Engaging Underrepresented Minorities (URMs) in STEM: Some Lessons Learned

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Agenda

• Intro
• A Case Study
• Case for Diversity
  • A conversation starter
  • “The facts” regarding the US STEM Workforce
• Lessons Learned
• Positive Factors: Research-Based Evidence
• Diversity is in your Court
  • Mentoring Strategies
  • Cultivating Positive Communities via Concept Mapping
• Diversity and Professional Development Resources
• Questions
• ...
A Case Study

• http://video.foxnews.com/v/4762903470001/black-history-month-dr-ashanti-johnson/?#sp=show-clips

• http://beta.criticalmention.com/app/#clip/view/21188337?token=6f79f2a9-3695-4340-8fb5-58efe318a842
2016 Fox News’ *Fox and Friends* African American History Month Feature Story

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Monday - Friday 8am to 8pm ET
Why should we even be concerned about broadening participation and diversity?...

A Conversation Starter

https://www.youtube.com/watch?v=4yrg7vV4a5o

Featuring Jane Elliot
“Being Black”
by Jane Elliot

https://www.youtube.com/watch?v=4yrg7vV4a5o
The Case for Diversity

DIALOG III participants at the Bermuda Biological Station (1999)
Need for Diversity

Scientific Excellence & Ingenuity

Workforce Development

"Diverse groups of problem solvers outperform groups of the best individual problem solvers."

Scott Page, 2007
The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, & Societies, Princeton University Press
GENERALLY:

Women
Persons with Disabilities
Native Americans
Hispanics
Alaska Natives
Native Hawaiians
other Pacific Islanders
Blacks or African Americans
Scientists and engineers working in science and engineering occupations: 2010

Residents population of the United States: 2008

- White men 32.2%
- Asian men 2.1%
- Asian women 2.2%
- Black men 5.8%
- Black women 6.4%
- Hispanic men 8.0%
- Hispanic women 7.5%
- Other men 1.2%
- Other women 1.2%
- Other 1.0%
- White women 33.4%

NOTE: Hispanic may be any race. Other includes American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, and multiple race.

87% non-URM

70% non-URM
68% non-URM
How is it going?

Scientists and engineers working in science and engineering occupations: 2013

88% non-URM

How is it going?

Scientists and engineers working in science and engineering occupations: 2015

88% non-URM

White men 49%

White women 18%

Asian men 14%

Asian women 7%

Black men 3%

Black women 2%

Hispanic men 4%

Hispanic women 2%

Other men 1%

Other women 1%

How is it going?

Degrees earned by URMs, 1995-2014

It is a complex issue...

It’s not usually just about one missing piece
What we have learned

• **Timing and coordination** is important at various scales: from academic calendar to academic and professional transitions.
• There is still an **unmet need for resources** that synthesize best practices.
• **Access to resources is a big obstacle** for both students and faculty, and is therefore a big opportunity for impact.
• **Partnerships** enable scaling out of project impacts and outreach.
• There is no one best strategy: multiple and complex challenges to STEM participation require a suite of **integrated strategies**.
Positive Factors: A Multi-layered Approach

- Financial Support
- Culturally Relevant Pedagogy
- Community Support
- Authentic Science Engagement
- Professional Development
- Campus and Classroom Culture & Climate
- Mentors and Mentoring
- Role Models
- Family Support
Role Models

“a person whose behavior, example, or success is or can be emulated by others”
Mentors and Mentoring

“An intentional relationship or partnership, focused on the needs of the mentee that encourages individuals to develop to their fullest potential.”

• One-to-one
• Faculty-to-student
• Peer-to-peer
• Group
• E-mentoring
• A shorter-term mentoring match at a conference
• Long term
Relies on student-based, project driven, discovery-based and often independent course work or research that provides a direct way for students to experience the feeling of authentic discovery, innovation, and individual ownership, creating engagement that is inspiring, and motivating, and interesting.

“Discovery-based: the possibility of true discovery & exploring the unknown. Independent research and individual ownership. Inspiring and motivating.”
Professional Development

- Institutional Leadership
- Engaged Faculty
- Bridging to the Next Level
- Continuous Evaluation
- Workshops
- Networking
- Coaching
- Participation in Professional Society Meetings

Campus-based programs include: LSAMP Bridge to the Doctorate, Alfred P. Sloan, Alliance for the Advancement to the Professoriate (AGEP), GK-12 Fellowship Programs and S-STEM
Campus & Classroom Culture and Climate

“very specific, minimal changes can make a difference”
Diversity is in your court

-Mentoring Resources and Best Practices
-Cultivating a Positive Campus Community: Articulating Your Story and Concept Mapping
Mentoring: Active Listening- an essential mentoring skill

• “Hearing” vs “Listening”
• Evaluate and then react

Some of benefits of active listening:
• Encourages the speaker
• Promotes trust and respect
• Enables listener to gain information
• Improves relationships
• Makes resolution of problems more likely
• Gains cooperation
• Promotes better understanding of people
Suggestions for Improving Active Listening Skills

1. Make Eye Contact
2. Exhibit Affirmative Nods and Appropriate Facial Expressions
3. Avoid Distracting Actions or Gestures
4. Ask Good Questions
5. Listen for Both Fact and Feelings
6. Paraphrase
7. Avoid Interrupting the Speaker
8. Do Not Talk Too Much

Taken from: http://pcaddick.com/page8.html
Mentoring & Professional Development: A Collaborative Experience

• Establish Relationship/ Determine Expectations
  • “Handlin’ your Business”

• Determine Next Steps
  • Self Assessment, Skills Assessment, Career Exploration, Personality Testing
  • Consultation with Intra-Campus development centers and programs
  • Suggested Readings

• Complete an Individual Development Plan
  • Goal Setting and Career Mapping
  • Preparing for Future Opportunities along the Pathway: Letters of Recommendation, Personal Statements, etc.
Assist Students in Marketing for Success

- Introvert/Extrovert
  - Either way, it’s necessary to be seen as a team player
  - Scientifically talented
  - Approachable and interested in work on group projects

- Connect/network with broad groups

- Develop “elevator” presentation

- Maximize interactions for purpose of expanding networks and identifying future opportunities
Encourage Students to Complete a Self-Assessment  
(an example presentation)

How many of you...

• Have participated in a research experience at your home institution?
• Have participated in a research experience away from home intuition?
• Have taken or planned to take math classes up through Calculus III?
• Have taken a GRE prep course?
• Have planned to take a GRE prep course?
• Have co-authored a research publication?
• ...

These are not random questions; they are points that make up the profiles of competitive applicants for REU’s, internships, B.S. and graduate school degree programs and jobs.
Promoting Positive STEM Communities:

Telling your Story using Concept Mapping with Positive Factors

Objective: For participants to recognize how Telling your Story and Concept Mapping can strengthen your mentor effectiveness.
Articulating your Story using Concept Mapping:

- **Constructing** your academic and career pathway.
- **Identifying** positive factors along your pathways

...My Story

*Objective: identify common positive factors that support STEM career pathways.*
Although landlocked, Dallas still offered exposure to marine sciences through the National Geographic Magazines.

Dallas Aquarium supported the dream of becoming a marine scientist.

Family and Teachers helped in becoming a marine scientist.

Magnet School provided the opportunity to pursue marine sciences.

Jacques Cousteau's work inspired this journey.
received a full scholarship to Texas A&M Galveston

while here was mentored by marine scientist

while attending Texas Instruments Internship

joined a Alpha Kappa Alpha Sorority

turned to support from Willie Crayton Director of Multicultural Services

despite fear of public speaking, was encouraged to run for Student Government

Pastors James & Wanda Turner
Early exposure to STEM in K-12
Family support
Resiliency
Community of support
Professional development
Role models
Campus & classroom culture
Mentors & mentoring
Authentic science engagement
American Scientist

Perspective

How to Recruit and Retain Underrepresented Minorities

From kindergarten through fulltime positions, what works to engage aspiring minority researchers in studying ocean science?

Ashanti Johnson, Melanie Harrison Osoro

Editor's Note: Ashanti Johnson not only studies aquatic environments but also is committed to mentoring young underrepresented minorities pursuing careers in science, technology, engineering, or mathematics (STEM). More than 20 years ago, she began a mentorship program for such students. Melanie Osoro is a former graduate student, now her coauthor and colleague, and an environmental scientist at the National Oceanic and Atmospheric Administration (NOAA). Their story of mentorship and collaboration starts before they met, when Johnson was a child.

I became interested in science in the 1970s, when African Americans and U.S. Hispanics comprised only 5 percent of the STEM workforce. As a third grader growing up in Oak Cliff, which at the time was a predominantly African American community in Dallas, Texas, I was given a class assignment as part of my school's talent and gifted program to identify a career that I wanted to pursue and then to conduct independent research on it. Some kids weren't sure what they wanted to do, but for me, that was easy. I wanted to be the next Jacques Cousteau. I watched the TV icon and oceanographer on PBS almost every Saturday. He worked with people of various nationalities, who spoke with different accents, as they explored exotic underwater locations. Inspired by his program, each year from third through twelfth grade, I conducted a new independent project related to the ocean.

At home, my parents supplied me with National Geographic magazines, took me to the Dallas Aquarium at Fair Park, and purchased individual volumes of Funk and Wagnalls Encyclopedia at the neighborhood grocery store to support my fascination with the sea and science. At school, my teachers, strong African American women, encouraged me to pursue my dreams, even though none of them had any experience related to oceanography or could point me to a single person of color who could serve as my role model. My family and teachers instilled in me the belief that if I applied myself I could achieve my career goal. They also taught me that it was important to be successful so that I could give back to the community and help others achieve.

These lessons served me well throughout my education, from public school through my doctoral studies at Texas AM University in College Station. Despite any challenge, I was determined to persevere. My success represented success for my family and community. I felt that each career achievement would put me in a better position to reach out and help others.

When I stepped onto the research vessel Gyun to collect sediment samples from the Gulf of Mexico during my final field season, I felt as though I were wearing my father's shoes. I was a scientist with a mission.

Recent Publications

Strategies for Increasing Diversity in the Ocean Science Workforce Through Mentoring

By Ashanti Johnson, Melanie J. Huggins, David Sieghlfd, and LoTyrae Braxton

Abstract. Establishing and maintaining a diverse US workforce that fully engages all populations represents a tremendous imperative not only for advancing ocean science-related enterprises but also for cultivating future global ocean science leaders who collaborate effectively to make discoveries, achieve solutions, and develop technologies. A growing body of evidence suggests that a more diverse professional US workforce that better reflects the nation’s demographics can be achieved through numerous strategies aimed at effectively recruiting, supporting through graduation, and facilitating the increased participation of underrepresented minorities in Earth, atmospheric, and ocean sciences (and other related) graduate degree programs. To provide background and context for understanding the diversity challenge, we first describe expectations for the future US population and compare these projections to information about today’s demographic realities and the situation for the sciences (including the ocean sciences) in particular. Descriptions of several specific implementations provide examples of successful strategies and reflect the research-based positive factors shown to foster increased engagement of underrepresented minorities.

Introduction

Why does increasing diversity in the ocean science workforce matter? Research (STEM) fields, including ocean sciences, is essential for maximizing and fostering progressive innovation that is critical to advancing ocean science. For example, ocean sciences are needed to address climate change (IPCC, 2014) and the coastal impacts of earthquakes and tsunamis (Burr et al., 2010). However, the ocean sciences are among those STEM fields that are the least diverse (Menken et al., 2017). While progress has been made in marine sciences (Mann et al., 2017), notable disparities persist across disciplines (Mann et al., 2017). The persistent underrepresentation of women and underrepresented minorities (e.g., African Americans, Hispanics, Native Hawaiians, and other Pacific Islanders) in ocean sciences has been noted by the National Oceanic and Atmospheric Administration (NOAA; 2019) and other U.S. research agencies. Of particular concern are the low numbers of URM students in ocean sciences, which can lead to a lack of diversity in the ocean sciences workforce, as noted in the 2019 National Academy of Sciences, Engineering, and Medicine (NASEM) report. The report highlights the need for increased diversity in the ocean sciences workforce as a means of addressing the complex challenges facing our oceans and marine ecosystems (NASEM, 2019).
MS PHD’S Professional Development and Mentoring Institute
URM Student Programs (K-12, undergraduate and graduate students)

MS PHD’S
Minorities Striving and Pursuing Higher Degrees of Success in Earth System Science

STEM Human Resource Development, Inc.
Diversity and inclusion workshops, training sessions, on-going support, etc. (faculty, researchers, administrators in academia, government and industry)
Thank you!

**MS PHD’S Professional Development and Mentoring Institute**  
(*a 501(c)3 non-profit organization*), CEO/Executive Director  

**STEM Human Resource Development (HRD) Inc.**, President/CEO  

**Cirrus Academy-A STEAM Charter School System**  
(*a 501(c)3 non-profit organization*), CEO/Superintendent  

**Mercer University**, Associate Professor  

Dr.AshantiJohnson@gmail.com  

http://video.foxnews.com/v/4762903470001/black-history-month-dr-ashanti-johnson/?#sp=show-clips
Talking Points to Encourage Students to Complete a Self-Assessment

*(an example presentation)*
Handlin’ Your Business
a necessary conversation

How many of you...

• Are from outside of the state of (Insert your state here)?
• Are from outside of the US?
• Are 1\textsuperscript{st} generation students?
• Are/were in organizations on campus?
• Hold/held leadership positions on campus?
• Are/were in honor societies?
How many of you...

• Are in STEM discipline organizations?
• Know what minority focused professional conferences are key for your discipline?
• Know what non minority-focused professional conferences are key for your discipline?
• Would like to conduct research and present your results at a professional society meeting?
• Have presented or will present your research at a professional society meeting?
How many of you...

• Have participated in a research experience at your home institution?
• Have participated in a research experience away from home intuition?
• Have taken or planned to take math classes up through Calculus III?
• Have taken a GRE prep course?
• Have planned to take a GRE prep course?
• Have co-authored a research publication?
How many of you...

• Have identified 3 possible universities that you would like to attend?
• Have identified at least 2 possible graduate schools that you would like to attend after receiving a B.S. degree?
• Have developed a networking strategy to connect with potential research advisors or opportunities?
• Who has a 5-year plan/goal?
• Who has a 10-year plan/goal?
How many of you...

• Who has a 20-year plan/goal?
• Who knows what is meant by digital identity?
• Who has purposefully kept their digital identity professional and would be comfortable with a potential employer carefully reviewing it?
• Who is on track with their 5-year plan/goal?
• What are your immediate next steps to reaching your goals?
How many of you...

• What barriers have you identified to reaching your immediate next steps?
• What would you like to accomplish through this meeting?
• What would you like to accomplish in this semester?
• What steps have you taken or identified you need to take to illuminate those barriers?
• Who is willing to admit that they could do a better job handling their business?
Handlin’ Your Business

These are not random questions; they are points that make up the profiles of competitive applicants for REU’s, internships, B.S. and graduate school degree programs and jobs.

How do I know this?
I will tell you how by giving you some information about my background and experiences.

(Insert YOUR story and concept map here)
Student Session Closing thoughts:

Remember:

* Your job is not to be eliminated because you have not handled your business
* Your job is to make anyone you represent be represented well
* Your job is to stay connected to your passions, and do what it takes to make it happen and let no one or anything keep you from your goals
  • Your job is to run your race...and complete it!!!

And while you are running your race look around and behind you to see others who are running their race. Encourage them. Support them. Help them. Lift them up as you climb!

At the end of your race you should be able to look at what you have accomplished in fulfilling your own goals, and see who you have helped along the way and what good you have done to leave an inheritance for future generations and be able to say “I have handled my business!”
Change Agents: Recruitment and Retention
Academic Mentoring and Professional Development Opportunities (Important Elements of Successful Recruitment and Retention Strategies)

Participation in professional organizations

Department-specific activities

Intra-campus collaborations

Industry and government

Campus diversity initiatives

Training opportunities
STEM Human Resource Development, Inc.
Infrastructure for Broadening Participation in STEM (IBP-STEM)

“To increase the diversity of the STEM workforce by helping students navigate their pathways to success in STEM.”