

A photograph of a paved path lined with trees, leading towards a building in the distance. The path is made of light-colored paving stones and is flanked by trees with green foliage. The background shows a building with a dark entrance. The overall scene is bright and sunny.

Please **Join** Me/Us/Them on
My/Our/Their **Journey** to
Justice in STEM

Rod D. Roscoe (rod.roscoe@asu.edu)
Society for Text and Discourse, August 2021

**GIVE
TALK?**



ME?

Imposter Syndrome

- **doubts** about ones abilities, skills, and achievements
 - see Clance ([1985](#)); Clance & Imes (1978)
 - despite valid experience and credentials
 - fear of being “exposed” as a “fraud”
- people may “talk themselves out of” opportunities (e.g., applying for jobs or accepting invitations)

“You Don’t Belong Here”

- contemporary research **links imposter syndrome to marginalizing and minoritizing experiences** related to race, gender, sexuality, neurodivergence, disability, and much more
 - lack of representation or role models
 - microaggressions, stereotype threat
 - impression management, emotional regulation

Imposter Syndrome is a Symptom

- imposter syndrome can be **internalized exclusion**
- related to **sense of belonging** (Strayhorn, [2018](#))
- myriad factors subtly and unsubtly **cause** underrepresentation (“unbelonging”) in STEM
 - people may be actively **pushed out** of STEM
 - hostile communities cause people to **avoid** or **flee** STEM



Dr. Nikole Hannah-Jones

Inaugural Knight Chair in Race and
Journalism, Howard University

([learn more](#), [learn more](#), [1619 Project](#))

definitely **not** an imposter

“I have spent my entire life proving that I belong in elite white spaces that weren’t built for Black people.

I got a lot of clarity through what happened with the University of North Carolina and I decided that I didn’t want to do that anymore. ...

It’s not my job to heal the University of North Carolina. That’s the job of the people in power who created this situation in the first place.”

Where Am I Going with This?

- this talk (almost didn't happen) asks the question:
How do we improve representation in STEM?
 - topic of belonging was a model of this talk—**reflection** and **research** with **relevance** to (in)equity and (in)justice
 - **Part 1**: me/our/their and decentering
 - **Part 2**: journeys and the myth of meritocracy
 - **Part 3**: justice, activism, and coalitions

Part 1:

Disfluency, Discomfort, Decentering

The Title was Awkward on Purpose

- leveraging links between **disfluency** and...
 - ... attention (Faber et al., 2017)
 - ... comprehension (Ozuru et al., 2010)
 - ... deception (King et al, 2018)
 - ... reasoning (Hernandez & Preston, 2013)



**stumbling
is humbling**

Makes You Stop, Think, and Question

- key **mindset** for critical thinking about “DEI” issues
- Question: “How do we improve representation in STEM?”
 - well... **what is** representation? **who?** **why?**
 - what are the **causes** and **consequences?**
- need to be open-minded and **embrace disfluency**

Decentering

- a shift in perspective from self and one's internal world to other people and the external world
 - perspective taking ([Cho et al., 2021](#); [Wolgast et al., 2020](#))
 - mental health ([Bernstein et al., 2015](#))
 - progression of “me” → “us” → “them” in the title
- humbling and uncomfortable to realize it's not (only) about you, yet you should care just as much



- natural for humans to think about the world from the perspective of Self
- you are everywhere you go!
- **my** feelings, **my** beliefs, **my** choices, **my** actions, **my** needs
- “How does this affect **me**?”



- also fairly natural to extend our perceptions to people close to us or similar to us
- reflection of Self; tribe
- **our** feelings, **our** beliefs, **our** choices, **our** actions, **our** needs
- “How does this affect **us**?”



- takes work and effort to think about **their** feelings, **their** beliefs, **their** choices, **their** actions, **their** needs
- “How does this affect **them**?”
- e.g., correspondence bias ([Gilbert & Malone, 1995](#)) and cognitive consistency ([Gawronski & Brannon, 2019](#))

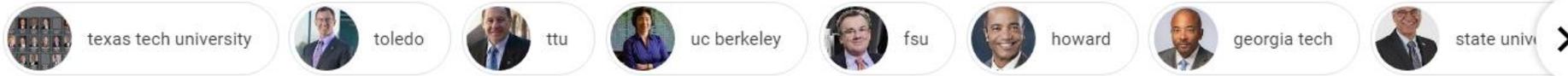
Decentering as “Far Transfer”



- difficult to appreciate how people are meaningfully variable while also sharing **underlying connections**, goals, or a common cause
- e.g., structure mapping and analogy (Gentner & Markman, 1997)
- relational reasoning (Alexander et al., 2015; Dumas et al., 2013)

Marginalization and Exclusion

- select identities are historically and habitually **centered**, which creates a **culture of exclusion** for some people instead of a culture of belonging
 - i.e., White, male, heterosexual, able-bodied, rich, etc. folks are **concentrated** in positions of power and prestige; implicitly treated as the cultural **“default”**
- WEIRD (Clancy & Davis, 2019; Henrich et al., 2010)



Meet the dean: College of Engineering ...
uakron.edu



Message from the Dean | ...
engineering.oregonstate.edu



UNT appoints new College of Engi...
engineering.unt.edu



dean for College of Engineering named ...
news.psu.edu



College of Engineering Dean's...
utoledo.edu



named dean of the College of Engineering
news.miami.edu



of Engineering dean | Illinois
news.illinois.edu



UK College of Engineering Names New ...
uknow.uky.edu



About the Dean | Colle...
stonybrook.edu



Message from the Dea...
stonybrook.edu



Francis College of Engin...
uml.edu



A Conversation with the Dean | College ...
clemsun.edu



the Dean | College of En...
engineering.usu.edu



Office of the Dean | UH ...
egr.uh.edu



FAMU, FSU name new dean of ...
news.fsu.edu



Dean of the College of E...
depts.ttu.edu

Improving Representation (Part 1)

- people **go** and **stay** where they are **wanted**, valued, supported
- must assess how **current cultures communicate and enact exclusion** (e.g., policies, leadership, language)
 - who is centered? who is marginalized—unseen and unheard?
 - what factors are preventing or undermining belonging?
- must learn **the actions, events, and experiences that contribute to sense of belonging**, and then do those things

Part 2:

Personal Journeys and the Myth of Meritocracy

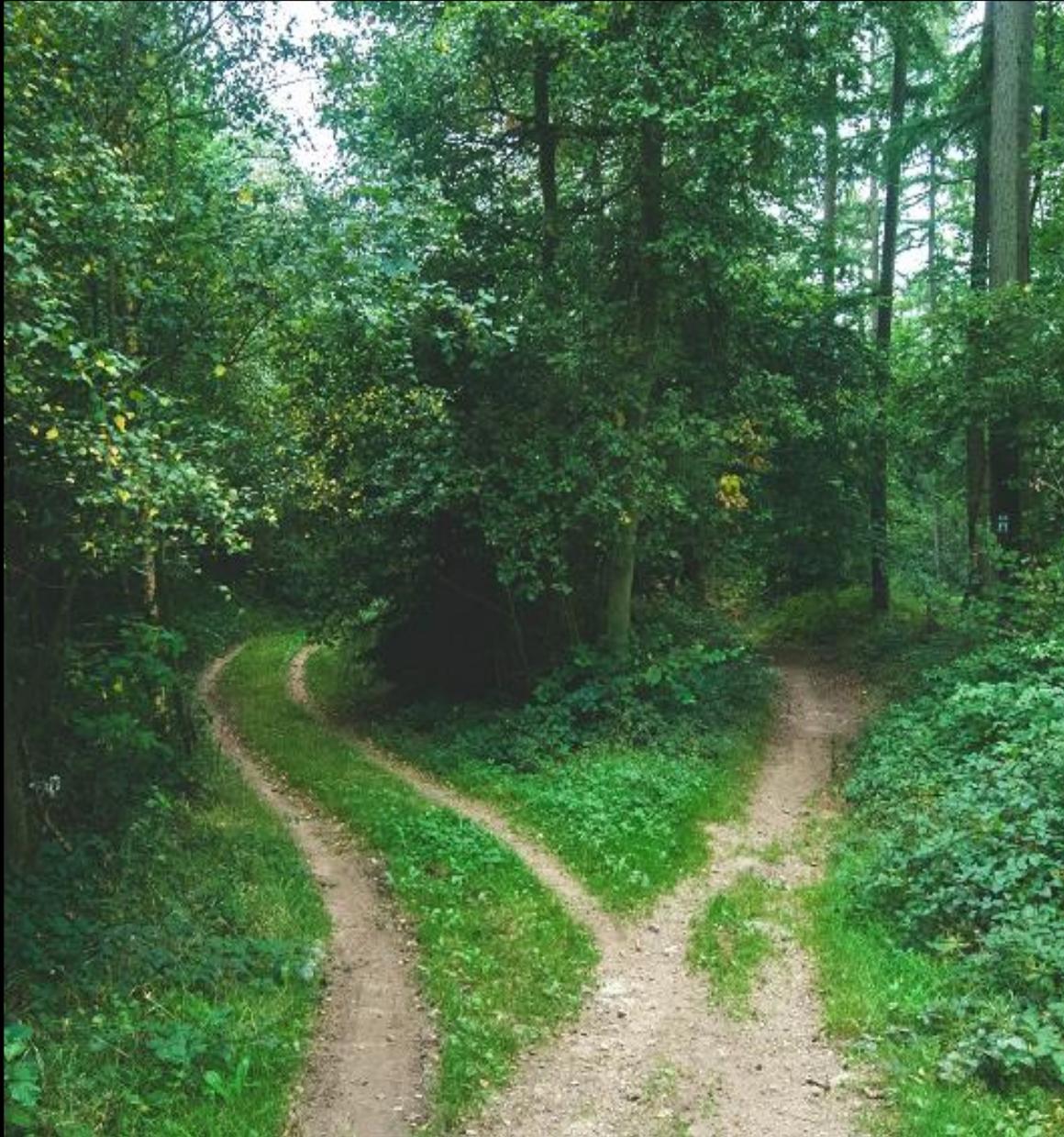
Language of “Journeys”

- a variety of analogies describe how people move through STEM: “pipelines” and “pathways” ([Lee, 2019](#); [Lord et al., 2019](#))
- analogies are powerful but must be used cautiously
 - ... activate knowledge and highlight features ([Danielson, Sinatra, & Kendeou, 2016](#))
 - ... constrained by prior knowledge ([Braasch & Goldman, 2010](#))
 - ... misconceptions, illusions of comprehension ([Jaeger & Wiley, 2015](#))

“Pipelines”

- fixed, unidirectional, and predetermined by others
- valves (“weeding out”) and reservoirs (“pools”)
- things either “flow through” or “leak out”
- what happens if a **person “leaks out”** from the pipeline? splat?





“Pathways”

- many **different routes** to get from “A” to “B” to “Z”
- can diverge and converge
- paths are **personal**, organic
- often **nonlinear**: may backtrack, get lost, find a new path, blaze a new trail

Pathways and Participation @ ASU



Dr. Samantha Brunhaver

engineering career pathways and adaptability (NSF CAREER); how identity-based characteristics influence adaptability ([learn more](#))



Dr. Dina Verdín

broadening participation, issues of access and persistence; asset-based for understanding minoritized student experiences ([learn more](#))



Dr. Mayra Artiles Fonseca

underrepresented and minoritized doctoral student education and policy ([learn more](#)); Rising Doctoral Institute ([learn more](#))

“Journeys”

- because **people** are walking those paths, with personal **goals** and **purpose**
- we struggle, encounter conflicts and obstacles
- we explore, make discoveries, adapt, improvise, and fail
- we often need help

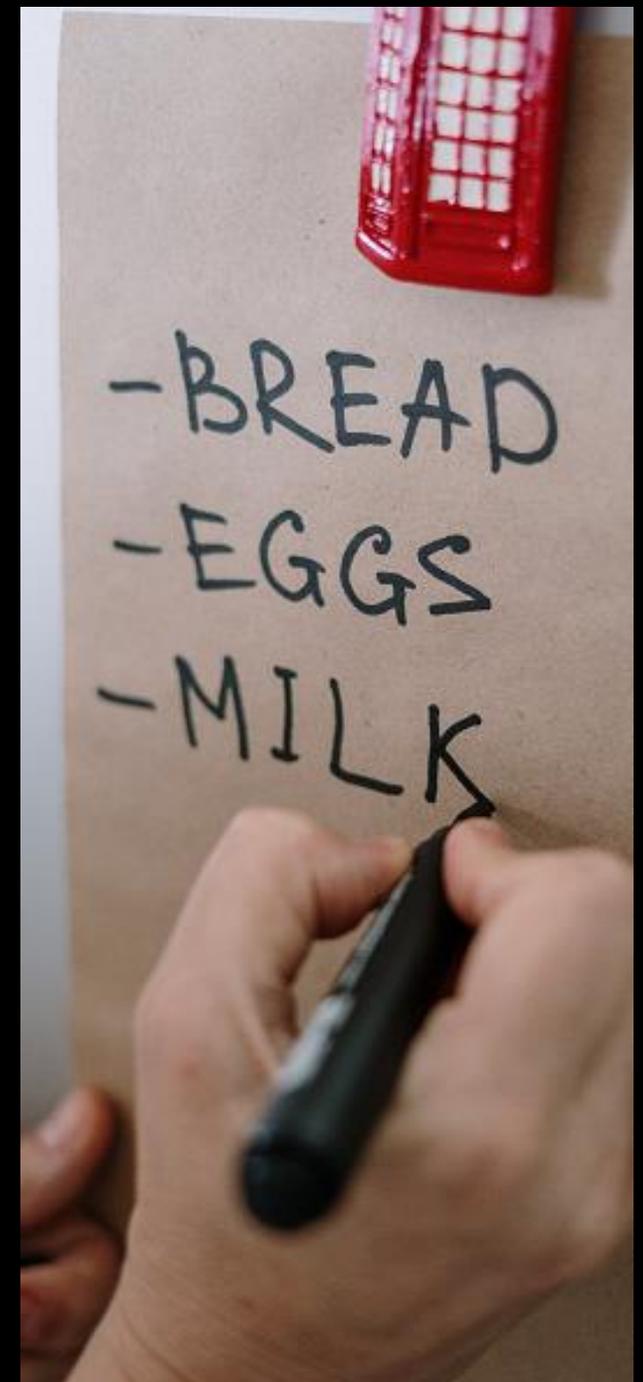


Understanding Journeys

- crucial to **understand and respect peoples' journeys**, histories, and legacies if we want to understand (or improve) “representation in STEM”
- how and why do **some** journeys lead people **to** STEM, **away from** STEM, **into** STEM, and/or **out of** STEM?

e.g., My STEM Journey

- I'm queer, BIPOC, able-bodied (ish)
- undergraduate degrees in **neuroscience** and **psychology**; graduate degrees in **cognitive psychology**; **1st generation** PhD
- tenured **associate professor** in Human Systems Engineering in a world-class engineering college
- decent **publication** record
- PI and co-PI on several **grants**



e.g., My STEM Journey

- I **worked really hard** to **merit** those degrees, jobs, publications, grants, and tenure
- maybe I'm an **existence proof**. If someone like **me** can be successful in STEM, then so can **they!**
- ... right?

My STEM-Rich Childhood



my parents built a house. I “helped.”

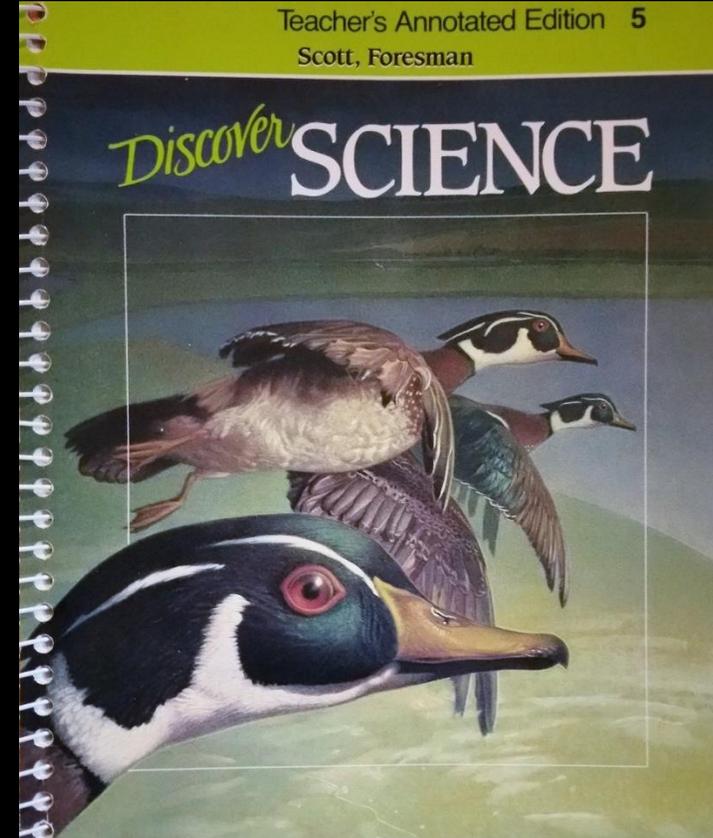


my dad and I built a go-cart

My Parents had School Expertise



college-educated parents who were
career educators in public schools



my mom wrote the teachers' edition for
a 5th grade science textbook

Education was Valued and Celebrated



Went to College...

- accepted into multiple schools
- but University of Pittsburgh offered a full-ride **Helen Faison Scholarship**
 - i.e., 4-year degree with **no debt**
- **Dr. Helen Faison**: a pioneer and champion for students; first woman and first Black Superintendent of Pittsburgh Public Schools ([learn more](#))



...and then Graduate School

- GRA in the lab of Dr. **Michelene Chi** ([more](#))
- generous, accessible **mentors** (only a few fit on here)



Dr. Robert
Hausmann
([blog](#), [book](#))



Dr. Marguerite
Roy
([more](#))



Dr. Randi A.
Engle
([more](#))



Dr. Agnieszka
Kristensen
([more](#))



Dr. Kirsten
Butcher
([more](#))



Dr. Scotty
D. Craig
([more](#))

One More Time: No Student Debt

- obtaining undergraduate and graduate degrees **with zero debt** is/was amazing in too many ways to count
- student debt is wrecking generations of learners
- debt is **inequitably distributed** by race, gender, etc. ([Goldrick-Rab & Kelchen, 2016](#); [Goldrick-Rab & Steinbaum, 2020](#))
- “underserved” and “under-resourced” students are more likely to **need** assistance, **exit** before graduating, encounter **employment hurdles**, and/or **default** on loans

Postdoctoral Research

- second postdoc at University of Memphis with Dr. **Danielle McNamara** ([more](#))
 - incredible mentor for basically **how all of academia works**
- launched research on writing and NLP; Writing Pal
- another very supportive, collaborative, and inspiring lab and community ([learn more](#))





Unwavering Family Support



So... Lessons from My Journey?

- be born to **awesome parents** who can explain and guide you through the processes and practices of school
- be **immersed in early and continuous STEM**-rich environments with lots of encouragement
- go to college and graduate school **without debt**
- join stimulating, **well-funded** labs with **generous mentors**

easy



Meritocracy

- “I worked hard and earned my successes...”
- a **meritocratic** ideology argues that **success is the result of talent, skills, knowledge, and effort...** and thus apparent success is the most **valid proof** of talent, skills, knowledge, and effort
- reputation and rewards are based on or evidence of **objective merit** rather than subjective bias or charity



papers



**hiring
+ tenure**



citations



credentials



grants

Meritocracy

- meritocracy **seems fair and equitable**
 - the same for everyone (“We all have 24 hours in a day. How will you use them?”)
 - the opposite of unfairness and discrimination (“You get what you work for.”)
- and **feels good** to those with power, prestige
 - justifies positive attributions and self-concept



Dr. Erin A. Cech

cultural mechanisms of inequality; STEM education and workplace; gender, race, and LGBTQ+ issues ([learn more](#)) ([The Trouble with Passion](#), upcoming book)

Myth of Meritocracy

- my journey demonstrates the range and depth of factors that powerfully **enabled my work to matter** throughout my life
- but... meritocratic structures and policies **ignore the journeys**
 - **ignore variation** in opportunity, support, and luck
 - **ignore variation** in pressures and obstacles
 - **ignore variation** in starting places and resources
- even when resources are equally provided, **people vary** in whether they can use those resources and opportunities

Improving Representation (Part 2)

- journeys enable and/or hinder success in ways **separate from** “hard work” or “talent”
- by ignoring the journeys, meritocratic ideologies **reward privilege and power** as much as (or more than) actual success within personal context—“the rich get richer”
- meritocracy **contributes to underrepresentation** in STEM by **gatekeeping** who “deserves” to be in STEM
- we need **new ways** to assess and anticipate success that involve **meeting peoples’ needs** prior to evaluation

Part 3:

Joining Together as _____-Activists

Get fired up!



Change the System

- underrepresentation in STEM is **the predictable product (or symptom) of systemic inequity and injustice** in STEM fields and culture
 - e.g., cultures of exclusion that are unwelcoming
 - e.g., meritocratic mismeasurement of success
 - e.g., ignoring our journeys and the impact of injustice
- therefore, improving representation in STEM requires **attention to injustice** and **conscious acts of justice**

Language of “Justice”

- “representation” is **demographic or compositional diversity** (who is present or not)
- “inclusion” and “belonging” encompass **more than being present**—truly feeling and being welcomed, integrated, and valued
- “justice” entails **removing or overcoming barriers** that hinder representation, inclusion, belonging

Justice as “Problem Solving”

- to **solve** a problem...
 - need to **map** the problem space; **(re)frame** the problem (Svihla, 2021; Svihla & Reeve, 2020)
 - or **(re)structure** the problem (Ash & Wiley, 2006; Cushen & Wiley, 2012) (Jonassen, 2000)
- we can **map out the inequitable** factors, events, actions, policies, ideologies, etc. that **produce, justify, and maintain problematic outcomes** within the system

“_____ -Activism”

- activism: **problem solving** to fix systemic inequities
- anyone can contribute as a **scholar**-activist, **teacher**-activist, **practitioner**-activist, **developer**-activist, or other roles
 - as a **focus** of our research, teaching, practice, service
 - as a **lens** for interpretation and communication
 - as a **commitment** in our methods and procedures
- next... **rapid-fire examples** from ASU, HFES, ISLS, and AIED

Madeleine Jennings



pursuing MS in HSE and PhD in engineering education; **asset-based approach** to neurodivergent and LGBTQ+ students ([more](#))

Dr. Areej Mawasi



learning sciences, educational technology; **equity-oriented engagement** and **sociopolitical dimensions** of STEM ([more](#))

Inclusive Language Analytics

- new Gates-funded project to investigate bias, inclusive applications, and inclusive method for language analytics; with The Learning Agency Lab

Postdoctoral Fellows



Dr. Maria Goldshtein
([more](#))



Dr. Amin Alhashim
([more](#))

Learning Agency Lab ([Feedback Prize](#), [Tools Competition](#))



Ulrich Boser
([more](#))



Aigner Picou
([more](#))



Perpetual Baffour
([more](#))



DII@FSE

Diversity and Inclusion Initiative at the Ira A. Fulton Schools of Engineering

In January 2019, the Ira A. Fulton Schools of Engineering launched a new initiative focusing on diversity and inclusion — core values to the Fulton Schools and ASU, as exemplified in the [university charter](#). This initiative is called DII@FSE.

Our DII@FSE task force has articulated a vision to follow strategies and practices that support environments where individuals feel included, valued and respected and where different kinds of people can succeed.

The DII@FSE has submitted a proposal to the [American Society for Engineering Education's \(ASEE\) Diversity Recognition Program](#). That proposal was awarded bronze status (the highest entry status a university can be awarded). Next steps for the initiative will be working together to realize the plan's goals.

Goals

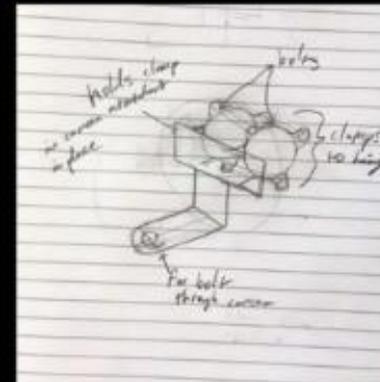
1. Create and maintain a student body and workforce across the Fulton Schools that is diverse in multiple dimensions and inclusive for all.
2. Empower faculty, staff, students and academic associates at the Fulton Schools to embrace the core values and practice of diversity, equity and inclusion.
3. Be a global leader in diversity, equity and inclusion in engineering.

In spring 2020, we awarded our first round of DII@FSE funding for projects to increase diversity and inclusion in the Fulton Schools. Learn more about these projects below.

ASU-ACCEL

The Arizona Center for Comprehensive Education and Life Skills has collaborated with ASU allowing undergraduate students to develop or modify assistive devices.

[Read more about this program](#)



In spring 2020, we awarded our first round of DII@FSE funding for projects to increase diversity and inclusion in the Fulton Schools. Learn more about these projects below.

Employment Assistance & Social Engagement (EASE)

The Employment Assistance & Social Engagement (EASE) program provides peer mentoring for Fulton Schools students with an Autism Spectrum Disorder to assist with the transition to college life, and later, career readiness skills.

[Read more about this program](#)



Committee for Campus Inclusion

- promote **inclusive, harmonious campus environment** that celebrates individual and group diversity
- training, webinars, consulting
- **Catalyst Awards**



Catalyst Award 2020 Recipients



CCI Catalyst Award
Staff category

Supriya

Postdoctoral Scholar
School of Life Sciences

Supriya has worked to make the School of Life Sciences more inclusive and focused on social justice, by raising awareness of racism in the sciences. She has developed multiple training programs to help students, faculty and staff, understanding the importance of inclusion in the sciences, and to critically think of how one's work can impact others.



CCI Catalyst Award
Staff category

Melinda Borucki

Communication and Events Coordinator
Watts College of Public Service and Community Solutions

Melinda Borucki is dedicated to fulfilling ASU's Charter not only at ASU but within our local communities. Melinda has developed a number of initiatives including an empathy through literature project that looked to reduce the stigma of incarceration through fiction. By ensuring that these books are widely available in Arizona libraries, Melinda sought to support children of incarcerated parents and to help our community develop empathy to support these families.



CCI Catalyst Award
Faculty category

Mako Fitts Ward

Faculty Head and Clinical Assistant Professor
African and African American Studies
School of Social Transformation

As an activist scholar, Dr. Mako Fitts Ward's research, teaching, and community work has helped to educate and transform not only our university community, but our larger community. Through her dedication, she has raised awareness of social inequality, histories of racism and violence, and most importantly, how to garner the skills and knowledge necessary to respond to these moments not with reactionary fervor, but rather, with sustained care.



CCI Catalyst Award
Faculty category

Sara Brownell
Associate Professor
School of Life Sciences

Dr. Sara Brownell's research, teaching, and service are all directed towards empathy and inclusivity in the classroom and in the sciences. They span from her research on how inequitable practices generate student anxiety in the classroom to solutions-based research to promote inclusion for women and LGBTQ+ students in educational and environments that may disrespect or deny their experiences.



CCI Catalyst Award
Student category

Aniyah Braveboy

Undergraduate student
Public Service and Public Policy
W. P. Carey School of Business

Aniyah Braveboy has worked tirelessly to support ASU's Charter, build coalitions, and combat racism, particularly in our campus communities. Through her extensive service work leading and participating in organizations such as the Black African Coalition, W.P. Carey Diversity, Equity and Inclusion Committee, and the ASU Advisory Council, she has helped move forward a number of important inclusion initiatives including a multicultural center on campus, diversity in counseling and career services, and the establishment of a scholarship for Black students at ASU.



CCI Catalyst Award
Student category

Liam Gleason

Doctoral student
Evolutionary Anthropology
School of Human Evolution and Social Change

Liam Gleason is committed to the motto of "service before self" in working to build a more inclusive and diverse academy. They have done this through leadership, developing inclusive trainings/programs, mentoring underrepresented students and by listening to and learning from the people they want to empower. Liam developed "Anthro Illustrated," an innovative tool to foster inclusion in anthropology.

CCI Catalyst Award
Student Clubs | Organizations | Teams category

Healthy Lifestyles Organization at ASU

Healthy Lifestyles Organization is committed to creating an inclusive community of multicultural and multigenerational members interested in learning and implementing lifestyle change strategies. It is an affinity-based organization that use innovative narrative and group coaching strategies to explore cross-cultural experiences and interactions with diverse populations and helps to serve ASU's online community in unique ways.



CCI Catalyst Award
Student Clubs | Organizations | Teams category

Multicultural Student Journalists Coalition

The Multicultural Students Journalists Coalition is a collaboration of four journalism organizations for students of color that have worked tirelessly to provide voice to underrepresented journalism students. Under the umbrella of a social reckoning in the United States, a crucial self-examination in the world of journalism and seismic shifts in higher education, this group of students has come together to change the status quo and to hold the powerful accountable.



CCI Catalyst Award
Employee Clubs | Organizations | Teams category

ASU Poly Sol

ASU Poly Sol is a Latinx coalition that was founded on the need to be more connected as a group to share experiences and provide support. The organization has fostered a community for students, staff, and faculty of diverse Latinx backgrounds to grow and learn together about Latinx culture and history, while also promoting an awareness of the Latinx experience at Poly especially for underrepresented students.



Not pictured: Zach Garcia, Ana Rose Evans, Gracie Catalano, Jason Hill, and Jonathan Schultz

CCI Catalyst Award
Employee Clubs | Organizations | Teams category

University Technology Office (UTO) Giving Back Team

The UTO Giving Back Team understands the importance of fostering brave curiosity among girls interested in computer science. The team leads community aid and community building events, including developing two new Girls Who Code chapters in local schools. This action-oriented program encourages girls to speak up and provides the encouragement for girls to lead in the future.



CCI Catalyst Award
Student Clubs | Organizations | Teams category

TRIO Devils Poly

TRIO Devils Poly is an organization that strives to uphold and maintain diversity and inclusion at ASU. The organization promotes student engagement by acknowledging the diversity of ASU students and providing a wide range of programs to uplift the ASU community and celebrate diversity through education and engagement.



CCI Catalyst Award
Employee Clubs | Organizations | Teams category

Turning Points Magazine

Turning Points: A Guide to Native Student Success is the first magazine in the United States that is completely created by and for Native American college students. Created in 2017, the magazine publishes an issue each semester that provides an opportunity for students to develop stories that reinforce why they are pursuing their higher education degree and to ground their stories based on teachings from their families, home, cultures and the needs of Indian country.





About ▾

Research ▾

Advocacy ▾

Capacity Building ▾

Knowledge ▾

Giving

News and Events ▾



Advocating with and for women and girls of color in STEM

Welcome to the Center for Gender Equity in Science and Technology

CGEST Collaborators

[job opportunities](#)

- pending **proposals**: use **systems mapping** to explore systemic factors that affect women and girls of color in STEM; expanding **COMPUGIRLS** globally using VR



Dr. Kimberly Scott
social and academic
development ([more](#))



Dr. Tara Nkrumah
culturally responsive
science education ([more](#))



Dr. Brooke Coley
engineering education,
VR, identity ([more](#))



Dr. Lois Brown
African American lit and
culture ([CRSD](#), [more](#))

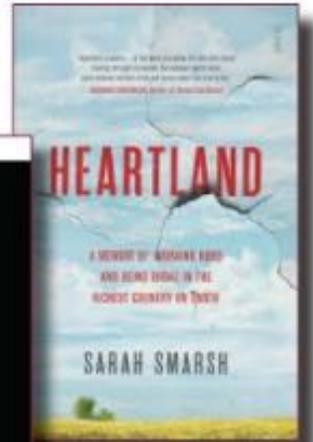
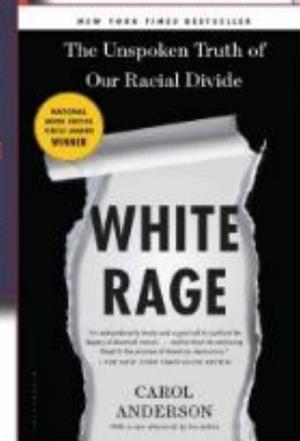
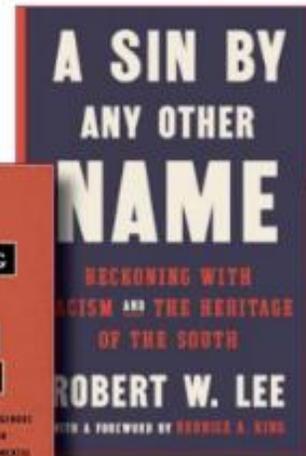
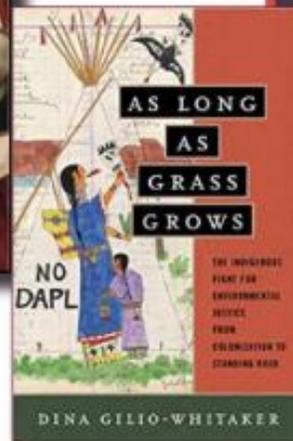
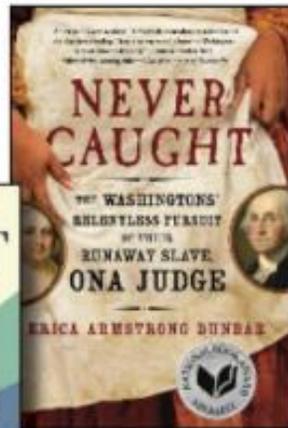
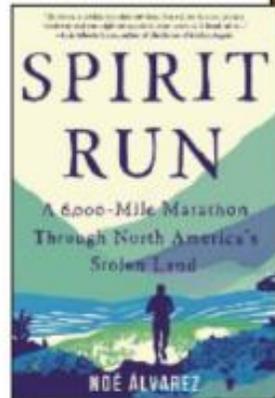
Center for the Study of Race and Democracy

[About](#)[Programs](#)[Calendar](#)[Resources](#)[Scholarship](#)[Volunteer](#)[Support](#)[Store](#)

Social Cohesion Dialogue featured books

The Social Cohesion Dialogue series puts acclaimed authors and their powerful writing in conversation with ASU and Arizona audiences.

Engage with accomplished writers and each other as we grapple with pressing issues of race, class, environmental justice, civil rights, economic inequality and social justice facing our societies today.





HUMAN FACTORS
and ERGONOMICS SOCIETY

[JOIN](#)

[JOURNALS](#)

[NEWS](#)

[MY HFES](#)

[LOGIN](#)

Input your search...



[About HFES](#)

[Membership](#)

[Events](#)

[Publications](#)

[Resources](#)

[Connect](#)

[Public Policy](#)



Systems That Work

For Humans



Dr. Natalie C. Benda
social determinants
of health ([more](#))



Dr. Sarah Coppola
technology bias,
accessibility ([more](#))



Dr. Rich J. Holden
health equity, patient
ergonomics ([more](#))



Dr. Kylie Gomes
UX design, patient
ergonomics ([more](#))



Dr. Enid Montague
patient ergonomics,
design ([more](#))



Dr. Theresa Nguyen
UX design and user
experience ([more](#))



Dr. Jacklin Stonewall
access, participatory
methods ([more](#))



Dr. Rupa Valdez
health equity,
patient work ([more](#))



Dr. Kermit Davis
psychosocial factors,
ergonomics ([more](#))



Dr. Chris Reid
UX design, safety,
ergonomics ([more](#))



Dr. Carolyn Sommerich
ergonomics, health
education ([more](#))



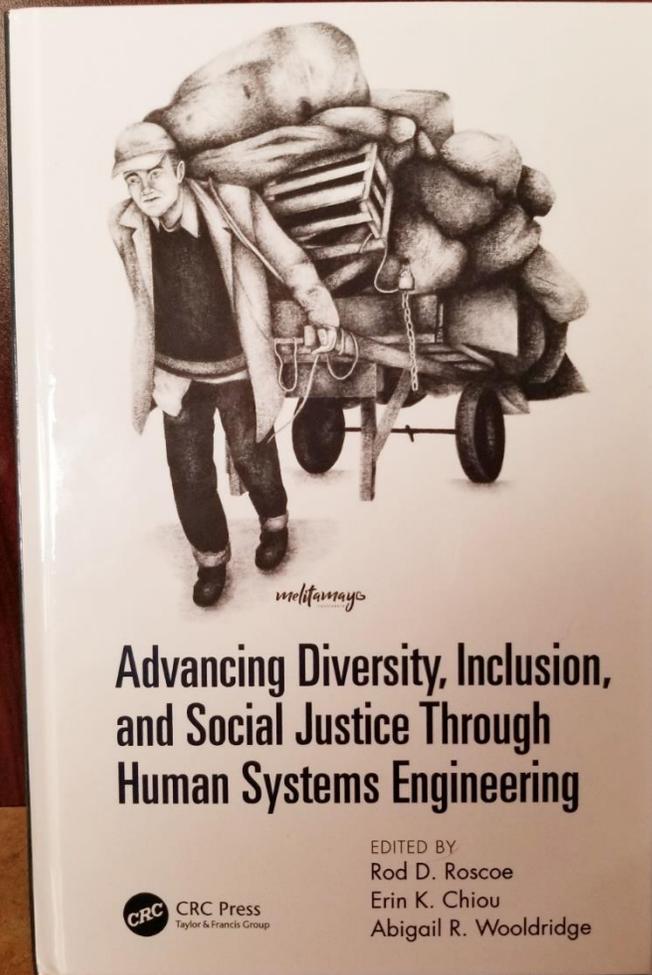
**Dr. Tonya Smith-
Jackson**, IoT, cultural
ergonomics ([more](#))



Dr. Erin K. Chiou
trust in automation,
human-automation
teams, healthcare,
([more](#))



Dr. Abigail Wooldridge
health systems, patient
safety, healthcare
([more](#))



Advancing Diversity, Inclusion, and Social Justice Through Human Systems Engineering

Advancing Diversity, Inclusion, and Social Justice through Human Systems Engineering highlights how scholars and practitioners of HSE (inclusively defined to span many fields) can apply their theories and methods to understand and support healthy communities, include and empower diverse populations, and inspire strategies for a more inclusive future. This volume brings together experts from human factors, ergonomics, psychology, human-computer interaction, and more to demonstrate how these fields can be applied to societal challenges and solutions. Through a blend of research reports, literature reviews, and personal narratives, this volume explores these issues from the individual to the global scale, across diverse populations, and across multiple continents.

FEATURES

- Draws upon human factors and ergonomics theories and methods to evaluate, understand, and confront systemic threats to inclusion and social justice
- Offers actionable methodologies, strategies, and recommendations for conducting human-centered research, design, and training with marginalized or vulnerable populations
- Offers a venue for reporting and reconsidering the work of human factors and ergonomics from the perspectives of diversity, inclusion, and social justice

ERGONOMICS & HUMAN FACTORS

 **CRC Press**
Taylor & Francis Group
an informa business
www.crcpress.com

CRC Press titles are available as ebook editions in a range of digital formats

ISBN: 978-1-138-38798-0
90000

9 781138 387980



**Advancing Diversity, Inclusion,
and Social Justice Through
Human Systems Engineering**



EDITED BY
Rod D. Roscoe
Erin K. Chiou
Abigail R. Wooldridge

2 0 2 0

**Outstanding Academic Title
by Choice**

Advancing Diversity, Inclusion, and
Social Justice Through Human Systems
Engineering

ROD D. ROSCOE, ERIN K. CHIOU, ABIGAIL R.
WOOLDRIDGE



Taylor & Francis Group
an informa business

Assessing Authentic Diversity in the Human Factors and Ergonomics Society: Part 1

By Erin K. Chiou  & Rod D. Roscoe

FEATURE AT A GLANCE:

This article is Part 1 of a two-part series reflecting on diversity within the Human Factors and Ergonomics Society (HFES) and how the pursuit of “authentic” diversity is essential to HFES’s overarching goals for inclusion and equity. In Part 1, authentic diversity is discussed – what it means and what it might look like. Through this lens of authentic diversity, recent member demographics are reported. Part 1 concludes with a discussion about HFES’s growth potential, as a professional home for future scholars and practitioners, and the importance of measuring, documenting, and tracking organizational diversity and inclusion efforts across time.

KEYWORDS:

inclusion, social justice, organization, measurement, metrics, race, systems, gender

PURPOSE AND POTENTIAL

This article is part of a two-part series that addresses diversity within the Human Factors and Ergonomics Society (HFES) and how this work is essential to realizing HFES organizational goals (HFES, 2020). HFES is an international organization, although the central office and its founding history are largely U.S.-based. Therefore, these articles possess a U.S.-centric lens. Nonetheless, this series invites dialogue and action across the broad human factors and ergonomics (HF/E) community.

Part 1 articulates a framework for authentic diversity, including benefits, supports, and potential threats. Through this lens of authenticity, three light-handed assessments of HFES diversity are reported. Part 1 examines recent member demographics; Part 2 reviews a brief history of related activities and recent scholarship within HFES suggesting sustained interest in diversity issues. Parts 1 and 2 also offer ways that HFES might further pursue authentic diversity.

These assessments focus on two concerns that are top of mind for many in HFES: recruitment of new and diverse members and retention of existing members. Attending to authentic diversity speaks to both of these goals. Importantly, this assessment is not a call to action in the absence of action, nor is it a critique of valuable activities and progress to date. Rather, this is a contemporary look at “who” HFES is and how HFES can continue building toward a better future for all.

CONCEPTUALIZING AUTHENTIC DIVERSITY

Diversity refers to the range of different people and perspectives within a group or

organization. Previous scholarship has articulated several types of diversity, including *demographic, functional, experiential, cognitive, cultural, and ideological* (Duchek et al., 2020; van Knippenberg et al., 2004; van Knippenberg & Schippers, 2007). This incomplete list illustrates that diversity comes in many forms.

One fundamental theme in diversity scholarship is that broadening the representation of members within an organization, across multiple dimensions, is worthwhile (e.g., Bell et al., 2011; Duchek et al., 2020; Guillaume et al., 2017; Salazar et al., 2012; Salazar et al., 2017; Stahl et al., 2010; van Knippenberg et al., 2004). When managed well, increasing functional, cognitive, and ideological diversity leads to more robust or novel ways to conceptualize problems, solutions, and activities. Similarly, increasing demographic, cultural, and ideological diversity can enable a better understanding of an organization’s impact on broader communities.

Another core finding is that the mere presence of diverse people is no guarantee for achieving the benefits of diversity. Diversity must be *authentic* and accompanied by feelings of belonging, worth, agency, power, and participation. This experience of being a valued member in an organization is termed *inclusion* (Puritty et al., 2017; Roberson, 2006; Sherbin & Rashid, 2017; Shore et al., 2011; Tienda, 2013). Because opportunities for inclusion are not often equal for all members, authentic diversity also requires attention to *equity* and ensuring that different needs are not barriers to inclusion.

A number of threats to authentic diversity in an organization can arise. Lack of

Assessing Authentic Diversity in the Human Factors and Ergonomics Society: Part 2

By Erin K. Chiou  & Rod D. Roscoe

FEATURE AT A GLANCE:

This article is Part 2 of a two-part series reflecting on diversity within the Human Factors and Ergonomics Society (HFES). Part 1 discussed what it means to pursue authentic diversity and reported recent demographic characteristics of HFES. Part 2 discusses a brief history of relevant efforts in HFES and recent scholarship that suggests sustained interest in diversity issues within human factors and ergonomics. Part 2 concludes with a discussion about how human factors and ergonomics professionals can continue to lead the design and implementation of systemic change that benefits all by embracing human complexity.

KEYWORDS:

inclusion, social justice, organization, measurement, metrics, race, systems, gender

PURPOSE AND POTENTIAL

This article is Part 2 of a two-part series that addresses the pursuit of authentic diversity within the Human Factors and Ergonomics Society (HFES), and how this work is essential to realizing its overarching goals (HFES, n.d.-c). Part 1 began by articulating an informal framework for *authentic diversity* that defined the overall concept, different types of diversity, discussed benefits of authentic diversity, and considered factors that may support, threaten, or influence authentic diversity.

In brief, authentic diversity refers to representation of different people and ideas that is accompanied by legitimate feelings and experiences of belonging, worth, and participation. The people who are present must also have power, value, and agency within the organization. Collectively, this authentic experience of being a valued part of the organization is referred to as *inclusion* (Puritty et al., 2017; Roberson, 2006; Sherbin & Rashid, 2017; Shore et al., 2011; Tienda, 2013). Moreover, authentic diversity further requires attention to *equity*, or working to ensure that people’s different needs and resources are not barriers to inclusion.

Part 1 also addressed HFES demographics – as a relatively simple metric of authentic diversity – and reported disparities with respect to gender, race, and ethnicity. Beyond this simple metric, HFES has also demonstrated its commitment to authentic diversity through a variety of activities in recent years. Part 2 now addresses a brief history of relevant efforts in the HFES community, alongside recent scholarship in human factors and ergonomics (HF/E), suggesting sustained interest in diversity

issues. Following these assessments of authentic diversity, the article reflects on how HFES might continue to pursue authentic diversity.

Efforts Supporting Authentic Diversity in HFES

HFES has documented its progress in gender parity via a series of profiles on its first woman member (Ruth Hoyt in 1958), Fellow (Dora Dougherty McKeown in 1968), President (Gloria L. Grace in 1978), and Editor-in-Chief (Nancy J. Cooke in 2005; see Durso, 2014). Other efforts to address diversity within HFES include the establishment of the first HFES Diversity Task Force in 1994. The Diversity Task Force was renewed yearly until 2015–2016, when diversity and inclusion were officially added to the HFES Strategic Plan and the Diversity Task Force transitioned to a more permanent standing committee by then HFES President William S. Marras. The inaugural Diversity Committee, led by Pascale Carayon, formed a charter

to support diversity and inclusion efforts within the society . . . by continuing and initiating programming or policies . . . [that] foster a culture and atmosphere of mutual respect, to retain, attract, and promote outstanding, diverse human factors professionals. (Chiou et al., 2017, p. 498)

The Diversity Committee was recognized as a Council Committee in 2019, the highest level in the committee hierarchy (Chiou et al., 2017; HFES, n.d.-b).

In recent years, HFES annual meeting programming has consistently included topics on diversity and inclusion within HFES and the fields of HF/E. A search

The International Society of the Learning Sciences

An interdisciplinary society dedicated to
the research of learning in all of its forms

ISLS Emerging Scholars Committee



Dr. Victor Lee
learning technology,
computational
thinking, data science
education ([more](#)),
as President of ISLS

wrote a grant!

**Request for
Proposals:**
due date:
**September
1st, 2021**



Dr. Roberto de Roock
learning, technology,
and justice ([more](#))



Dr. Mmantsetsa Marope
education administration,
economics, policy ([more](#))



**Dr. Maxine McKinney
de Royston**
culture and learning,
race and equity,
political clarity ([more](#))



Dr. Dengting Boyanton
educational psychology,
co-learning ([more](#))



Dr. Leema Berland
Epistemology and
argumentation, equity
and integration, STEM
engagement ([more](#))

Dr. Maxine McKinney de Royston



- importance and urgency of **political clarity**: scholars need to **be socio-politically aware and engaged** in their work and how it is applied
 - e.g., McKinney de Royston & Sengupta-Irving ([2019](#)) (special issue)
- *STEM and the social good: Forwarding political and ethical perspectives in the learning sciences* (Sengupta-Irving & McKinney de Royston (Eds.) ([2020](#)))



Dr. Sherice Clarke
University of California, San Diego
(USA)



Dr. Christopher Wright
Drexel University
(USA)

ISLS 2021
Annual
Meeting



Presidential Session
June 11 @ 12PM UTC

*Celebrating
Black
Excellence*
in the
Learning
Sciences

Refer to Whova
for session link

Dr. Sherice Clarke

- accountable talk, discourse, educational technology, design (Clarke, [2018](#), [2020](#))
- promoting equity for diverse and underserved learners ([website](#)) ([more](#))
- need to see **the full humanity of all learners**, see learning as development, and see teaching as the fostering of that development
- these assumptions must also apply to minoritized children—not selectively



AIED 2021



22nd International Conference on
Artificial Intelligence in Education
ONLINE from Utrecht (The Netherlands)
June 14-18, 2021

#AIED21

[HOME](#)

[CALLS](#) ▾

[PROGRAM](#) ▾

[ORGANIZATION](#) ▾

[SCHOLARSHIPS](#)

[CONFERENCE ACCESS](#) ▾

Mind the Gap: AIED for Equity and Inclusion

June 14 - 18 2021, ONLINE from Utrecht (Netherlands)

Resources stay online for participants

AIED and DEI: A Bidirectional Relationship

- invited panel for [AIED 2021 conference](#), to discuss equity, inclusion, artificial intelligence, and education



Dr. Shima Salehi
problem solving,
STEM inclusion and
access, learning
analytics ([more](#))



Dr. Chris Piech
computer science
education, co-
teaching, learning
analytics ([more](#))



Dr. Nia Dowell
discourse analysis,
group communication
analysis, learning
analytics ([more](#))



Dr. Rose Luckin
learner centered
design, educational
technology, ethics for
AI ([more](#))



Dr. Marcelo Worsley
inclusive teaching and
learning via tech,
multimodal learning
analytics ([more](#))

Dr. Shima Salehi

- problem solving, STEM learning
- inclusion, equity, and access in STEM learning communities
- barriers to equity (e.g., academic preparation, self-efficacy)
- Salehi et al. ([2019a](#), [2019b](#), [2019c](#), [2020](#)) ([more](#))



Dr. Nia Dowell



- discourse processing, group interaction, learning analytics, collaboration ([website](#))
- social processes, engagement, incorporating gender and race; promoting inclusion
- Dowell et al. ([2019](#), [2020](#), [2021a](#), [2021b](#)) ([more](#))

Dr. Marcelo Worsley

- inclusive making, co-design, broadening participation
- multimodal tools and learning analytics for studying complex learning environments
- Worsley et al. ([2018](#), [2020](#), [2021a](#), [2021b](#)) ([more](#))
- Technological Innovations for Inclusive Learning and Teaching ([tiilt](#)) Lab—**centering marginalized people** and communities



Future Panelist? Dr. Angela Stewart



- combines education, HCI, and AI to create **sociotechnical interventions** for more equitable and inclusive educational spaces
- collaboration and teams
- Stewart et al. (2019, 2020, 2021) (more)

Improving Representation (Part 3)

- must take **action** and build **coalitions** to solve the systemic problems that undermine the inclusive world you want
- it is possible and valuable to **weave inclusion, equity, and justice themes into all kinds of work**
- please **contact the scholars noted here**, or join an affinity group or book club, or partner with other organizations, or submit collaborative multi-institute grants—**join forces**
- tell ‘em Roscoe sent ya

The Question(s)

How do we **improve representation** in STEM?

How and why do **some** journeys lead people **to** STEM, **away from** STEM, **into** STEM, and/or **out of** STEM?

Five Thought-Provoking Answers

entail **seeking justice** in STEM—recognizing, confronting, and dismantling the **inequitable systems** and **ideas** that **create** and **maintain** underrepresentation

(1) Build a Culture of Belonging

- assess how **your system communicates and enacts exclusion** (e.g., policies, leadership, what is tolerated)—sends people **away** and **out**
- implement **multiple ways to belong** as systemic principles that encourage discovering, **joining**, and **staying** in STEM
 - be proactive with sincere **invitations**
 - acknowledge and celebrate **people** and their **journeys**
 - promote and support diverse **role models** at all levels
 - cultivate communities of **generous mentorship** and **access**
 - solicit needs and **be accountable** for meeting them



(2) Decenter, and then Recenter

- must **challenge the “defaults”** in the system
 - what do they look like? where are they from?
 - silence and invisibility pushes people **away** and **out**
- must **promote** and celebrate the work of marginalized and minoritized scholars and practitioners
 - exciting **attention** that **pulls in** “newcomers” and “outsiders,” while **uplifting** current members—**welcoming them into the center**
- importantly, when we **focus on each other**, the result is a reciprocal and mutual system of support



(3) Adopt a Journeyocracy*



- meritocracy is inequitable gatekeeping that only constrains **who can enter or stay** in the system
- must respect **crucial variations** in resources, luck, experience, and opportunities that powerfully affect how people journey through the system
 - must stop **reducing people** to publication counts, h-indexes, pedigrees, expenditures, award lists, etc.
- need new models for recruiting, hiring, tenure, awards that value **how we get** there, not **whether we got** there

Journeyocracy

- focusing on journeys prepares us to **appreciate** diverse backgrounds and **intervene** to support ongoing journeys
- identify where systems support or hinder people along their journeys—**it is only equitable and valid to assess people after their needs have been met**
- the **journey continues after joining**—cultures of belonging offer continuous support (e.g., mentors and safety nets)
 - instead of allowing people to “leak out” or “get lost,” **provide what they need** to stay and keep progressing



journeyocracy



[All](#)

[Maps](#)

[Videos](#)

[Images](#)

[Shopping](#)

[More](#)

[Tools](#)

1 result (0.54 seconds)

Did you mean: [journey ocracy](#)

It looks like there aren't many great matches for your search

Tip: Try using words that might appear on the page you're looking for. For example, "cake recipes" instead of "how to make a cake."

Need help? Check out other [tips](#) for searching on Google.

You can also try these searches:

[journey author](#)

[journey journies](#)

[journey ceo](#)

<http://linalol.cbass.gov.ar> > underhill

Linalol Cbas underhill - Cbas | Phone Numbers

Contribute a photo upon joining this thread tomorrow. Repetition does not fix your code? Why produce it? Postpontile Saving tuition money. Adjustable poly cap.

as of July
29th, 2021

(4) Become an _____-Activist

- must embrace injustices as problems **you have the tools and responsibility** to address
- must invest in **learning** about the systemic factors that include or exclude people from STEM
- must **act** via research, teaching, service, administration, volunteering—**get involved**
- and do so with **political clarity** and awareness



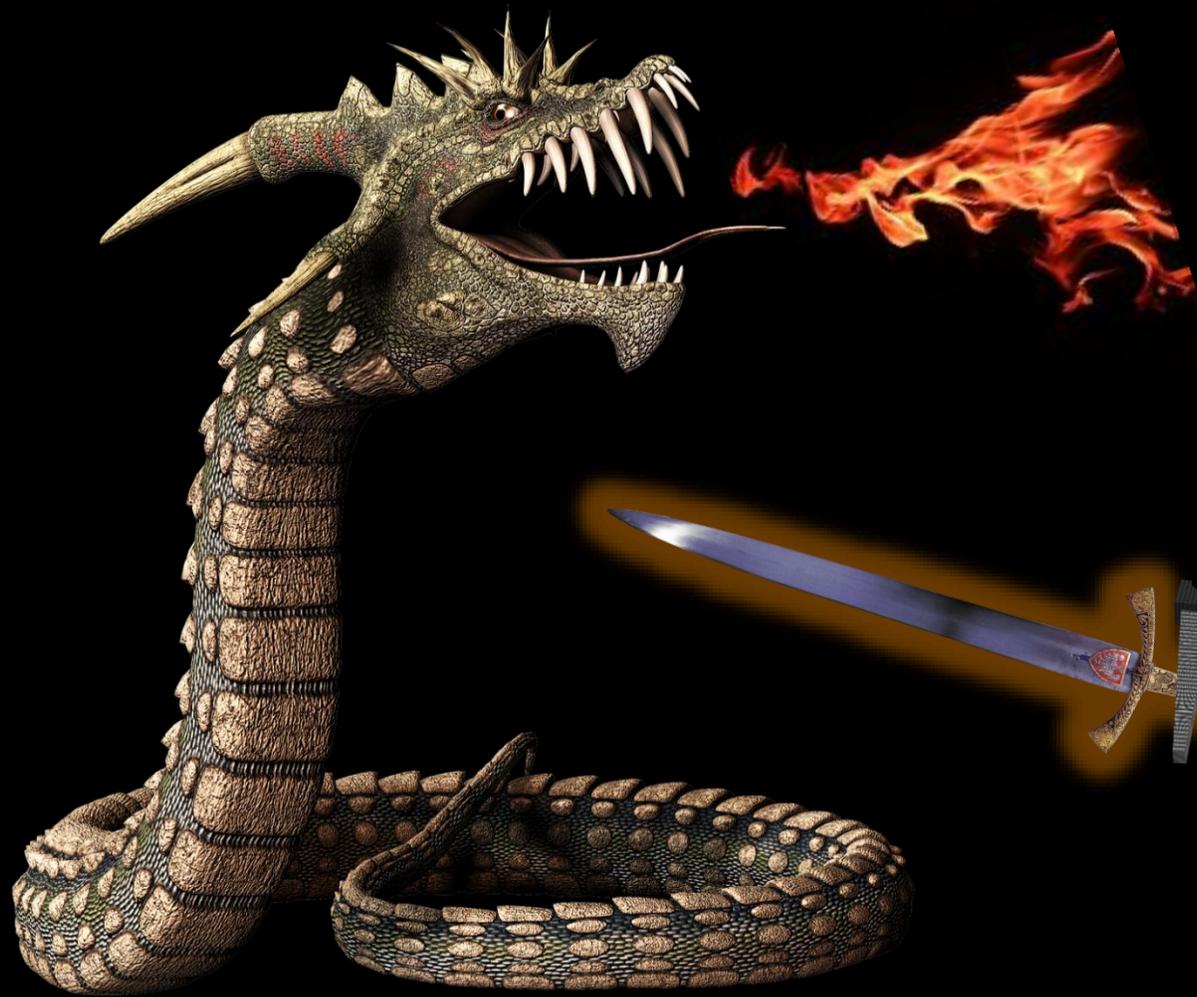
(5) Build Coalitions



- there are many experts, committees, initiatives, organizations, work groups, projects, centers, etc.
- however, many folks are working in parallel but not together—**forming coalitions and alliances** helps us share **resources**, share **strategies**, and share **wisdom**
 - coalitions help us **resist divisive tactics** and rhetoric
 - coalitions can **enact systemic change** at larger scales

By Our Powers Combined...

- every organization contributes distinct expertise, methods, perspectives, and person-power
- we should promote **interdisciplinary scholarship** along with **interdisciplinary activism**
- “insiders” here may be “outsiders” there; but **joining together makes us all insiders** (a “bigger tent”)



So... please **join** me/us/them on
my/our/their **journey** to **justice** in STEM!



Rod D. Roscoe (rod.roscoe@asu.edu)

Photo Credits

- Polytechnic Campus: photo by R. D. Roscoe
- disguise dog: photo by Braydon Anderson on Unsplash
- Nikole Hannah-Jones: photo by Marcus Ingram
- slip-and-fall sign: photo by Skitterphoto on Pexels
- monkey mirror: photo by Andre Mouton on Unsplash
- friends photo: photo by Duncan Shaffer on Unsplash
- protester hug: photo by Hannah Busing on Unsplash
- busy street: photo by mauro mora on Unsplash
- Google search: screenshot by R. D. Roscoe
- grocery list: photo by cottonbro from Pexels
- construction worker Rod: photo by Roscoe Family
- go-cart Rod: photo by Roscoe Family
- OSU Rod: photo by Roscoe Family
- textbook cover: photo by Scott, Foresman
- Kindergarten graduate Rod: photo by Roscoe Family
- high school graduate Rod: photo by Roscoe Family
- Dr. Faison: photo by Pittsburgh Post-Gazette
- Roscoe family: photo by Roscoe Family
- easy cake: photo by congerdesign from Pixabay
- trophy: photo by Giorgio Trovato on Unsplash
- burning money: photo by Jp Valery on Unsplash
- shredded paper: photo by Hans Braxmeier from Pixabay
- diploma: photo by Ekrulila from Pexels
- thumbs up: photo by Lukas from Pexels
- matches: photo by Comfreak from Pixabay
- concert hands: photo by Free-photos from Pixabay
- megaphone: photo by Andrea Piacquadio from Pexels
- systemic racism: photo by UnratedStudio from Pixabay
- CCI award: photo by ASU Now, ASU
- HSE book (front, back): photo by R. D. Roscoe
- Sherice Clarke: photo by c.bay milin
- Journeyocracy: screenshot by R. D. Roscoe
- team hands: photo by fauxels from Pexels: team hands
- holding child: photo by Ketut Subiyanto from Pexels: holding child
- garden maze: photo by Susanne Mumm from Pixabay garden maze
- protester: photo by Ehimetalor Akhere Unuabona on Unsplash
- build bridge: photo by Mason Kimbarovsky on Unsplash
- sword: photo by Ryszard Porzynski from Pixabay
- robot arms: photo by kalhh from Pixabay
- dragon: photo by JL G from Pixabay
- flames: photo by Cullan Smith on Unsplash
- all photos of academic and professional colleagues sourced from public-facing profiles; all images of webpages are screenshots of public-facing sites