

A Guide to Anti-Racism Practice in Engineering

Abstract

Recent events have brought systemic racism and racial injustice in all facets of society into sharp focus. The Inclusive Engineering Consortium (IEC), a recently formed consortium of HBCU, HSI, and TCU ECE programs, recognizes the need and opportunity this has created to stimulate action on creating a more just and welcoming environment for underrepresented minorities in engineering education. IEC members are compelled by our mission to make a stand together in treating everyone with equity and respect, regardless of race, religion, ethnicity, sex, gender identity or orientation, age, disability, citizen status, or national origin. Accordingly, and in response to both national calls for racial justice and exigencies in higher education around equity and representation, we delivered a series of capacity-building workshops in 2021 to 1) promote an understanding of inequitable patterns and 2) introduce participants to frameworks that help to counter them. Actionable steps were identified to mitigate the deleterious effects of exclusion in engineering education and to facilitate collaboration of individuals and institutions in a way that enables tangible change.

Introduction

The Inclusive Engineering Consortium (IEC) is collaboration of 20 ECE programs at Minority Serving Institutions (MSIs), similar programs at several Predominantly White Institutions (PWIs), and several industrial partners. Founded in 2019, this non-profit enables its member educational institutions to produce more diverse and better prepared electrical and computer engineers through collaboration. It grew out of an NSF funded multi-year project to develop and implement Experiment Centric Pedagogy (ECP) in 13 HBCU ECE programs. [Ref 1] While working on that highly successful project, the participants realized that collaboration with one another and, potentially, with others could enhance all aspects of their education and research enterprises in ways that were difficult or impossible to achieve independently. IEC offers a new problem-solving lens to address problems-issues-opportunities by joining forces when more resources are required than are available locally and/or when a more global approach is inherently better.

A series of workshops on Anti-Racism Practice in Engineering: Exploring, Learning & Solutions (ARPELS), which took place over several months during 2021, led to the creation of this guide. The topic of the ARPELS series came from several sources. First, during the early days of COVID, the death of George Floyd caused IEC to commit to 9 goals [Ref 4], including:

- Developing a deeper understanding for ourselves of the root causes of racism, discrimination or any form of implicit bias and developing plans to eliminate them from academic settings.
- Exploring and implementing best development, recruitment, support and mentoring practices to increase the numbers and rank of underrepresented minority faculty at partner institutions.



- Creating an annual national IEC event to engage our communities on how electrical and computer engineering promotes social, economic and environmental justice.
- Reaching out to institutions from across the higher education spectrum to establish conversations about racism, how it impacts lives and careers and how we can partner together to eliminate it.
- Starting and maintaining ongoing conversations with our own minority and non-minority faculty, staff and students on how each of us can promote equity by examining and improving our policies, procedures, strategic plans and key indicators.

This response called for action, not just words, so the decision was made to develop a workshop series in the general area of social justice. After a series of discussions, both internal and external to IEC, a more specific focus on Anti-Racist Practices, particularly in the context of expanding opportunities for historically minority faculty and students in electrical and computer engineering, was identified. Because of the overall goal of IEC to facilitate collaborative approaches to the job of ECE faculty as educators and scholars and the response of the IEC community to the mini workshops [Ref 3], particularly those specifically on teamwork led by Russell Korte of George Washington University, the plan for the new workshop series was based on addressing anti-racism in the context of the science of team science [Ref 5]. The questions that guided the preparation and delivery of each session were: 1) What does an equitable partnership look like? 2) How do you go about establishing it? 3) What are the important dimensions? 4) How can we advance success across the board for both parties? These questions were also specifically addressed in session 2.

Session 1 focused on building an understanding of anti-racism and its relevance to engineering. Participants prepared by completing background reading and a pre-session survey. Breakout discussions on the second day addressed disparities identified on day 1.

Session 2 focused on forging equitable partnerships, especially between IEC MSI member programs and Predominantly White Institutions (PWIs). Participants came prepared to discuss a series of questions on equitable partnerships (discussed below).

Session 3 began with a panel discussion of 5 African American academics representing different levels of administration: an engineering school dean; an associate provost; an NSF program director; a graduate school dean and senior vice provost for academic affairs; and a vice-chancellor of diversity, equity and inclusion. Breakouts addressed issues raised by this outstanding panel.

The three sessions (winter and spring 2021) were followed by an additional workshop session (fall 2021) focused on catalyzing research teams with partners from MSIs, PWIs and industry. Participants discussed strategies, funding opportunities and lessons learned from the previous sessions on how to establish equitable partnerships to address four emerging technologies and associated research opportunities. Each breakout was facilitated by distinguished researchers who helped define the area and described key new areas for research. In each case a new



working group was formed to build both collaborative educational and technical research capabilities.

For all four sessions, the key measures of success came from the lively and fruitful discussions reported on from the breakouts, which provided many excellent ideas that are being implemented by IEC to fulfill its mission of enabling its member programs to address together the issues they are unable to handle alone.

Participants in each session were encouraged to build their background in diversity and anti-racism by watching or reading the following:

- Picture a Scientist – A documentary available on NOVA [Ref 6]
- Faculty Diversity – What colleges need to do now [Ref 7]
- Responses to 10 Common Criticisms of Anti-Racism Action in STEM [Ref 8]
- Lecture and Discussion on How to be an Anti-Racist (Ibram X. Kendi) [Ref 9]
- How to be an Anti-Racist (Ibram X. Kendi) [Ref 10]

Training on anti-racist methods was developed and delivered by Dr. Delia Saenz, who also facilitated the self-reflection and discussion sessions.

Workshop Session Discussions

The information addressed in the sessions came from the presenters, question and answer periods and breakouts. Everyone contributed in some way.

Session 1: Principles of Anti-Racism

The outcomes for this session will be briefly summarized, with selected excerpts, because they have previously [Ref 3] been described. Essentially every idea presented was reinforced in the subsequent sessions, most notably that the language of anti-racism provides a powerful context for the experiences of faculty and students. ‘Racism is indeed relevant to engineering, and impacts faculty and students alike. Anti-racism can be on both a personal and system level, and is learned... Continuing these discussions and discussions can be a catalyst for action, and can eventually lead to systematic changes.’ Responses from participants were consistently positive. ‘Thanks for such an impactful and eye-opening workshop.’ ‘Is anyone else saying wow?!?’ ‘I learned even more in this second session than the first.’ ‘Thank you for a great workshop.’

Session 2: Forging Equitable Partnerships

Participants and the workshop leader shared positive and negative experiences, which was helpful as it captured, by examples, the reason for the workshop. The importance of setting guidelines and expectations upfront was emphasized. If there is no clear guidance, the team doesn’t work well.



A clear case was made that diversity and inclusion allows teams to take on bigger problems; produce more creative solutions; and engage different skill sets to create quality solutions. In the business world, with women and minorities in management, greater growth and more profit are the outcomes. A societal case was made for diversity as well.

Breakout groups identified several areas for collaboration: 1) senior design, especially having a common showcase for student work; 2) curriculum modules, especially involving industry; 3) engaging industry in collaborations involving students and faculty from both MSI & PWI with co-advisors from both institutions; 4) helping students be industry ready, particularly addressing rapidly changing technology through rapid response curriculum development teams with contributions from both industry and the academy, with free access to all; and free up education from limitations imposed by the term schedule. ERCs have course content developed that can serve as models, addressing all issues.

A participant gave an example that in meetings there is a moderator to assure that interactions follow the norms described above. If someone starts to use microaggressions or starts overtalking, there may be a pause. The person is not always called out, but there may be a pause, and then that person will be talked to after the meeting. If you have some level of privilege, do your part to speak up, self-reflect.

Training is important for both faculty and students if they are to make teams work. It is important to “break the ice” and “check in.” The social aspect is important. Those in leadership should be trained in inclusive practices and bring more people into the conversation. Leadership can come from each of us, it doesn’t have to just come from those holding an official leadership position. It is incumbent on each of us to speak up and speak out.

Each group reflected on why it is valuable to collaborate and how to do it, the value of the MSI-Industry-PWI partnership, and how IEC can play a role in facilitating/supporting partnerships.

Session 3: Panel of Administrators/Leaders Discuss Anti-Racist Practice in Engineering

Karen Butler-Purry, Assoc. Provost at TAMU - Discussed a Sloan Minority PhD Program and an NSF LSAMP Bridges to the Doctorate program. For these doctoral focused programs, the first semester is most important in retaining students, success was almost assured if they made it through the first semester. It is very critical to have core faculty engaged with the program. Institutionalization is the most challenging aspect to such programs. Success can be achieved if you have committed people and systems in place. Institutionalization is always a challenge. Deans and provosts must be part of the process.

Christine Grant, NSF Program Director – She shared her life experience of 40 years in the profession, starting at Georgia Tech, then NC State as the only woman of color in the school at the beginning. The language of anti-racism provides context for experiences. It is important not



to wait 30 years for self-reflection. Diverse faculty should be engaged with as individuals, not collectively. Organizations must enact policies to address racism. Faculty must develop networks of support and facilitate such networks.

Renetta Tull, Vice Chancellor at UC-Davis – Empower leaders in order to change mindsets. Moving the needle requires action. The Impact of societal influences can't be separated from the impact on the individual psyche. It is important that the act of developing new programs is not a panacea, we have to pay attention to the system itself, and the people who have the power to make change. Reflect on the history of your own institution to inform future strategy for advancement. Acknowledge the history of engineering in terms of inclusion.

Stephanie Adams, Dean at UT-Dallas – For doctoral students, invite underrepresented students to a 'bootcamp' for basic skills in communications, preparation for careers in academia, and better coping skills. It is best to engage students early. Bring in students by cohort from the start. A data driven approach to DEI in departments is critical. Benchmark against peers and aspirants. Set a clear vision. Solicit buy-in. Require accountability in leadership in achieving DEI goals, as well as appropriate resources that match priorities. If you can't be the source of change, then move aside for someone who knows what to do.

Mark Smith, Dean at UT-Austin – A Big change towards addressing racism is identifying it as an issue and giving visibility to it. Make a DEI statement be part of the promotion and tenure package and annual faculty reviews. Chairs and directors must also be asked about DEI, particularly how it is integrated into the reward process. Search committees must include DEI seriously. Sharing student experiences is important in terms of their journey through the graduate experience. Compile these into a book and use it as a resource on lessons learned. Complement with videos to set the stage for discussion.

Breakout Reports – Diversity and inclusion should be a part of faculty evaluations and departmental assessment and planning. Use connections with other organizations to increase diversity engagement and data collection. Use the P&T rubric to work across boundaries and increase inclusivity. Have faculty address who they do research with, who they publish with, who they collaborate to teach classes. Search committees should include a diversity advocate to make sure it is looking without bias at each candidate and that the candidate seems to reflect a diverse pool. There is a need to address systemic racism issues and the relationship between PWI and HBCUs. Everyone should be open to discussing issues like racism. Information should be provided to potential collaborators at the beginning of discussions about joint activities. Not enough potential students or faculty have MSIs on their radar. There is a need for collective outreach to reach a much larger audience at all levels from K-12 through college so that there is a real, informed choice that includes MSIs.

Guidelines to Advancing DEI in Engineering Programs

Dr. Saenz also presented a set of guidelines for engineering educators to advance diversity, equity and inclusion in their programs. These guidelines are summarized below:

I. Advancing Change:

- Needed elements (RRR):
 - Resolve
 - Resources
 - Responsibility
- **Resolve** comes in the form of commitment. Do you/your organization articulate values, mission, set goals at individual, unit, organizational level?
- **Resources** come in the form of investment (\$, time) Is there a budget or % of budget, formally designated time within each function area devoted to DEI?
- **Responsibility** is reflected in accountability. Is there an individual or group that is charged with creating change; are there metrics & evaluations coupled with consequences / rewards?

Once the RRR commitment has been made:

- Understand the **process components**
- Map out a strategy / methodology (e.g., coherent framework, review best practices, address challenges, assess, adjust)

II. Process components for change

- **Education:** workshops, reading groups, teach-ins, resource identification, speakers
- **Data collection:** identify disparities (invitations, participation, persistence), success/failure (awards), leadership, goals, progress
- **Communication/messaging:** print/web, mission, vision, representation, audiences, impact
- **Resource (re)allocation:** research, teaching, service, outreach, investments specific to DEI
- **Accountability:** responsibility, evaluation, public awareness, cultivating allies

III. Mapping out strategies/methodology

Is your focus on

- Diversity = #'s
- Climate = inclusion, belonging
- Equity = policies, voice, curriculum

All are important!

Best Practice Examples

I. Investment

- Direct 5-10% of overall budget to DEI activities
- Couple cost-share investments (for large externally funded centers) with requirements for inclusion of diverse leadership & other DEI components
- Direct donor funds to equity-focused programs & URM student scholarships
- Provide faculty stipends to develop diversity-relevant courses and/or adaptations to current courses
- Fund student internships in anti-racist organizations
- Create Chief Diversity Officer (CDO) position at unit level (w/support, gravitas)

II. Diversification

- Require pools & short lists to reflect diversity (for admissions, hiring of faculty, staff, administrators)
- Set goals for diversity based on federal databases (e.g., K-12 pipeline, IPEDS degrees); grow your own!
- Create authentic partnerships between PWIs & MSIs (research, recruitment, exchanges)
- Allocate minimum 50% RET, REU slots to URM
- Require all faculty, staff, students to do outreach to underserved, UR communities
- Reduce # non-Tenure Track (TT); increase TT/prof of practice

III. Policies

- Equitable policies related to living wage, maternity leave, tuition remission, child care
- Admissions: standardized tests, applications criteria
- Committee assignments (URMs beyond DEI work)
- Professional development requirements for education on racism, privilege, fragility, whiteness, white savior (consultants, in-house experts) [fire safety, IT security]
- Creating curricular requirements around DEI for undergrads, grad students

IV. Climate

- Address directly the needs of students from diverse backgrounds, including intersectional social identities (race, gender, sexual ID, socioeconomic status (SES), 1st gen)
- Have leadership enthusiastically advance the notion of audits/reviews of disparities; identify and measure goals; be subject to evaluation on DEI
- Identify and dispel myths: not enough? Produce in-house
- What images/spaces reflect diversity?
- Administer climate surveys & disseminate results; generate discussion and solutions



V. Data

- Report #'s applications, short lists, visits, offers, start-up, P&T rates, resources allocated
- Monitor student rates of DWFs, service utilization, switch-outs in major, degree attainment, loans, & courses with disparate racial outcomes—address disparities
- Set goals, monitor, report, pivot as needed

VI. Create an ecosystem

- Create ecosystems, not projects
- Who controls the system? What is their perspective? What is their understanding of DEI? Who is at the decision-making table?
- Change the schemas for engineer, leader, innovator, academic potential—include persons from diverse backgrounds
- Personally: schedule the equivalent of 20 minutes/day on anti-racist learning & action

VII. Resources

- NYU Anti-Racism Education, Programs, and Resources
<https://www.nyu.edu/life/global-inclusion-and-diversity/anti-racism.html> (go to Anti-Racism Education Resources subsection)
- On Becoming an Anti-Racist University: Principles and recommendations for universities from Black Engineering faculty <https://blackinengineering.org/action-item-list/>
- Ready to Be an Ally for Black Academics? Here's a Start
<https://www.chronicle.com/article/ready-to-be-an-ally-for-black-academics-heresa-start>
- COVID-19 & Engineering Education: An interim report on the Community Response to the Pandemic and Racial Justice
https://ira.asee.org/wp-content/uploads/2020/10/COVID-19-Interim-Report-Final_Sept2020.pdf?fbclid=IwAR0jvob4Tt3nmn9xRmRIhUowx7m_YrWoSF99-jXbLOVeizdDc7bZgSZ1-lg

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[Ref 4] <https://www.iec.org/>

[Ref 5] National Research Council. 2015. *Enhancing the Effectiveness of Team Science*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/19007>.

[Ref 6] Picture a Scientist (video) <https://www.pbs.org/wgbh/nova/video/picture-a-scientist/>

[Ref 7] Faculty Diversity: What colleges need to do now (pdf)
<https://store.chronicle.com/products/faculty-diversity>

[Ref 8] Responses to 10 Common Criticisms of Anti-Racism in STEMM (pdf) Maya L. Gosztyla, Lydia Kwong, Naomi A. Murray, Claire E. Williams, Nicholas Behnke, Porsia Curry, Kevin D. Corbett, Karen N. DSouza, Julia Gala de Pablo, Joanina Gicobi, Monica Javidnia, Navina Lotay, Sidney Madison Prescott, James P. Quinn, Zeena M. G. Rivera, Markia A. Smith, Karen T. Y. Tang, Aarya Venkat, Megan A. Yamoah Published: July 15, 2021
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