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WIP: The Role of [Onboarding Program] in Fostering a Sense of Belonging and Sociocultural Competence in New Engineering Students

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Work in Progress: The Role of TerrapinSTRONG in Fostering a Sense of Belonging and Sociocultural Competence in New Engineering Students

Abstract

The purpose of this work-in-progress paper is to describe the development and assessment of a new onboarding program designed for all incoming first-year and transfer engineering students at the A. James Clark School of Engineering (Clark School) at the University of Maryland.

TerrapinSTRONG has the following overarching goals:

- Cultivate a sense of community, sense of belonging, and connectedness amongst students in the Clark School; and
- Develop an appreciation for and understanding of diversity and inclusion.

There are several components and attributes of TerrapinSTRONG in which incoming engineering students participate prior to and during their first semester in the Clark School.

Due to the COVID-19 pandemic, TerrapinSTRONG for fall 2020 was implemented virtually. The online nature of these programs and their various components will be outlined in the work-in-progress paper to provide the ASEE community with an example of recent and continuing developments in first-year and transfer student onboarding programming in an engineering school. We will also discuss past programmatic efforts that took place on-campus and outline promising practices for future cohorts of students. These initiatives, both in-person and online, were developed to promote an understanding of diversity and inclusivity in the engineering context.

TerrapinSTRONG Onboarding Programs in the A. James Clark School of Engineering

The past five years has seen significant changes in onboarding in the A. James Clark School of Engineering (Clark School) at the University of Maryland. In response to student concerns shared in engineering course evaluations, results of a 2018 campus climate study, formal and informal student concerns shared by students of color and women students, and reported incidents of bias and hate within the engineering and campus community, the engineering school developed a plan for properly onboarding and orienting new engineering students with the goal of creating a more inclusive engineering community. The onboarding program was designed to improve the climate and culture within the engineering school, ensure all engineering students feel they matter, belong, and have the skills to engage in inclusive leadership practices inside and outside of the classroom.

Programming to support specific target populations, including transfer students and students from underrepresented populations, has been prioritized in these onboarding efforts. In addition, an increased emphasis has been placed on cultivating a sense of community in the new student population and supporting the development of an appreciation for and understanding of diversity and inclusion. These initiatives culminated in fall 2020 with the TerrapinSTRONG Onboarding Program, a comprehensive offering of experiences to meet the needs of a diverse student

population. The various onboarding initiatives are each described below and collectively make up the TerrapinSTRONG onboarding program in the Clark School.

ClarkLEAD/ClarkWELCOME

ClarkLEAD was initially piloted in 2018 with 107 newly admitted engineering students. The program was then expanded to include all newly admitted first-year and transfer engineering students. The summer 2019 program included approximately 740 new engineering students and 80 trained facilitators. The initiative was led by the Office of Global Engineering Leadership and is supported by faculty, staff and students across the Clark School.

Under ordinary circumstances, ClarkLEAD is a half-day intensive onboarding program which culminates in an engineering community picnic. Due to COVID-19, the program was consolidated into a virtual format for summer 2020 and rebranded as ClarkWELCOME. Over 400 students took part in the 75-minute welcome program in August 2020. The Clark School welcomed students through recorded messages from a selection of faculty, staff and students. Students then took part in smaller group conversations facilitated by trained upper-level students. Students had approximately 30 minutes in their small groups to explore themes around community building, diversity and inclusion, an asset-mindset, and teamwork.

The goal of ClarkLEAD/ClarkWELCOME is to foster an engineering community that is united, respectful, safe, inclusive, accountable, empowered, and open to growth to impact society.

Through participation in ClarkLEAD/ClarkWELCOME, students will:

- begin to feel a sense of belonging, that they matter, and are a connected part of the Clark School community;
- feel a sense of psychological and physical safety within the Clark School and campus community;
- have an understanding of campus and Clark School values related to leadership and diversity;
- have an understanding of a Strengths-based leadership philosophy;
- develop an awareness of the importance of diversity and inclusion in the engineering design process; and
- begin to develop leadership skills for facilitating a respectful, safe, and inclusive team environment.

Table 1. Half-day *ClarkLEAD* onboarding schedule

12:30-12:45 PM	Welcome by Dean; overview of Clark School and commitment to diversity and inclusion
12:45-3:45 PM	ClarkLEAD program begins • Introducing the difference between diversity and inclusion • Benefits of diversity and inclusion • Personal identity wheel • Introduction to strengths-based leadership philosophy • Review Gallup CliftonStrengths Results • Understanding others' strengths and talents • Overview of Four Domains of Leadership • Understanding strengths-based leadership from a group/team perspective • Overview of high performing teams and benefits of diversity in team environments • Diversity simulation activity • Understanding the importance of diversity and inclusion and why this matters in an engineering context • How to contribute to inclusive teams and engaging in inclusive leadership with others
3:45-3:50 PM	Closing remarks by Associate Dean for Undergraduate Programs; leadership charge for students to contribute to a thriving, inclusive Clark School community
3:50-4:00 PM	Participants complete ClarkLEAD survey
4:00-6:00 PM	Picnic for all engineering students

Table 2. 75-minute *ClarkWELCOME* onboarding schedule

1:00 PM	Welcome & Housekeeping
1:10 PM	Pre-recorded video: Welcome by Dean
1:15 PM	Pre-recorded video: Welcome montage of staff, students, faculty and alumni
1:25 PM	Pre-recorded video: 3 current students share their stories of what helped them feel a sense of community and belonging
1:35 PM	Break into small groups to engage in self-reflection and facilitated discussions around the following themes: ● Their personal strengths and their mentors who have impacted their lives; ● Envisioning what an inclusive community would look like and how they can build on their assets to contribute meaningfully to create a supportive environment; and ● The role of teamwork in engineering and the connection between diversity and inclusion to effective teams.
2:05 PM	Return to large group for closing, announcements, and a group photo
2:15 PM	Program ends

Fall Transfer Welcome

The Fall Transfer Welcome was first facilitated in fall 2018. The initiative is led by the Office of Undergraduate Advising and Academic Support and is facilitated by a committee of engineering staff and current transfer students within the Clark School. In 2018 and 2019, the program was held as a one-day on-campus event on the Friday before the first day of the fall semester. The program is optional for students and serves as an extended orientation to welcome newly admitted transfer students to the Clark School. Each fall, the Clark School admits around 150 transfer students. Roughly 70 students attend the Fall Transfer Welcome each fall (nearly half of the admitted class). Fall Transfer Welcome programming includes sessions focusing on academic support and wellness, departmental breakouts and lab tours, peer-led student panels, and sessions hosted by academic success programs.

Table 3. 1-Day in-person *Fall Transfer Welcome* schedule

9:00AM	Welcome from Associate Dean
9:15AM	Health, Wellness, & Time Management Activity
10:30AM	Departmental Breakouts (featuring lab tours and faculty panels)
12:00PM	Lunch with Currently Enrolled Transfer Students
1:00PM	Campus Resource Panel
1:30PM	Rotating Sessions • Tour of STEM Library • Presentation from Career Services
3:00PM	Student Affairs Information Sessions
3:30PM	Ice Cream Social & Closing

In fall 2020, the Fall Transfer Welcome program was facilitated online due to the COVID-19 pandemic. Rather than facilitating a one-day event, the content from prior programming was moved into an online education learning management system and made available to students in the week leading up to the first day of classes. Sessions that were previously hosted in-person were facilitated online and students were provided with a combination of pre-recorded and live Zoom sessions. In addition to attending live sessions, students also had the opportunity to engage in the online discussion board.

ClarkCOMMUNITIES

ClarkCOMMUNITIES was a new initiative designed to respond to the challenges and difficulties associated with COVID-19 and a remote/virtual start to the university experience for our new cohort of engineering students in fall 2020. Engineering student affairs staff were acutely aware of the challenges this would cause students and began to explore programming to support the new student population in developing a sense of community while exploring topics which would enhance their ability to engage effectively across difference and develop an appreciation for and understanding of diversity and inclusion.

ClarkCOMMUNITIES is built around weekly small-group dialogue sessions facilitated by trained upper-level students. The program incorporates dialogue pedagogies and practices associated with enhancing a sense of belonging over a twelve-week community building experience [1] - [5]. Groups averaged eight new students with two facilitators. The schedule is shown in Table 4. The initial weeks focused on community and relationship building within the groups and progressed to discussions around leadership, inclusion, and mental health. Topics aligned with campus events and the semester calendar. For example, the career readiness session aligned with a virtual career fair. The goal was to scaffold the program progression to develop a level of comfort and a sense of community prior to exploring more challenging subjects.

Table 4. ClarkCOMMUNITIES weekly schedule of topics

Week	**Topic**	**Week**	**Topic**
1	Get Involved, Stay Involved	7	Break
2	Creating Space for Dialogue	8	Leadership & Identity
3	Career Ready, Set, Go	9	Mental Health & Stress
4	Building Inclusive Communities	10	Break
5	Inclusive Engineering Design	11	Stuck in Time: Procrastination & Goal Setting
6	Break	12	Keeping Engaged

Background

Sense of Belonging

The TerrapinSTRONG goals, outcomes, curriculum, and pedagogical design were informed by the literature on sense of belonging, campus climate, student onboarding, and intergroup dialogue pedagogy. The term "sense of belonging" arose from college student retention literature. For decades, scholars have sought to better understand factors that support students' integration and transition to college campuses [6] - [7]. While often critiqued for focusing too closely on the "traditional" college experience, Tinto's [8] - [9] Student Integration Model is arguably the most cited model for college student retention [6]. Tinto's model suggests that students need to fully integrate into their college campus to be academically successful and to persist beyond their first year of college. The model also suggests that students are more likely to integrate when there is a perceived notion of "fit" or sense of belonging within the college community.

The concept of sense of belonging did not originate with Tinto; rather, Maslow [10] first described belongingness as a basic human motivation. In his work describing the role of sense of belonging in student success, Strayhorn [7] cites Maslow and goes on to define sense of belonging as follows:

> Students' perceived social support on campus, a feeling or sensation of connectedness, and the experience of mattering or feeling cared about, accepted, respected, valued by, and important to the campus community or others on campus such as faculty, staff, and peers (p. 4).

Research suggests that students' sense of belonging is directly connected to peers and the way in which students experience diverse peer groups [11], [7].

While sense of belonging has been applied broadly to all college student populations, recent research has been most concerned with how students from underrepresented groups achieve a sense of belonging – particularly at predominately white institutions (PWI). For example, Hurtado and Carter [12] explored how academic and social experiences affect belonging for Latinx students. Other studies have examined the experiences of women of color (e.g., [13]), African American students in STEM (e.g., [14]), and women in STEM (e.g., [15]). A great deal of literature looks directly at sense of belonging among STEM students; however, there is currently little research examining the belongingness of engineering students specifically.

In their 2016 ASEE paper, Liptow, Chen, Parent, Duerr, and Henson [16] describe the role of community and sense of belonging in a first-year student success course designed specifically for first-generation and underrepresented engineering students. Through qualitative interviews with their students, the scholars found that a sense of belonging within engineering was negatively affected by stereotypes of who belongs in engineering. Broadly speaking, women and underrepresented minority students, in particular, reported lower levels of belonging as compared to white male students. However, reflections from study participants indicated that the course did help to develop students' engineering identities and contributed to their overall sense of belonging with the engineering program.

Students' ability to achieve a sense of belonging on college campuses has often been connected directly to campus climate. Chilly campus climates have been found to have a psychological impact on students that can dramatically impact students' ability to integrate to campus and persists [17] - [18]. One way to address chilly campus climates and to support students' sense of belonging has been found through early student involvement and high-impact practices. Examples of these practices include onboarding programs (e.g., orientation and first-year seminars) and intergroup dialogue [18] - [19].

Onboarding Programs

While literature examining the term "onboarding" specifically is limited within higher education, programs designed to support newly admitted students are commonly described in first-year experience literature [20]. These programs are meant to support students' transition into college and have been around since as early as the 1600's. In fact, Harvard College implemented an orientation program that connected new students with current students in 1636 [21]. The first onboarding programs were primarily designed to support the transition of new students into post-secondary education. Today's onboard programs vary among institutions, but it is common to see one- or two-day orientation programs, first-year seminars, welcome weeks, and common book reading initiatives [19]. These programs offer students opportunities to foster connections, clarify academic pathways and goals, meet key faculty and staff, and showcase campus resources and services. They also provide institutions the chance to express expectations and values to students at a critical time of transition [22].

A 2019 report from the American Council on Education indicates that the racial and ethnic diversity of students across all levels of higher education has increased over the past 20 years [23]. Therefore, the evolving nature of today's college student population has led to the continued evolution of first year student programs to meet changing needs [19]. In recent years, education researchers have expanded their investigations on the impacts of the college student experience to look beyond the traditional measure of critical thinking and intellectual values, which tend to assume that students enter college with similar backgrounds and experiences. Rather, researchers now factor for the diversity of identities and backgrounds that college students present with a realization that those may affect growth in areas that were not traditionally studied [24].

With the clear increase in demographic diversity among college students, racial identity plays a role in the first-year experience of both white and nonwhite students more than ever [25]. Many view the salience of diversity in today's climate to be a prime opportunity to foster awareness and openness which will better prepare students to work and live in diverse communities in the future [26].

Evidence suggests that students will progress toward greater understanding of racial, ethnic, and social diversity the more they interact with others, especially those who are different from themselves [27]. Intentional efforts from institutions to engage students in conversations about diversity have overall positive effects on all participants, though the extent of the impact may vary among racial, ethnic, and gender identities [25]. In their conclusion, Hu and Kuh [25]

express the great importance of higher education professionals to develop and implement programs that promote togetherness and conversation among students from diverse backgrounds in order to advance a welcoming and inclusive culture. An example of this is described by Ribera and colleagues [18] who emphasize the importance of high-impact practices: "Involving students early on in effective educational practices may help these students forge supportive academic and social relationships with members of the campus community and encourage positive intergroup dialogue among students from diverse backgrounds" (p. 549).

Pedagogical and Theoretical Framework

Several components of the onboarding initiative utilized intergroup dialogue as pedagogical framework. Intergroup dialogue is a foundational tool in diversity initiatives in higher education. Intergroup dialogue can be described as a facilitated conversation and process designed for small groups of people to talk about their identities and life experiences as well as engage in dialogue about "societal issues such as politics, racism, religion, and culture that are often flashpoints for polarization and social conflict" [3]. This process typically focuses on goals of advancing compassion, empathy, cross-cultural understanding, advocacy, social justice, and social change.

Research has shown that intergroup dialogue in the higher education context can have significant and positive impacts on student development, increasing student motivation, learning, and academic achievement [1] - [2], [5]. Through engagement in intergroup dialogue, students become more self-aware in their own social identities, and build knowledge about other social identity groups. By developing this knowledge while participating in facilitated conversations with others, students can better understand societal and structural inequities.

Research suggests that students who participate in intergroup dialogue experiences demonstrate greater motivation to improve communication about difference, engage in difficult conversations, and promote social change [2] - [4]. Establishing intergroup dialogue opportunities in higher education settings, particularly among first-year students in onboarding programs, can provide a meaningful opportunity for engaging students in a social justice-oriented approach that contributes to the development of cultural competency and inclusive community building [1], [5].

TerrapinSTRONG was designed to foster a sense of belonging among all students while also centering sociocultural competency, defined as the ability to effectively engage in conversations across and about differences, as a core onboarding outcome for engineering students. To advance these efforts, the onboarding curriculum were informed by the theoretical frameworks of sense of belonging [28], sociocultural theory [29], and cultural competence [30]. Sense of belonging has been identified in foundational theories as a key factor in students' development of self-efficacy, intrinsic motivation, and task value, as well as general adjustment to and success in postsecondary education [6], [7], [12], [28], [31]. Therefore, our research also draws from Lim and Renshaw's [29] sociocultural theory, which views learning as interconnected with historical, cultural, institutional, and communicative processes. Through this lens, sociocultural theory views individuals as cultural and historical beings. Cultural competence is then grounded in self-awareness and humility and can be used as a tool to advance equity, diversity and inclusion. Cultural competence can be tied to an individual's ability to be sensitive to both their own and

others' identities, acknowledging that differences and similarities exist, and work effectively to form sustainable mutually beneficial and empathetic partnerships [30], [32].

Methods

Participants

The Clark School had 1154 newly matriculated first-year and transfer students in fall 2020, all of whom were invited to participate in TerrapinSTRONG onboarding programs. Between mid-November and mid- January, all 1154 new students were invited to complete a voluntary survey regardless of whether or not they attended an onboarding program. Of the 1154 new students, 250 students completed at least 70% of the survey instrument and were included in the data analysis. All participants provided their responses voluntarily.

Assessment Tool Design

The survey questionnaire, built in Qualtrics, was designed to collect data to examine the extent to which the TerrapinSTRONG initiatives addressed programmatic goals/outcomes. This survey inquired about students' cultural competency, perceptions of their sense of belonging, and the impact of the TerrapinSTRONG initiatives on their experiences as a student. The tool measured the following variables:

- Sense of Belonging – An 8-item scale to assess students' perceived sense of belonging, safety, and security within the engineering community. These questions utilized a 5-point Likert scale from "Very Uncomfortable" to "Very Comfortable." These questions were adapted from the Multi-Institutional Study of Leadership as well as sense of belonging items asked from previous campus-based climate studies.
- Engineering Engagement – A 6-item scale to assess students' level of comfort engaging in engineering courses and extracurricular activities as well as seeking support from engineering peers, faculty and staff. These questions utilized a 5-point Likert scale from "Very Uncomfortable" to "Very Comfortable."
- Socio-Cultural Dialogues – A 6-item scale to measure students' perceived level of engagement in conversations across differences and about differences. This section used a 4-point Likert scale from "Never" to "Very Often". These questions were adapted from the Multi-Institutional Study of Leadership.
- Commitment to Diversity – A 6-item scale to assess students' perceived level of participation and interest in conversations around diversity and their comfort engaging in conversations about diversity. These items utilized a 5-point Likert scale from "Strongly Disagree" to "Strongly Agree".
- Participation in Onboarding – Students indicated which, if any, of the onboarding programs they participated in.
- Demographics – Students provided demographic information including race, ethnicity, gender identity, sexual orientation, age, admission status, citizenship, education level of parent(s)/guardians(s), and major.

The long-term plan for this project is to longitudinally track students' academic progress to assess retention and progress through degree completion in Clark School and at the University of Maryland. Finally, the outcomes of future TerrapinSTRONG initiatives will be evaluated, which will allow for a comparison of the efficacy of virtual and in-person programming.

Procedure

The survey was sent out electronically by email to 1154 new engineering students through the distribution tool in Qualtrics. It began with an informed consent form which provided details of the study, and informed participants that their participation was voluntary and that withdrawal was allowable at any time. In addition, participants were provided with an explanation for how the collected data would be used and notified that their university identification number would be requested in order to allow the researchers to collect additional information from student records, such as program participation, and academic progress through degree completion. Provision of the university identification number was voluntary and did not influence participants' ability to take part in the survey. Finally, participants were informed that they would have an opportunity to complete a separate survey to enter a drawing to win university apparel (valued up to $60) at the conclusion of the survey. Participants provided confirmation that they intended to take part in the study, understood the information being provided, and were at least 17 years of age. Participants then responded to questions related to the areas identified previously, including students' cultural competency, perceptions of their sense of belonging, and the impact of the TerrapinSTRONG onboarding initiatives. At the conclusion of the survey, participants were given the opportunity to complete a separate survey to take part in a raffle.

Preliminary Results

A total of 250 participants completed the survey, which is a 21.7% response rate. Note that data were not included if less than 70% of the survey was complete. T-tests were conducted to determine if there were significant differences in the responses to the sense of belonging, engineering engagement, socio-cultural discussions, and commitment to diversity scales based on numerous factors including gender, race/ethnicity, onboarding participation and length of onboard. The means and p-values are reported in Tables 4-7. There were no significant differences in the perceptions of sense of belonging based on gender, race/ethnicity, and participation in an onboarding program. Similarly, there were no significant differences in the participants' reporting of their level of engagement with diverse populations or their engagement in dialogue about diversity and differences. Participants identifying as males ($M= 3.99$, $SD=0.72$) reported higher levels of engineering engagement compared to participants identifying as females ($M=3.71$, $SD=0.82$), $t(237)=2.65$, $p=0.0086$.

Table 5. Means and T-test p-values for sense of belonging based on gender, race/ethnicity, and participation in onboarding

	N	Mean
Total Sample	250	3.99
Gender[1]		
Female	79	3.95
Male	160	4.03
p=0.054		
Race/Ethnicity[2]		
Racial/Ethnic Minority	113	3.94
White	126	4.04
p=0.22		
Onboarding Participation[3]		
Participated in Onboarding	113	3.94
Did Not Participate in Onboarding	126	4.04
p=0.095		

[1]11 participants did not identify as male or female or chose not to report and were not included due to the small sample size.
[2]11 participants did not report race/ethnicity were not included due to the small sample size.
[3]2 participants did not report whether they had participated in onboarding were not included due to the small sample size.

Table 6. Means and t-test p-values for engineering engagement based on gender, race/ethnicity, and participation in onboarding

	N	Mean
Total Sample	250	3.86
Gender[1]		
Female	79	3.71
Male	160	3.99
p=0.*0086**		
Race/Ethnicity[2]		
Racial/Ethnic Minority	113	3.81
White	126	3.93
p=0.21		
Onboarding Participation[3]		
Participated in Onboarding	187	3.85
Did Not Participate in Onboarding	61	3.90
*p=0.*45		

*p≤0.05

[1]11 participants did not identify as male or female or chose not to report and were not included due to the small sample size.

[2]11 participants did not report race/ethnicity were not included due to the small sample size.

[3]2 participants did not report whether they had participated in onboarding were not included due to the small sample size.

Table 7. Means and t-test p-values for engaging in socio-cultural dialogues based on gender, race/ethnicity, and participation in onboarding

	N	Mean
Total Sample	250	2.17
Gender[1]		
Female	79	2.27
Male	160	2.15
p=0.22		
Race/Ethnicity[2]		
Racial/Ethnic Minority	113	2.24
White	126	2.14
p=0.28		
Onboarding Participation[3]		
Participated in Onboarding	187	2.21
Did Not Participate in Onboarding	61	2.07
p=0.29		

[1]11 participants did not identify as male or female or chose not to report and were not included due to the small sample size.
[2]11 participants did not report race/ethnicity were not included due to the small sample size.
[3]2 participants did not report whether they had participated in onboarding were not included due to the small sample size.

Table 8. Means and t-test p-values for commitment to diversity based on gender, race/ethnicity, and participation in onboarding

	N	Mean
Total Sample	250	4.28
Gender[1]		
Female	79	4.36
Male	160	4.27
p=0.093		
Race/Ethnicity[2]		
Racial/Ethnic Minority	113	4.25
White	126	4.31
p=0.39		
Onboarding Participation[3]		
Participated in Onboarding	187	4.25
Did Not Participate in Onboarding	61	4.39
p=0.15		

[1]11 participants did not identify as male or female or chose not to report and were not included due to the small sample size.
[2]11 participants did not report race/ethnicity were not included due to the small sample size.
[3]2 participants did not report whether they had participated in onboarding were not included due to the small sample size.

Discussion and Future Work

Campuses continue to grapple with the impacts of the twin pandemics brought by COVID-19 and a country facing its historical legacy of racism, inequity, and oppression. These pandemics have also brought greater awareness for higher education and its roles in shaping and creating campus environments committed to inclusive excellence. Engineering programs are often committed to serving the public good and graduating engineers capable of addressing the grand engineering challenges of our time. As we consider this moment in our history and the role engineers can play in improving society, we must consider the engineering environment and the intervention strategies we can implement to contribute to more inclusive engineering environments where students feel they belong and matter.

Specifically, we sought to better understand onboarding programs and their role in students' sense of belonging, engineering engagement, and commitment to socio-cultural discussions and diversity. In addition, we wanted to better understand if differences existed within the engineering community for the core onboarding outcomes. Knowing and understanding this information will help us to further develop and enhance onboarding programs in the future.

When comparing those who participated in an onboarding program versus those who did not participate, no significant differences were observed for the onboarding program outcomes studied (sense of belonging; engineering engagements; socio-cultural discussions; commitment

to diversity). While we do not know if our onboarding initiatives contributed positively to our intended outcomes, these findings inform how we will further study the role of onboarding programs in influencing inclusive engineering environments. We plan to conduct a future study where we develop a regression model which controls for certain characteristics (e.g., pre-college experiences, living-learning program participation) to be able to better understand how much, if at all, onboarding programs contribute to engineering students' sense of belonging, engagement, and commitment to socio-cultural discussions and diversity.

COVID-19 brought the need to temporarily pivot our onboarding programs to an online modality. As we reflect on intergroup dialogue as our pedagogical framework utilized in our onboarding initiatives, little has been studied about the usefulness and effectiveness of these dialogues in a virtual environment. We suspect the online modality and online fatigue experienced by students likely limited the effectiveness of our onboarding efforts in influencing a more inclusive engineering environment. As we plan to repeat our study in Fall 2021, we will have data to compare Fall 2020 and Fall 2021 to better understand if in-person onboarding efforts are more effective at influencing a sense of belonging, engineering engagement, and commitment to socio-cultural discussions and diversity. In the next study we will seek to understand if there are differences in the impact of onboarding programs based on student demographics such as race, ethnicity, gender, sexual orientation, and first year vs. transfer students.

A key finding observed in our study was that male students were significantly more likely than female students to be engaged within the engineering environment. We need to better understand why this may be the case and what we can do to encourage greater engagement for all students. More effort and attention should be placed in future onboarding efforts to highlight the importance of active engineering engagement and the benefits of seeking support from peers, engineering faculty, and staff.

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