

# 2009 Advancing Diversity at Virginia Tech

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*An Introduction to Bias Literacy*

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# Scope of Presentation (Tag-team Approach)

- Beliefs, Values, & Actions in the Workplace
- Concepts from Research on Discrimination & Prejudice
- Strategies for Promoting Innovation & Change
- Legal Sustainability of Targeted Programs

# Types of Bias

- Gender
- Race/ethnicity
- Disability
- Age
- Geography
- Citizenship
- Institutional affiliation
- Etc.

## We argue for change...

- Be fair, let everyone play
- Get more people in S&E and be more competitive
- Be smart and use untapped talent

BUT many believe:

- We are fair
- Everybody who wants to get in, can get in
- Our systems for recruitment get the best & the willing

## In a Perfect World . . .

We **recognize** differences in appearance, personal style, life experience

We **respect** difference in preferences that are not destructive to us and are not relevant to the job

We **do not reduce** an individual to his or her group

We **do not project** negative assumptions about the group onto the individual

# America's Core Values

**“... all men\*\*\* are created equal.”**

- Declaration of Independence, 1776

**\*\*\* not women, not slaves, in 1776  
(this is an example of implicit bias...)**

## Laws that elaborate

- **Equal Pay Act of 1963** – abolishes differential pay based on sex
- **Civil Rights Act of 1964** – outlaws racial segregation in schools & discrimination in employment; establishes Equal Employment Opportunity Commission as enforcer
- **Title IX 1972** – any educational program receiving Federal funds may not discriminate based on sex
- **Americans With Disabilities Act of 1990** – bars discrimination in employment based on disability
- **Civil Rights Act of 1991** – strengthens 1964 civil rights laws; establishes the Glass Ceiling Commission (1991-1996)

## Law re: Science and Engineering

- **The Perkins Act of 1978** – to open vocational training, required each state to hire a sex-equity coordinator; truncated in 1998
- **Equal Opportunities for Women and Minorities in Science and Technology Act of 1981** – NSF should encourage all groups ; start a suite of targeted programs; report national statistics every two years
- Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology Development 1998 – How are we doing?, 2002-2004, **Land of Plenty** report, a.k.a. Morella Commission
- U.S. Government Accountability Office Report on Gender Issues 2004 – Title IX applies to science and engineering in higher education & we need more compliance review s as enforcement is inadequate

# Conscious versus Unconscious Discrimination, a.k.a. “subtle prejudice”

MIT report, 1999, Dean Robert J. Birgeneau:

“I believe that in no case was this discrimination conscious or deliberate. Indeed, it was usually totally unconscious and unknowing. Nevertheless, the effects were and are real.”

# Conscious versus Unconscious Discrimination (cont.)

= petty slights,  
nuanced visual clues,  
tone of voice,  
lack of eye contact,  
social avoidance or shunning,  
ambiguous jokes,  
“unfriendly” → “hostile” environment

# Overt versus covert discrimination

- Intended and covert
  - Giving candidates lower ratings
  - Ignoring qualifications in hiring, admissions
  - Verbal (and undocumented) negative comments
- *Unintended* and covert
  - Deciding that married women are “out”
  - Deciding that minorities “can’t hack it”

# Personal versus Institutional Bias, a.k.a. “structural discrimination”

Using extra qualifications that exclude members of a group:

- English language test (culturally biased) for immigrants
- Aptitude test for minorities only
- Age, height, weight & vision for flight attendants
- Physical strength for fire departments
- Higher requirements for SAT scores for women
- Quotas

# What Research Says: Gender Schema Theory

- Everyone has unconscious beliefs about girls and boys, men and women
- Psychologists show that all humans rely on categories to make sense of the world
- Gender plays a major role in how children organize information
- These evolve into stereotypes or “rules of thumb”

# American Gender Schema

- Men are dominant, competitive, achieving
- Women are co-operative, supportive
- **We over-rate men, under-rate women**
  - A study of peer review for post-doctoral fellowships found that women had to have more credentials than men to get the same competence rating from reviewers
  - A study artificially changed the gender of curricula vitae and found that both men and women preferred male job applicants
  - Letters of recommendation for medical faculty differed “systematically” in preference toward men, in terms of length, “doubt-raising” language, and references to status
- Men are perceived to be taller, more capable, more independent, more rational, leaders
- Women (regardless; categorically) are shorter, less capable, followers, nurturing, expressive, caring

# Evidence *Refuting* Commonly Held Beliefs About Women in Science & Engineering

- Women are not as good in mathematics . . .
- Underrepresentation on faculties is a matter of time . . . [and] how many women are qualified . . .
- Women are not as competitive as men . . .
- Behavioral research is qualitative; why pay attention to the data in this report?
- Women and minorities are recipients of favoritism through affirmative action programs.
- Academe is a meritocracy.
- Changing the rules means that standards of excellence will be deleteriously affected.
- Women faculty are less productive. . .
- Women are more interested in family than in careers.
- Women take more time off due to childbearing, so they are a bad investment.
- The system as currently configured has worked well in producing great science; why change it?

## Gender Schema & Rating

- Virginia Valian (1998). *Why So Slow? The Advancement of Women*. Cambridge, MA: MIT Press.  
Gender schema theory
- Christine Wenneras and Agnes Wold (1997). Nepotism and sexism in peer-review. *Nature* 387, 341-343.  
Female applicants for post-doctoral fellowships needed more credentials than males for the same rating

# Accumulative Advantage

- **Small advantages or disadvantages accumulate over time to produce larger advantage/disadvantage**
- **Small disadvantages are important**
  - e.g., access to a course, slightly lower grades, less help-attention-
  - encouragement, financial support, assignments, evaluations, promotion,
  - advancement, recognition, skills training, peer network, mentoring,
  - salary-status
- **“The rich get richer, and the poor get poorer”**
  - **Merton’s “Matthew Effect”**

# Accumulative Advantage

R.F. Martell, D.M. Lane & C. Emrich (1996). Male-female differences: a computer simulation. *American Psychologist* 51:157-158

In a hypothetical organization of 8 levels, with 50:50 ratio of men:women at start, giving a 1% advantage for men at each level yields 65% male at the top level

## **Case Study: American Medical Association & “The Racial Divide in Medicine” —Why are African Americans underrepresented in medicine and the AMA (<5% membership)?**

- AMA permitted state & local medical associations to exclude black physicians, thus barring them from the national AMA
- Black doctors were listed as “colored” in its national physician directory
- AMA was “silent” over Civil Rights Act of 1964; declined to participate in efforts to force hospitals built with federal funds to not discriminate
- National Medical Association est. in 1895 for black physicians
- In 1954, AMA refused to allow the Old North State Medical Society (black physicians in NC) to be admitted to AMA
- Now, AMA provides scholarships to support minority medical students & has a Minority Affairs Consortium

# Stereotype Threat

- An individual who is negatively stereotyped for an activity is likely to perform worse than they are capable, for that activity
- Effect can be triggered indirectly, without explicit reference to stereotype
- Examples:
  - Women taking a math test told “women do worse than men”
  - White men told “Asians tend to do better than whites”
  - African Americans told “we are measuring your IQ”
  - Elderly told “we are testing your memory”

# Mediating Stereotype Threat

- The effect can be reduced: *How?*
- Strong optimistic & non-judgmental relationship with teacher
- Awareness of positive (high performing) role models
- Self-affirmation and sense of adequacy
- Awareness of the threat => inoculation / psychological resistance

## Related Phenomena

- **Pygmalion Effect:** when a teacher has high expectations for a student, the student performs better (obverse: “the soft tyranny of low expectations”)
- **“Self-fulfilling prophecy”** in management & other arenas

# Stereotype Threat

- C.M. Steele and J. Aronson (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology*, 69:797-811
- J.R. Steele, L. Reisz, A. Williams and K. Kawakami (2007). Women in mathematics: examining the hidden barriers that gender stereotypes can impose. In R.J. Burke & M.C. Mattis (Eds.), *Women and Minorities in Science, Technology, Engineering and Mathematics: Upping the numbers* (pp. 159-182). Cheltenham, UK: Edward Elgar.

# Implicit Bias Theory

- People are unwilling to admit bias, or it is unconscious
- An online test uncovers unconscious bias
- Premise:
  - associations with “young” and “old,” or “white” and “black,” and “science” or “liberal arts,” and men/women **are made faster** due to unconscious thinking and preferences – they are more “**automatic**”
  - **If you measure the TIME it takes to make associations, in milliseconds**, you capture implicit bias and unconscious schemas

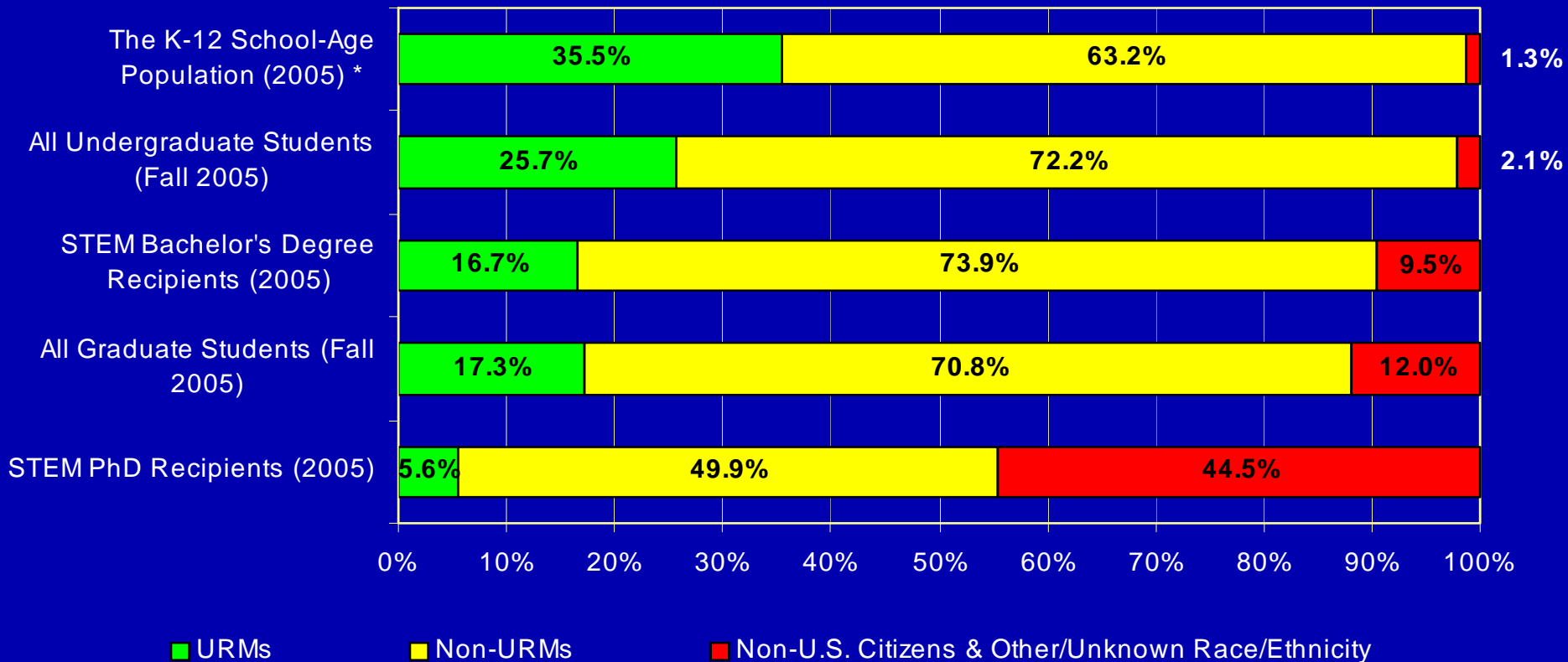
Source: Harvard University (2007), Project Implicit.

<https://implicit.harvard.edu>

# Strategies for Innovation: Thinking about Underrepresentation—Fix the Students, Pathways, or College?

- **Students:**
  - Demographic composition
  - Pre-college academic preparation
- **Pathways:**
  - Intervention programs—add-on to formal education
  - Access to higher education—cost reduces diversity
- **College Environment:**
  - Cultural competence of faculty—teaching diverse students
  - Structural support—climate, career information, mentoring

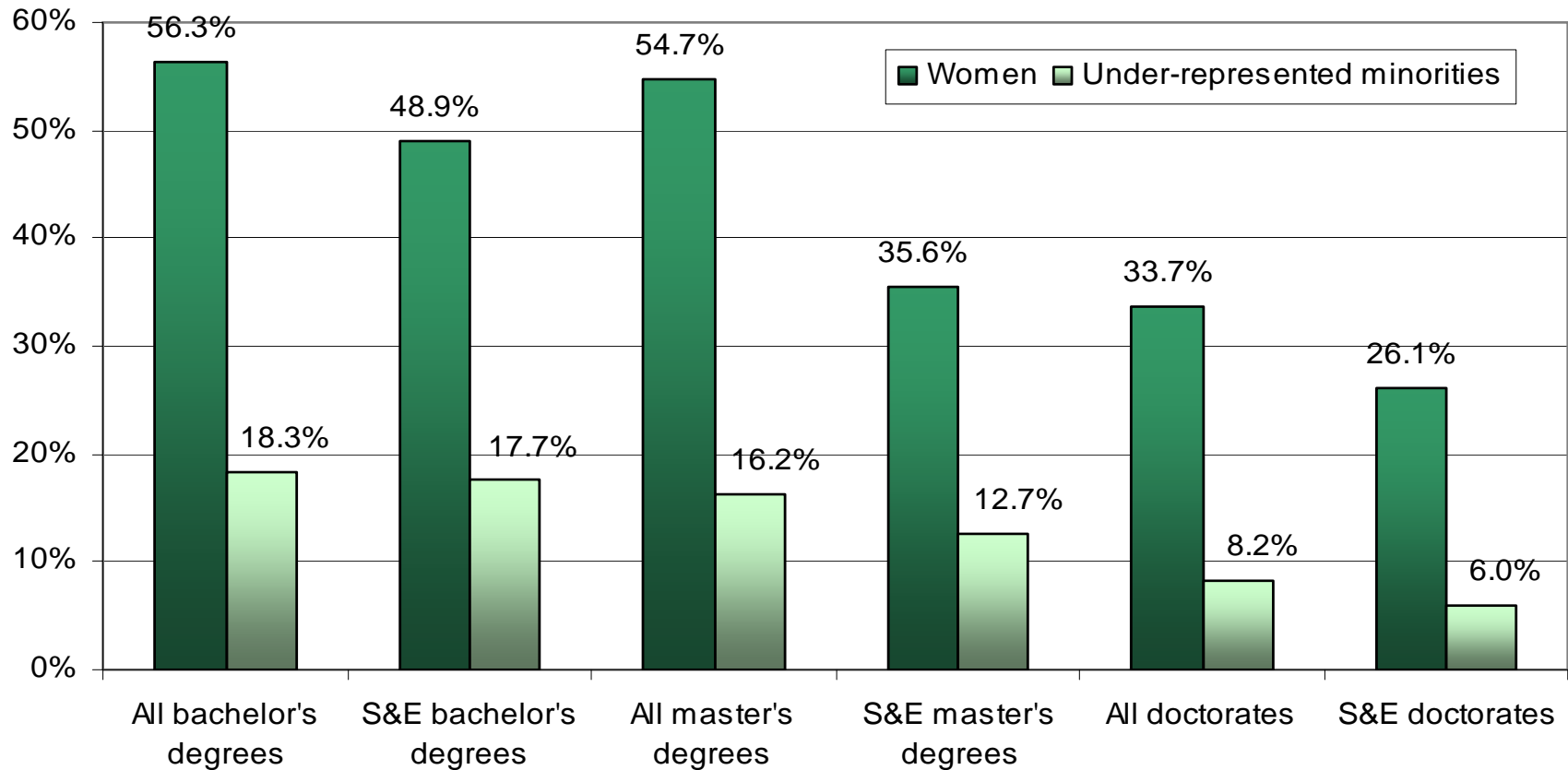
## Under-represented minorities (URMs) and non-URMs as a percent of . . .



*Note: Data for the K-12 population were not available by citizenship, so non-U.S. citizens are included in all percentages.*

*Source: CPST, data derived from National Science Foundation, WebCASPAR Database, National Center for Education Statistics, Digest of Education Statistics, 2006, and U.S. Census Bureau, Population Division*

### Percent of U.S. Citizen and Permanent Resident Women and Under-Represented Minorities at Each Degree Level, 2005-06



Source: CPST, data derived from National Science Foundation, *Science and Engineering Degrees, by Race/Ethnicity of Recipients: 1995-2006*.

# How to Promote Participation: What to Do If You Can't Target

- Provide undergrad research experiences for underrepresented students
- Network with faculty in institutions with significant minority enrollment
- Link to special programs
- Advertise opportunities through professional societies
- Talent scout among own undergrads
- Offer financial support
- Survey the climate of departments and the institution
- Encourage learning communities
- Mentor, advise, role-model, etc.

# BEST Principles for Capacity-building

## Design Principles to Expand Higher Education Capacity

### *Principle*

### *Evidence*

• Institutional leadership	Commitment to inclusiveness across the campus community
• Targeted recruitment	Investing in and executing a feeder system, K-12
• Engaged faculty	Developing student talent as a rewarded faculty outcome
• Personal attention	Addressing, through mentoring and tutoring, the learning needs of each student
• Peer support	Student interaction opportunities that build support across cohorts and allegiance to institution, discipline and profession
• Enriched research experience	Beyond-the-classroom hands-on opportunities and summer internships that connect to the world of work
• Bridging to the next level	Institutional relationships that help students and faculty to envision pathways to milestones and career development
• Continuous evaluation	Ongoing monitoring of process and outcomes that guide program adjustments to heighten impact

## Study Interventions to Understand What Works

- Display/share the research base for STEM interventions (mostly social & behavioral sciences)
- Distinguish research from evaluation, intervention studies from “best practice”
- Two national conferences (2007-08)—both NIH-sponsored, the first planned by an NAS committee
- Introduce NIH & NSF grantees to one another, while showcasing social & behavioral science work
- 3<sup>rd</sup> Understanding Interventions Conference, May 7-9, 2009, Bethesda, MD
- More info at [www.understandinginterventions.org](http://www.understandinginterventions.org)

## What We Don't Know and Why We Need Research on Interventions (illustrative questions)

- What are the reasons for differential attrition from STEM BS & graduate programs?
- What is the impact of international students on the participation of US citizens?
- Where do new women PhDs go, especially women of color?
- Why do some URMs excel to the PhD—self-efficacy, participation in multiple interventions along the pathway, nurturing undergraduate environments, graduate mentoring?
- Who is recruited where after completing the PhD—and is early completion (<6 years) a *de facto* requirement to be competitive for top university faculty positions?

# Preliminary Conclusions on Big Questions

- **Is S&E losing talent?** Yes, even among students on portable fellowships. The professions (medicine, law, business) are more attractive/lucrative, with high retention despite cost to students.
- **Is the NSF “broader impacts” criterion a lever for intervention?** In some cases, but it is applied unevenly, reducing the reach to those underserved in STEM.
- **Do institutions try to adapt proven models?** Not really. Even well-documented programs are treated as anomalies.
- **Are the data compelling?** Not yet, since we lack longitudinal data on “cumulative effects” of interventions on career outcomes.
- **What is the effect of the legal challenges to diversify?** There is a backlash against affirmative action playing out at the state level. Targeted programs are scarce in public institutions.

## Chubin's Recent Writings That Elaborate on Above

- “Making a Case for Diversity in STEM Fields,” *Inside Higher Ed*, Oct. 6, 2008 <http://www.insidehighered.com/views/2008/10/06/chubin> (with S.M. Malcom).
- “Educating Generation Net—Can U.S. Engineering Woo and Win the Competition for Talent?” *Journal of Engineering Education*, v. 97, July 2008: 245-257 (with K. Donaldson, L. Fleming, and B. Olds).
- “Federal Agencies” (249-258) and “Professional Societies” (263-272) in S. Rosser, ed., *Women, Science, and Myth: Gender Beliefs from Antiquity to the Present*, ABC-CLIO, 2008.
- *NACME Data Book—2008 Update*. Commission on Professionals in Science and Technology, <http://www.nacme.org/databook/> (with L. Frehill).
- “Voices of the Future: African American PhDs in the Sciences,” In R.J. Burke and M.C. Mattis, eds., *Women and Minorities in Science, Technology, Engineering and Mathematics: Upping the Numbers*. Edward Elgar, 2007: 91-100.
- “The New Backlash on Campus,” *College and University Journal*, v. 81, Fall 2006: 65-68 (with S.M. Malcom).

# The Precedent of Law over Interventions: U. of Michigan Admissions Lawsuits

- Is it legitimate to use race-sensitive criteria in admitting students to law school and to college, as a means to diversify the student body?
- Much of the justification for Michigan case grounded in research by Patricia Gurin et al.  
<http://www.vpcomm.umich.edu/admissions/overview/>
- 2003 Supreme Court decision: OK in the law school (Grutter), not OK in the college (Gratz)

## Evidence for the Value of Diversity in Learning

Studies cited in *amicus* briefs in Michigan Supreme Court cases, esp. by:

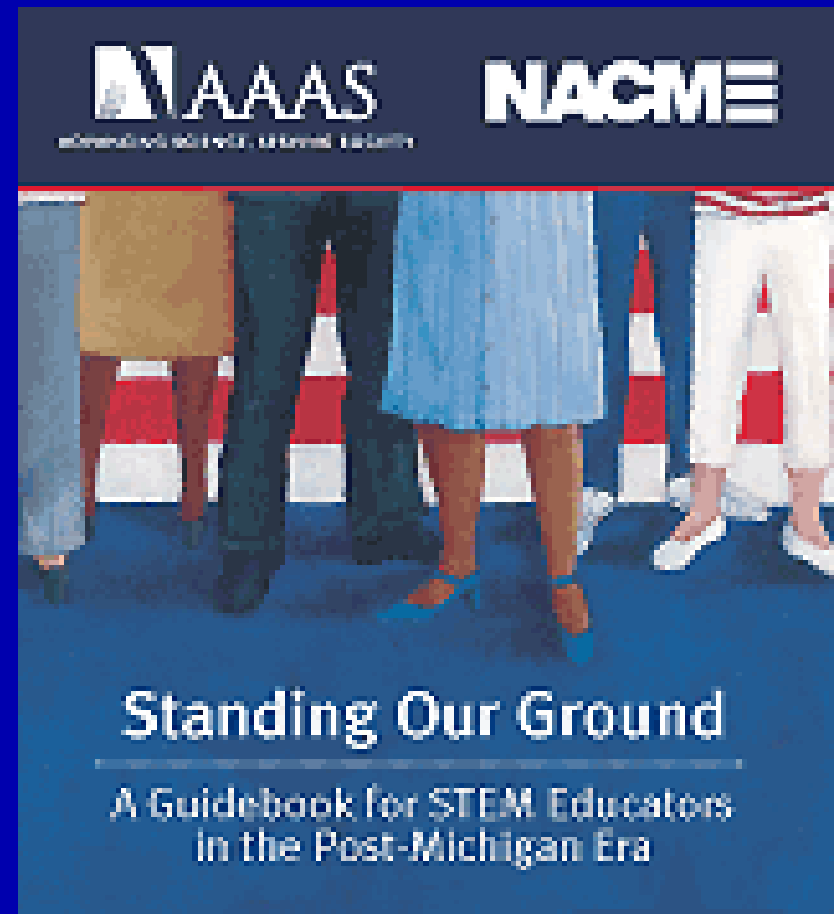
- ACE et al.  
[http://www.vpcomm.umich.edu/admissions/legal/gra\\_amicus/gra\\_ace.html](http://www.vpcomm.umich.edu/admissions/legal/gra_amicus/gra_ace.html)
- AERA et al.  
[http://www.vpcomm.umich.edu/admissions/legal/gra\\_amicus-ussc/um/AERA-gra.pdf](http://www.vpcomm.umich.edu/admissions/legal/gra_amicus-ussc/um/AERA-gra.pdf)
- MIT-Stanford et al. (only brief to focus on STEM)  
[http://www.vpcomm.umich.edu/admissions/legal/gru\\_amicus-ussc/um/MITfinal-both.doc](http://www.vpcomm.umich.edu/admissions/legal/gru_amicus-ussc/um/MITfinal-both.doc)

## Focus on the National Legal Context— Timeline of AAAS Efforts in STEM Participation

2003:	June	Supreme Court rulings in Michigan admissions cases
2004:	Jan	AAAS-NACME Conference on impact of rulings on higher education <i>non</i> -admissions practices
	Aug	AAAS Capacity Center established
	Oct	<i>Standing Our Ground</i> issued
2007	June	Supreme Court rulings on Seattle & Jeff Co, KY
2008:	Jan	Roundtable on <i>Efficacy of University-based Science &amp; Engineering Despite Limitations of “Strict Scrutiny”</i> (NACME, Sloan, & AAAS support)
	Sept -	Project on <i>Demonstrating the Legal Sustainability of Effective STEM Diversity Programs</i> (Sloan, NSF, AAU, & AAAS support)

**2004: To help guide program staff & university counsels in interpreting the Grutter and Gratz rulings . . .**

**2008: New Sloan- and NSF-funded pilot project (AAAS/AAU) to identify effective STEM programs & practices for students, and faculty make them legally sustainable**



See [http://www.aaas.org/publications/books\\_reports/standingourground/](http://www.aaas.org/publications/books_reports/standingourground/)

## Most Recent K-12 Cases

- *Parents Involved In Community Schools v. Seattle (Washington) School District No. 1 et al.* and *Meredith v. Jefferson County (Kentucky) Board of Education*, both decided in June 2007
- Applying the doctrine of “strict scrutiny,” the court found that programs in these districts did not meet the *Grutter* test (in the 2003 U. of Michigan case)
- The Supreme Court ruled that these two school districts were focused solely on achieving a certain black/white racial balance mirroring that of school districts. The Court did *not* link this to *Grutter*.

# Implications of K-12 Rulings for Higher Education

- Race, ethnicity, and class (socioeconomic status)—what is gained and lost by substituting one for the other?
- Affirmative action as doctrine that is race/ethnicity-based (or gender-based), and therefore politically charged (Olivas)
- Class as race/ethnicity-neutral, and thus more politically palatable (Kahlenberg)—but how effective (a la 10% admissions plans, even if criteria broadened to resemble “holistic review”) re URMs?
- The “private” alternative—e.g., UCLA Scholars’ Fund (Abrams)

# How Should Universities Respond?

- Recognize that historically, a desired characteristic—sex, race/ ethnicity, age, etc.—was used as a “plus factor” within merit-based competitions. Now that same characteristic may be labeled “preferential” and the **determining** factor, so “targets” (e.g., black males of college age) are discouraged.
- Note that the legal precedents treat K-12 and higher education as **separate** domains. However, we in STEM know that this is a K-20 pathway and what happens early impacts who emerges later.
- Connect the dots to respect the law *and* recognize the realities of educational opportunity. Faculty must consult the general counsel.

# Looking Ahead: Continuing Challenges to Policy & Practice

- Holistic Review in undergraduate admissions policies, decentralized admissions at graduate level
- Financial aid, outreach, targeted recruitment, faculty composition
- Threats by anti-affirmative action groups, especially at the state level
- Despite research that demonstrates efficacy, failure of the Administration/OCR to provide guidance on practice other than “race-neutral alternatives”
- Heightened demands for performance accountability
- Hope: Change of Administration . . . and most likely in tone

# Strategies: How to Change the Culture

From zero-sum game to “plus factors”—the need to keep score:

- Research *and* teaching, no “excellence” without equity, technical *and* “soft” (professional) skills—not versus
- Need for *critical mass* (context-specific, students *and* faculty), affinity groups, & mentoring
- *Measure* dimensions of participation: access, excellence, advancement, role models

# Change is Evident, but Vigilance is Needed

Diversification of a University Faculty

Number of Women Faculty in the School of Science (1963-2006)

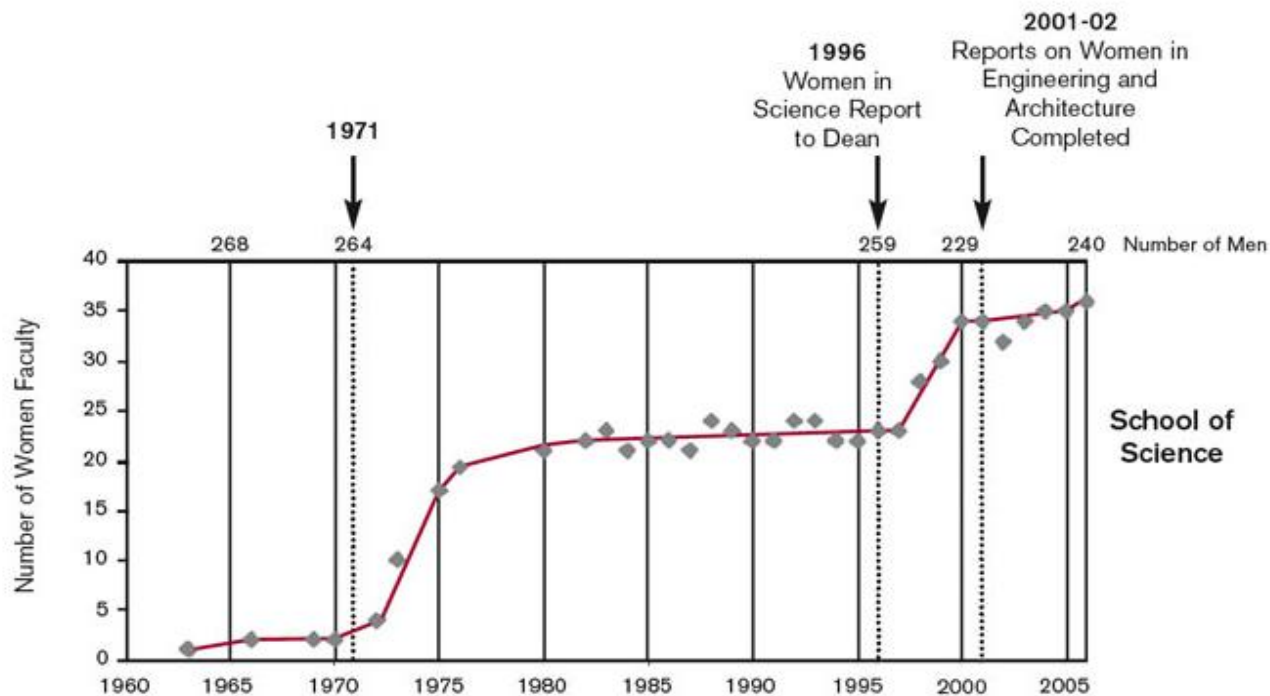


Figure 3a. The number of women faculty in the School of Science over time. The number of male faculty is indicated for certain years near the top of the graph. The years of key events that led to rapid increases in the numbers of women faculty are indicated by the dotted vertical lines.

# Tipping Points: How will we know we've achieved institutional nirvana?

- When “climate surveys” are no longer required, but conducted at regular intervals
- When soft-money projects that have demonstrated efficacy are institutionalized as an ongoing program supported by the institution’s operating budget
- When promising practices, e.g., undergraduate research, are shared across departments, with or without administration incentives
- When the institution, and not its constituent parts, is seen as the unit of change

# Scott E. Page, University of Michigan & Santa Fe Institute

“One cause of our inability to create a science of innovation has been the unfortunate assumption that ability is the sole driver of innovation. We tend to believe that if we want innovation then we need smarter people. That premise, though grounded in solid intuition, omits what may be the most powerful force for innovation—*diversity*.”

source: *The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools and Societies*, Princeton University Press, 2007

## Scott E. Page

### “Diversity as Innovative Ability”

“But what is diversity? Most people think of diversity in identity terms—differences in race, gender, ethnicity, physical capabilities, and sexual orientation. For an economy, the relevant diversity is not external. It resides in people’s heads.”

**Thank you!**  
**To continue the conversation. . .**

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