ASEE 2022 ANNUAL CONFERENCE
Excellence Through Diversity
MINNEAPOLIS, MINNESOTA, JUNE 26TH-29TH, 2022 ASEE
Paper ID #37101

WIP: ASEE Year of Impact on Racial Equity: P-12 Parents and Guardians Engagement

Homero Murzi (Assistant Professor)

Dr. Homero Murzi (he/él/his) is an Assistant Professor in the Department of Engineering Education at Virginia Tech with honorary appointments at the University of Queensland (Australia) and University of Los Andes (Venezuela). Homero is the leader of the Engineering Competencies, Learning, and Inclusive Practices for Success (ECLIPS) Lab where he leads a team focused on doing research on contemporary, culturally relevant, and inclusive pedagogical practices, emotions in engineering, competency development, and understanding the experiences of traditionally marginalized people (e.g., Latinx, international students, Indigenous students) in engineering from an asset-based perspective. Homero is interested in understanding how to develop effective and culturally relevant learning environments that can promote the sustainable competencies engineering students require to succeed in the contemporary workforce. His goal is to develop engineering education practices that value the capital that traditionally marginalized students, bring into the field. Homero aspires to change discourses around broadening participation in engineering and promoting action to change. Homero has been recognized as a Diggs Teaching Scholar, a Graduate Academy for Teaching Excellence Fellow, a Global Perspectives Fellow, a Diversity Scholar, a Fulbright Scholar, an inductee into the Bouchet Honor Society, and received the prestigious NSF CAREER award. Homero serves as the VT Engineering Education Chair for Equity and Inclusion, and the American Society for Engineering Education (ASEE) Incoming Chair for the Commission on Diversity, Equity, and Inclusion (CDEI). He holds degrees in Industrial Engineering (BS, MS) from the National Experimental University of Táchira, Master of Business Administration (MBA) from Temple University, and Engineering Education (PhD) from Virginia Tech.

Katey Shirey (eduKatey STEAM Education)

Dr. Katey Shirey's work stems from her combined interests in science, art, and education. Dr. Shirey graduated from the University of Virginia with bachelor's degrees in physics and sculpture. She received her master's in secondary science education, also from UVA, and taught Physics at Washington-Liberty High School in Arlington, VA. Dr. Shirey received her Ph.D. in 2017 from the University of Maryland in Education with a focus on teacher challenges and productive resources for integrating engineering design into high-school physics. Through her work as a Knowles Teacher Initiative Senior Fellow and founder of eduKatey LLC, Dr. Shirey provides and researches engineering-integrated STE(A)M curriculum, professional development, and teachers' reflective growth practices.

Malinda S Zarske (Teaching Associate Professor)

Dr. Malinda Zarske is the Chair of ASEE's Commission on P-12 Engineering Education. She is also a Teaching Professor in the Integrated Design Engineering program at the University of Colorado Boulder. She teaches undergraduate product design and core courses in engineering, as well as STEM education courses for pre-service teachers and professional development around equitable STEM teaching for inservice teachers.

Elizabeth Litzler (Director)

Elizabeth (Liz) Litzler, Ph.D., is the Director of the Center for Evaluation & Research for STEM Equity (CERSE) at the University of Washington (UW) and an Affiliate Assistant Professor in UW Sociology. She was the 2020-2021 Chair of the ASEE Commission on Diversity, Equity, and Inclusion (CDEI). She is a former Board Member of Women in Engineering ProActive Network (WEPAN) and the recipient of the 2020 WEPAN Founders Award. She has led social science research projects such as the UW portion of NSF funded Revolutionizing Engineering Departments Participatory Action Research (REDPAR) and the Sloan funded Project to Assess Climate in Engineering (PACE). She also manages program evaluations that provide actionable strategies to improve diversity, equity, and inclusion in STEM fields. This

includes evaluation of NSF ADVANCE, S-STEM, INCLUDES, and IUSE projects, and climate studies of students, faculty, and staff. Her social science research covers many topics and has used critical race theories such as Community Cultural Wealth to describe the experiences of systemically marginalized students in engineering.

Jeremi S London (Assistant Professor)

Associate Professor of Engineering Education at Virginia Tech Chair of ASEE's CDEI during the Year of Impact on Racial Equity

WIP: ASEE Year of Impact on Racial Equity: P-12 Parents and Guardians Engagement

Introduction & Context

This is the last of four WIP papers in a series on the ASEE Year of Impact on Racial Equity (YIRE) organized by the ASEE Commission on Diversity, Equity, and Inclusion (CDEI). The major tenets of this initiative can be described by three pillars. The pillars are: The Faculty and Administrators pillar, The Engineering Design Teams Pillar, and The P-12 Parents and Guardians Pillar. These pillars are focused on engaging engineering and engineering technology students, faculty and administrators in colleges of engineering and engineering technology, and parents and guardians of students grades pre-kindergarten to 12. This paper focuses on the efforts of the P-12 parents and Guardians pillar.

To explain our rationale and goals for the ASEE Year of Impact on Racial Equity, we quote content from the Summer 2021 ASEE Prism article:

> "In light of ASEE President Sheryl Sorby's acceptance speech at the 2020 Annual Conference, in which she outlined a vision for ASEE and an engineering education experience that reflects more diversity and equity, as well as the societal momentum toward dismantling white supremacy and racism, it is time for a Year of Impact on Racial Equity. Many aspects of the current engineering culture have origins and practices that center whiteness and exclusivity. However, we are all caretakers of this engineering culture and can either protect exclusionary traditions or strategically design models that better meet the current diverse challenges and needs for our society.
>
> In order to improve the field's diversity, adaptability, and competitiveness, the Year of Impact on Racial Equity is focused on making organizational change to address the culture, policies, and racial/ethnic representation within engineering student organizations, colleges of engineering, and pre-college outreach efforts, respectively. This Year of Impact will move us beyond action to focus on the <u>impact</u> of the actions we take.
>
> We expect that actions in these domains will result in three concrete forms of impact: (1) **Empowered engineering student organizations** to make engineering education more inclusive at the level of peer-to-peer interactions; (2) **Actionable organizational policies and effective practices implemented in Colleges of Engineering** that disrupt the status quo regarding who gets to participate in engineering education as a student and as a faculty member; and (3) **Increased participation and comfort among Black and Brown K-12 children** in pre-college engineering activities which communicate that an engineering career is an option for *anyone.* These outcomes map to three strategic pillars of the Year of Impact on Racial Equity."

This paper focuses on ASEE members' efforts to support the "Increased participation and comfort among Black and Brown K-12 Children in pre-college engineering activities which communicate that an engineering career is an option for anyone." As a result, members of our pillar have been activated to create actionable results in the 2021-2022 school year. Similarly, our learning experiences from this pillar will be presented at the 2022 ASEE national conference.

To meet our goal of increasing recruitment and retention of students from traditionally marginalized backgrounds, Pillar members invested in the development of different forms of communication (e.g., videos, interactive maps, curated resources) so that parents, guardians, and teachers would have broader access to engineering education best practices, engineering programs, and other initiatives. These Pillar projects have been created by volunteers who came up with and are executing and leading the ideas. We are also connecting with different organizations at the national level to make sure our efforts are synergistic.
This paper summarizes our activities thus far in more detail and presents the preliminary outcomes and future plans for the work of the volunteers of the P-12 Pillar.

Our Process and Collective Engagement

Our Pillar started by identifying volunteers interested in P-12 racial equity improvement. Once the YIRE was announced, we were able to recruit 11 people to engage with the Pillar. We had monthly meetings during the Fall 2021 and Spring 2022 semester, brainstormed several initiatives, and have had discussions on how to engage the ASEE community with important socializers in P-12 education (e.g., teachers, parents and guardians).

One of our strengths is having members in the Pillar who are very active in the American Society for Engineering Education (ASEE) Pre-College Engineering Education (PCEE) Division and the ASEE Commission on P-12 Engineering Education which already have several outreach initiatives in place. To respond to the YIRE with increased impact, new efforts needed to be created that went above and beyond those already in place while building on existing programming and volunteer efforts.

During early meetings of this Pillar, attendees discussed the areas they wanted to focus on. First, we agreed that part of our task was about engineering and engineering technology awareness, engineering and engineering technology perceptions, and engineering and engineering technology self-efficacy. Also, if we genuinely wanted students to see themselves in engineering or engineering technology, they would need to know what the field is, feel safe exploring it and gain confidence in their engineering or engineering technology identity to seek out future engineering and engineering technology opportunities. Second, once a student, parent, guardian, or teacher felt interested in or motivated to learn about and try engineering or engineering technology, we wanted to help them find engineering and engineering technology opportunities easily.

After this discussion, the first step of the process included a literature exploration of some of the best practices for engaging P-12 socializers, influences, and stakeholders. After this exploration, where we could not find many relevant articles, we created some concrete initiatives. In the following section, we present some information about our four most significant initiatives and some concrete examples. Some of our work relied on sharing information to help promote existing ongoing initiatives, and some of the work was novel for this community.

Our Specific Actions

Diversity in Engineering Awareness and Identity Building

Decades of educational research on role models has shown that children and adolescents' goals and aspirations are influenced by role models [1]–[3]. Role models teach youth how to behave and provide support and guidance as mentors. But additionally, race- and gender-matched role models actually provide concrete information to youth about "what is possible" for them as members of particular social groups. Zirkel [4] wrote:

> Young people learn the racial and gendered structuring of the culture in which they live by noting the race and gender of adults in different professional positions. The presence or absence of [people] like [them or] others in different social positions implicitly conveys information to young people about the possibilities for their futures.

If we want to encourage Black and Brown students to engage in engineering and engineering technology, then we must provide race- and gender-matched engineering role models to the audience of youth plus their teachers, parents, and guardians. In addition, we need to elevate the presence of engineers of all genders and engineering students of color to displace the core assumptions of engineering's white-centeredness actively. So, for our first actions, we set off to share engineering images and stories starring people of color that reflected the Black and Brown students we were trying to reach.

Student questions about engineering social media posts

Our first effort in this vein was to start some conversations online about engineering that would validate and encourage Black and Brown students to feel welcome in engineering. We decided to make social media posts that would depict students of color and ask questions of the social audience to share their experiences of engineering and being an engineering student.

Our target audience for this effort was high school students considering options and majors for higher education and their teachers, parents, and guardians. An ASEE member volunteer gathered twenty questions from her incoming college first-year engineering students–these were real questions that real students had about engineering and becoming an engineer. Another member volunteer created a digital image for each question that included images of students of color in an effort to showcase a variety of genders, skin tones, hair textures, and clothing. The images were reviewed at meetings of the YIRE Pillar, the ASEE P-12 Commission, PCEE, and the ASEE Commission on Diversity, Equity, and Inclusion.

Images were posted weekly using the hashtag #ASEEYIRE to Twitter (@PCEE_Div), Instagram (@asee_pcee), and Facebook (@AseePCEE) beginning on November 2, 2021. Figure 1 provides some sample posts.

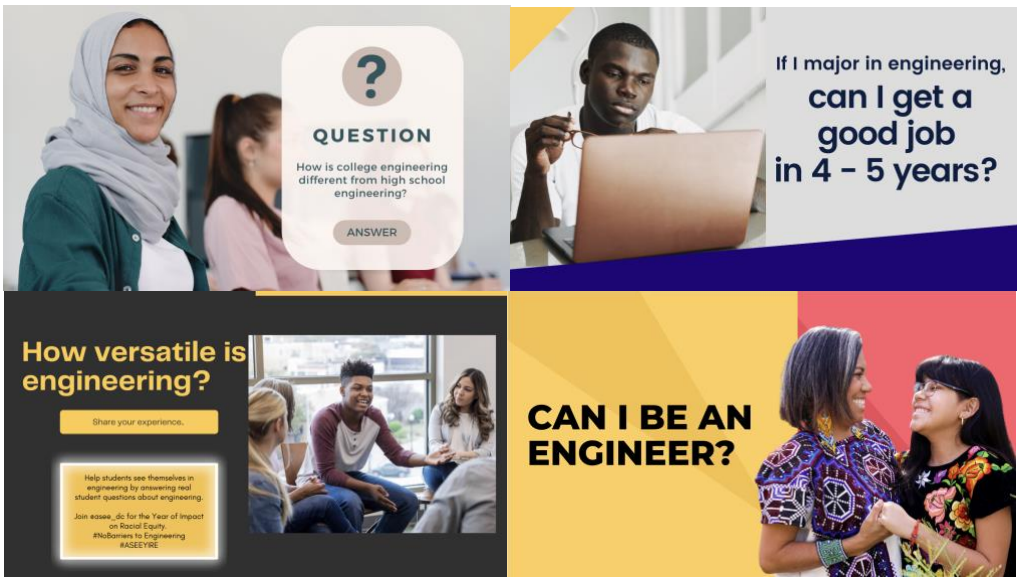

Figure 1. Sample posts of social media campaign

Unfortunately, the posts had meager interaction online. In the future, we hope the images could be used as slides or as pointers in student-facing conversations that can address some of these complex issues and help socializers or influencers with starting points to having these conversations.

A day in the life of an engineering student videos

Another project to support Black and Brown students, parents, and guardians to see their potential as an engineering or engineering technology student is a showcase of a day in the life of an engineering student of color. We are collecting short videos from real Black and Brown students in different engineering and engineering technology programs where they will share what they do and who they are. We intentionally are asking to use different backgrounds so kids can visualize themselves being engineering or engineering technology students and imagine themselves in the hallways, dorms, labs, and classrooms. The videos will be shared widely with our different communities and will also be shared with P-12 educators and collaborators so they can reach a broader audience. Figure 2 presents some screenshots from the first two videos produced.

Figure 2. Screenshots of the day in the life sample videos

Sharing P-12 Engineering Opportunities: Interactive Map

The other part of our goals was to make it easier for P-12 students, teachers, parents, and guardians to find engineering and engineering technology outreach opportunities in their area. We found that while there are many national engineering publications, including ASEE's own Engineering Go for It!, there was not a fully comprehensive clearinghouse of engineering activities to browse. Therefore, the Pillar is developing a national interactive map tool that can help users identify current outreach programs in their area to support this. (Opportunities may be added at https://forms.gle/QvfJftA7aEiY4V6h8.) This tool aims to map and share the different outreach programs in the country in different states. The goal is for parents and guardians to go to the map and locate their zone and see what programs are available for their Black and Brown kids.

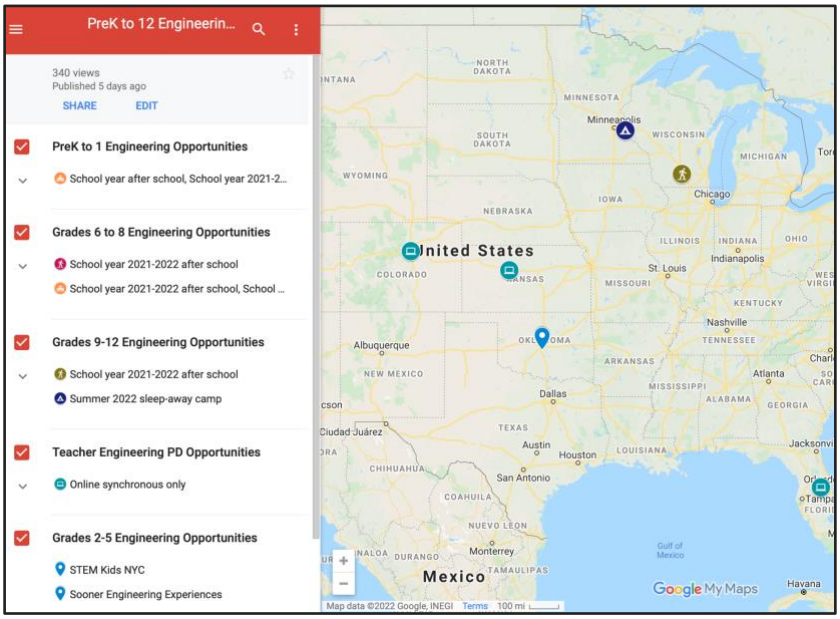

Figure 3. Screenshot of the interactive map

Now that the need for a clearinghouse of sorts is articulated, we hope that in the future, ASEE members could contribute their outreach efforts to this map or a website so that ASEE could more directly support P-12 students of color across the nation.

Conclusion

The work of all of the Year of Impact on Racial Equity pillars has had the express purpose of continuing to keep racial equity front of mind and front of hand. We want to ensure that the momentum created in Spring of 2020 with the murder of George Floyd does not wane back to the point of the status quo. This requires that we continue to push forward our initiatives both at our own institutions and at the national level.

We are about halfway through the YIRE and recognize that there has been less bandwidth than we hoped to push this work forward. We are not surprised by this given the additional stress and

disruption related to Covid-19 and new variants of the virus that are sapping people's extra time and energy. Nevertheless, we plan to share information about these initiatives on the CDEI website and at the annual conference in the CDEI booth in the diversity pavilion in the exhibit hall. We also expect that there will be even more progress on some of these issues by the 2023 ASEE Annual Conference, and we plan to submit papers to document the work that was done and the impact we have had.

References

[1] V. Grande, A.-K. Peters, M. Daniels, and M. Tedre, "'Participating Under the Influence': How Role Models Affect the Computing Discipline, Profession, and Student Population," in *2018 IEEE Frontiers in Education Conference (FIE)*, Oct. 2018, pp. 1–9. DOI: 10.1109/FIE.2018.8658944.

[2] M. S. Kearney and P. B. Levine, "Role Models, Mentors, and Media Influences," *The Future of Children*, vol. 30, no. 1, pp. 83–106, 2020.

[3] A. Abbasianchavari and A. Moritz, "The impact of role models on entrepreneurial intentions and behavior: a review of the literature," *Manag Rev Q*, vol. 71, no. 1, pp. 1–40, Feb. 2021, DOI: 10.1007/s11301-019-00179-0.

[4] S. Zirkel, "Is there a place for me? Role models and academic identity among white students and students of color," *Teachers College Record*, vol. 104, no. 2, pp. 357–376, 2002.