

CGS 2008 Annual Meeting

Strategies for Effective Diversity Programs in Graduate Schools

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AAAS Capacity Center

American Association for the Advancement of Science

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Problem Thread: We're here to explore . . .

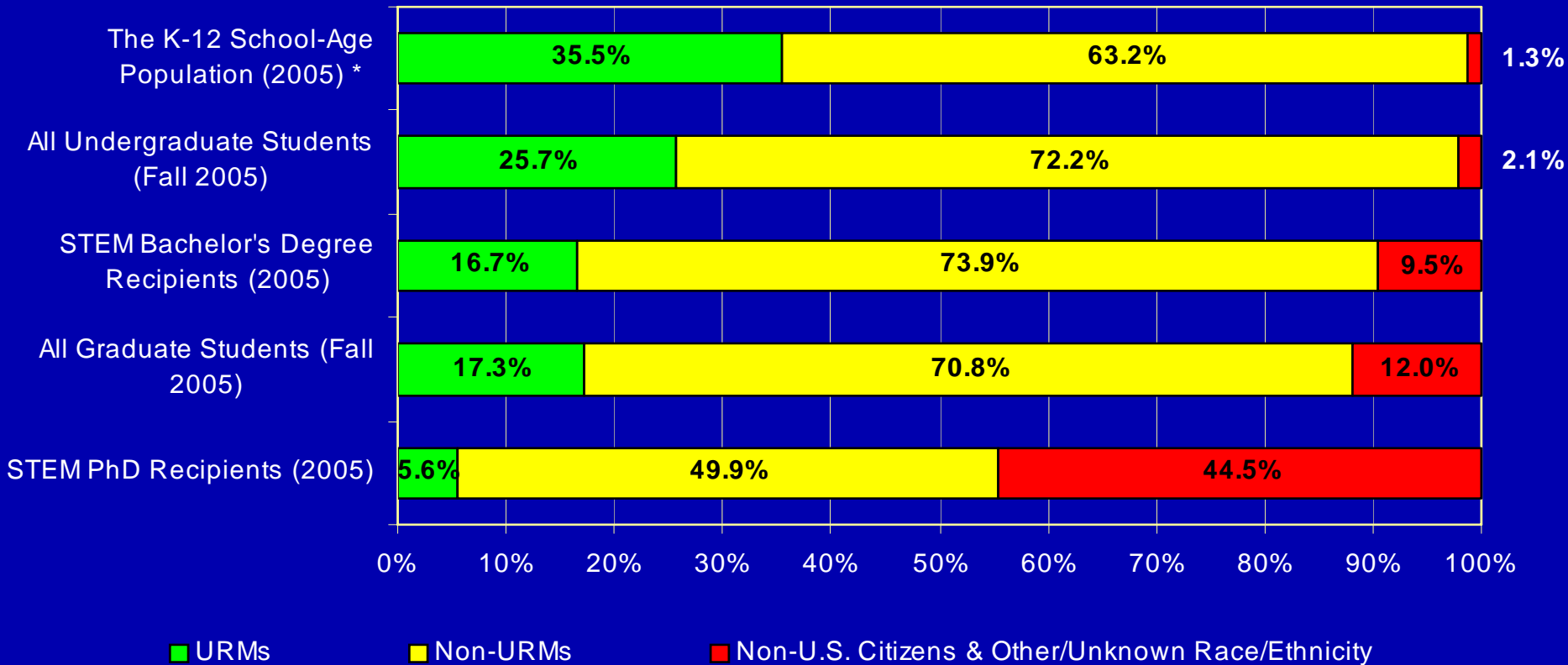
- Who *participates* in STEM—education to workforce?
- How can *institutions* of higher education improve academic success and career advancement, i.e. utilization of talent?
- How does Federal *policy* help/hinder?

. . . Above all, what works and why?

Big Picture: What Research and Evaluation Indicate

- Segments of the education pathway, precollege to workforce, are connected.
- The URM pipeline to doctoral degrees is far from full . . . and not at parity with representation in the general US population.
- Women are at or beyond parity in PhDs awarded in certain disciplines, but grossly underrepresented on the tenure-track, especially in research universities.
- International students are the dominant force in US PhD production, especially in STEM disciplines.

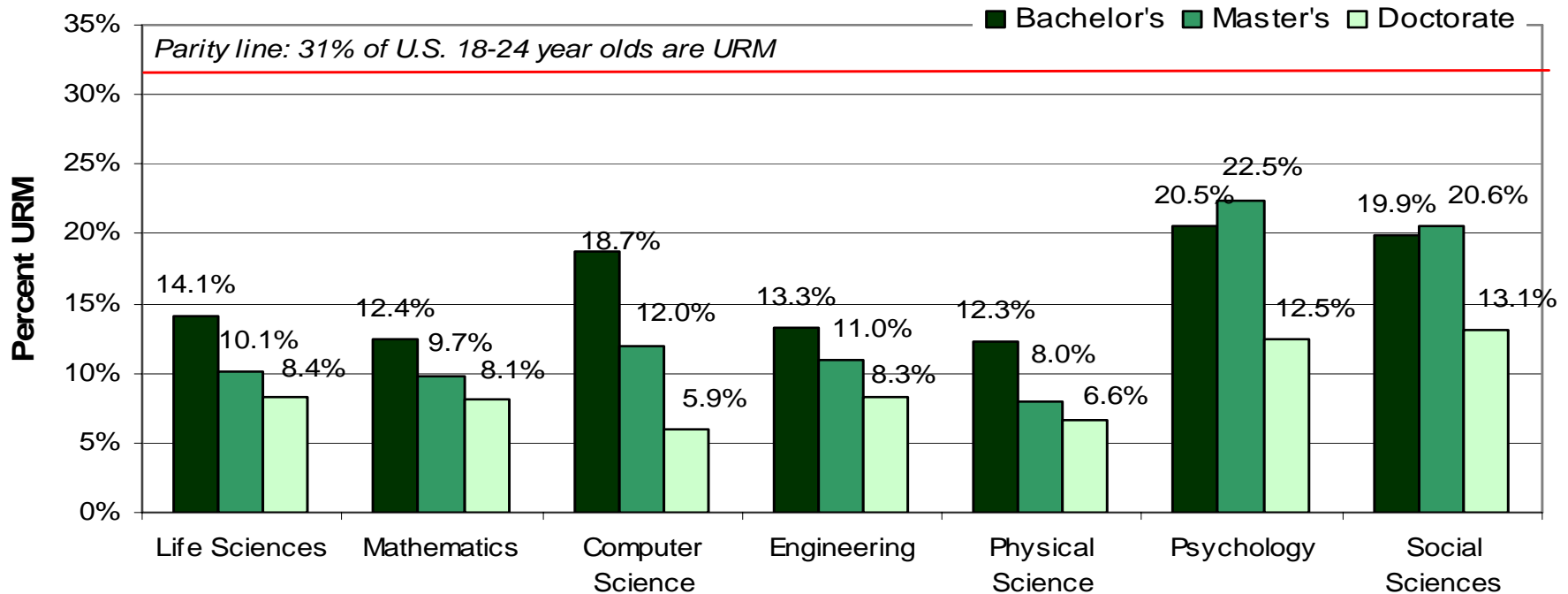
Under-represented minorities (URMs) and non-URMs as a percent of ...



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

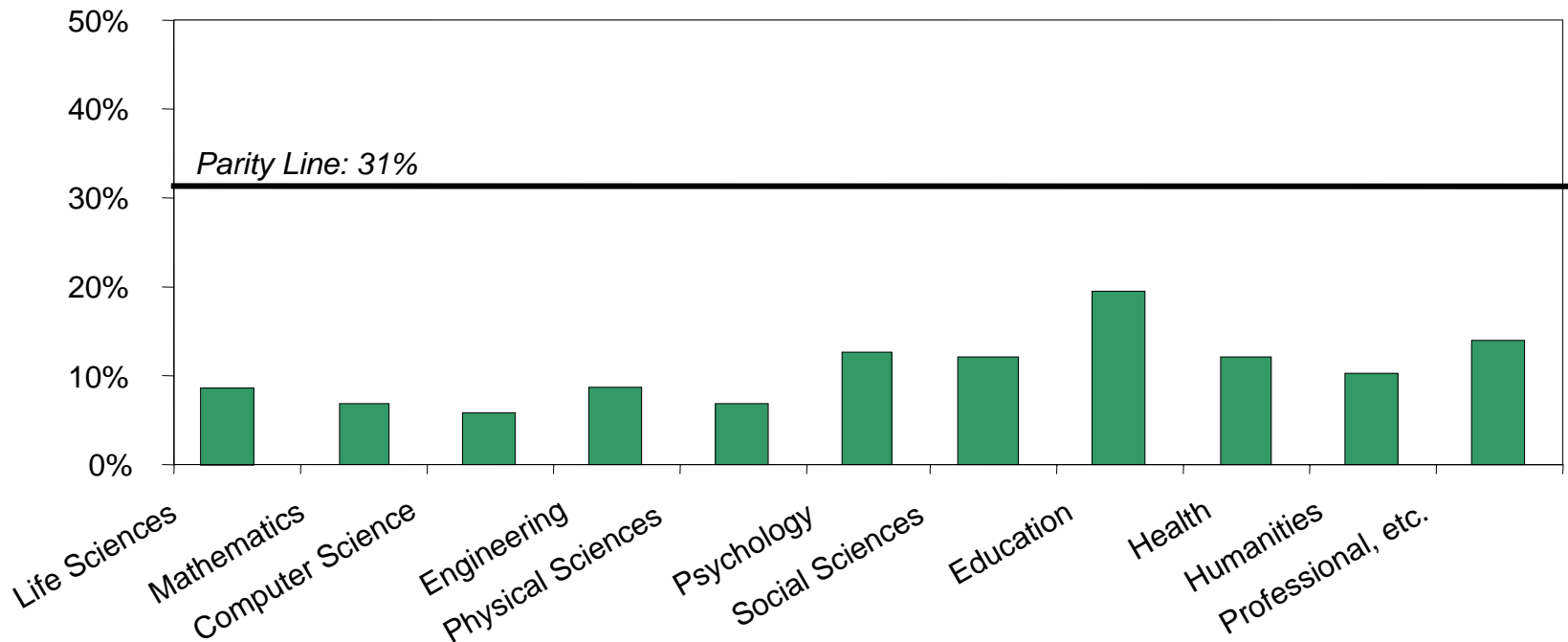
Source: CPST, data derived from National Science Foundation, WebCASPAR Database, National Center for Education Statistics, Digest of Education Statistics, 2006, and U.S. Census Bureau, Population Division

URM Degrees Earned, by Field (2005)



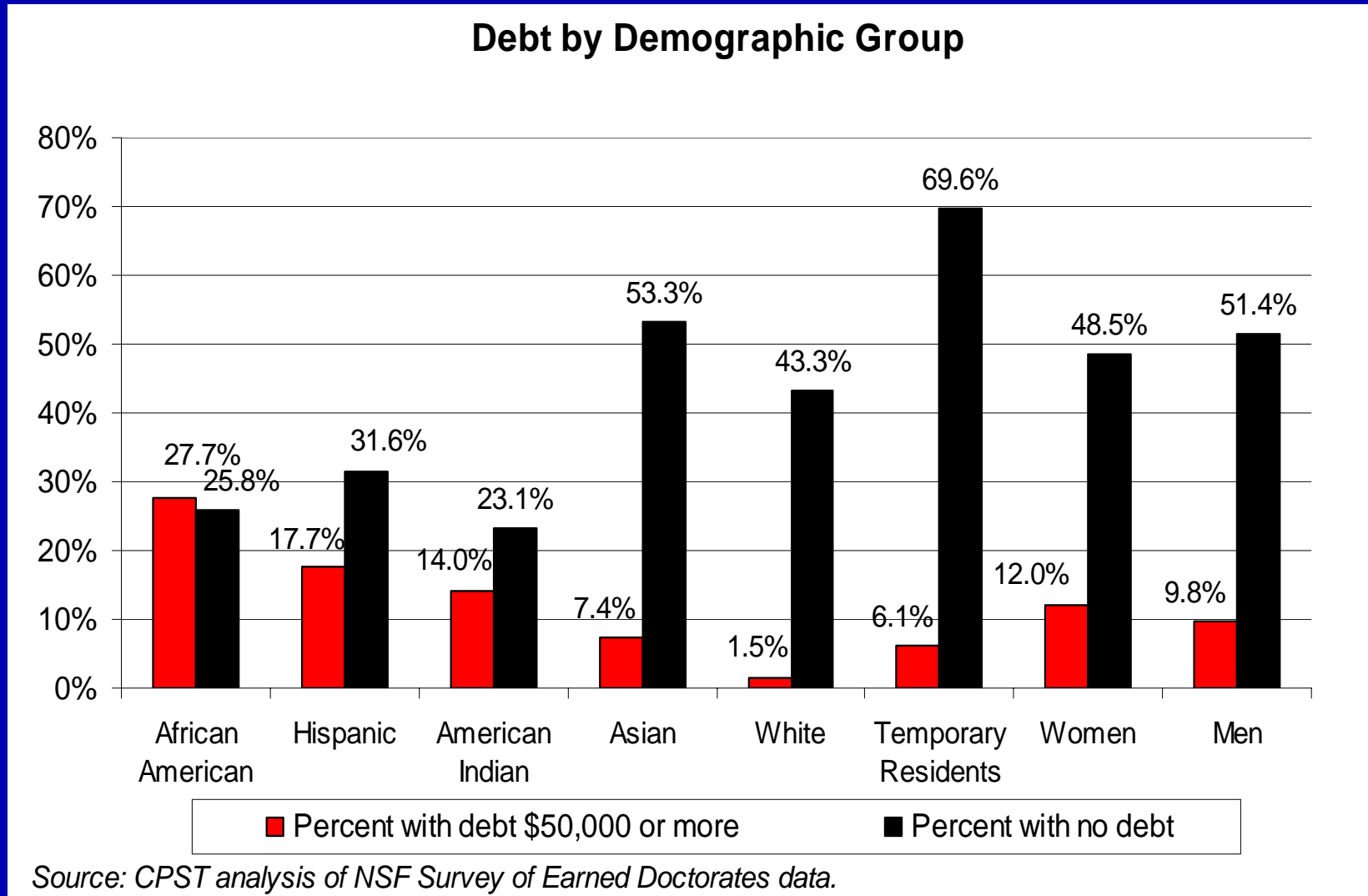
Source: CPST analysis of IPEDS data using NSF's WebCASPAR system. Life Sciences includes biological and agricultural sciences; Physical sciences includes the earth, atmospheric and ocean sciences disciplines. URM = Under-represented minority and includes African American, American Indian and Hispanics.

Percent URM Among Doctorate Recipients, U.S. Citizens and Permanent Residents, 2006

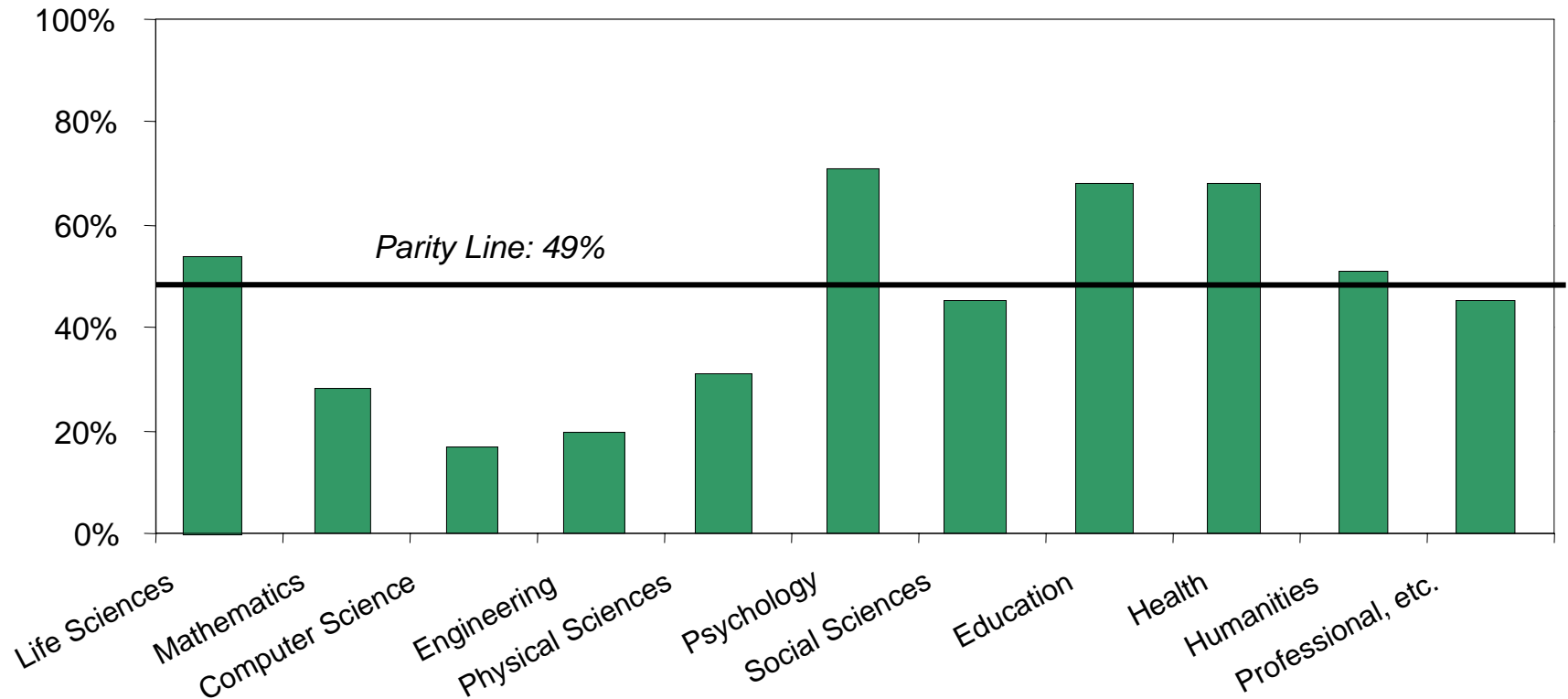


Source: CPST: Professional Women and Minorities, 17th Ed. "Professional, etc." includes professional, unknown, and other. URM includes African American, Hispanic, and American Indian.

URMs are more deeply in the red after earning a PhD than non-URMs

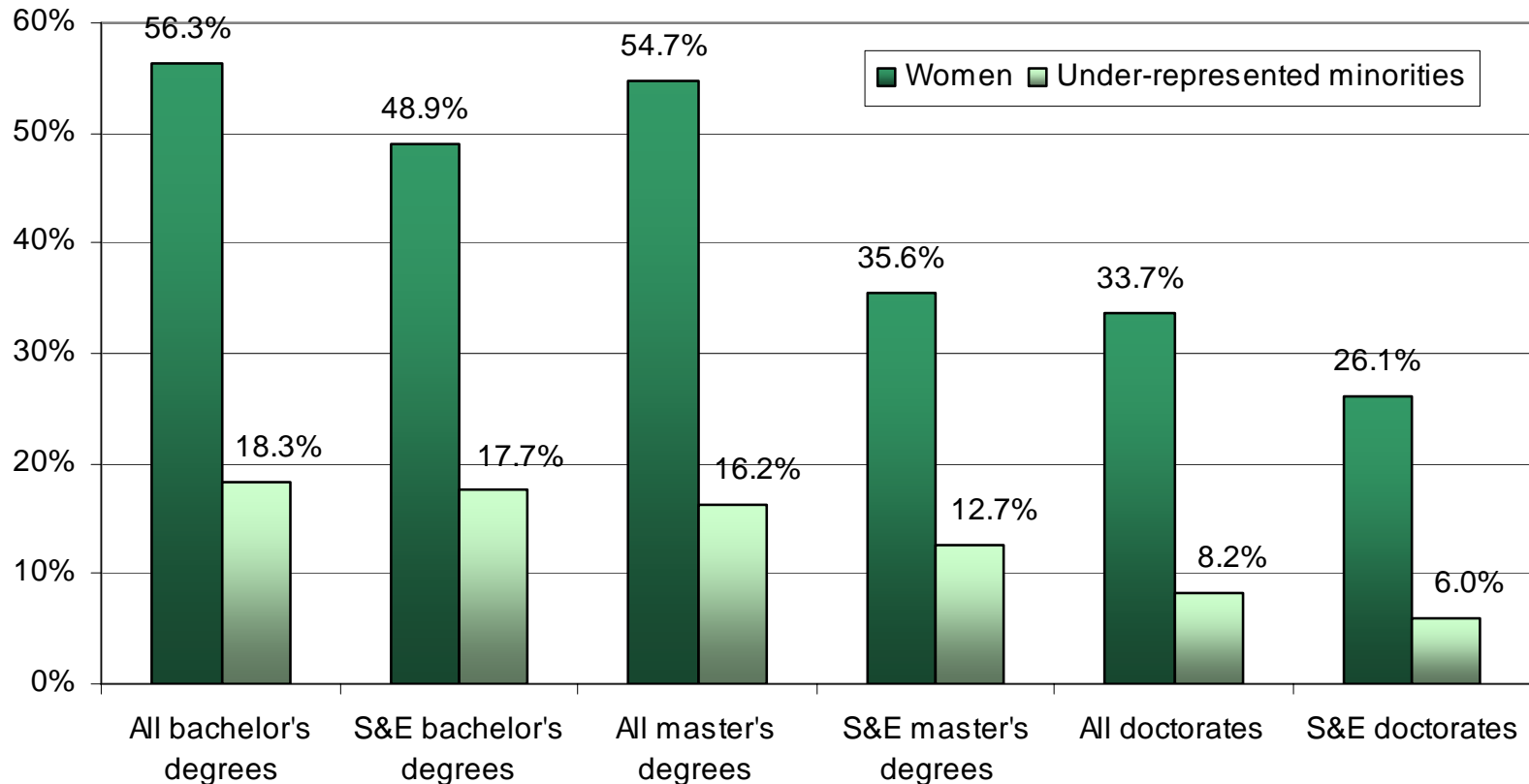


Percent Female Among Doctorate Recipients, 2006



Source: *CPST: Professional Women and Minorities, 17th Ed.* "Professional, etc." includes professional, unknown, and other.

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*.

Tenured/Tenure-track Faculty in Top 50 Departments (*The Nelson Diversity Surveys, 2007*)

	White	Black	Hispanic	Native Amer
Biology	3654 83.5%	51 1.2%	107 2.4%	10 0.2%
Psychology	1547 87.3%	55 3.1%	63 3.6%	7 0.4%
Chemistry	1459 86.2%	23 1.4%	37 2.2%	3 0.2%
Mathematics	2167 81.1%	25 0.9%	36 1.3%	1 0.0%

CGS Ph.D. Completion Project*

- Data disaggregated by broad field, race/ethnicity, gender, & citizenship
- Raises various questions about the differences observed
- 24 universities provided data on their doctoral students

source: reported in Scott Jaschik, “Ph.D. Completion Gaps,” *Inside Higher Ed*, Sept. 9, 2008, www.insidehighered.com/layout/set/print/news/2008/09/09

Cumulative Completion Rates for PhD Students Starting in 1992-94 (in %)

<i>Group</i>	<i>By Yr 5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>
Male	24	39	48	53	57	58
Female	16	30	41	47	52	55
Af Am	16	25	34	40	44	47
As Am	15	30	39	46	49	50
Latino	13	24	33	43	48	51
White	18	33	43	49	53	55
<i>Internat'l</i>	33	49	59	64	66	67

source: CGS, Ph.D. Completion Project, 2008

10-Year Completion Rates by Field & Race/Ethnicity

<i>Field</i>	<i>Af Am</i>	<i>As Am</i>	<i>Latino</i>	<i>White</i>
Engineering	47	53	55	60
Life Science	60	47	54	60
Math/Phys Sci	37	53	53	52
Soc Sci	47	44	55	57
Humanities	52	46	37	51

source: CGS, PhD Completion Project, 2008

10-Year Completion Rates by Field & Gender

<u>Field</u>	<u>Women</u>	<u>Men</u>
Engineering	56	65
Life Sciences	56	64
Math/Phys Sci	52	59
Soc Sciences	57	53
Humanities	52	47

source: CGS, PhD Completion Project, 2008

What We Don't Know (a partial list)

- What are the reasons for differential attrition from 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 a *de facto* requirement to be competitive for top university faculty positions?

Understanding Interventions

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

Understanding Interventions—2nd Annual Conference

WELCOME & OVERVIEW

Anthony L. DePass, *Committee Chair*

Long Island University-Brooklyn

Daryl E. Chubin, *Committee Vice-Chair*

American Association for the Advancement of Science

Atlanta, GA

May 2-4, 2008

Conference Objectives

2007 Workshop

- Promote the use of hypothesis-based approaches
- Familiarize biomedical scientists with the social, behavioral, & economic sciences knowledge base
- Equip attendees with some approaches, methodologies, & tools for conducting interventions research
- Develop a community of scholars

2008 Conference

- Foster a multi-disciplinary community of scholars
- Disseminate interventions-related research within the social, behavioral, & economic sciences
- Focused plenaries symposia, & poster sessions on:
 - funding, collaborations, & publishing
 - methodologies, tools, & approaches
 - investigative studies on training, mentoring, career choice
- Emphasize the “how” over last year’s “what”

Table 2
**BEST Evaluation Criteria for Assessing
 Higher Education Programs/Practices**

Questions/Criteria	Exemplary – actionable now	Promising	Not ready to adapt/scale
1. Were expected outcomes defined before program launch?	Yes	Soon after	Sort of/vague
2. Are outcome data attributable to the program intervention?	Far exceeded original expectations	Exceeded original expectations	Failed to meet expectations
3. Does it demonstrate excellence, which requires equity? – i.e., did it increase the diversity of the target population?	Chief outcome achieved and documented (positive trend)	Chief outcome implied (no monotonic trend)	Equity at core of program design, not an add-on
4. What was the value-add of the experience to the target population?	Related outcomes that move treatment group to next competitive level	Majority (but not most) of individuals in treatment population enhanced	Gains for some individuals that can be attributed to treatment
5. Is there evidence of adaptation/ institutionalization, i.e., multiple sites?	Explicit scale-up strategy w/evidence	Attempt to implement strategy and evaluate	Confined to a single site
6. Is there evidence of effectiveness with a population different from that originally targeted?	Planned and executed	Planned	Serendipitous
7. How long has it been in place?	Self-sustaining (10+ years)	Majority soft money (3-10 years)	New (<3 years)
8. Were there unexpected consequences?	Positive in intensity or extent (and measured)	Identification of possible/probable consequences	Evidence for systematic rather than random effect

Issues Shaping/Shaped by Interventions & Research

Relevant legislation & national policy initiatives

Tradition v. bias

Conscious v. unconscious discrimination

Overt v. covert prejudice/discrimination

Personal v. institutional bias

Accumulative advantage

Stereotype threat

Glass ceiling/Mommy track

Occupational segregation

Statistical profiling

Gender discrimination

"Climate" study

Women of color

Organizations working for diversity

Mismatch Theory

- Origins over a decade old, but recently revived in analysis of law school & med school graduates
- Low expectations (“tyranny of soft expectations”)
- Direct minority students to MSIs, less selective & community colleges where they are more likely to succeed
- Reduce attrition at selective colleges & research universities
- Focus on increasing numbers rather than quality & competitiveness

source: Richard Tapia, “The Flaws in the Mismatch Theory,” Testimony before the U.S. Commission on Civil Rights, Sept. 12, 2008.

Evidence That Refutes “Mismatch” & Touts “Institutional Effects”: One Example

- 10+ years of STEM BS→PhD data: comparative analysis of CSU-educated students in UC PhD STEM programs (courtesy of UCOP Data Systems, 2007)
- Frank Bayliss, principal author (SFSU—one of 24 CSUs)
- Multiple sponsors, multiple programs, strong completion record
- Chapter 18, Bayliss et al., “Institutional Transformation: Establishing a Commitment to Research and Student Success,” in M. Boyd and J. Wesemann, eds., *Broadening Participation in Undergraduate Research: Fostering Excellence and Enhancing the Impact*, Council for Undergraduate Research, forthcoming 2009.

UC PhD STEM 10-Year Completion Rates, by Students' Undergraduate Institution, Fall 1992-94 Entry Cohorts (UCOP, April 2007)

	<u>Life Sciences</u>			<u>Physical Sciences/Math</u>			<u>Engineering/Computer Science</u>			<u>All STEM Fields</u>		
	No. of URM Students	No. of All Students	% URM	No. of URM Students	No. of All Students	% URM	No. of URM Students	No. of All Students	% URM	No. of URM Students	No. of All Students	% URM
CSU	17	122	14%	25	153	16%	15	78	19%	57	353	16%
UC	44	438	10%	32	350	9%	23	313	7%	99	1,101	9%
Other	61	802	8%	57	885	6%	50	698	7%	168	2,385	7%
<i>Subtotal</i>	122	1,362	9%	114	1,388	8%	88	1,089	8%	324	3,839	8%
<i>Total⁴</i>	222	1,759	13%	185	1,811	10%	95	1,722	6%	502	5,292	9%

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.

Strategies: Changing the Culture

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

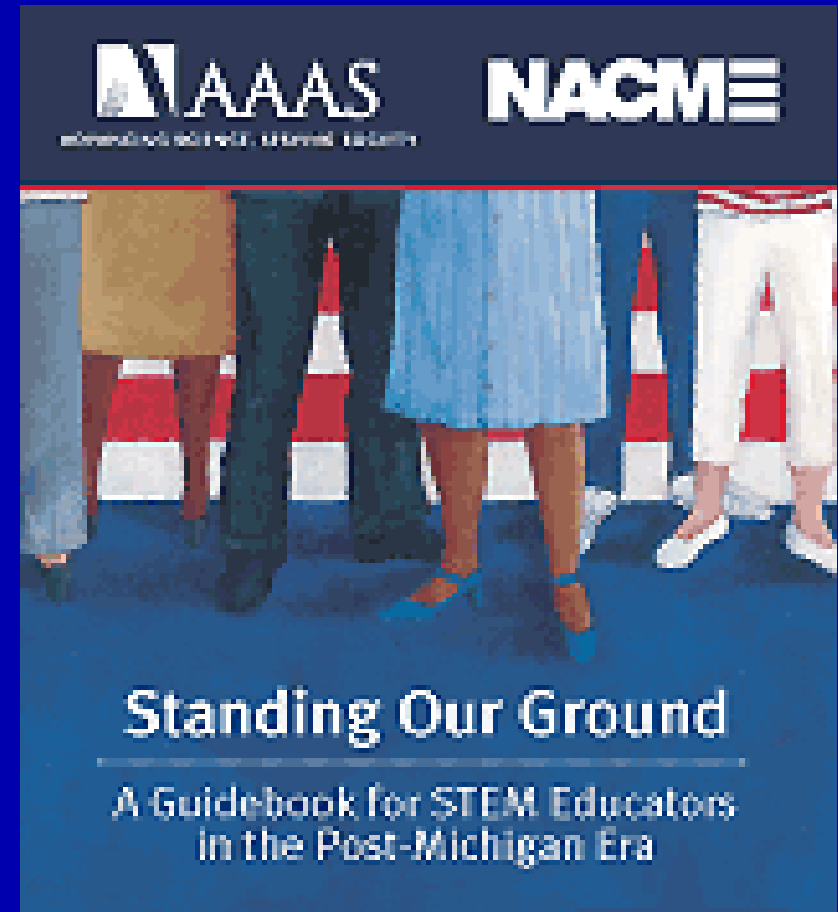
- Research *and* teaching, no “excellence” without equity, technical *and* “soft” (professional) skills—not versus
- Need for *critical mass* (context-specific, students *and* faculty), affinity groups, & mentoring
- *Measure* dimensions of participation: access, excellence, advancement, role models

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 & 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/

Laws Matter

- 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
- Executive Order 11246 of 1965 (amended 1973)—Federal contracting requirements and workforce affirmative action
- 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)

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.”

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

Recent Sources—My Personal Involvement

- “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).

Thank you!

To continue the conversation. . .

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