, L’oreal)
- Takes pressure off internal resources
- Allows for faster progress
Policy Change is Critical

• RTP to reward collaborative/team science
• Family leave
• Teaching and service loads
• Child-care
• Mentorship and menteeship
• Spousal hires
Advancing women’s careers in science, technology, engineering, mathematics and medicine: evaluating the effectiveness and impact of the Athena SWAN Charter

Dr Fehmidah Munir, Dr Carolynne Mason, Dr Hilary McDermott, Dr John Morris, Professor Barbara Bagilhole and Professor Mary Nevill

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STEM EQUITY ACHIEVEMENT (SEA) CHANGE AWARDS

WHITE PAPER

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With Joyce Wong (Boston University) and Julie Chen and Victoria Denoon (UMass Lowell)
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