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Disrupting Computing Department Cultures, One Cohort at a Time

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Shaundra B. Daily is the Cue Family professor of practice in Electrical and Computer Engineering & Computer Science at Duke University and Levitan Faculty Fellow, Special Assistant to the Vice Provosts. Prior to joining Duke, she was an associate professor with tenure at the University of Florida in the Department of Computer & Information Science & Engineering. She also served as an associate professor and interim co-chair in the School of Computing at Clemson University. Her research focuses on the design, implementation, and evaluation of technologies, programs, and curricula to support diversity, equity, and inclusion in STEM fields. Currently, through this work, she is the Backbone Director for the Alliance for Identity-Inclusive Computing Education as well as Education and Workforce Director for the Athena AI Institute. Having garnered over $40M in funding from public and private sources to support her collaborative research activities, Daily's work has been featured in USA Today, Forbes, National Public Radio, and the Chicago Tribune. Daily earned her B.S. and M.S. in Electrical Engineering from the Florida Agricultural and Mechanical University – Florida State University College of Engineering, and an S.M. and Ph.D. from the MIT Media Lab.

Cecilé Sadler, Massachusetts Institute of Technology

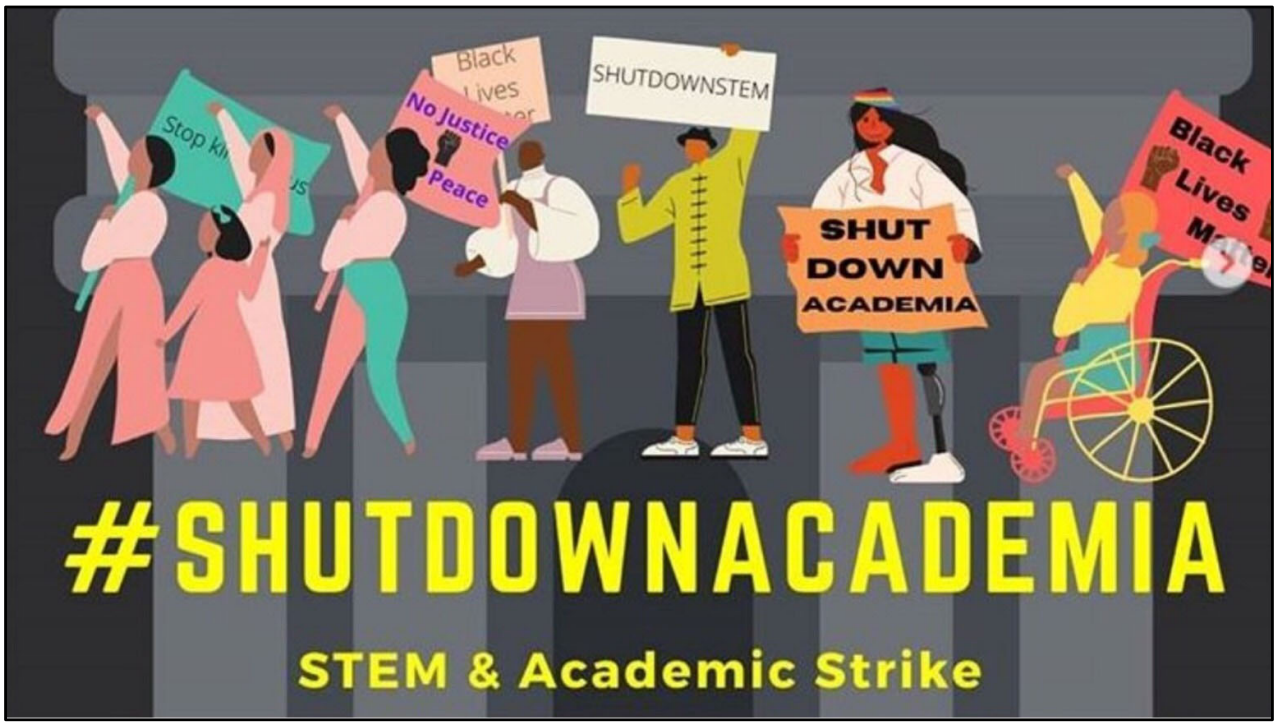
Cecilé Sadler is a graduate student at the MIT Media Lab with the Lifelong Kindergarten group. She is studying the intersection of computing and education in an effort to design equitable learning environments that promote creativity through technology development. Her research interests focus on investigating how computing can be leveraged to create spaces for young people of color to practice agency and develop their cultural identity through playful learning experiences. Cecilé is a graduate of North Carolina State University and Duke University, earning her B.S. and M.S. in Computer Engineering. She is on the Competence in Computing (3C) Fellows Program leadership team and senior personnel on the Alliance for Identity-Inclusive Computing Education (AiiCE).

Disrupting Computing Department Cultures, One Cohort at a Time

A. Nicki Washington, Ph.D.
Shaundra B. Daily, Ph.D.
Cecilé Sadler

Good afternoon, morning. I am Dr. Nicki Washington. I am a professor of the practice in computer science as well and gender, sexuality, and feminist studies at Duke University.
This is Dr. Shani Daily, a professor of the practice in electrical and computer engineering and computer science at Duke University.
And this is Cecilé Sadler who is a PhD student at the MIT media lab.

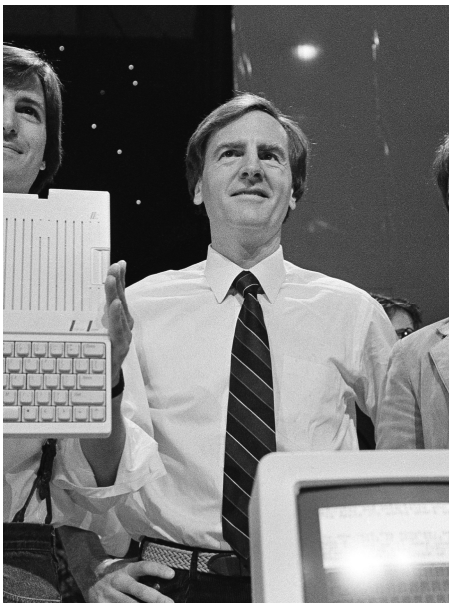
The catalyst for the changes we seek can be traced back to a series of tragic events that shook our collective conscience. The murders of Breonna Taylor, Ahmaud Arbery, and George Floyd sparked a wave of commitments to racial justice, diversity, equity, and inclusion. This wave reached academia, where the #BlackInTheIvory Twitter hashtag unveiled the harsh realities of anti-Black racism faced by faculty, staff, and students in historically white colleges and universities.



In response to these devastating events, on June 10, 2020, STEM faculty across the United States came together for #ShutDownSTEM, a one-day academic strike dedicated to understanding and confronting anti-Black racism in higher education and STEM fields. #ShutDownSTEM provided a collective moment for STEM academics to reflect, have difficult conversations, and commit to taking action against systemic racism. However, we quickly realized that a single day was insufficient to prepare for the long-term, ongoing work required to truly dismantle entrenched inequalities that persist within our institutions. More

comprehensive, sustained efforts would be needed to drive meaningful change.

We set to create something more comprehensive to address challenges we were seeing in our own academic spaces. Given our respective backgrounds, we began our focus specifically in computing. Let's talk a bit about our motivations.

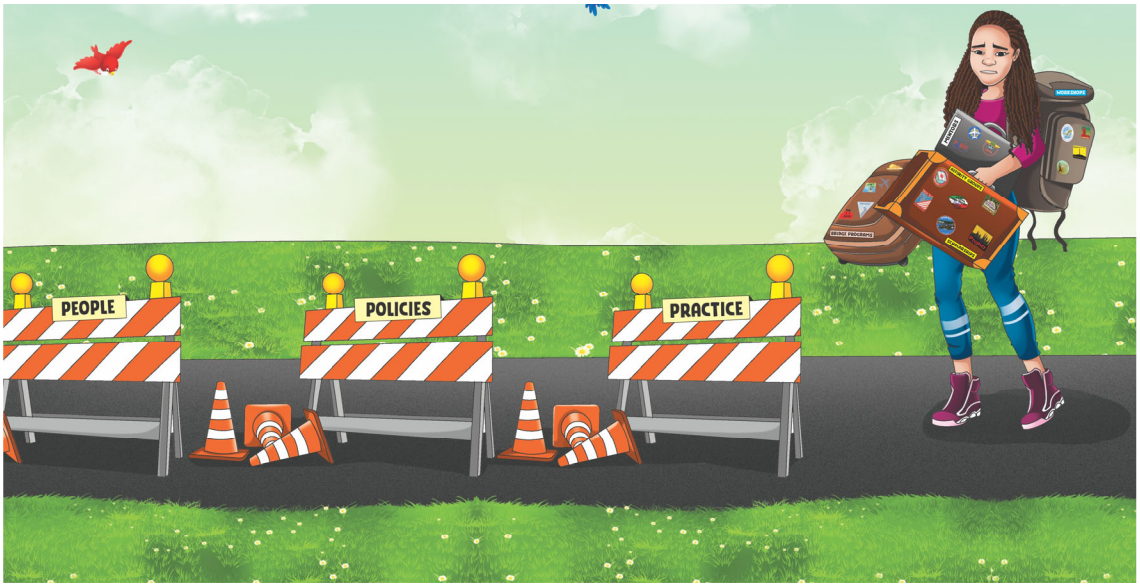


For too long, computer science and the tech sector have been dominated by a narrow slice of humanity. White, Asian, male, middle-to upper class, able-bodied - you know the drill. The effects of this lack of diversity are clear. Workplace cultures that feel chilly, even hostile, if you don't fit the mold.

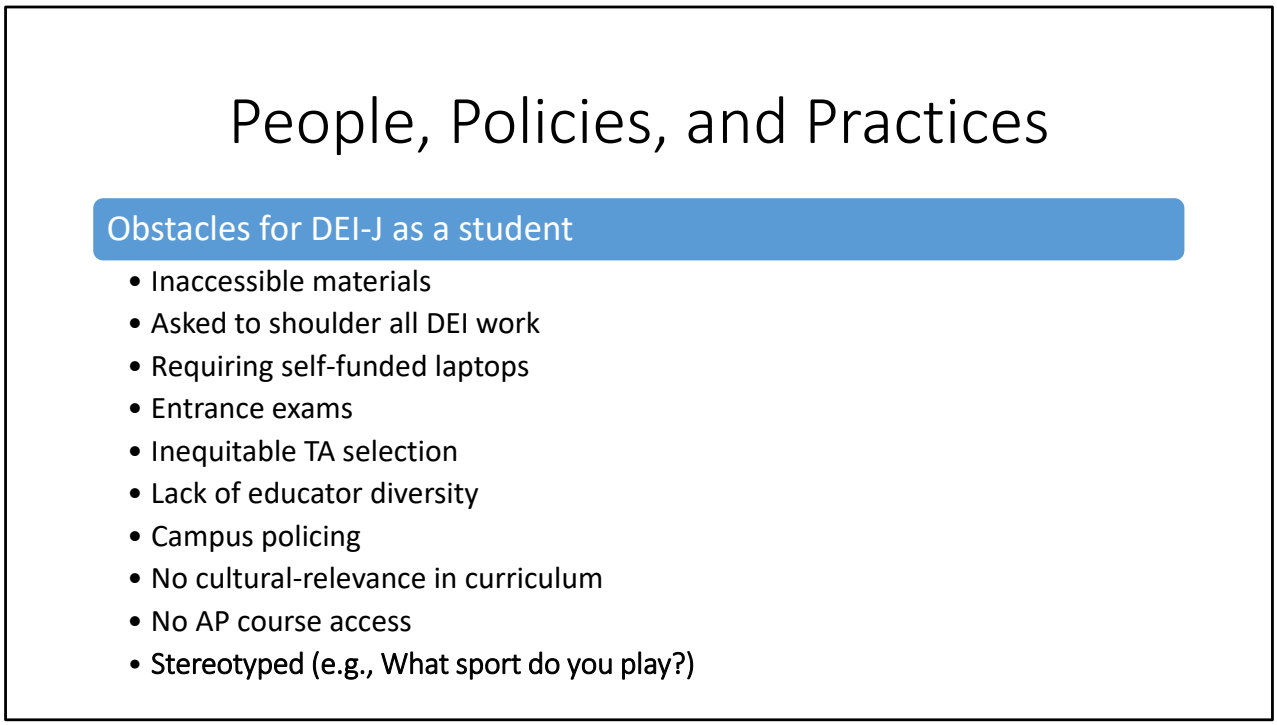
This lack of diversity has real implications, especially for marginalized populations. Let me give some examples. Facial recognition systems that are trained mostly on white male faces end up failing for women and people of color. That leads to exclusion, false accusations, and

enables surveillance of marginalized groups.
Predictive policing algorithms trained on data from overpoliced neighborhoods amplify and automate bias against communities of color. They send even more police where they aren't needed, creating more incarceration and more trauma.
Healthcare algorithms have been shown to recommend less care for Black patients than their equally sick white counterparts and financial lending algorithms discriminate in giving loans. The list goes on. These are not abstract problems. Real humans get hurt by these flawed technologies every single day. Lives and opportunities are damaged. It will keep happening as long as we have homogenous teams building products in a cultural vacuum, without diverse voices and perspectives shaping the process. Further, the problem will persist if students are not educated about identities that they do not share.

As you are probably aware, there have been many efforts to improve this lack of diversity. Camps and clubs that give students an early taste of coding. Mentors who guide learners down unfamiliar paths. Affinity groups that provide community and belonging. Special workshops that showcase role models with lives like their own. Action forums where truth is spoken. Programs that carve out space for those long excluded. Campaigns that widen definitions of who belongs in tech. And these initiatives matter - how could they not?



But if diversity remains elusive, we must dig deeper still. Expand our vision beyond the student-centered efforts. Because students do not exist in isolation. They remain bound by people, policies, practices and gatekeepers who block access and prevent them from being successful in computing.

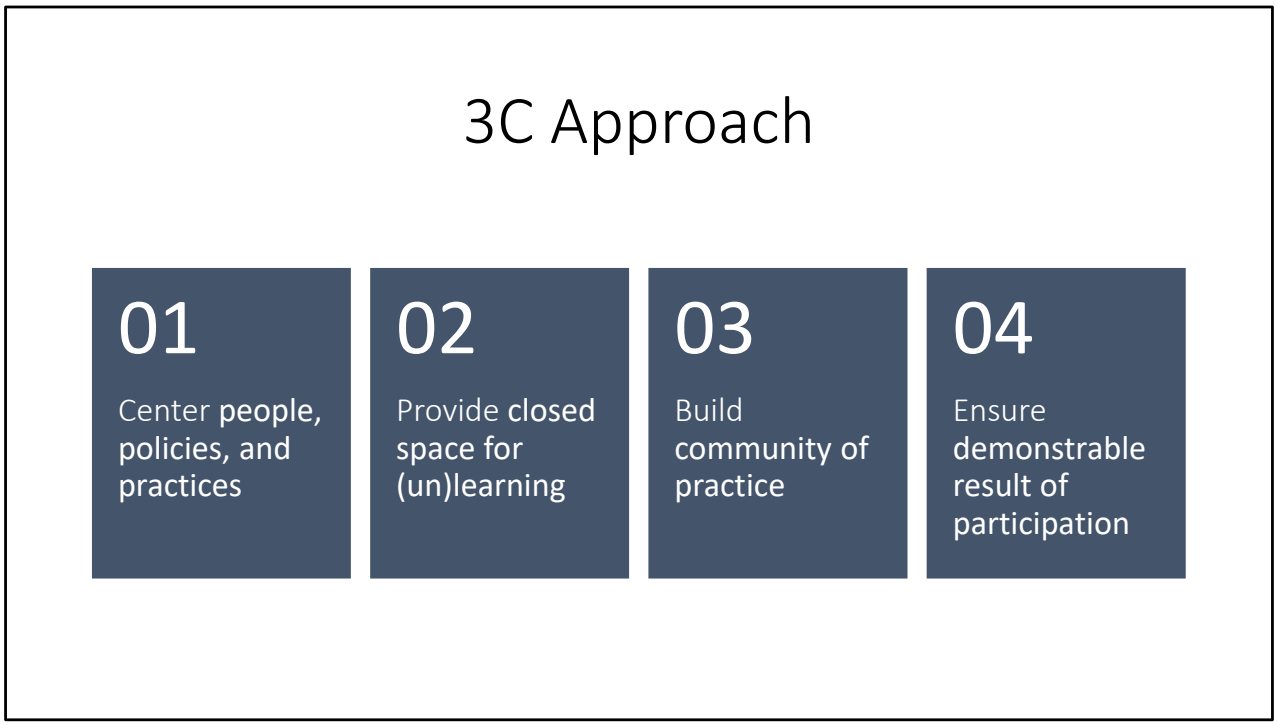


- Inaccessible materials - Course materials may not be available in formats accessible to students with disabilities. Providing materials in multiple formats helps increase accessibility.
- Being asked to shoulder all the DEI work - Marginalized students may feel pressure to take on a disproportionate amount of diversity, equity and inclusion work on campus. This additional labor is taxing.
- Requiring self-funded laptop - Requiring an expensive personal laptop can present a financial barrier for students from lower-income backgrounds.

- Entrance exams - Standardized tests like the SAT/ACT can disadvantage certain groups.
- Inequitable TA selection – We all know the assumptions about TAs is that those are the students who “get” the course materials. Having TA demographics that don’t match student populations contributes to messaging about who belongs and who is capable.
- Lack of diversity of teaching staff - Seeing few teachers/professors from similar backgrounds can feel isolating for marginalized students.
- Campus policing - Marginalized students may feel targeted by campus police practices.
- No cultural-relevance in curriculum - Marginalized perspectives and experiences may be left out of course content.
- No AP course access - Schools in lower-income areas may not offer as many AP courses. Making APs available in all schools promotes equity of opportunity.
- Stereotypes and assumptions - Assumptions that students are on campus for sports rather than academics, or both can diminish student feelings of belonging.

"The classroom remains the most radical space of possibility in the academy"
– bell hooks

The Cultural Competence in Computing (3C) Fellows program was conceived to directly address the "people" we're speaking about and indirectly the practices and policies. Our mission is to empower computing faculty, staff, postdoctoral researchers, graduate students, and professionals to learn about identity, intersectionality, oppression, and their impact on computing environments and then use this knowledge to design courses, activities, and policies that promote inclusivity and prepare graduates to create more equitable technologies and cultures.



Again, our approach is to center the people, policies and practices that impact marginalized students. We provide a closed and safe space for both learning and unlearning, while building a community of practice. And we don't stop with this. Every participant is required to produce a module, course, or policy solution in order to complete the program.

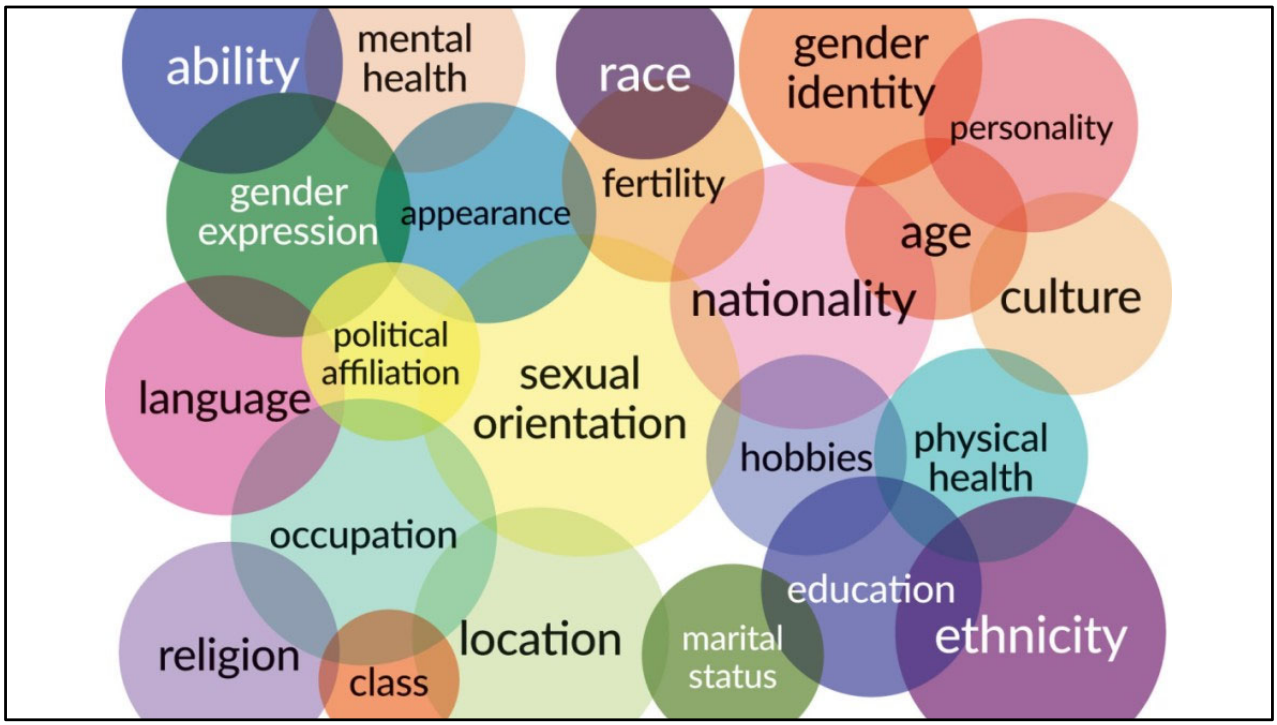
2-year, Virtual Format

This two-year, virtual, professional development program includes foundational sessions in the first year, occurring twice a month on Saturdays. Each session has guest speakers who share about identity related topics including race and ethnicity, class, disability, gender identity, sexual orientation, and intersectionality. The second year has two Saturday sessions and participants work to implement their deliverable. We also have established rules of engagement for our sessions to support an environment that is conducive to discussing these topics that can carry a lot of emotional weight.

Rules of Engagement

- Everyone will participate in a mature and respectful fashion.
- Throw sunlight, not shade.
- Be open to be challenged or confronted on your ideas or prejudices.
- Study and avoid engaging in rhetorical fallacies.
- Avoid broad generalizations you can't back up with evidence
  - "everyone everywhere always does x"

This is an abbreviated version of these rules. Without going through each of them, the rules generally call for mutual understanding, self-awareness, evidence-based dialogue, and avoiding hurtful/counterproductive language. This fosters an environment where people feel safe probing complex topics together.



When we speak of identity, it is complex, woven through with our individual gifts and burdens, our family stories, and our people's history. Identity takes root in childhood and blossoms in those pivotal adolescent years when young people begin to know themselves and become known. Identity is a tapestry, made up of experiences and relationships, values and beliefs, interests and affinities. It exists not as distinct categories but overlapping and evolving throughout our lifetimes.

Here are just a few examples of speakers that we've had throughout the cohorts.

Ruha Benjamin is a professor who studies the relationship between race and technology, and how new technologies can perpetuate inequality. She wrote the book "Race After Technology" exploring algorithmic bias and discrimination.

Imani Barbarin is an activist and writer who advocates for disability rights and justice, bringing attention to ableism

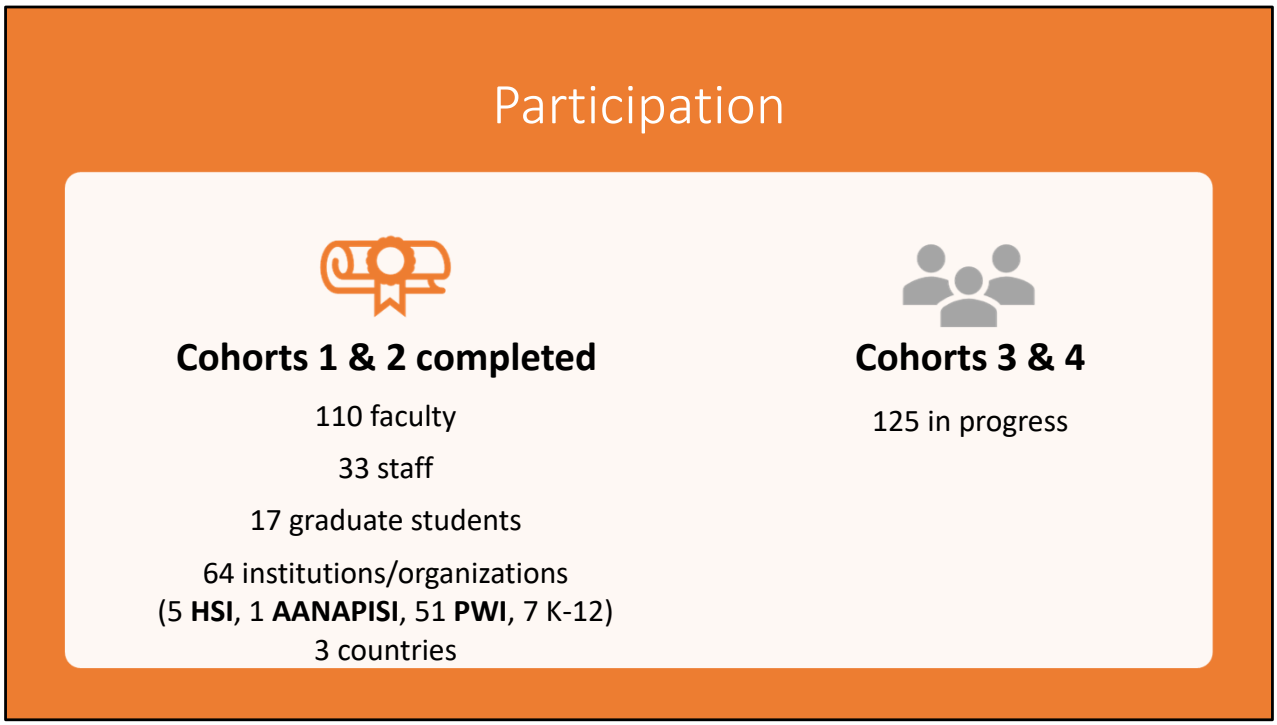
in society. She speaks out about representation for disabled people in media and improving accessibility.

Lee Baker is an anthropologist who studies the biological variation in humans and criticizes the concept of race as unsupported scientifically. His work argues that racial categories are social constructs, not biological truths.

Safiya Noble is a professor studying algorithmic bias and discrimination, especially in search engines like Google. Her book "Algorithms of Oppression" looks at how search results can amplify stereotypes and challenge notions of neutrality in technology.

Eduardo Bonilla-Silva is a sociologist who researches racial inequality, focusing on color-blind racism and how denial of racism today perpetuates systems of oppression. His book "Racism without Racists" examines post-Civil Rights era racial attitudes in America.

Jennifer C. Nash is a professor of African & African American Studies and Gender, Sexuality & Feminist Studies at Duke University. Her research examines black feminism, critical race theory, and intersectionality, analyzing how race intersects with gender, class, and sexuality in American culture and law.



We launched our first cohort in the 2020-21 academic year. Since then, 110 faculty, 17 graduate students, and 33 staff from 64 institutions and organizations. We've had a majority of PWIs, but also some Hispanic Serving and Asian American and Native American Pacific Islander

Institutions across three countries have completed the first two cohorts. Cohort 3 is actively participating in year two, and Cohort 4 is in year one. Each subsequent cohort builds on the lessons learned from the prior, refining the

program's impact.

This map demonstrates the distribution of the participants I've just mentioned

Evaluation

- Iterative improvements between sessions based on participant feedback
- Duke Social Science Research Institute
  - Increased **knowledge and awareness** of the impact of systemic inequities on computing environments
  - Increased **self-efficacy** to identify factors negatively impacting minoritized people
    - Willingness and preparedness to act
  - Increased levels of **self-awareness**, including areas for growth

In addition to iterating on sessions based on participant feedback we are also evaluating program outcomes. Based on interviews, from participants who completed cohort 1 not only have fellows shared an increase in knowledge and awareness about their identity related topics and their applicability but they also reported an increase in self-efficacy in their ability to identify the factors that negatively impact the experience of minoritized individuals. All respondents indicated they developed a deeper understanding of systemic bias, inequities, and inequalities and their impact on computing environments

as a result of being a part of the 3C Fellows program. They also noted an increased ability to identify areas of needed growth or self-improvement through self-reflection on their own experiences and practices.

Evaluation Recommendations

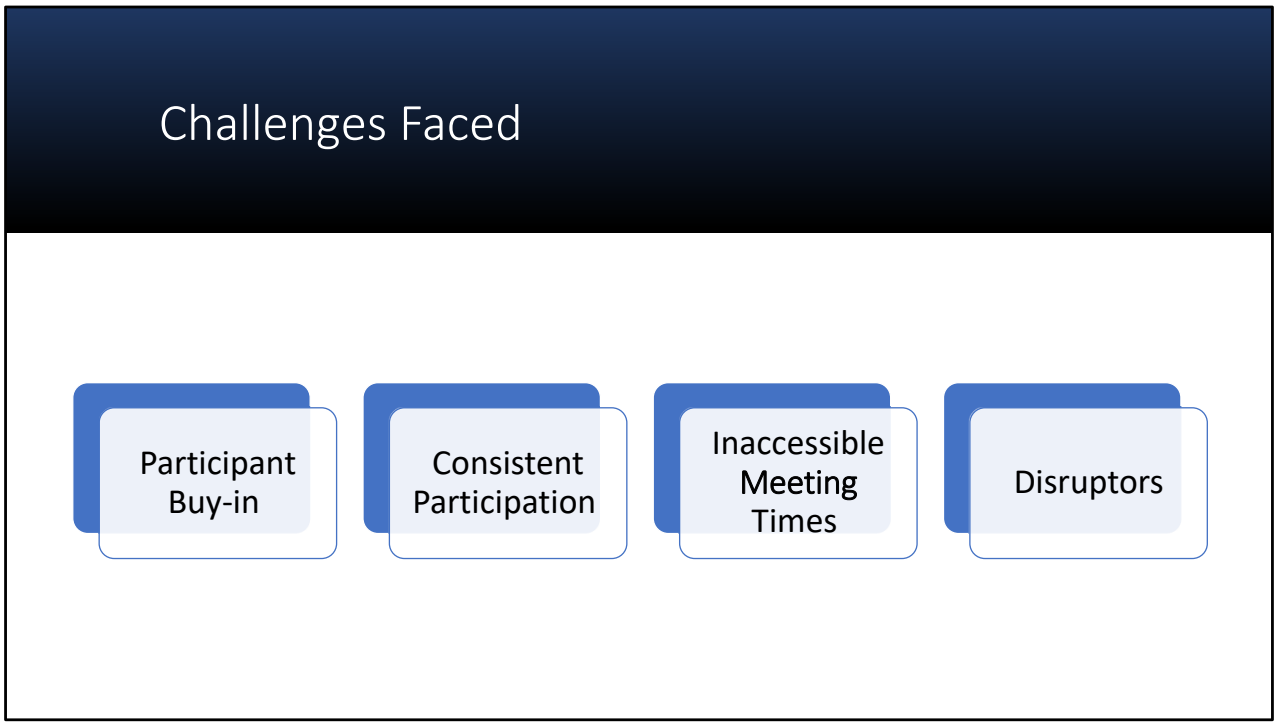
- Refine prep packet/pre-work
- Breakout session processes and composition
- Offer more practical guidance on implementation
- Feedback and accountability mechanisms on program deliverables
- Facilitate community building

Here is a sample of the recommendations provided by our evaluators to improve the program.

1. Refine prep packet/pre-work - Prioritize key readings, provide more time for completion, incorporate structured opportunities to discuss and apply concepts.
2. Offer practical guidance - Share models and provide opportunities to practice applying concepts to deliverables and initiatives beyond the classroom.
3. Give project feedback - Provide mechanisms like office hours, mentors, or peer groups to give deliverable feedback.
4. Build in accountability - Use tools like checklists,

partnerships, or program completion certificates tied to deliverable implementation.

5. Facilitate community building - Incorporate networking opportunities within and across Cohorts. Clarify expectations around Fellows spearheading efforts.



During the program implementation, we encountered several challenges that we have continuously refined to address in each new cohort. These challenges included participants who were hesitant to fully commit and maintaining participant buy-in. The participation in cohorts 1 and 2 was largely a response to the post-summer 2020 trend of individuals seeking ways to demonstrate commitments to DEI. Subsequent solicitations have relied on word of mouth, referrals, and listservs.

Another challenge was inconsistent participation, which

we tackled by introducing attendance requirements. Despite being an online program, we also grappled with scheduling issues due to participants being scattered across different time zones and facing religious conflicts. To cater to these diverse needs, we implemented an asynchronous option that included weekly check-ins and breakout group discussions.

Additionally, disruptive individuals within the group posed challenges. Those who persisted in causing issues, even after warnings, were ultimately removed from the program.

Future Directions

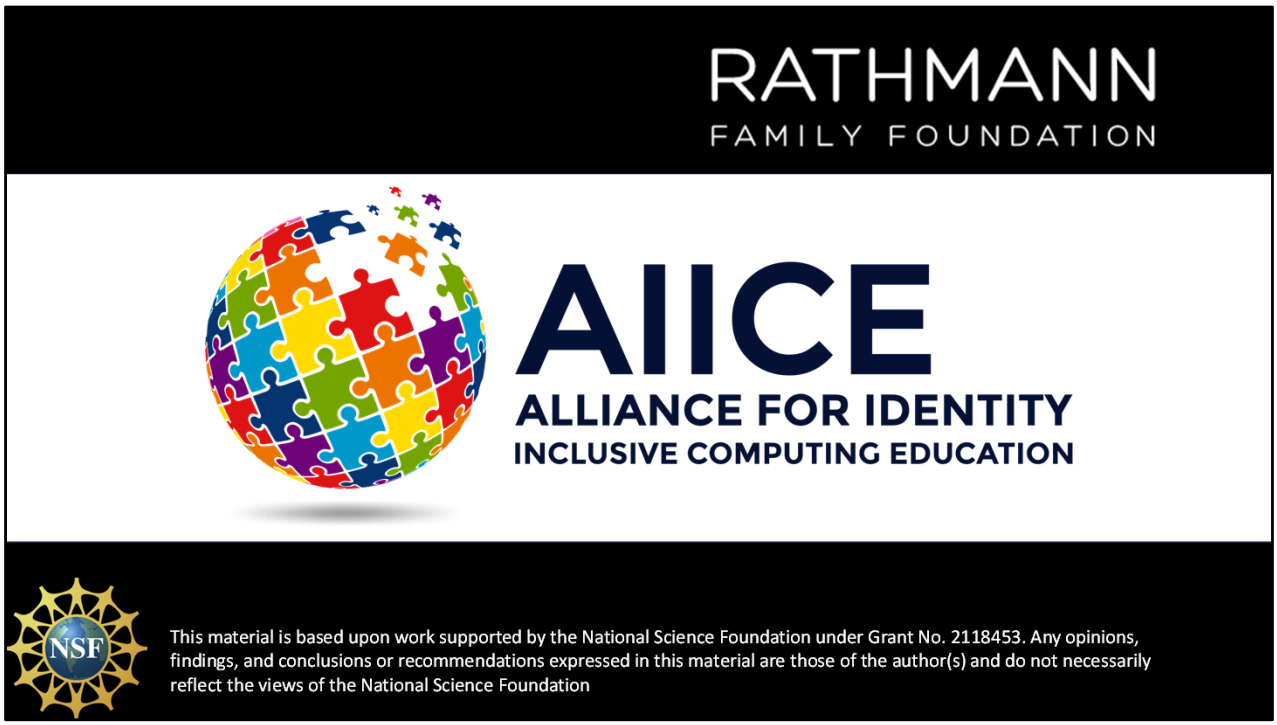
- Extensions to STEM disciplines
- Long-term impacts of participation

As we continue to expand our reach, we're exploring opportunities to extend the 3C Fellows program beyond computing to encompass broader STEM disciplines like biology, chemistry, engineering, and math. We are also looking at partnerships with technology companies to bring this program to industry. Our goal is to have over 1,000 total participants from computing and STEM within the next 5 years.

In addition, we want to evaluate the long-term impacts of the program beyond the two-year completion. We plan to

conduct longitudinal monitoring changes in diversity at their institutions and measuring shifts in workplace cultures and retention rates. We hope these studies will demonstrate that the 3C program effects lasting change even after formal participation ends.

We believe that by disrupting our computing and STEM department cultures, one cohort at a time, we can drive systemic change and create a more inclusive and equitable future for technical fields. But we recognize that true change takes time, and we are committed to doing this work for the long haul.



This work has become a part of the Alliance for Identity-Inclusive Computing Education (AiiCE) supported by the National Science Foundation. We also have support from the Rathmann Family Foundation

Any questions?