DOE Laboratories of the Future Workshop

Mentorship at the Laboratories Across all Career Levels and Types

January 25, 2022

U.S. DEPARTMENT OF ENERGY | Office of Science

DOE Laboratories of the Future

- *Why are we doing this?*
  - DOE labs are globally recognized to be the crown jewels of the U.S. research enterprise
  - Masters of science at scale, interdisciplinary research, and operating national user facilities
  - Entering eighth decade of operation and retain vestiges of WWII-era roots
  - We want to ensure the laboratories excel for next 70 years, as well as take advantage of new opportunities that could transform the way research is performed
- *What are we doing?*
  - Developing a vision for how laboratories will operate in the future using stakeholder input and ideas from other successful models
  - Attempting to do this without being bound by current constraints
  - We are asking the question, if you were to establish the lab system today, what would it be?

Researcher Mental Health and Work-Life Balance Post-COVID Workshop

- **Introduction – Dr. Steve Binkley,** Acting Director of the Office of Science
- **Dr. Jennifer Stanford,** Center for the Advancement of STEM Teaching and Learning Excellence **– Importance of Mentorship in Effective and Inclusive STEM Education**
- **Dr. Ann Quiroz Gates,** University of Texas at El Paso **– Developing the Next-Generation Researcher through Inclusive Excellence**
- **Dr. Jeanita Pritchett,** National Institute of Standards and Technology **– How to Leverage Mentoring and Coaching to Cultivate an Inclusive Workplace**
- **Dr. Melissa McDaniels,** Center for the Improvement of Mentored Experiences in Research **– Building Cultures of Inclusive Mentorship at National Laboratories**

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Thank you!

- If you have any questions, please reach out to:

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The Importance of Mentorship in Effective and Inclusive STEM Education

Jennifer S. Stanford, Ph.D. (she/her/hers)
Associate Professor of Biology,
Co-Director of CASTLE
January 25, 2022

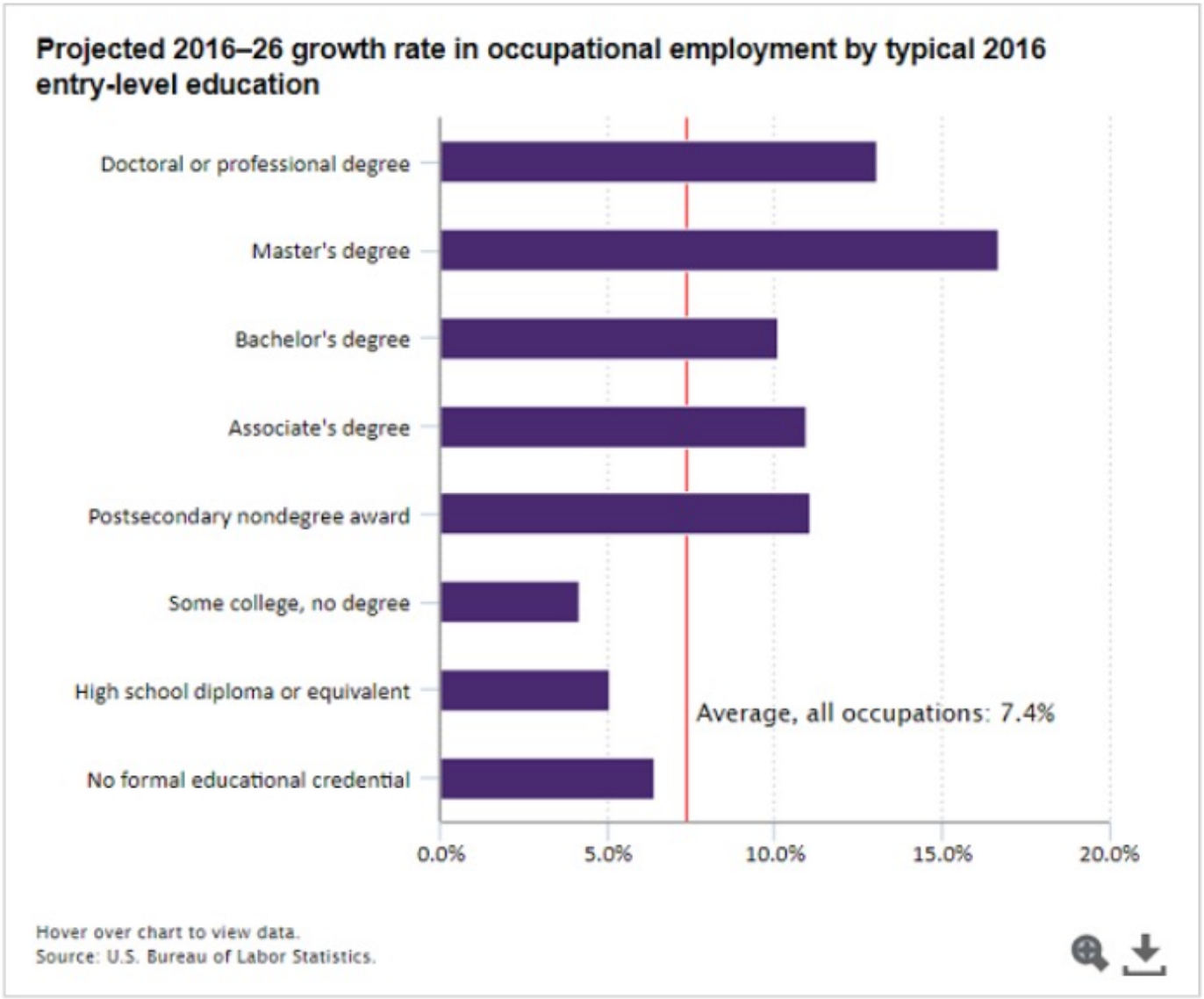
DREXEL UNIVERSITY
Center for the
Advancement of
STEM Teaching and
Learning Excellence

College of
Arts &
Sciences
Drexel University

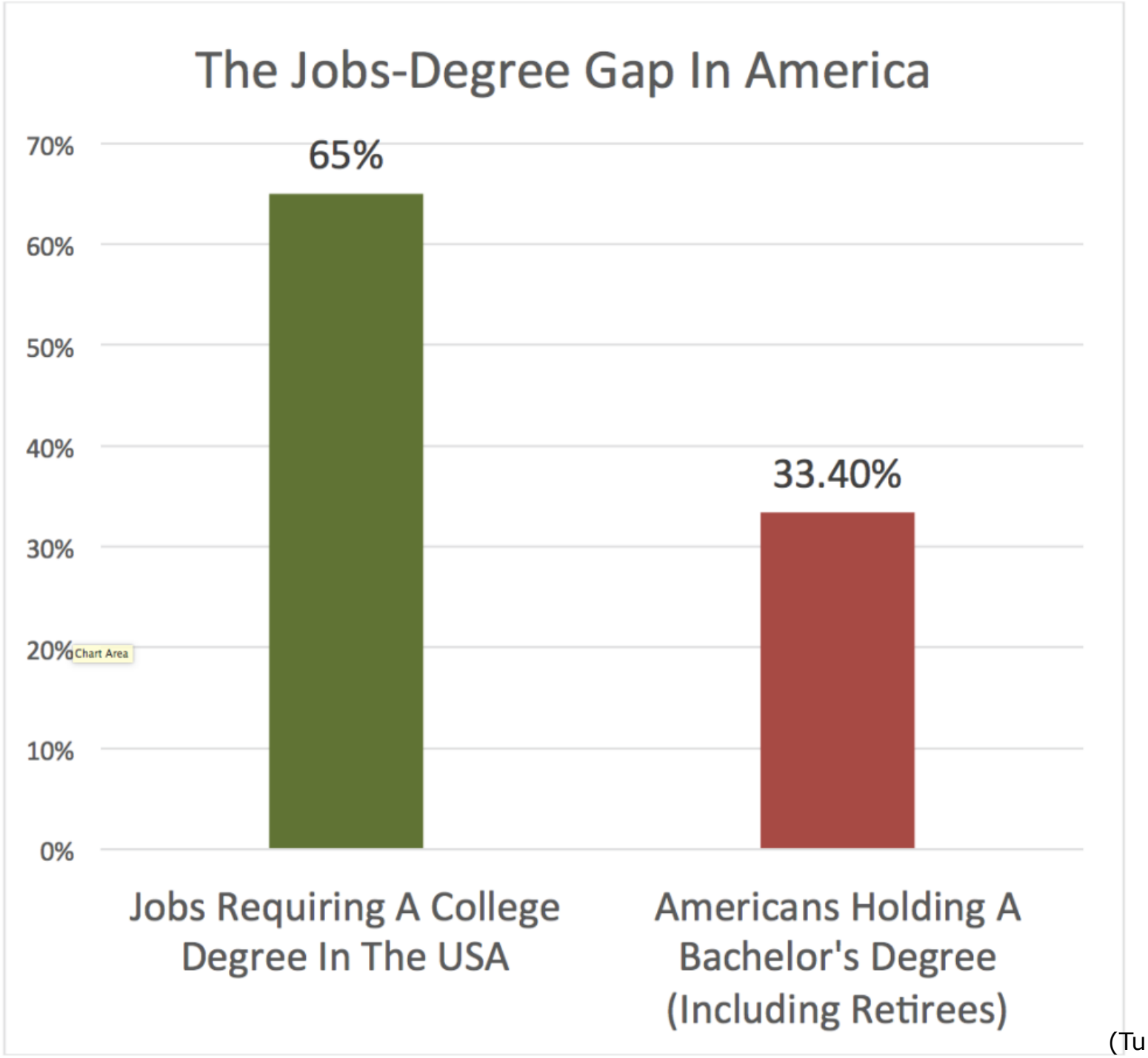
Overview

- Why do we need effective and inclusive approaches to education?
- Why are research experiences beneficial for students?
- How can we evaluate the importance of mentorship?
- Best practices in mentorship
- Importance of community
- Importance of training

Why is it important to think about effective, inclusive mentorship?

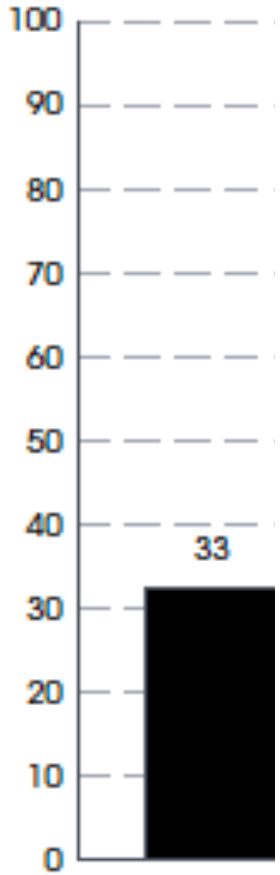


There is increasing demand for college educated employees (Rolen, 2019)

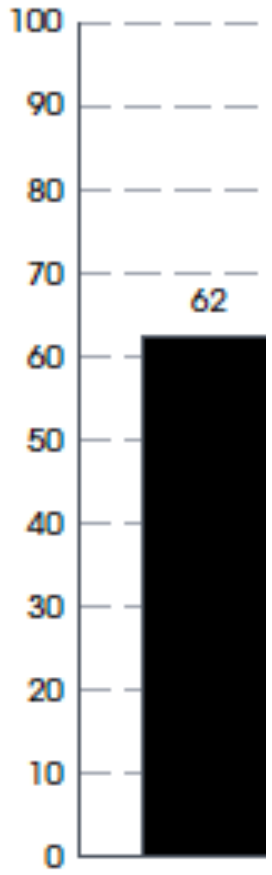

The Jobs-Degree Gap In America
70%
60%
50%
40%
30%
20%
10%
0%
Chart Area
65%
33.40%
Jobs Requiring A College Degree In The USA
Americans Holding A Bachelor's Degree (Including Retirees)

(Tures, 2019)

Graduation Rates for Undergraduates



% of Students Completing an Associates Degree

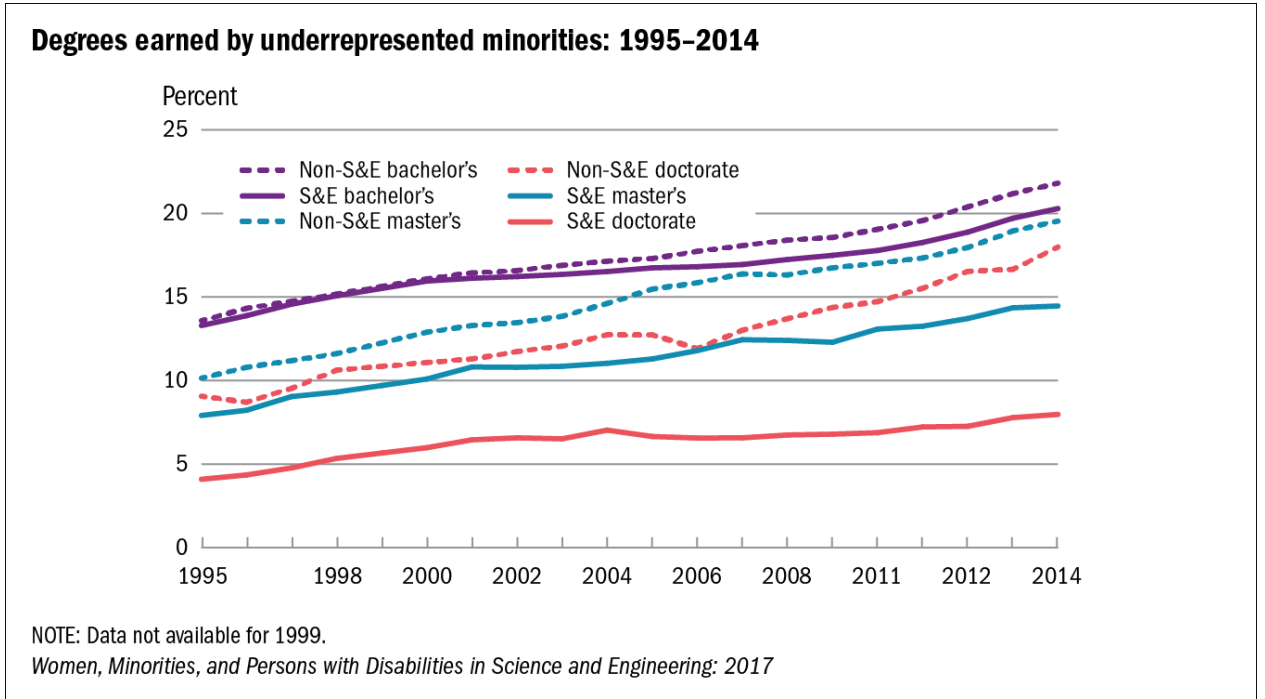


% of Students Completing A Bachelors Degree

(National Center for Education Statistics The Condition of Education 2020 Report)

Diversity and Inclusion in STEM

- 32% of the US population is from a racial or ethnic group that is underrepresented in STEM (NSF: https://www.nsf.gov/statistics/2017/nsf17310/digest/introduction/)
- Many STEM occupations require at least some college education (US Bureau of Labor Statistics)



Diversity, Equity and Inclusion Matters

- Gibbs, 2014
  - Critical to excellence
  - Lack of diversity represents loss of talent
  - Important for economic growth and global competitiveness

Diversity, Equity and Inclusion Matters

- Gibbs, 2014
  - Critical to excellence
  - Lack of diversity represents loss of talent
  - Important for economic growth and global competitiveness
- Output is not the only reason
  - Let’s not alienate and discourage people for the wrong reasons

Isn’t this just an academia problem?

- Why do students leave?
  - How courses are taught
  - Concerns about math ability
  - Financial reasons
  - Fixed mindset – natural ability determines capacity
  - Lack of support – focused on intelligence
  - Lack of esteem for the discipline
  - Lack of connection with others

Seymour, Hewitt, Friend. (1997) Talking about leaving: Why undergraduates leave the sciences
Seymour, Hunter et al., (2019) Talking about leaving revisited

Why is Research Important for Undergraduates?

- Known approach to improve retention

- Many other known benefits

What are the known benefits of research?

- Provides sense of empowerment, instills confidence, integration into the culture of science
  - BIO 2010: Transforming Undergraduate Education for Future Research Biologists (National Academies)

- Increase students' interest in graduate careers, understanding of research, tolerance for obstacles
  - Vision and Change in Undergraduate Biology Education: A Call to Action (AAAS)

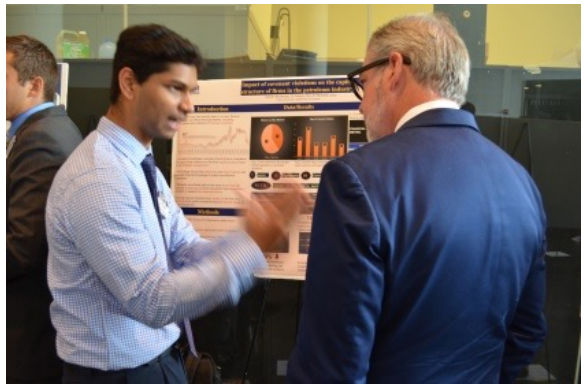
- Increased confidence in ability to think like scientists, preparation for graduate training, learning in a variety of areas, retention
  - Seymour, Hunter et al., 2004; Lopatto 2006; Lopatto 2007; Laursen, Hunter et al., 2010; Junge, Quinones et al., 2010

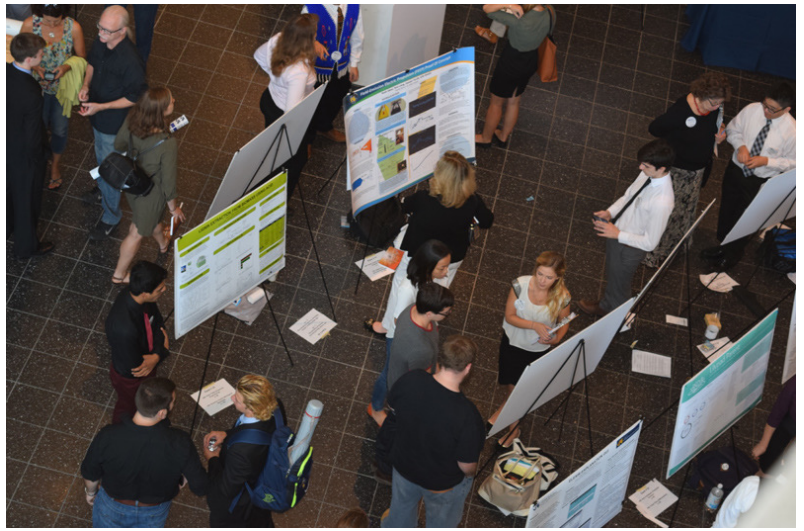
- Increased student retention
  - PCAST 2012

- Students from underrepresented groups who participate in research are more likely to retain and remain interested in a STEM career
  - Schultz et al., 2011

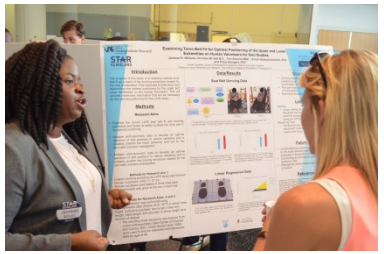
The STAR Scholars Program

- Undergraduate summer research
- Summer after Freshman year
- 10 Weeks
- Typically high-achieving students
- STEM and Non-STEM





Summary of Summer Research Outcomes



- Currently supports 5% of freshman
- 96% retention rate
- Students report gains in all skills assessed
- STEM & Non-STEM students report similar gains in all skills assessed, with few significant differences
- Of the responding STAR Mentors
  - The majority would participate again

(Stanford et al., 2017)

Why is expanding access to research an important goal?

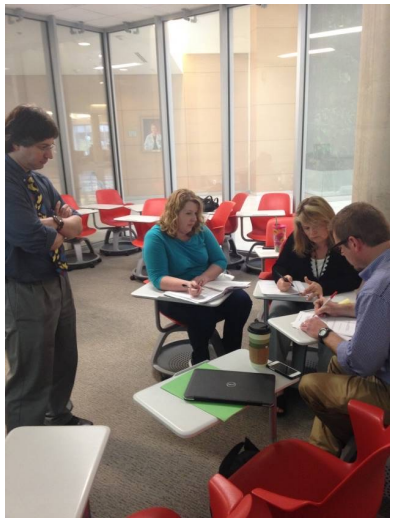
- Research experiences are beneficial
- Benefits should not be limited to a small group of students
- As of 2017, only 15% of employed scientists and engineers are individuals who are Hispanic/Latino/Black/African American/American Indian/Alaska Native/Native Hawaiian/Other Pacific Islander
  - (NSF Report – Women, Minorities, and Persons with Disabilities in Science and Engineering)
- Women earn only 36% of bachelor's degrees in STEM
- "…Benefits of some form of research experience are substantial even for students who do not pursue graduate study."

How can undergraduate access to research be expanded?

- Offer more research experiences
- Partnership with labs outside of academia
- Course-Based Undergraduate Research Experiences
  - Less time in the lab, more students per experience, different populations reached, similar outcomes (Smith et al., 2021; Corwin et al., 2015; Linn et al., 2015; Lopatto et al., 2008)

The importance of mentoring

- An expert can provide knowledge, structure, validation, support, guidance, connection
- An expert can address imposter syndrome
- Mentors can provide training and socioemotional support (Haeger and Fresquez, 2016)
- Mentorship can be critically important for students from underrepresented racial and ethnic groups (Haeger and Fresquez, 2016)



Research is a Type of Experiential Learning

- Definition from the 2016 Colonial Academic Alliance Pedagogy Summit on Experiential Learning

- Experiential learning is an intentionally-designed opportunity for students to learn by “doing” – an active, engaged process that connects content to context. Experiential learning requires students to purposefully apply knowledge, practice skills, and engage in critical reflection.

Lindsey Interlante – Colonial Academic Alliance

Understanding experiential learning

- Colleagues from College of Charleston and University of North Carolina, Wilmington, including: Jess Boersma, Lea Bullard, Xiushan Jiang, Beth Meyer-Bernstein, Paul Townend, Runa Winters
- Developing a survey instrument to study experiential learning

Experiential Learning Instrument

- Extensive development process
- Piloted with students from Drexel University, College of Charleston, and University of North Carolina Wilmington
- Has been revised
- 10 minutes in length
- Asks about: demographics, details of the experience, mentorship, who students talked with about their experience, guidance, motivation, activities, outcomes
- In the process of validating the instrument

Photo: DragonsTeach Hands-on Science


Photo: DragonsTeach Hands-on Science

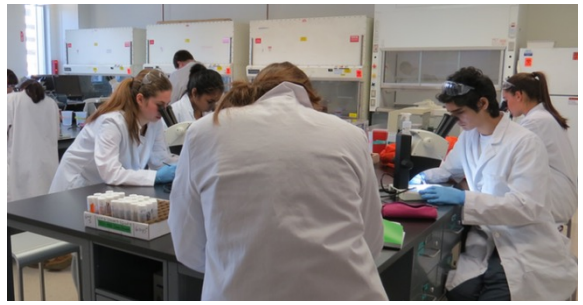


Photo: Mentored Research

Best Practices in Undergraduate Research Mentoring

- Identify students needs and interests
- Set clear expectations
- Teach skills, methods and techniques
- Have high expectations and provide emotional support

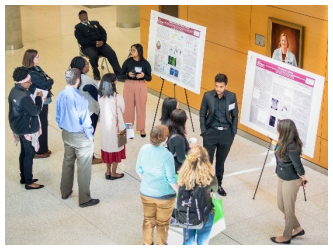
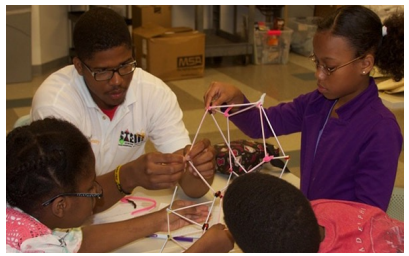
- Build community
- Spend time one-on-one with mentees
- Increase student ownership over time
- Support student professional development
- Create opportunities for students to learn to mentor

- Encourage dissemination

Elon University: https://www.centerforengagedlearning.org/salientpractices/

Inclusive Mentoring

- Cultural sensitivity is important in cross-cultural mentorship
- Criticism should be paired with reassurance
- Communication and mutual trust is important
- Resistance to mentorship may be due to the need to build trust
- Avoid making assumptions - communicate

Georgia College – Mentoring Undergraduate Research Handbook – Hammack et al.

The importance of community

- Community can provide support, identity development, and safety (Bender et al., 2008)
- Communities of practice can allow people to receive training, feedback and exposure to new ideas (Laursen, 2019; Lave and Wenger, 1991; Wenger et al., 2002)
- Community can allow for vertical mentoring, which can provide social and academic support (Collier, 2017)

Forming Communities

- Within the lab
- Cohorting for additional support
- Among mentors
- Making use of the virtual space
- Cross-institution cohorting
- Consider issues of inclusivity
- Think about the goals
- Empower community members

The importance of training

- How have we learned about teaching and mentorship? Cultural competence?
- There are bodies of literature on these subjects
- We can, and should, learn about effective ways to mentor inclusively
- Growth mindset
- Opportunities for self-reflection, engaging with change leaders and participating in a community of practice can be helpful (Shumar, Silverman, Moyer, Casino, Condon, Murasko, King, Stanford)

Acknowledgements

- **Collaborators**: Shivanthi Anandan, Rocio Benabentos, Jess Boersma, Eric Brewe, Lea Bullard, Lorne Byrne, Tami Carmichael, Vincent Cassone, Alisa Morss Clyne, Steve Cox, Kapil Dandekar, Patrick Daubenmire, John DiNardo, Tod Duncan, Laura Duwel, Adam Fontecchio, Dave Goldberg, Mary Jo Grdina, Susan Gurney, Zahra Hazari, Kathy Hunting, Jane Indorf, Lindsey Interlante, Xiushan Jiang, Karen Kabnick, Youngmoo Kim, Dan King, Val Klein, Antonios Kontsos, Laird Kramer, Tim Kurzweg, Kara Lindstrom, Joy Little, Dan Marenda, Pat Marstellar, Mat McDonald, Beth Meyer-Bernstein, Jaya Mohan, Bill Mongan, Donna Murasko, Geoff Potvin, Richard Riegelman, Suzanne Rocheleau, Adrian Shieh, Wes Shumar, Tim Siftar, Jason Silverman, Liz Spudich, Leanne Sweppenheiser, James Tangorra, Kaci Thompson, Paul Townend, Runa Winters, Ryan Zerr
- **Stanford Research Group Members**: Vahideh Abdolazimi, Brett Condon, Annette Dean, Sierra Hellwitz, Dan Marenda, Alison Moyer, Kevin Smith, Emily Sterner, Ed Waddell, Haizhi Wang, Jules Winters, Junyang Xian
- **CASTLE Administration**: Adam Fontecchio, Jason Silverman, Rachael Switalski
- **CASTLE Staff**: Meredith Casino, Marisa Dietrich, Alistar Erickson-Ludwig, Tara Jurgelewicz, Faun Rockcliffe, Jessica Ward
- **Drexel Administration**, **Department of Biology Faculty and Staff, CASTLE Affiliated Faculty**
- **Mentors for STAR Program, STAR Scholars, Participants in the Faculty Course**

INCO GRANT PROGRAM innovate/collaborate

The Panaphil and Uphill Foundations

Earl P. Allabach Trust

CIRTL

The Chappell Culpeper Family Foundation

DARE Drexel Areas of Research Excellence

The Arthur Vining Davis Foundations

NSF

hhmi Howard Hughes Medical Institute

Drexel University

DEVELOPING THE NEXT-GENERATION RESEARCHER THROUGH INCLUSIVE EXCELLENCE

Ann Q. Gates
Senior Vice Provost Faculty Affairs
University of Texas at El Paso

Director of the Computing Alliance of Hispanic-Serving Institutions, an NSF INCLUDES Alliance

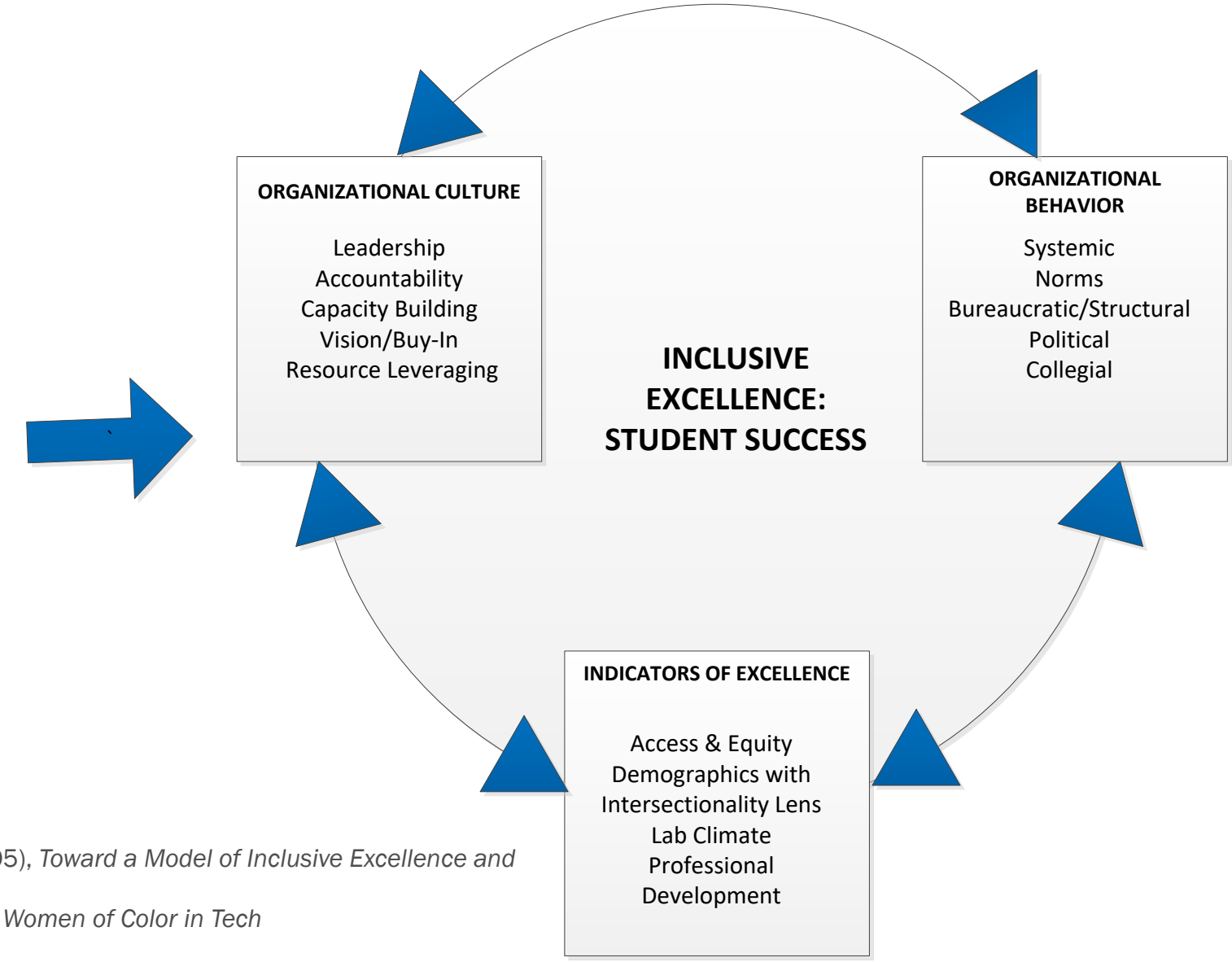
HRD-1834620
CNS- 1551221

DOE Laboratories of the Futures 1/25/2022

BIG PICTURE: DIMENSIONS OF INCLUSIVE EXCELLENCE

DEI DRIVERS

Need for a more inclusive workforce
Persistent disparities in STEM
Value of diverse perspectives in decision making
Value of creating a sense of belonging and identity



Williams, D., Berger, J., & S. McClendon (2005), *Toward a Model of Inclusive Excellence and Change in Postsecondary Education,* AACU
NASEM (2021) *Transforming Trajectories for Women of Color in Tech*
actreport.com

Affinity Research Group Model

A comprehensive model that

- Creates and maintains dynamic, productive, and inclusive research groups.
- Involves the *deliberate design* of research groups whose members share a common purpose – an *affinity*
- Emphasizes the conscious development of students' disciplinary knowledge, research abilities, and team skills
- Provides a sense of professional identity and belonging.

GOAL OF AN ARG

Purposefully and intentionally develop students' skills through active engagement for success in current and advanced studies, research, and the workforce.

An ARG is a non-hierarchical model that promotes:

- *Collection of best practices*
- *Cooperative group interaction*
- *Deliberate and intentional development and practice of skills*
- *Support structures*

Expand participation by recruiting students who may not normally be involved in research

AFFINITY RESEARCH GROUP COMPONENTS

ARG Philosophy
Team building
Basic group and research skills

Problem solving
Domain expertise
Skills practice
Accountability

Clear Goals and Objectives
Defined activities
Defined Deliverables

Deliberate Development of Skills

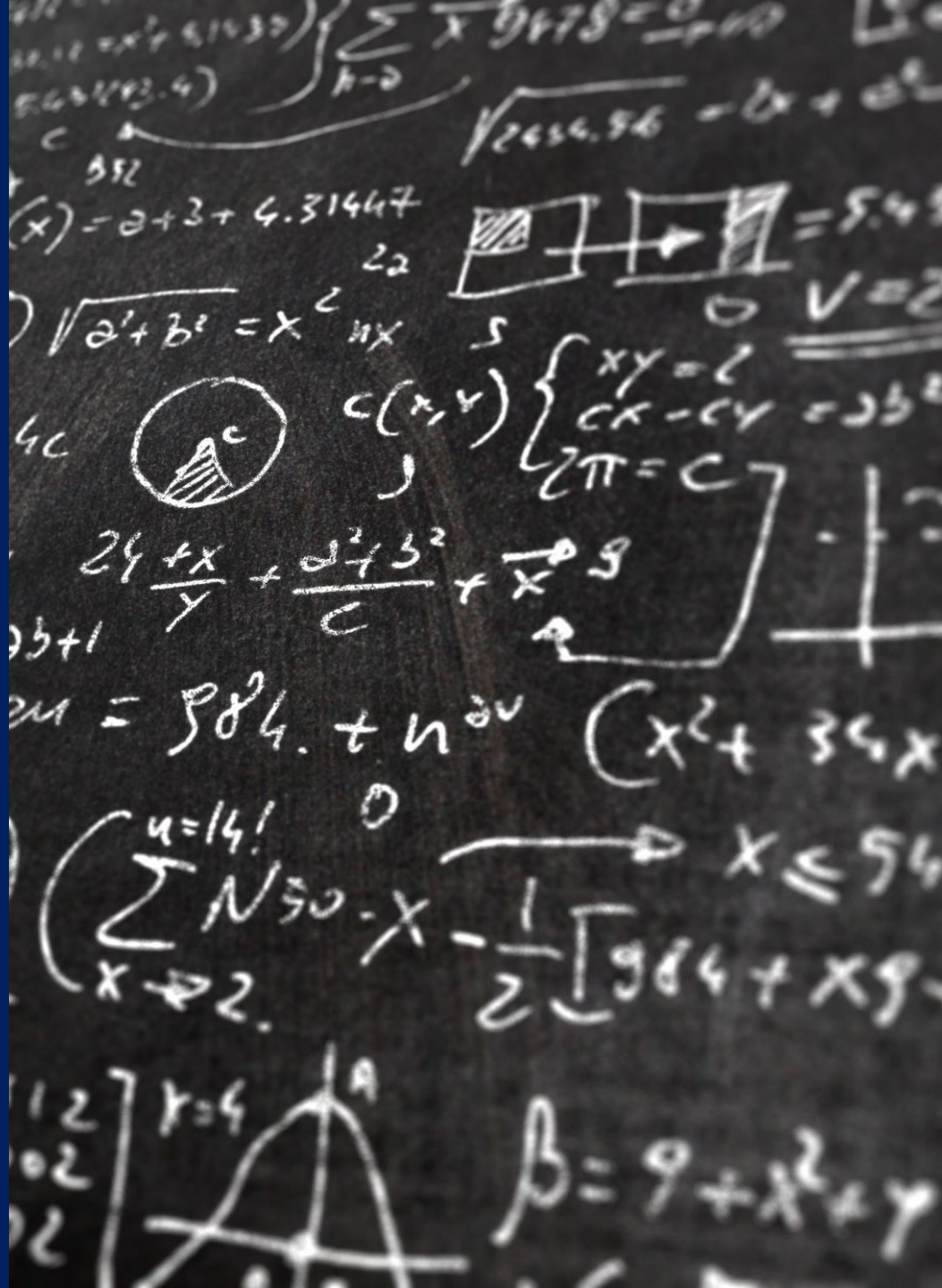
CORE VALUES OF AN ARG

Student Success: An ARG values the deliberate development of skills in each student to ensure success.

Cooperation: An ARG values cooperation in all interactions, including mutual respect of opinions and ideas of all members, promotive interaction, positive interdependence, and individual accountability.

Excellence: An ARG values excellence and strives to achieve it in all its actions.

TEACH AND LEARN COOPERATIVE ELEMENTS



COOPERATIVE TEAM SKILLS

- **P**ositive interdependence
- **I**ndividual accountability
- **G**roup processing
- Professional **S**kills
- **Face**-to-face promotive interaction

Positive Interdependence

- All swim or sink together
- Success of the project is the success of the group
- Structured by:
  - *Team identity*
  - *Mutual goals*
  - *Joint rewards*
  - *Shared resources*
  - *Assigned roles*

Individual Accountability

- Every members feels responsible for contributing to the task and helping the team.
- Structure by:
  - *Reporting status*
  - *Expressing group's perspective accurately*
  - *Assigning concrete tasks and deadlines*

Face-to-Face Promotive Interaction

- Acknowledge contributions of individuals
- Celebrate individual and team members' success.
- Provide constructive critique

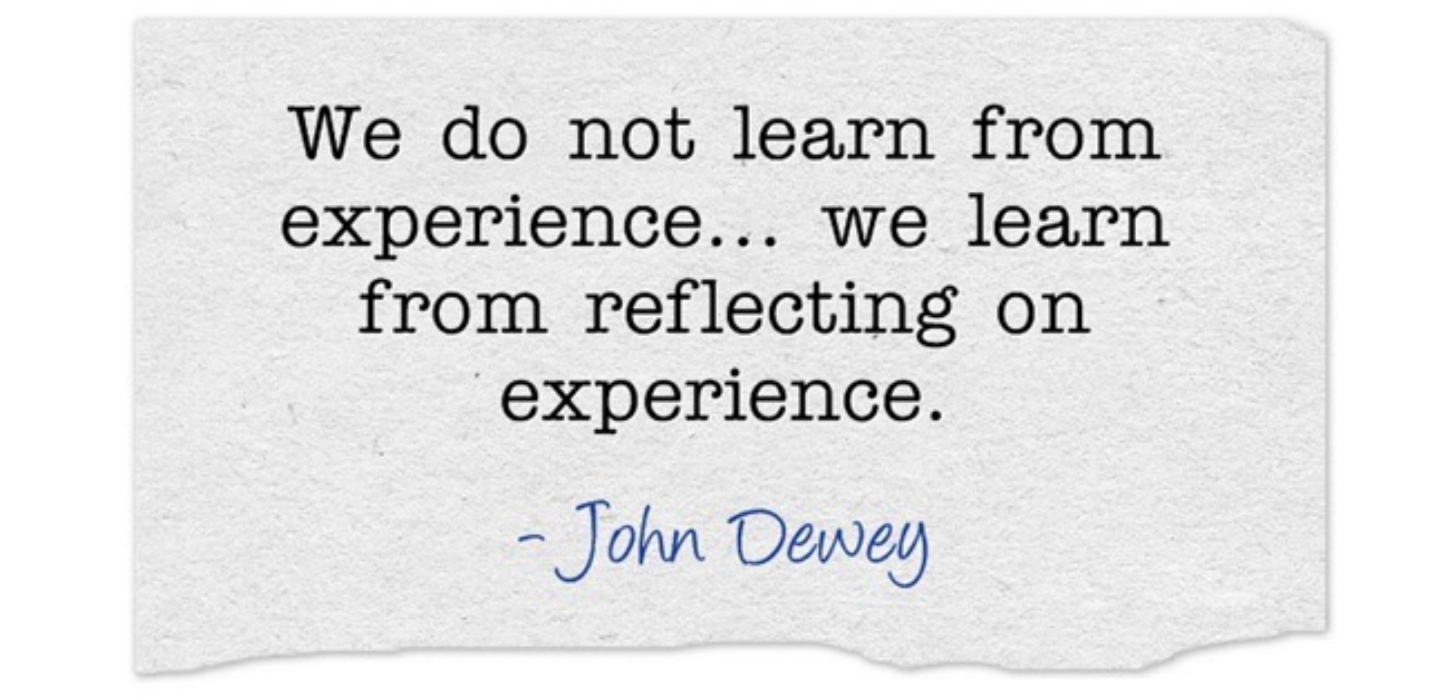
Group Processing

What worked?

What didn't work?

How can you improve?

Discuss, plan, and refine



GROUP PROCESSING

Social and Professional Skills

Do not assume that those who join a research group or team with the necessary skills to be successful.

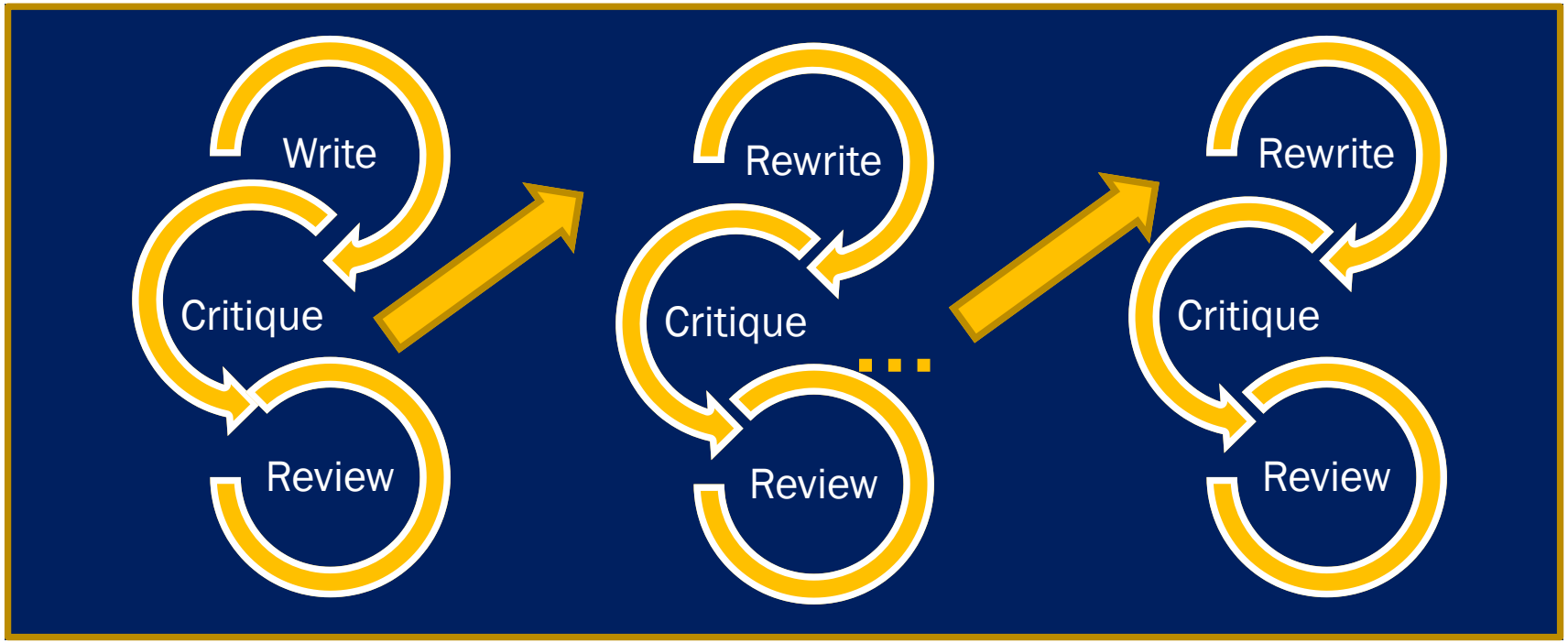
- Understand the need to learn and practice a skill
- Identify phrases that someone can say when practicing a skills
- Practice skills in an intentional and deliberate manner

SKILLS DEVELOPMENT

- Cooperative team skills
  - Group functioning
  - Paraphrasing
  - Constructive critique
  - Conflict resolution
- Research skills
  - Setting goals and objectives
  - Research plan
  - Literature survey
  - Poster presentation
- Team management skills
  - Defining tasks and activities
  - Defining timelines
  - Setting meeting agenda
  - Documenting meeting minutes
- Communication skills
  - *Oral*
  - *Written*
  - *Constructive critique*

EXAMPLES

- Writing a Personal Statement
- Hints on Writing an Abstract
- Submitting a Successful GRFP
- Setting Clear Goals and Objectives



Phases of Skills Development

Selected Publications

A. Gates, H. Thiry, & S. Hug (2016). “Reflections: The Computing Alliance of Hispanic-Serving Institutions.” *ACM Inroads*, 7(5): 69-75.

E. Villa, E., K. Kephart, A. Gates, H. Thiry, and S. Hug, “Affinity Research Groups in Practice: Apprenticing Students in Research,” *Journal of Engineering Education*, Vol. 102, No. 3, pp. 444-466, 2013.

K. Kephart, E. Villa, A. Gates, and S. Roach, “The Affinity Research Group Model: Creating and Maintaining Dynamic, Productive, and Inclusive Research Groups,” *CUR Quarterly*, Council on Undergraduate Research, Vol. 28, No. 4, pp. 13-24, 2008.

VIRTUAL REU PROGRAM

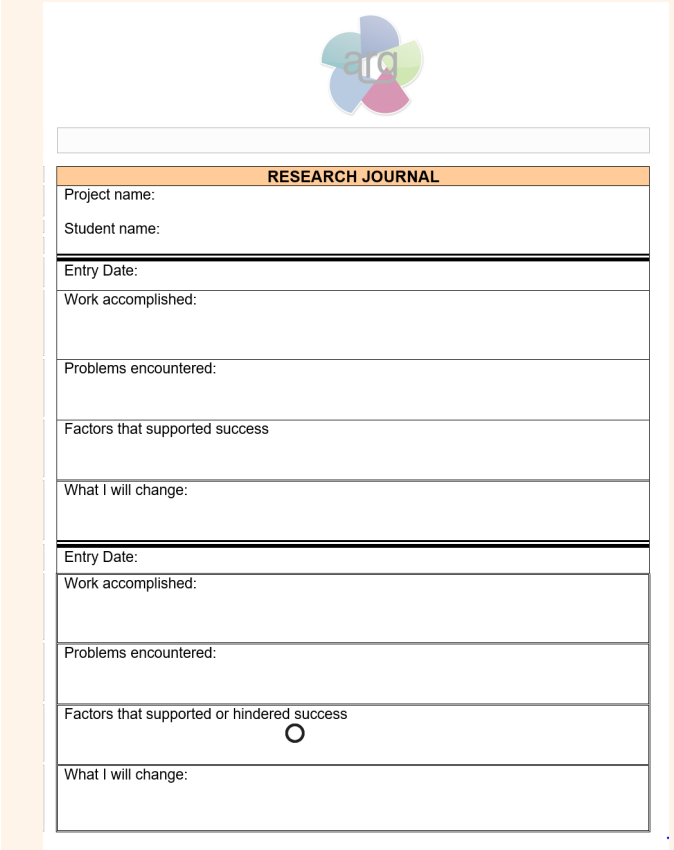
Purpose of the vREU Program

Work	Build	Develop
Work with a faculty research mentors to establish well-defined research project(s) with intellectual merit.	Build a national community of faculty and undergraduate researchers who adopt Affinity Research Group (ARG) practices.	Focus on the development of research, communication, and technical skills.

ARG Curriculum for vREU Faculty Mentors

Week	Topic	Faculty Homework	Skills Developed
1	Orientation	Introduce self and research	Self-exposition and context. Public speaking & professional presentation
2	Probing Questions	Practice asking probing questions	Critical thinking and listening
3	Abstracts	Draft and discuss abstracts	Collaborative review Scientific writing expertise
4	Elevator or Zoom Pitch	Practice scripted pitch	Public speaking, rehearsal. Strategic thinking
5	Poster Preparation	Layout poster, with hypothesis, proving questions, all.	Research methodology, process. Sequential thinking and presentation
6	Poster Critique	Giving & getting constructive feedback	Critical thinking, understanding dissimilar perspectives, communication
7	Final Report	Draft final report	Writing, crucial thinking
8	Conference registration; Poster Submission	Register for conference with poster	Research communication; presentation

Research Journal

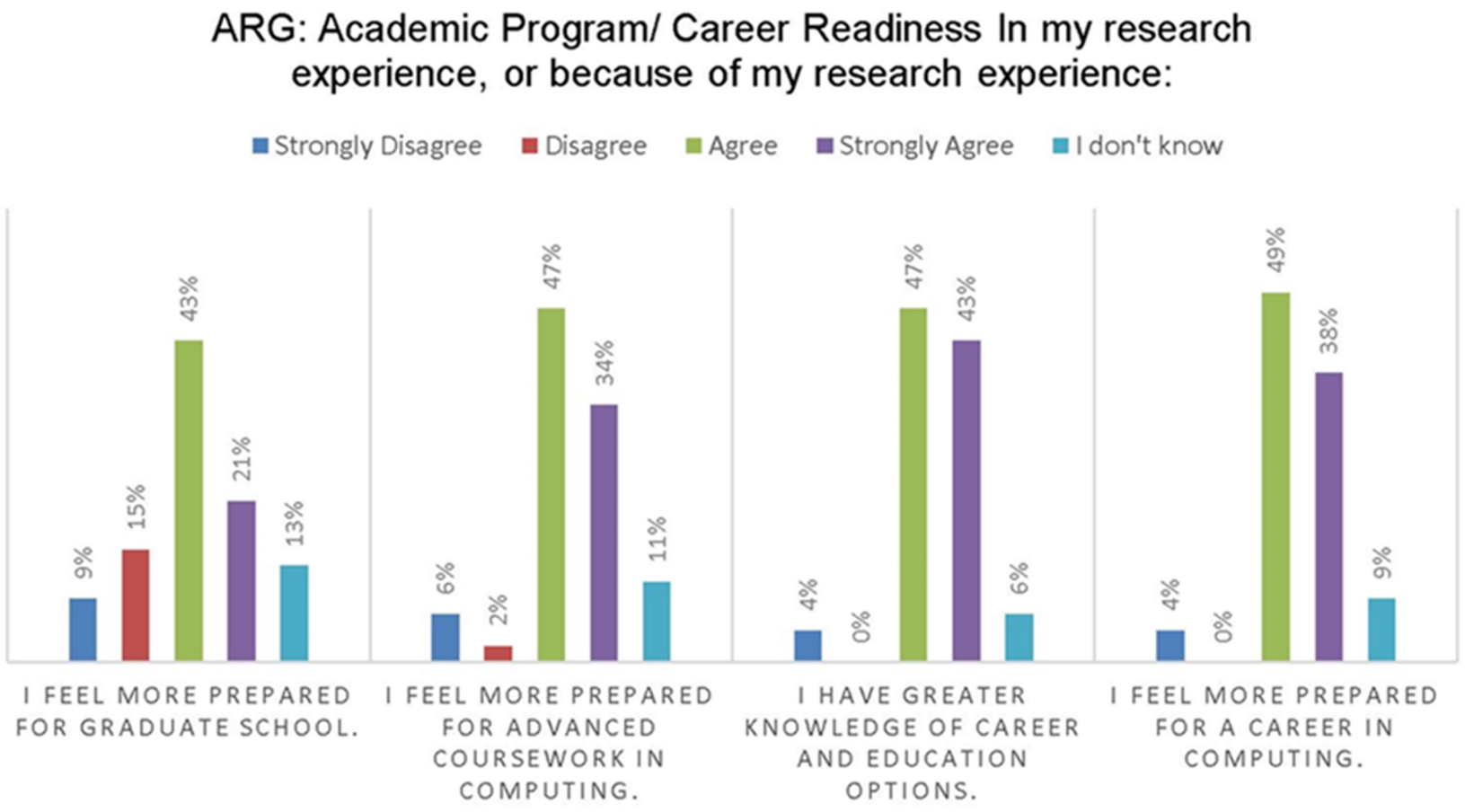


RESEARCH JOURNAL

Project name: Student name:
Entry Date:
Work accomplished:
Problems encountered:
Factors that supported success
What I will change:
Entry Date:
Work accomplished:
Problems encountered:
Factors that supported or hindered success
What I will change:

- Purpose: To capture research progress, identify areas of need, and future work
- Students: Submit at the end of the week with feedback the following week
- Faculty: Review the research journal template and provide feedback.

The vREU Program



Online format was viable, show comparable self-reported results to last face to face study for CAHSI (2017)

Faculty appreciated

a) the structure, b) resources for students, and c) access to faculty member peers.

CONTACT INFORMATION

Contact: Ann Q. Gates, agates@utep.edu
Website: http://cahsi.org

Handbook

A. Gates, S. Roach, E.Y. Villa, K. Kephart, C. Della-Piana, and G. Della-Piana, *The affinity research group model: Creating and maintaining effective research teams*, Los Alamitos, CA: IEEE Computer Society, 2008.

How to leverage mentoring and coaching to cultivate an inclusive workplace

DOE Laboratories of the Future Series (LOFT)

Jeanita Pritchett, Ph.D.
Senior DEI Strategist | Office of Diversity, Equity, and Inclusivity
National Institute of Standards and Technology
January 25, 2022

National Institute of Standards and Technology (NIST)

NIST Mission:

- Founded in 1901, NIST is a non-regulatory federal agency within the U.S. Department of Commerce. NIST's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.

NIST Core Values:

- NIST is an organization with strong values, reflected both in our history and our current work. NIST leadership and staff will uphold these values to ensure a high-performing environment that is safe and respectful of all.
  - Perseverance: We take the long view, planning the future with scientific knowledge and imagination to ensure continued impact and relevance for our stakeholders.
  - Integrity: We are ethical, honest, independent, and provide an objective perspective.
  - Inclusivity: We work collaboratively to harness the diversity of people and ideas, both inside and outside of NIST, to attain the best solutions to multidisciplinary challenges.
  - Excellence: We apply rigor and critical thinking to achieve world-class results and continuous improvement in everything we do.


Motivation
Advice
Training
Success
COACHING &
MENTORING
Direction
Goal
Support
Potential

Mentoring and Coaching...what's the difference?

Mentoring

Mentoring is a learning relationship, generally focused on long term career development. The primary purpose is to drive personal growth; building skills, knowledge and understanding.

Coaching

ICF defines coaching as partnering with clients in a thought-provoking and creative process that inspires them to maximize their personal and professional potential. The process of coaching often unlocks previously untapped sources of imagination, productivity and leadership.

Leveraging mentoring and coaching to create an inclusive environment

- Creating a workplace that includes diverse representation is essential, but shaping an environment where all employees feel a sense of belonging, valued, and supported is the ultimate goal. An inclusive environment is the mechanism to embrace diversity benefits and mentoring as well as coaching are highly impactful strategies to create an inclusive work culture and meet diversity goals.

- Mentoring and coaching can:
  - Drive meaningful interactions between individuals of different generations, genders, and races
  - Support the retention of employees, especially for those from underrepresented groups.
  - Support individuals' professional growth, organizational development and overall success of the enterprise

Arc of the advising relationship

Establishing trust

- Get familiar with each other
- Discuss working norms

Designing a plan

- Begin with the end in mind
- Goal setting

Path towards success

- Execute the plan
- Check in regularly
- Revise as needed

Wrapping up

- Reflect
- Celebrate "wins"
- Show appreciation
- Agree on the path forward

First couple of months

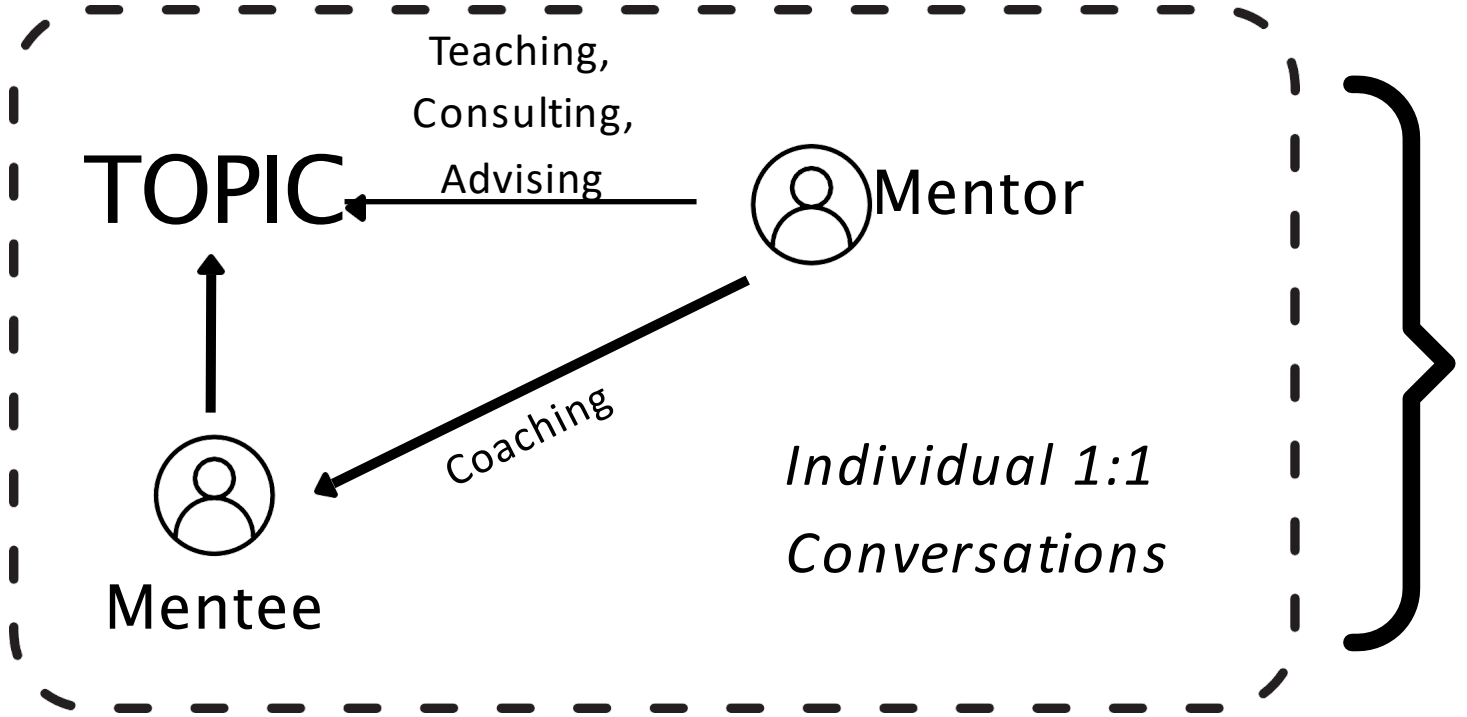
Bulk of the time

Final month(s)

Advising Framework

Leading

Inspiring-Motivating-Role Modeling- Vision



Core Skills

Questioning

Listening

Structuring Conversations

Feedback

Sponsoring

Advocating-Brokering Connections-Creating Opportunities

Adapted from Mentoring Core Skills Training (NIST/Illumina Executive Coaching)

Mentoring and Coaching Core Skills

- Questions and Questioning
- Listening
- Structuring Conversations for Impact
- Feedback

Questioning Techniques

Mentoring is a brain to pick, an ear to listen, and a push in the right direction." (John C. Crosby)

- Effective questions are, in general...
  - Open-ended/ not "yes" or " no"
  - Short
  - Start with "What" or "How"
  - Do not involve a choice
- Questions should:
  - Be delivered one at a time
  - Be followed by silence
  - Avoid starting with "Why"

Types of Mentoring Questions

"Mentoring is a brain to pick, an ear to listen, and a push in the right direction." (John C. Crosby)

- ✓ Open
  - What are some possible explanations?
- ✓ Clarifying
  - What do you mean by "the right way" ?
- ✓ Probing
  - What specifically have you tried? How did you know that your method was appropriate?
- ✓ Filtering
  - Which of these options would you prioritize?
- ✗ Leading
  - It's obvious that we should include Figure 1, right?

Listening Intent-Your mindset

Mentoring is a brain to pick, an ear to listen, and a push in the right direction." (John C. Crosby)

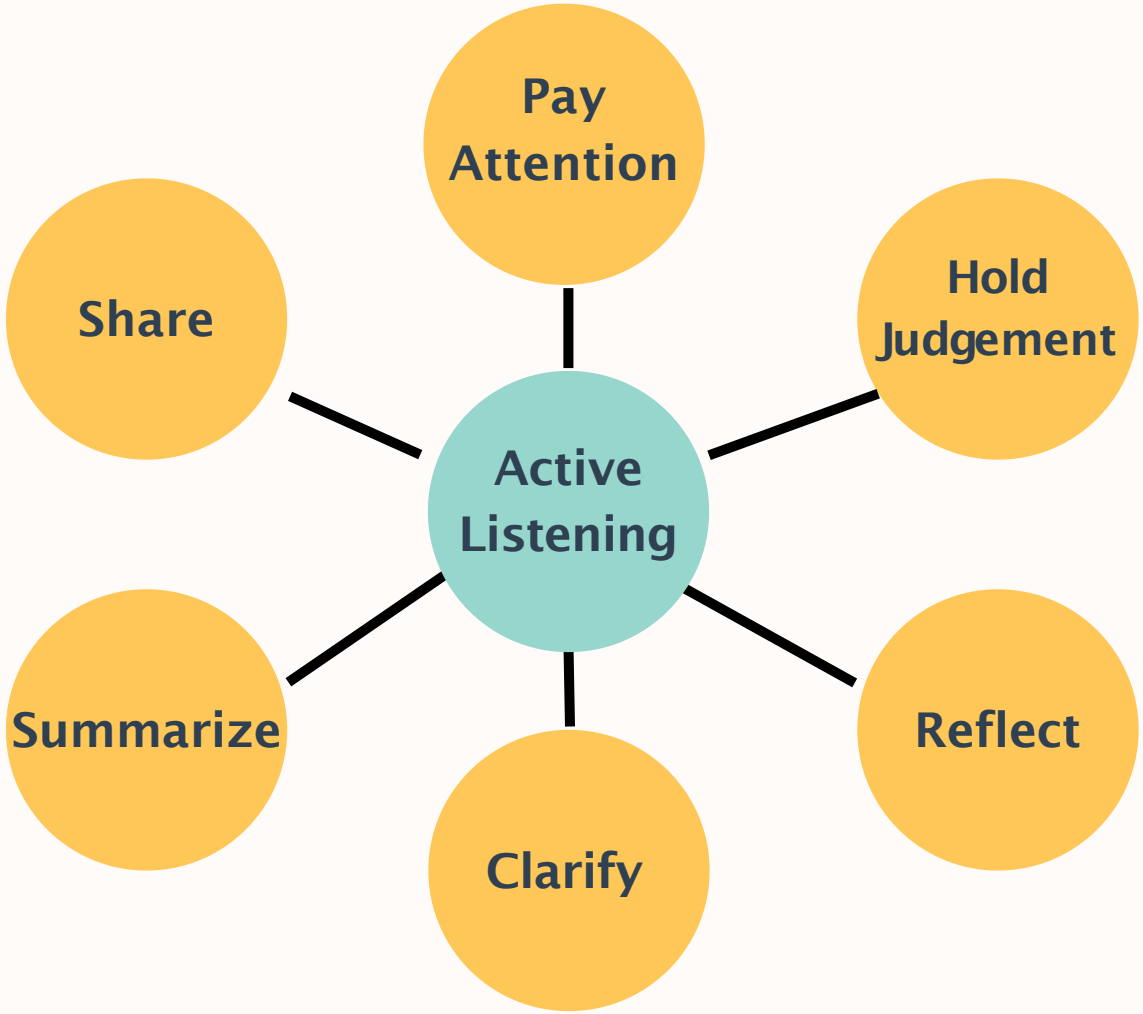
- Understand your default listening style: Win, Fix, or Learn?

- In the moment, ask yourself would it make sense to :
  - Listen to Win?
  - Listen to Fix?
  - Listen to Learn?

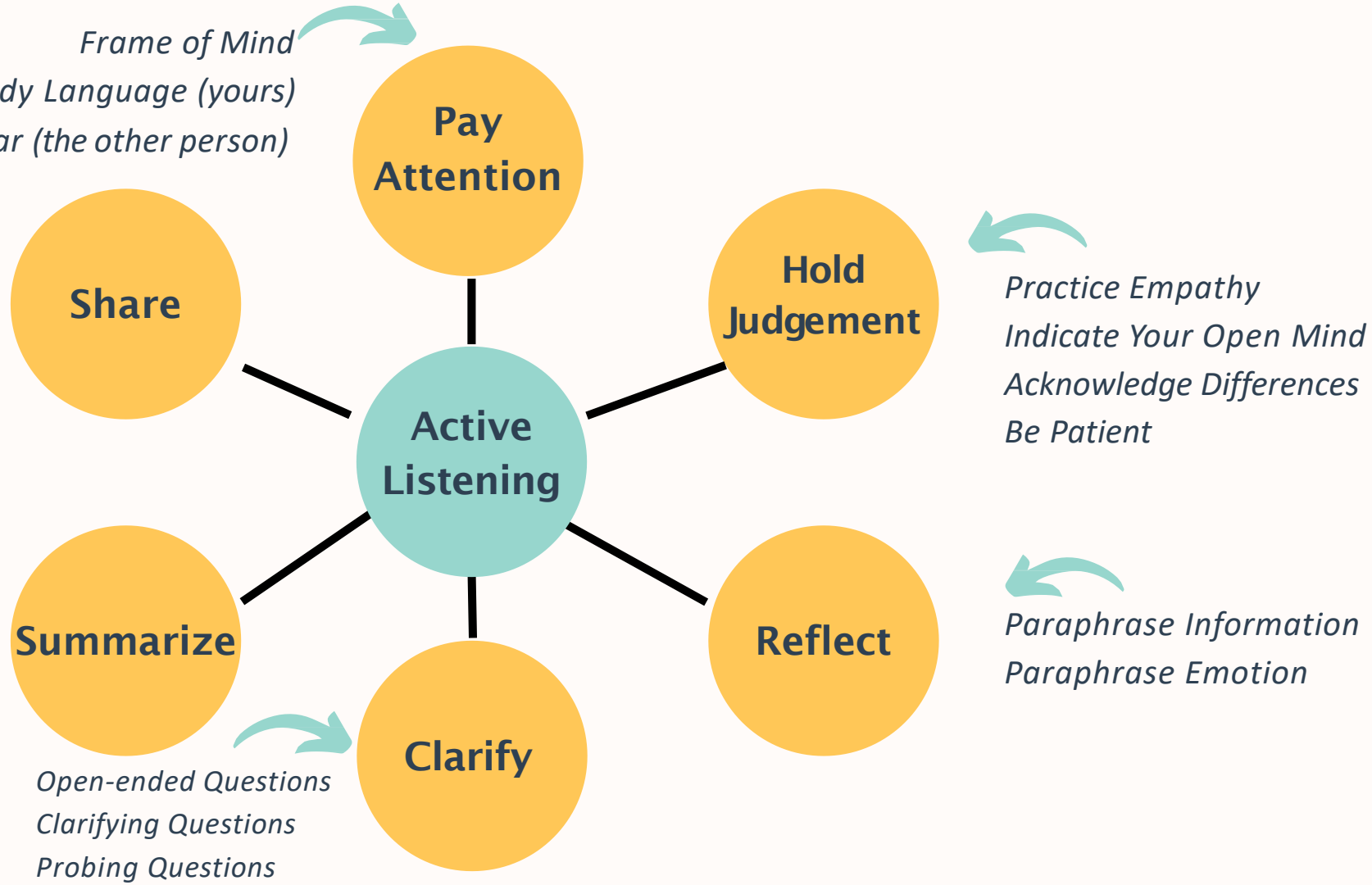
- Which types of questions might you rely on when you are
  - Listening to Win?
  - Listening to Fix?
  - Listening to Learn?

Question types: open, clarifying, probing, filtering

Active Listening- the "How"

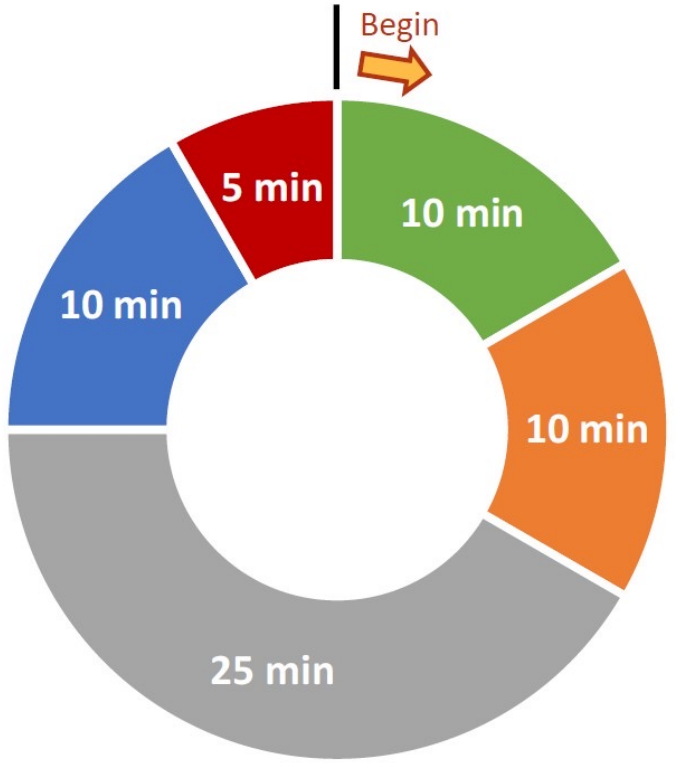


Active Listening- the "How"



Structured Mentoring or Coaching Conversations for Impact

- Check-in & Set Agenda
- Clarify Topic(s), Priority, and Approach
- Process Topics
- Plan Actions & Discuss Next Steps
- Reflect on Learning



Example: Breakdown of a 1-hr mentoring conversation.

Adapted from practices taught by The Coaches Training Institute and in the Georgetown University Executive Certificate Program in Leadership Coaching.

Feedback: Different Types

"We all need people who will give us feedback. That's how we improve." (Bill Gates)

- Basic Types of Feedback
  - Positive
  - Constructive
  - Developmental-can be positive or constructive
- Uses of Feedback in Mentoring
  - Situational-Event-based, continuous, timely
  - Performance Assessment-Comprehensive, periodic, scheduled

Feedback: Considerations for Delivery

"We all need people who will give us feedback. That's how we improve." (Bill Gates)

- Allowing Time
- Anticipating Reactions
- Thoughtful Timing
- Providing Context
- Practicing Discernment

Empower your workforce through coaching and mentoring

"Leadership is about making others better because of their presence and making sure that impact lasts in your absence." (Sheryl Sandberg)

- Focus on building trust and establishing meaningful relationships
- Partner to design an action plan to reach goals
- Practice using impactful questions and active listening
- Offer feedback and always remember to celebrate all "wins"!

Questions

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CIMER Center for the Improvement of Mentored Experiences in Research

https://bit.ly/DOE_Mentorship_January2022

Building Cultures of Inclusive Research Mentorship at Federally-Funded Research Centers (National Labs)

DOE Laboratories of the Future Series (LOFS)

Melissa McDaniels, Ph.D.
Co-Investigator, Inclusive Graduate Education Network
Associate Executive Director
Center for the Improvement of Mentored Experiences in Research
University of Wisconsin-Madison

Recognition

- Colleagues at Department of Energy
  - Steve Binkley
  - Victoria DiStefano
  - Susannah Howieson
  - Daniel Searer
- Fellow panelists
- National laboratory colleagues

Overview

- Amplify resources
- Making Your Case: Why Cultures of Inclusive Excellence?
- Recommendations for Institutional Leaders
- Steps towards building capacity for inclusive excellence in federally-funded research centers

Center for the Improvement of Mentored Experiences in Research (CIMER)

CIMER Mission

Improve the research mentoring relationships for mentees and mentors at all career stages and disciplines through the development, implementation, and study of evidence-based and culturally-responsive interventions.

IGEN
Inclusive Graduate Education Network

Project Overview

IGEN Goals:

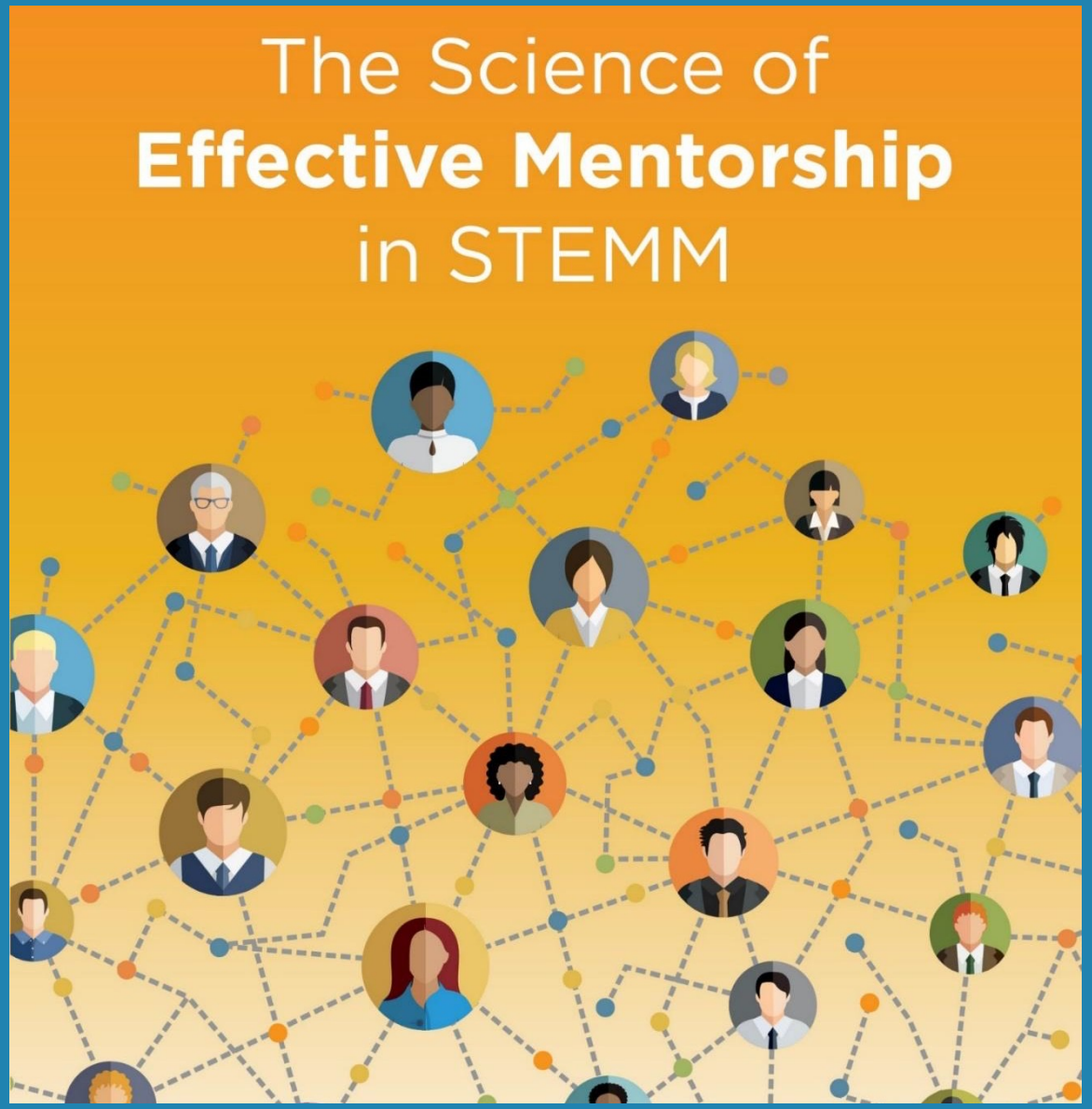
- Increase the fraction of students from underrepresented groups who complete physical science doctoral degrees
- Catalyze the adoption of evidence-based inclusive practices in graduate education
- Establish sustained, cross-sector partnerships that support the advancement of underrepresented students

Mentorship Education Project Objectives

- To adapt an existing evidence-based mentor training curriculum primarily focused on mentorship in the university context to one that is salient to the federally funded research center context. Deliver a train-the-trainer program to build capacity in laboratories. Promote a community of practice among new “trained facilitators”.

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

The Science of **Effective Mentorship** in STEMM



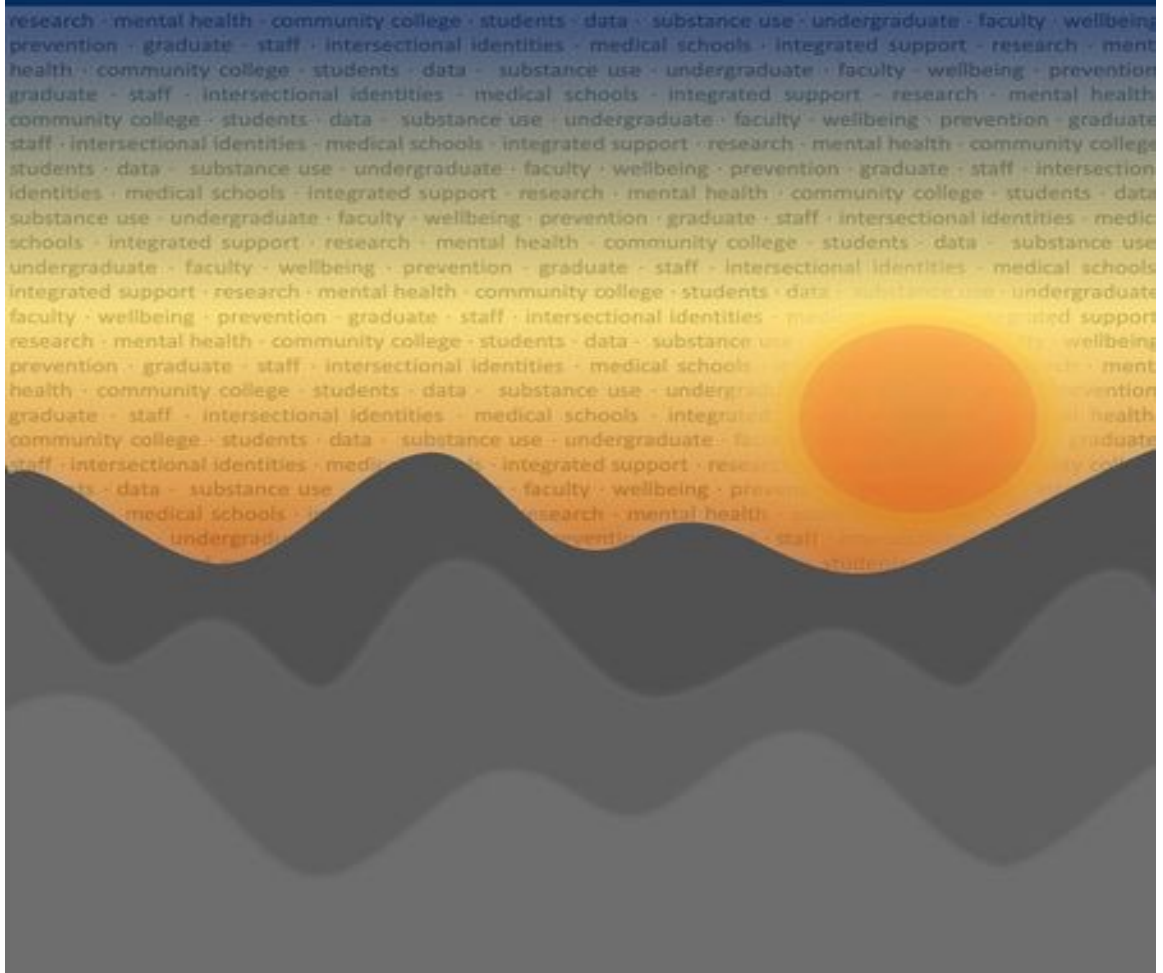
#NASEMmentoring

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

CONSENSUS STUDY REPORT

MENTAL HEALTH, SUBSTANCE USE, and WELLBEING in HIGHER EDUCATION

Supporting the Whole Student



Mentorship - A Definition

Mentorship is a professional, working alliance in which individuals work together over time to support the pers al and professional growth, development, and success of the relational partners through the provision of career and psychosocial support.

Mentorship includes **career support functions** (e.g., career guidance, skill development, sponsorship) and **psychosocial support functions** (e.g., emotional support or role modeling) aimed at mentee talent development.

What does the scholarship say about why we should be concerned about cultures of inclusive mentorship at research institutions?

There is a Science of Mentorship

Science is “the intellectual and practical activity encompassing the systematic study of structures and behaviors through observation, experiment, and theory.”

The Science of Mentorship

- brings together multiple disciplinary perspectives—from organizational and social psychology to discipline-based education
- provides guidance on effective behaviors, theoretical frameworks, measures and assessment techniques, mentoring tools, possible structures of mentoring relationships, and the role of institutional support

1. Identities affect mentorship in STEMM (NASEM, 2019)

- Specific dimensions of identity—**science identity, cultural identities**—are linked empirically to:
  - academic and career development
  - the experience of mentoring relationships in STEMM

- Mentorship can ameliorate negative effects of trainees' feelings of being "othered" due to their non-science identities in STEMM by increasing inclusion and psychosocial support.

2. Individuals from historically and currently excluded groups have differential experiences of mentorship

- Students from UR racial/ethnic groups report that their primary advisor is less respectful of their ideas, less supportive compared to White students (Noy & Ray, 2012)
- White men are more likely to benefit from the impact of their novel innovations than UR women and men and White women (Hofstra et al., 2020)
- White investigators significantly more likely than Black and Hispanic investigators to win R01 awards; minority investigators indicate that **inadequate mentoring posed obstacles to obtaining funding** (Ginther *et al*., 2011)
- Trainees have unequal access to mentoring and quality mentorship (Milkman et al., 2014; (Thomas *et al*., 2001; Helm *et al*., 2000; Morzinski *et al*., 2002).

3. Recognizing and responding to cultural identities contributes to mentorship effectiveness

- Mentoring addressing cultural diversity matters and psychosocial needs of diverse students is positively correlated with their science identity, commitment to a research career, and satisfaction with a research career (Fresquez & Haeger, 2016)

- Mentorship can ameliorate negative effects of students' feelings of being "othered" due to their non-science identities in STEMM by increasing inclusion and psychosocial support

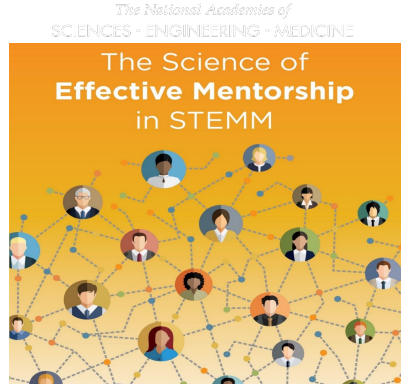
How can we Create a Culture of Effective Mentorship?

The NASEM presents **nine sets of recommendations** to encourage a shift away from a culture of ad hoc mentorship and toward one of intentional, inclusive, and effective mentorship in all institutional contexts.

The first seven outline specific roles for participants in the mentorship ecosystem:

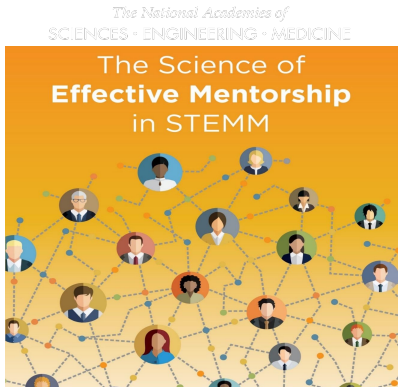
- institutional leadership,
- division leaders (department chairs)
- program leaders,
- mentors,
- mentees, and
- professional associations.

The final two sets of recommendations are directed at agencies that fund mentorship programs and scholars of mentorship



Research Institutions can **broaden access to quality mentorship and support systems**, which may entail significant institutional change.

- Use an evidence-based approaches to support mentorship (e.g., mentorship education, resources, tools)
- Establish and use structured feedback systems to improve mentorship
- Recognize and respond to identities in mentorship
- Support multiple mentorship structures
- Reward and incentivize mentorship
- Mitigate & prevent negative mentorship experiences



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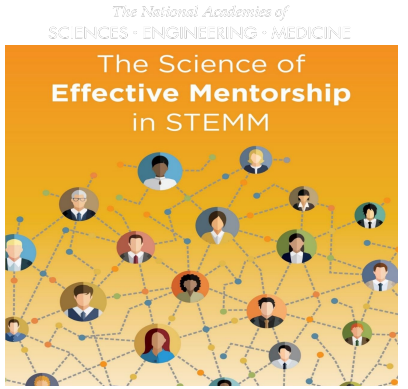


What have we done in partnership with Department of Energy National Laboratories?

Mentorship Education for Scientists at Federally-Funded Research Centers (National Laboratories)

Part of the
W.H. Freeman Entering Mentoring Series

W.H. FREEMAN
ENTERING MENTORING SERIES

IGEN

CIMER Center for the Improvement of Mentored Experiences in Research

Step 1: Adapt an empirically tested mentorship education model for national laboratories

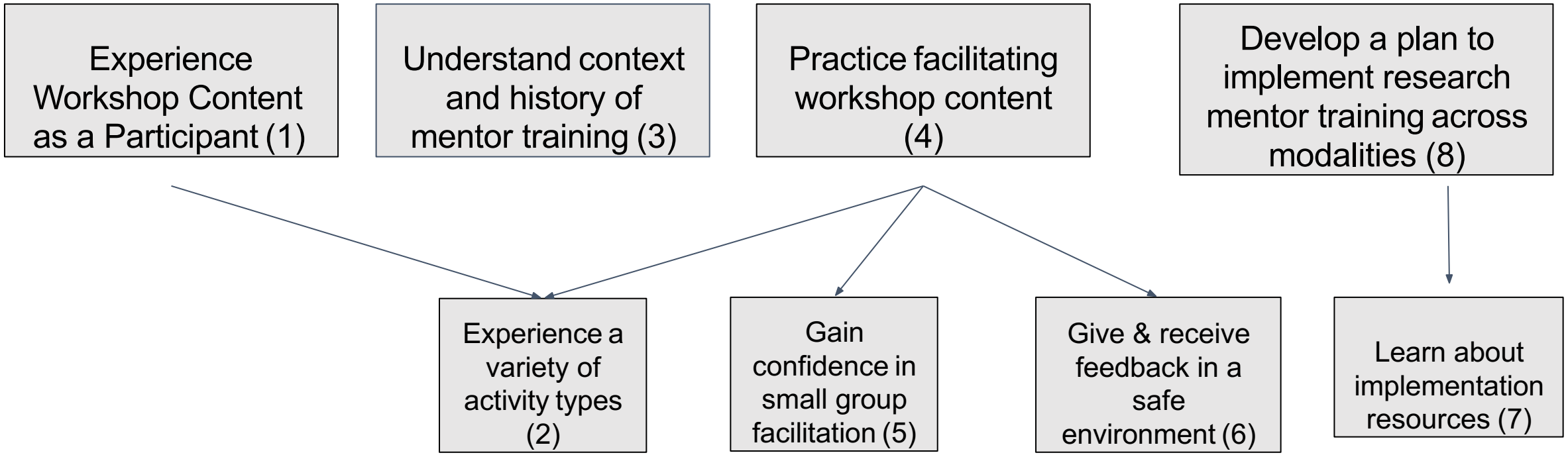
CIMER

Curriculum

- **Audience:** research supervisor, technical manager, formally assigned career mentors of postdocs
- **Competencies:** equity and inclusion, maintaining effective communication, aligning expectations, promoting researcher independence, promoting professional development, supporting work life integration, assessing understanding
- **Materials:** facilitation guides, implementation models, handling facilitation challenges, participant materials.
- **Activities:** case studies plus other activities.

Step 2: Deliver an empirically tested train-the-trainer opportunity

Facilitating Entering Mentoring Workshop Objectives



Observe how facilitators foster community and engage with the content (2)

Department of Energy and NASA Federally-Funded Research Centers (National Labs)

Teams from Labs (27 participants)

CIMER Center for the Improvement of Mentored Experiences in Research

November 1, 2021

Dear [redacted]

This letter recognizes you as a Trained Facilitator of the *Entering Mentoring* curricula series because of your participation in the *CIMER Train-the-Trainers Workshop: Facilitating Entering Mentoring* at IGEN on October 18-22, 2021. The Center for the Improvement of Mentored Experiences in Research (CIMER), supported by the Wisconsin Center for Education Research at the University of Wisconsin-Madison, is leading a nationwide initiative to improve the research mentoring relationships for mentees and mentors at all career stages through the development, implementation, and study of evidence-based and culturally-responsive interventions. This mentorship initiative builds upon previous work funded by the National Institutes of Health (NIH) to support the training and career development of individuals from groups underrepresented in biomedical, behavioral, clinical, and social science research careers.

As part of this effort, CIMER offers train-the-trainer workshops around the country like the one you attended. Our goal is for participants to:

- Develop the knowledge and skills to implement research mentor training
- Become familiar with the *Entering Mentoring* mentor training curricula
- Gain confidence in facilitation skills
- Practice facilitating activities from the *Entering Mentoring* curricula
- Be able to describe evidence supporting the effectiveness of mentor training
- Articulate practical plans for implementing mentor training at their home institution/organization

Step 3: Support a Community of Practice (in development)

- Monthly coffee hours
- Trained Facilitator newsletter
- Online conversational space
- Additional training opportunities (possible culturally aware mentorship training)

Resources

DOE Laboratories of the Future Series
January 25, 2022

Building Cultures of Inclusive Mentorship at Federally Funded Research Centers

Melissa McDaniels (mmcdaniels@wisc.edu)

Resources & Workshop Documents

Slides

Further Interest Form

- Please fill out this form if you want to learn more about mentorship education in the National Labs
  https://forms.gle/42xQKJiVB8Ew79fd8

Resources shared in workshop: