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# **An Integrated Approach to Diversity, Equity, Accessibility and Inclusion (DEAI) in STEM**

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# Session Abstract: Correction

In 2014, students of color outnumbered white students in public schools for the first time. By 2060, the percent change in the black population for students under the age of 18 is expected to increase in the US by 15.2 % and by 153.7% for those who report two or more races (relative to a decline of 23.8% in the white population of students under the age of 18). Yet the teaching workforce is predominantly white and female and the ratio of teachers of color to students of color today is 1 to 50. Research by Redding (2019) clearly shows that students' academic performance, self-worth, and behavior improve when they are in a classroom with teachers where there is a demographic match between teachers and students. In this session, we will discuss how schools and school districts can support students of diverse backgrounds and diversify the demographic of teachers to better reflect their students by taking an integrated approach to diversity, equity, accessibility, and inclusion in STEM.



# Agenda

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- ❑ What is DEAI?
- ❑ Why is identity in STEM important?
- ❑ Why is DEAI in STEM important?
- ❑ How can we ensure DEAI in STEM?





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# What is DEAI?

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SECTION

1



# Discussion

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- ❑ Record in the discussion thread 1 thing that you already know about diversity, equity, accessibility and inclusion (DEAI) in STEM.



# What is DEAI? Can you match the term to the definition?

Term	Definition
A. Diversity	1. Giving equitable entry to everyone along the continuum of human ability and experience
B. Equity	2. Ensuring diverse individuals fully participate in all aspects of the work including decision making and engineering solutions
C. Accessibility	3. All the ways that people are different and the same and the individual and group level
D. Inclusion	4. Fair and just treatment of all members

Source: [American Alliance of Museums \(2019\). Facing Change.](#)

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# What is DEAI?

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C. Accessibility	1. Giving equitable entry to everyone along the continuum of human ability and experience
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A. Diversity	3. All the ways that people are different and the same and the individual and group level
B. Equity	4. Fair and just treatment of all members

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# Why is “identity” in STEM important?

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SECTION

2

# Identity Map: Foundation for DEAI

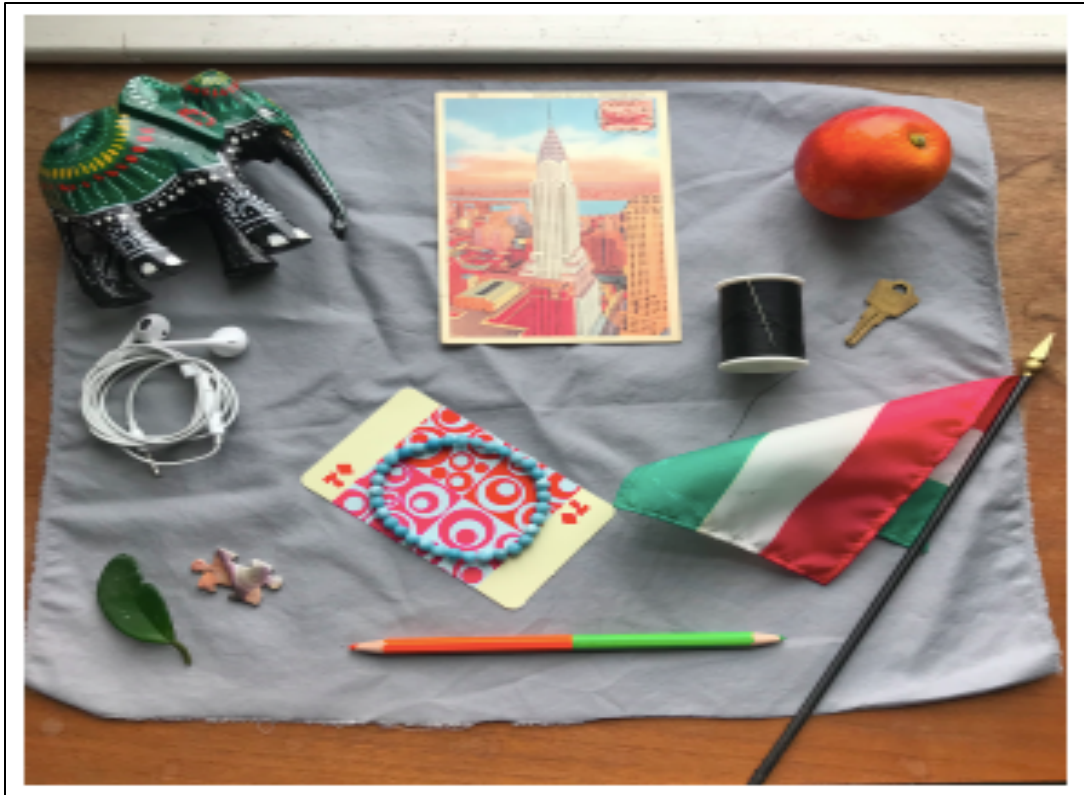
Our identity often influences how we:

- view a scientific phenomenon
- solve a problem
- engineer a solution
- view others

Understanding your own identity and the identity of others and their perspective, informs your decision making in STEM.



You can also have students make a physical identity map using objects that describe who they are.



# Identity Map Discussion

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- ❑ Are certain aspects of your identity more influential than other aspects? Why?
- ❑ How might your identity map change over time?
- ❑ How much control do you have over the things on your identity map?
- ❑ How might your personal identity influence how you approach Diversity, Equity, Accessibility, and Inclusion in STEM?



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# Why is “DEAI” in STEM important?

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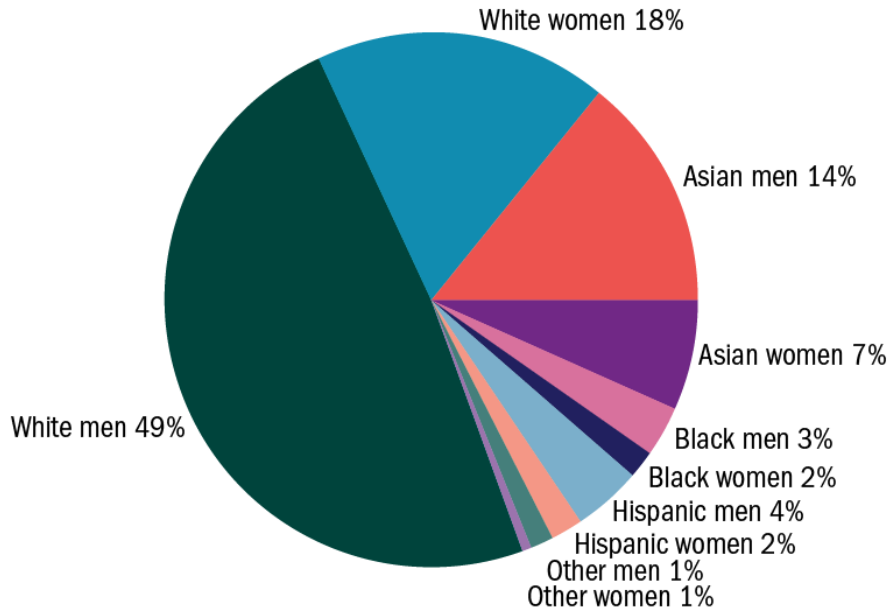
SECTION

3



# There is a lack of diversity in the STEM workforce...

## Scientists and engineers working in science and engineering occupations: 2015



# Retention is a Problem

## Who leaves STEM?

STEM Ph.D. Holders in Non-STEM Careers

**1 in 6**



STEM Ph.D. holders leaves STEM

**1 in 5**



Female STEM Ph.D. holders leaves STEM

**1 in 5**



Black STEM Ph.D. holders leaves STEM

**Source:** American Institutes for Research | [www.air.org](http://www.air.org)

# The problem in the STEM workforce:

- ❑ Blacks, Hispanics or Latinos, and American Indians or Alaska Natives are underrepresented in STEM fields compared to their overall participation in the workforce
- ❑ Women in computing and engineering are dramatically underrepresented compared to their participation in the workforce as a whole.
- ❑ Women face barriers to success in STEM (e.g., although women lead 45% of all US businesses, just 17 of the 225 new biotech companies launched in the last 5 years were led by women CEOs and only 4 were women of color.



# The problem in STEM classrooms:

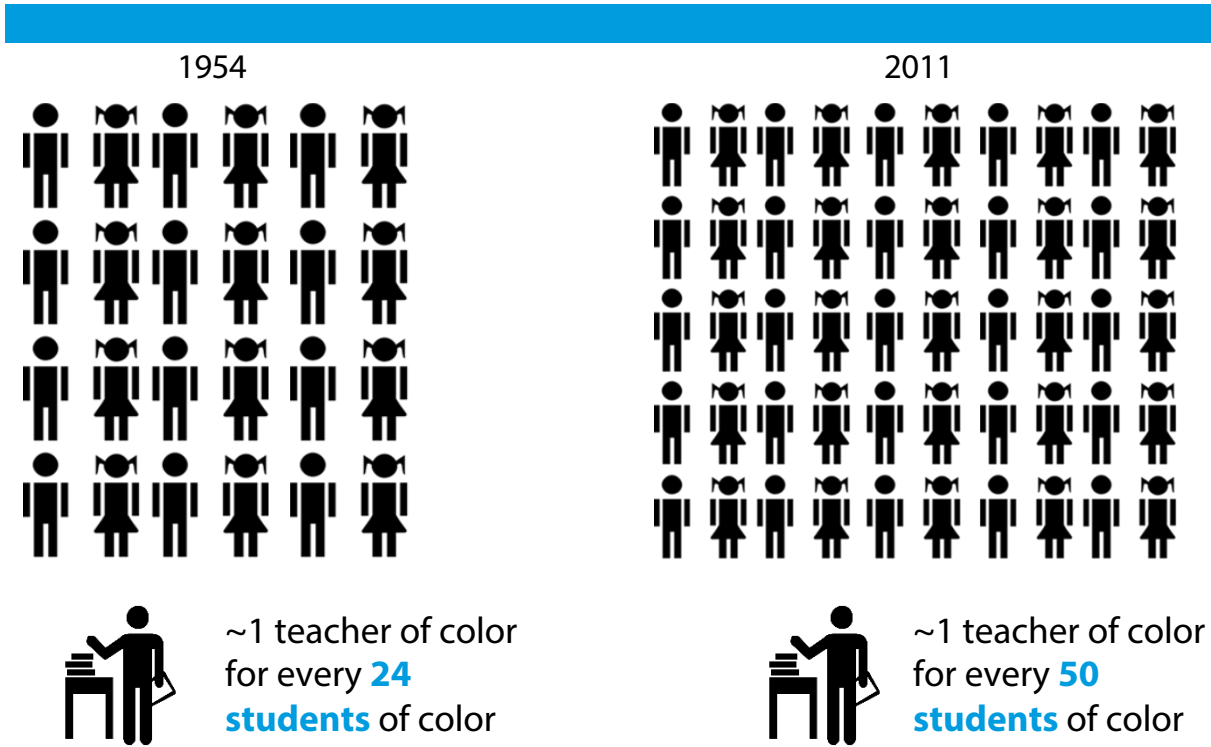
- ❑ Young girls shy away from STEM because of: masculine stereotypes about STEM, parents' expectations, peer norms, lack of fit with personal goals (e.g., desire for communal roles)
- ❑ In high school and college, young women avoid STEM majors or leave permanently because: feeling misfit in STEM classes, being vastly outnumbered by male peers, lacking female role models.
- ❑ African American and Hispanic girls have high interest in STEM, high confidence, and strong work ethic, but have fewer support and less exposure to STEM than their peers.

Dasgupta & Stout. (2014). *Girls and women in Science, Technology, Engineering, and Mathematics: STEMing the Tide and Broadening Participation in STEM Careers. Policy Insights from the Behavioral and Brain Sciences.*

Girl Scouts USA (2012). *Generation STEM: What Girls Say about Science, Technology, Engineering, and Math*



Today, the ratio of teachers of color to students of color is too low (even lower than it was in 1954!!).



Torres, J., Santos, J., Peck, N., & Cortes, L. (2004). Minority Teacher Recruitment, Development, and Retention (K. Latina & J. Swedlow, Eds.). Retrieved September 1, 2015, from <http://files.eric.ed.gov/fulltext/ED484676.pdf>

# DEAI in the STEM Teaching Workforce

- ❑ Student-teacher racial/ethnic matching affects teachers' perceptions of students, and students' academic and behavioral outcomes.
- ❑ Assignment to a same-race teacher is associated with more favorable teacher ratings, although the relationship differs by school level.
- ❑ Black students score higher on achievement tests when assigned to a Black teacher.
- ❑ Less consistent evidence is found for Latinx students.

Source: Redding, C. (2019). A Teacher Like Me: A Review of the Effect of Student-Teacher Racial/Ethnic Matching on Teacher Perceptions of Students Academic and Behavioral Outcomes. *Review of Educational Research*



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# Identity Map

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# How can we ensure DEAL in STEM?

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SECTION

4



# Use universal design in engineering = be proactive

“the design of products & environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.”

Source: Sheryl Burgstahler *The Center for Universal Design in Education*  
[www.uw.edu/doit/CUDE/](http://www.uw.edu/doit/CUDE/)

Atchison, C. & Burgstahler, 2. (2019, August 7). Diversity, Equity, and Exclusion? How to address diversity with respect to ability in your research and practice in the INCLUDES National Network [Webinar]. In CIRCL Webinar Series. Retrieved from <https://circlcenter.org/events/webinar-diversity-includes/>



# Provide role models for students so they can see themselves in others



**MEERA VENKATESAN**

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President's Malaria Initiative, (USAID)



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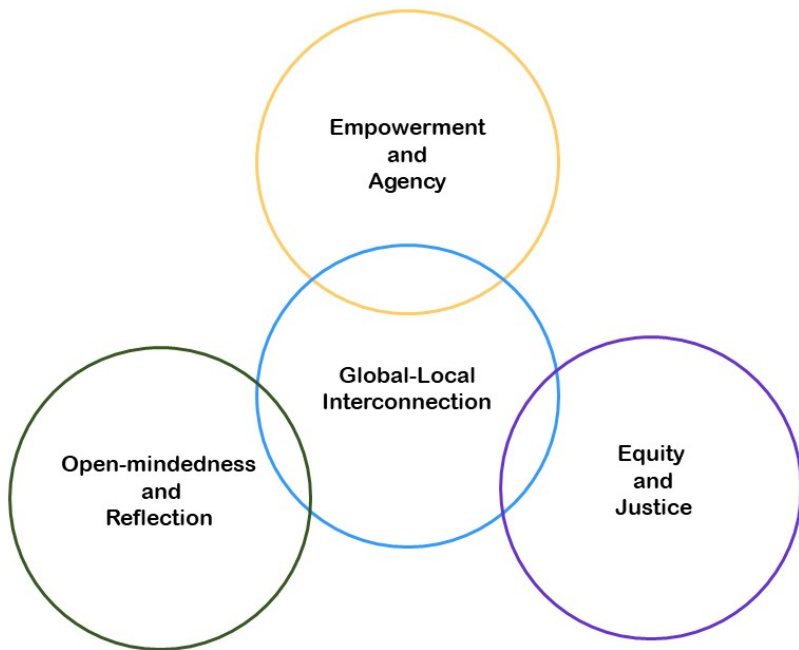
**BRIDGET GILES**

RESEARCH ASSISTANT PROFESSOR

Organization:

Virginia Modeling Analysis & Simulation Center at Old Dominion University (VMASC)

Make STEM socially relevant by combining key pieces of science and social studies education practices with social and emotional learning.



**Sustainable Mindsets**



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# EQUALITY



# EQUITY

<https://interactioninstitute.org/illustrating-equality-vs-equity/>

## Equality



The assumption is that **everyone benefits from the same supports**. This is equal treatment.

## Equity



**Everyone gets the supports they need** (this is the concept of "affirmative action"), thus producing equity.

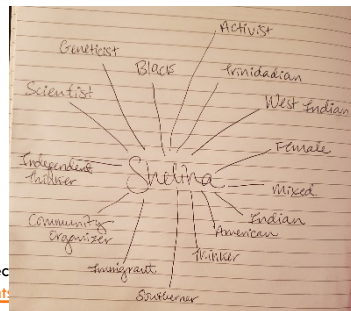
## Justice



All 3 can see the game without supports or accommodations because **the cause(s) of the inequity was addressed**. The systemic barrier has been removed.

# Key Considerations of Integrated DEAI

- ✓ Consider the impact of your identity map/intersectionality
- ✓ What behaviors can you change towards an integrated DEAI approach in STEM?
- ✓ Considering DEAI, how can you be an advocate for students?
- ✓ Listen, Connect, Modify
- ✓ Empathy is key!



Atchison, C. & Burgstahler, 2. (2019, August 7). Diversity, Equity, and Exclusion? How to address diversity with respect in the INCLUDES National Network [Webinar]. In CIRCL Webinar Series. Retrieved from <https://circlcenter.org/event>

AccessINCLUDES

[www.uw.edu/doiit/programs/accessincludes](http://www.uw.edu/doiit/programs/accessincludes)



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# What resources are available to support DEAL in the STEM classroom?

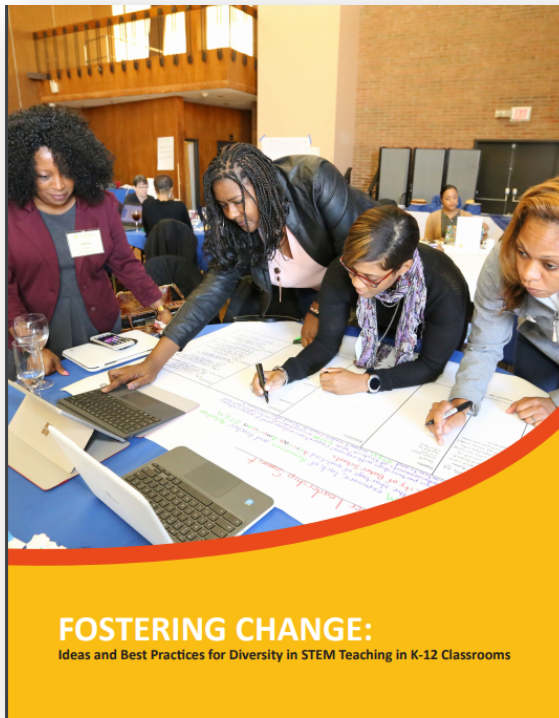
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SECTION

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# Playbook of DEAI Strategies



- ❑ Designed for school systems, SEAs, community partners, IHEs.
- ❑ Available: <https://www.ssec.si.edu/sites/default/files/Fostering%20Change%20Playbook%20FINAL.pdf>



# White Papers



## Gender Equity in STEM Education

**How Educators Can Help Girls Succeed in All STEM Subjects**

"Boys are just better at science."

"Girls can't do math!"

"You don't look like a scientist."

Common statements such as these are just one type of social cue that reflects deeply embedded ideas in society, reinforcing the underlying notion that girls and boys are inherently different when it comes to science, technology, engineering, and math (STEM) aptitude. The misconceptions that boys have superior STEM abilities to girls was historically commonly accepted. Fortunately, extensive research over the past 30 years has provided strong evidence that girls and boys are similar in STEM abilities (O'Dea, et al., 2018). Unfortunately, differences in participation and achievement persist (Funk and Parker, 2018).

When teachers, parents, or other influential people believe these stereotypes, it often leads to treating girls and boys differently and



Credit: Smithsonian Science Education Center

thereby perpetuating ideas that are untrue—that girls cannot be good at math, that they do not look like scientists, or that they will not be interested in engineering. This continues to influence and harm girls' representation in STEM fields in different ways. It becomes a self-fulfilling prophecy: even when girls—those who identify as girls as well as those who perceive others to identify them as girls—are

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## Teaching Everyone

**Addressing Diversity, Equity, Accessibility, and Inclusion in the STEM Classroom**

Principal Hayes walks into a fifth-grade classroom to observe a lesson. After listening to small-group discussions for a few minutes, she checks her schedule. She thought she was going to observe a science lesson, but the students are sharing stories about family meals. She approaches the teacher, Mr. Amari, who is in the process of projecting a piece of artwork showing a mother and daughter working with dried corn. Mr. Amari explains that the class will be studying sugars and starches. He has set up the opening lesson so that students are grounding their research in their own

experiences with corn as a food. Principal Hayes joins in the subsequent whole-class discussion and shares a story about helping her grandfather cook shrimp and grits.

Principal Hayes then joins a kindergarten class that has been investigating how pushes and pulls can change the speed and direction of objects. Students are talking about the new composting program in the school cafeteria. They have noticed a problem: not all students can easily get to and put their leftovers into the tall compost bins. One student suggests a solution using a shorter bin on wheels that students can push or pull to move around for compost collection. The teacher, Ms. Radigan, points out that this is a good place to think about inclusive design. She encourages the class to think of designs for the rolling bin that would enable all students to put their compost into the bin and to roll the bin around for others.

Taking an integrated approach to teaching STEM subjects is not only about bringing together science, technology, engineering, and math. We know that this integrated approach must serve all STEM learners along the continuum of human ability, cultural experience, and interest. How are Mr. Amari and Ms. Radigan serving all students? What research-based strategies should Principal Hayes be looking for in her school's STEM curriculum to ensure STEM is accessible to all students?



Credit: "Drying Corn" by Carl Moon, Courtesy of Smithsonian American Art Museum, Gift of Florence O. R. Lang

# Online Resources: WiSTEM<sup>2</sup>D



<https://www.stem2d.org/>



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# Thank You!

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