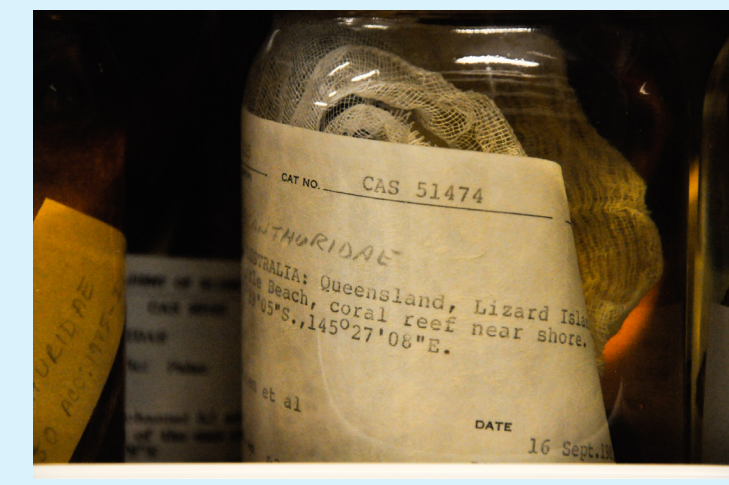




Elementary students on a field trip at the Darling Marine Center (Maine)



Students in the Minorities Striving and Pursuing Higher Degrees of Success in Earth System Science (MS PhD'S) program behind the scenes at the California Academy of Sciences



BROADENING PARTICIPATION IN SUMMER RESEARCH PROGRAMS FOR UNDERGRADUATES



Program Director Dr. Rick Wahle with Gulf of Maine and World Ocean REU students Alexandra Lopez, Alexander Vermont and Louisa Walker on the annual research cruise (2011).

The Institute for Broadening Participation (IBP) is a non-profit organization dedicated to designing and implementing strategies to increase access to STEM (Science, Technology, Engineering, and Mathematics) education and careers for diverse underrepresented groups.



This project funded by NSF-OCE Grant # 1014125

Pathways to Ocean Sciences

The Institute for Broadening Participation (IBP)

PIs: Ashanti Johnson & Allyson Fauver
Team members: Liv Detrick, Susie Valaitis, Sandra Thomas, Dana Saywell, David Seigfried, Chris Cash

What is "underrepresentation"?

Underrepresentation often refers to "people from groups who have historically been denied access or faced steep barriers to accessing higher education in the US."

The following groups of individuals are considered underrepresented in STEM fields:

- Native Americans
- Alaska Natives
- Blacks or African Americans
- Hispanics
- Native Hawaiians
- Other Pacific Islanders
- Women
- Persons with Disabilities

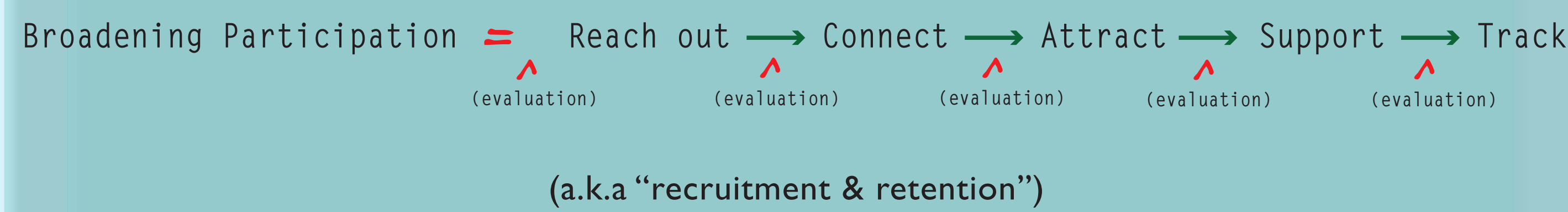
NSF defines underrepresentation also in terms of "individuals from institutions and geographic areas that do not participate in NSF research programs at rates comparable to others."

NSF, "Broadening Participation at the National Science Foundation: a Framework for Action" (2008) http://www.nsf.gov/statistics/ibp/nsf_frameworkforaction_0808.pdf

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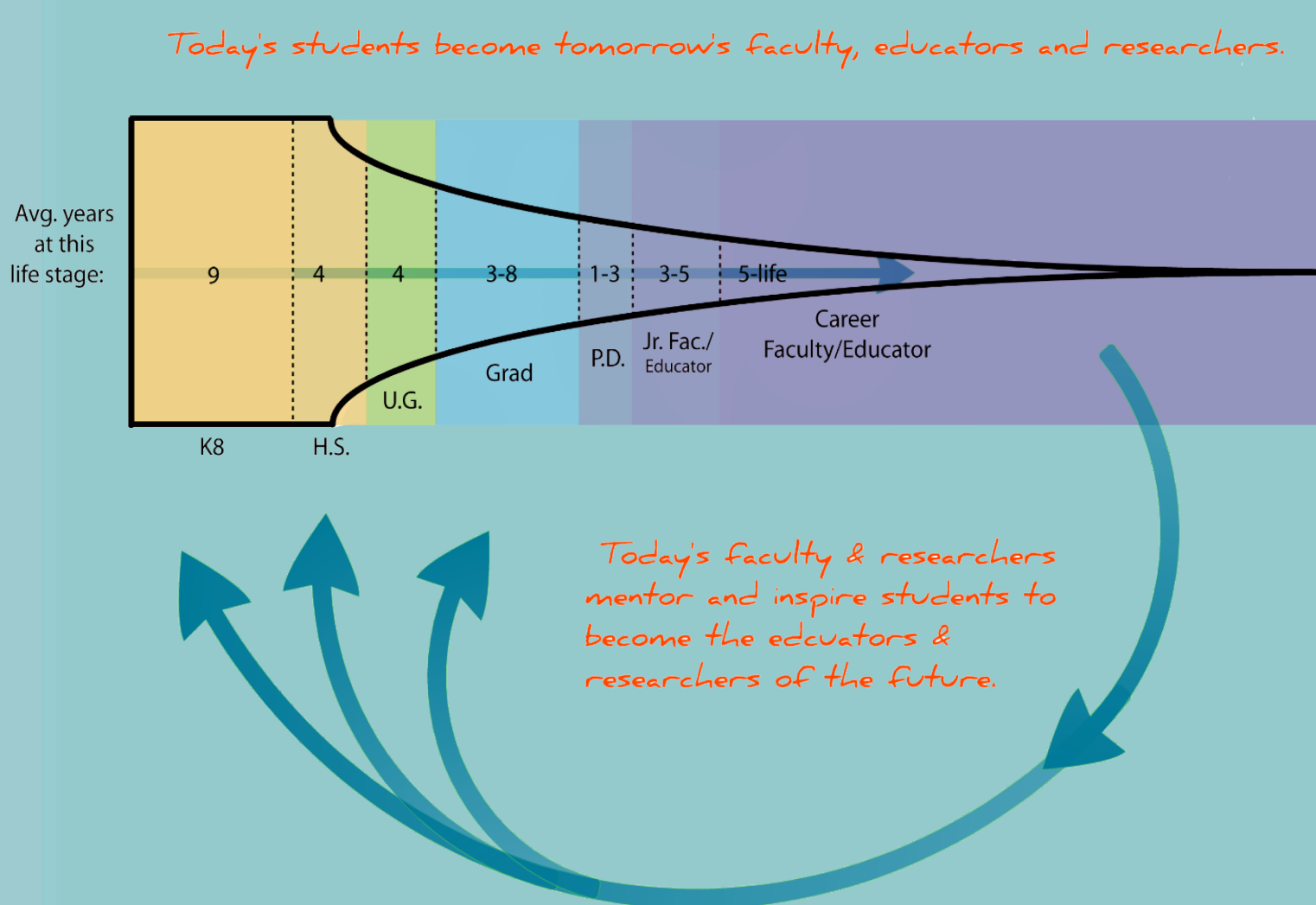
What is "broadening participation"?

On the short term it refers to increasing the participation and success of underrepresented students in your program.



On the long term it means fostering levels of representation in the STEM pipeline that more closely reflect the demographic diversity of the US population.

"The Pipeline"



The demographic composition of the pipeline tends towards self-repetition.

More than 75% of white and Asian students earn a high school diploma, in comparison to 56% of Latino, 54% of black, and 51% of American Indian students.

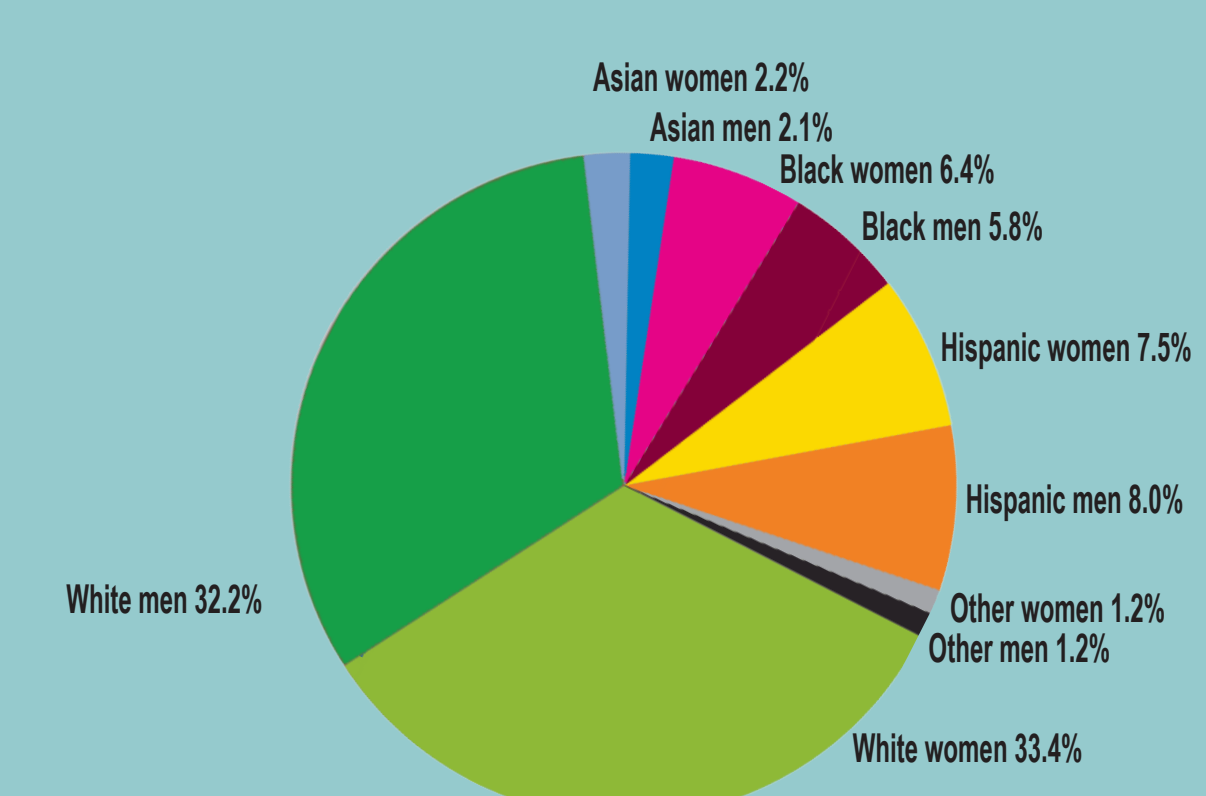
59% of white students complete a bachelor's degree within six years of enrolling in college, in comparison to 47% of Hispanic students, 40% of African Americans, and 39% of Native American students.

In 2008, women comprised only 20.6% of full-time, full professors with science and engineering doctorates (but 50.7% of the total US resident population).

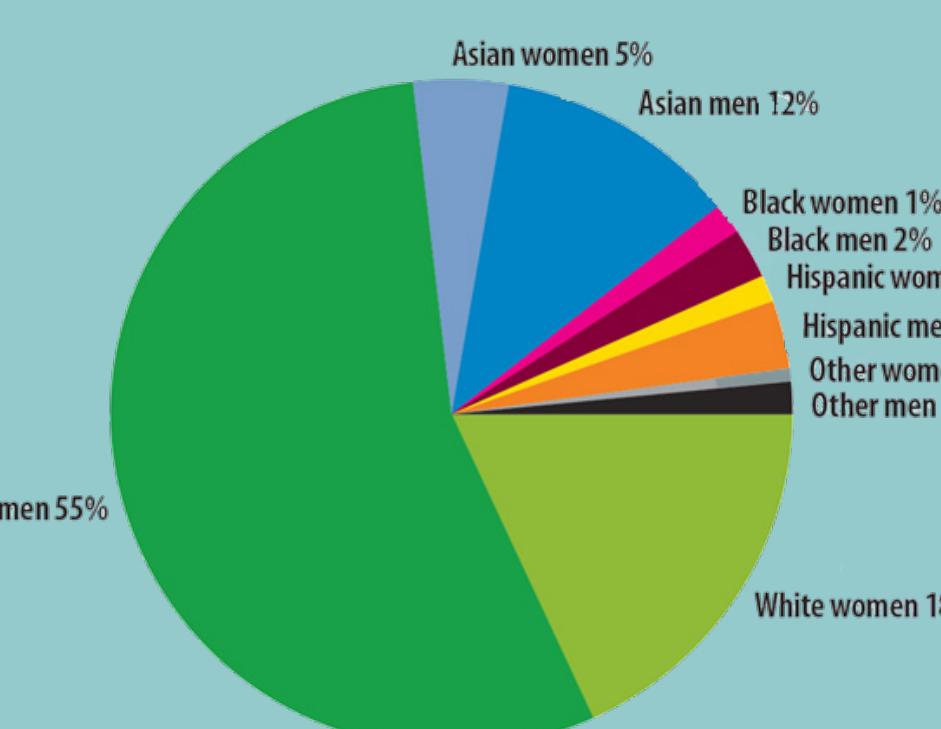
Underrepresented minorities (African Americans, Hispanics, and American Indians/Alaskan Natives) comprised only 5.7% of full-time, full professors with science and engineering doctorates (but 30.1% of the US resident population).

The science and engineering workforce is composed of people who earned degrees over roughly three decades.

Resident population of the United States (2008)



Scientists & engineers in science and engineering occupations (2006)



NOTE: Hispanic may be any race. Other includes American Indian/Alaskan Native, Native Hawaiian/Other Pacific Islander, and multiple race. SOURCE: NSF, Women, Minorities, and Persons with Disabilities in Science and Engineering; 2011, <http://www.nsf.gov/statistics/wmpd/>

Who is underrepresented in the Ocean Sciences?

Doctoral Recipients	2001	2002	2003	2004	2005	2006	2007	2008	2009
Ocean/Marine Sciences:	179	207	196	189	190	179	231	219	217

2009 Doctoral Recipients	US Citizens & Permanent Residents									w/ Disability
	All	Visa holders	Male	Female	American Indian	Black	Asian	Hispanic	White	
Ocean/Marine Sciences:	217	66	118	99	0	1	7	10	124	?? Unk.

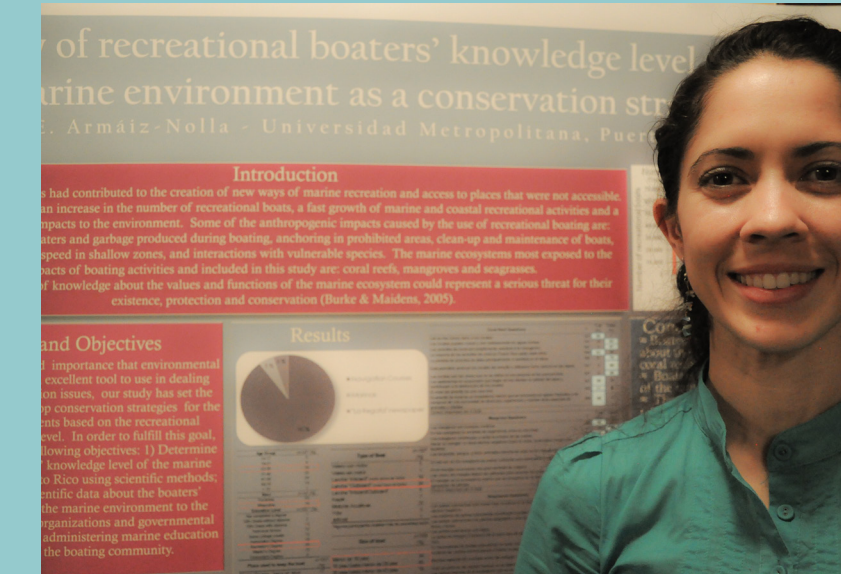
NSF, Division of Science Resources Statistics, 2010. Doctorate Recipients from U.S. Universities: 2009. Special Report NSF 11-306, Arlington, VA. <http://www.nsf.gov/statistics/nsf11306/>



Students at Coastal Studies for Girls, a residential science and leadership semester school for 10th grade girls.



REU students at the REU Program in Estuarine and Coastal Marine Sciences (Duke U.)



Kamil E. Armaiz-Nolla (Universidad Metropolitana (UMET), San Juan, PR) presenting her research on Puerto Rico's recreational boaters' knowledge level of the marine environment as a conservation strategy.

Why does broadening participation & increasing diversity matter?

Success

Tap the power of diversity: diverse groups of problem solvers outperform groups of the best individuals at solving problems.

Page: Scott E. (2007), "The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies" Princeton University Press

Broader Impacts

My Project . . . Advances Discovery

Benefits Society Broadens Participation

Enhances Infrastructure Promotes Teaching, Training & Learning

Disseminates Findings Supports Networks & Partnerships

NSF, "What's New? Broadening Participation: A Framework for Action" (2008) http://www.nsf.gov/statistics/ibp/nsf_frameworkforaction_0808.pdf

Global Leadership: Workforce Excellence

Although the unmatched vitality of the United States' economy and science and technology enterprise has made the U.S. a world leader for decades, allowing Americans to benefit from a high standard of living and national security, U.S. advantages in the marketplace and in science and technology are eroding in a world where advanced knowledge is widespread and low-cost labor is readily available.

The U.S. labor market is projected to grow faster in science and engineering than in any other sector in the coming years. Currently, only 6% of all 24-year-old Americans hold an undergraduate degree in STEM disciplines; for underrepresented minority students, the percentage hovers at 2-3%. Non-US students account for almost all the growth in US STEM doctorates awarded in the past 15 years.

Committee on Science, Engineering and Public Policy (2011), Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads. Committee on Science, Engineering and Public Policy (2007), Rising Above the Gathering Storm: Energizing and Empowering America for a Brighter Economic Future. Washington, D.C.

Global Leadership: Scientific Excellence

"Creating opportunities and developing innovative strategies to broaden participation among diverse individuals, institutions, and geographic areas are critical to the NSF mission of identifying and funding work at the leading edge of discovery. The creative engagement of diverse ideas and perspectives is essential to enabling the transformative research that invigorates our nation's scientific and engineering enterprise.

Broadening participation infuses science and engineering excellence into varied individual, institutional, and geographic networks and provides for the discovery and nurturing of talent wherever it may be found . . . [an] emphasis consistent with the American Competitiveness Initiative (ACI) and the America Competes Act, federal responses to the widespread concern that the U.S. is in danger of losing its position of world leadership in science and technology."

NSF, "Broadening Participation at the National Science Foundation: a Framework for Action" (2008) http://www.nsf.gov/statistics/ibp/nsf_frameworkforaction_0808.pdf

How do I broaden participation and increase diversity in my program?

A. Grow the diversity awareness and cultural competency of project faculty and partners.

- Get faculty on board: why does diversity matter to them?
- Offer and implement training /orientation
- Provide access to materials and resources that support faculty in their efforts

B. Develop and implement a comprehensive plan for outreach and student support that covers:

- Outreach & recruitment
- Support & retention (pre-, during, & post-program)
- Tracking & evaluation

C. Embrace the pipeline.

Embracing the pipeline involves far-thinking in a system built around supporting and assessing results on the (relatively) short-term. But persist! Reaching backward and forward in the pipeline is critical to creating deep and lasting change, and – fortunately! – including just a few concrete activities focused on this end can make a difference.

- INSPIRE backwards and outwards: reach out to young students in K12 and bring your science back to community and family.
- SUPPORT forwards: help students continue on a successful career pathway and transition into grad school, the post-doc experience, and the junior faculty or early professional stages of their academic, research or industrial careers.

D. Evaluation: put the systems into place that enable you to track your efforts and assess change.

E. Dissemination: share your work, findings and successes at conferences and in publications.

Visit www.pathwaystoscience.org/oceanscience.asp

Download checklists, templates & handouts with details & examples of on-the-ground project components and activities.

Access resources:
The Online Diversity Reference Library
The Online Mentoring Manual

Post your opportunity for students.

Questions?
toll free (866) 593-9103
contactus@ibparticipation.org