Understanding Interventions
That Impact Research & Practice

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Outline

— Data

— Need for UI
  Conferences
  Journal

— Examples
  How to Diversify—Select Strategies
  Professional Development

— Evolution of Thinking
Despite accounting for one-half of the college-educated workforce, women in 2015 accounted for less than one-third of S&E employment. Although the number of women in S&E jobs has risen significantly in the past 2 decades (from 755,000 in 1993 to 1,818,000 in 2015), the disparity has narrowed only modestly. Similarly, underrepresented minorities—blacks, Hispanics, and American Indians or Alaska Natives—have made substantial strides in S&E employment, increasing from 217,000 S&E workers in 1993 to 705,000 in 2015. However, their representation in S&E jobs (11%) remains below their share of the population (27%).
Nor in Percentage of Underrepresented Minorities
Need for UI

• “Broaden participation” in STEM education & professional training—undergrad to early career

• Engage four key constituencies: training program directors (primarily NIH & NSF), social science scholars, interventions researchers, & education evaluators

• Fill the gap in the scholarly infrastructure to advance issues of underrepresentation, diversity, & inclusion from the margins to the mainstream of STEM disciplines

• Provide resources (website, searchable literature archive, journal, & annual conference that provide: a) venues for dissemination of interventions research and related training; b) opportunities for researchers/practitioners to interact and collaborate; and c) a mechanism for discourse on translating research into practice (implementation of interventions)
UI Conferences at a glance

• 11 national conferences (2019 in Baltimore)

• Average attendance (230-300)

• Main sponsor (NIGMS, with contributions from NSF, HHMI, Sloan Foundation, & ETS)

• Plenary sessions this year (cross-cutting theme—bias):

  *The Brilliance Barrier: Stereotypes about Brilliance Are an Obstacle to Diversity in Science and Beyond*

  *STEMing the Tide: How female scientists and peers act as 'social vaccines' to promote young women's success in STEM*

  *GRE and Graduate School Admissions: A Panel Discussion*

  *Can We Talk Here? Language, Identity, and Becoming a Scientist*
A Sample of What We Know—
Key Concepts Explored Empirically at
*Understanding Interventions* Conferences,
2008-2019

- **Stereotype threat**—performance in academic contexts can be harmed by the awareness that one’s behavior might be viewed through the lens of racial or gender stereotypes. It can also lead students to choose not to pursue a particular domain of study and, consequently, limit the range of professions they pursue (Steele and Aronson 1995)

- **Critical mass**—the presence of a particular minority on campus or in a classroom, not a fixed percentage or number of students. The desired result is members of underrepresented minority groups no longer feeling isolated or stigmatized, and can be judged individually (as affirmed by *Grutter*, 2003, and *Fisher*, 2013, Supreme Court cases)

- **Self-efficacy**—extending Bandura’s (1977) findings that one’s capacity to execute actions required for achievement derive from students’ beliefs that they can complete an undergraduate or graduate degree in a STEM discipline (Chemers et al. 2011)

- Other notable concepts: *implicit/unconscious bias, climate, retention, mentoring/coaching*

Individuals’ beliefs about ability:

• Where does ability come from?
  Innate and unchangeable talent (“fixed mindset”)
  or
  Training, effort, strategies, etc. (“growth mindset”)

• Nation-wide survey of faculty and graduate students:
  30 disciplines (N = 1820). Participants were asked what
  they see as required for success in their field:

• Being a top scholar of [discipline] requires a special aptitude that just
  can’t be taught.
• With the right amount of effort and dedication, anyone can become a
  top scholar in [discipline].

source: Cimpian, UI Conference, Baltimore, 2019
Problems with Existing Data

1. Programs can “cherry pick” students (who are likely to succeed without the program—growing new talent vs. harvesting abilities)
2. No comparison/control group
3. Long-term evaluations outside of funding scope
4. No way to examine the “mechanisms” of success
5. Retrospective accounts can be biased

source: Schultz et al., UI Conference, Philadelphia, 2016
Key Points: An Example

1. NIH programs for undergraduates (RISE* and MARC#) have a strong effect on student *intentions* to pursue a career in the sciences.

2. RISE and MARC undergraduates have (*outputs*): higher graduation rates, applications to doctoral programs, enrollment in doctoral programs, completion of doctoral programs.

3. RISE works primarily because it provides students with *research experience*.

4. Research experience promotes *self-efficacy* and (more importantly) *identity* as a scientist.

*Research Initiative for Scientific Enhancement
#Maximizing Access to Research Careers
Understanding Interventions Journal (UI Journal)—
a refereed, on-line, open-access journal

Editor: Daryl Chubin

Associate Editors: Janet Branchaw (Wisconsin-Madison)
Frances Carter-Johnson (NSF)
John Matsui (Cal-Berkeley)

Publisher: Anthony DePass (LIU-Brooklyn)
Sample Articles Published in UI Journal

• Teaching Academics about Microaggressions: A Workshop Model Adaptable to Various Audiences

• Breaking the Bias-Habit: A Workshop to Help Internal Medicine Residents Reduce the Impact of Implicit Bias

• Supporting the Transition of Community College Transfer Students into STEM at a Four-year Institution

• Helping Mentors Foster Trainees’ Ability in Scientific Communication
HOW TO DIVERSIFY
(Select Strategies)

Supply
• New PhD production: *role of undergraduate origins* (i.e., MSIs)
• Ratio of minority students admitted, *esp. in publics*, to minority faculty

Climate
• Recruitment/hiring procedures: overcoming judgments of “fit” by department faculty to “vertical accountability” (*faculty, chair, dean*)
• Retention: colleague/community support (“bridge leaders”), promotion & tenure (*v. appeal of non-academic position*)

Resources
• Institutional commitment/leadership: adaptation & endorsement of *national model*
• Policy with goals/budget: *translated at department level*

Underlying Factors Addressed
• tribalism/pedigree (*institutional halo effect*)
• outreach beyond familiar networks in *diversifying search process, pool, short list and controlling bias/stereotypes*
Professional Development—
Examples of How to Intervene

Challenging Implicit Bias: Train the Trainer Program

Receive the training needed to prepare/deliver implicit bias workshops at your institution

Two-Part Webinar Event: Engineering Inclusive Classrooms

Join a two-part webinar to learn actionable strategies for engineering inclusive classrooms

UI Workshops (2019)
Critical Interventions to Help STEM Students Prepare for Graduate School

Nurturing Women of Excellence in Natural Science and Mathematics
How to Help Students Create an Airtight Research Report

Best Practices for Managing a National Initiative: The Example of the National Research Mentoring Network (NRMN)

The Scientific Workforce: Using Data to Guide My Career Development
Diversity & Inclusion in Science—Evolution of Thinking (→ Action)

- Diversity 1.0: At this level, excellence and diversity are viewed as competing ends.

- Diversity 2.0: At this level, diversity and excellence coexist, with diversity on the periphery.

- Diversity 3.0: At this level, diversity and inclusion are woven into the core workings of the institution and are considered integral for achieving excellence.

source: IBM, then introduced into the academic medical community
Thank you!

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