Facing a Double Pandemic: Viewpoints of African American Engineering Students during COVID-19 and Racial Unrest in the United States

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Introduction

The 2020 global pandemic caused by COVID-19 highlighted a number of inequities in the United States including, but not limited to, the digital divide for remote learning and instruction, healthcare, livable wages, etc. It also highlighted an issue that Black Americans have had to deal with since being brought to this country for enslavement – racism. The death of George Floyd in May 2020 compelled many corporate executives, institutional leaders, and the like to issue statements in support of "Black Lives Matter" and standing in solidarity with the Black community. However, many Black Americans feel that these statements are made half-heartedly – statements stay statements and never evolve into meaningful action. In fact, Black/African American students are actively dealing with racism on campuses as recently as September 2021 where an anonymous racist letter was emailed to the student chapter of the National Society of Black Engineers (NSBE) (and subsequently almost all of the Black/African American students) at the University of Massachusetts – Amherst [1], [2].

In June 2020, a mixed methods research study was conducted on how underrepresented engineering students were impacted by COVID-19. The study included 500 participants, with roughly 50% of those participants identified as Black/African American. Participants were asked to respond to the prompt *"Imagine you are chatting with a friend or family member about the evolving COVID-19 crisis. Tell them about something you have experienced recently as an engineering student."* Participants' responses included a variety of topics related to coping with the pandemic and adjusting to virtual instruction, but some participants shared stories regarding racism, social injustices and unrest, and how it impacted their personal lives, mental health, and educational pursuits. This paper addresses the following research question: *What were the experiences of Black engineering students at the beginning of the dual pandemic?* Recognizing that some participants chose to address social issues in response to the initial prompt was an indicator that there is a much-needed discussion to be had about the experiences of Black engineering students with anti-Black racism while in pursuit of their engineering degree programs.

Related Literature

The heightened awareness of racial inequity in the U.S. has resulted in scholars investigating the impacts of racism on targeted groups. Hammond et al. accentuate the gap between engineering students' desire to discuss racial injustice in the classroom and faculty anxieties in facilitating such discussions. This study was conducted to examine the grounds behind the disconnect between students and faculty in discussing racial injustice in engineering classrooms. The results revealed that students wanted to engage in discussions on racial injustice, but they felt uncomfortable and needed more support from faculty members. On the other hand, faculty members were anxious about managing discussions on racial injustice and feared negative consequences, such as being accused of bias or jeopardizing their careers [3].

Another relevant article by Cokley et al. emphasized the importance of addressing the intersectional impact of the COVID-19 pandemic and racial injustice on the mental health of Black Americans and the need for culturally responsive interventions that address this population's unique experiences and needs [4].

Thirdly, Tai et al. provide an update on the disproportionate consequence of COVID-19 on ethnical and racial minority groups in the United States. They discuss the underlying factors contributing to these disparities, including systemic racism, social determinants of health, and unequal access to healthcare [5].

Lastly, to contextualize these aforementioned studies within the context of engineering students, Ghaffarzadegan, Larson, and Hawley explored how education can be understood as a complex system. The authors argue that education is not simply a matter of individual teachers and students working together but is a complex interplay of multiple factors, including government policies, cultural beliefs, and social networks. Pulling on complex systems ideas, the authors explore how different elements of the educational system interact with and influence one another and how shifts in one part of the system can hold far-reaching consequences throughout the whole [6].

These implications must be discussed as they shape classroom dynamics and facilitate justice, equity, diversity, and inclusion (JEDI) goals. We postulate that there is additional room for discussion in this space which we aim to add to with our findings.

Methods

Participants

500 micro-narratives from underrepresented engineering students were collected from June to July 2020. Participant recruitment and the detailed use of the SenseMaker platform that was used for data collection and preliminary data analysis are outlined in [7]. In summary, SenseMaker is an online mixed methods data collection tool that prompts participants to share a narrative and then answer quantitative questions immediately afterward. This method of data collection encourages the participant to think critically about the narrative they shared within the context of the quantitative questions that are developed using a theoretical framework. The stories shared in this work are from participants who granted permission for everyone to read [8].

To answer our research question "*What were the experiences of Black engineering students at the beginning of the dual pandemic?*", a high-level thematic analysis was conducted on the stories of participants who 1) identified as Black and 2) mentioned keywords such as the *dual pandemic, police brutality, racism, and George Floyd.* indicated they would like their professor to know about their experience. For Criteria 1, a little more than 50% of the participants identified as Black (including Mixed Race). Of those participants, there were 17 instances that included the keywords identified by Criteria 2. In the following sections, we will highlight the seven major themes that resulted from these stories which are outlined in Figure 1. Examples of these experiences are presented in the next section for participants who indicated that their stories could be shared publicly. The legend for how we have labeled our participants can be found in Appendix A.

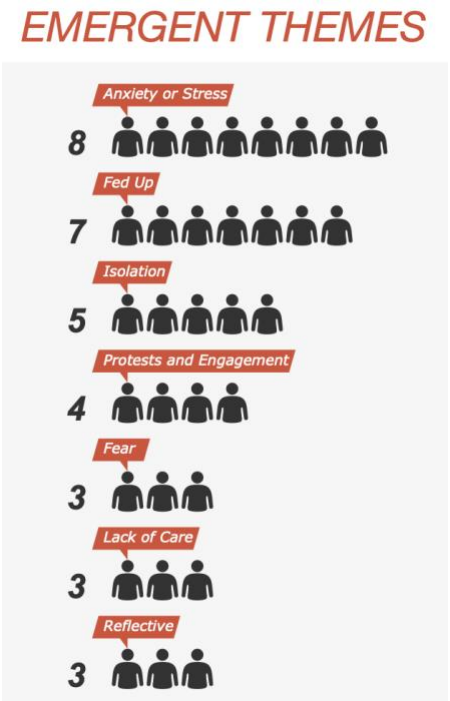

Figure 1 : Qualitative themes and number of occurrences

Results

Quantitative Results (Demographic Overview)

Some of the demographic data that we collected from all participants include race, gender identity, major, year in school, institution type, home location, and family income as well as asking participants how they felt about their experience during this time. Figure 2 will include all participants to demonstrate the total racial breakdown, however, Figures 3 – 9 will focus primarily on students who met Criteria 1 for the purpose of this paper.

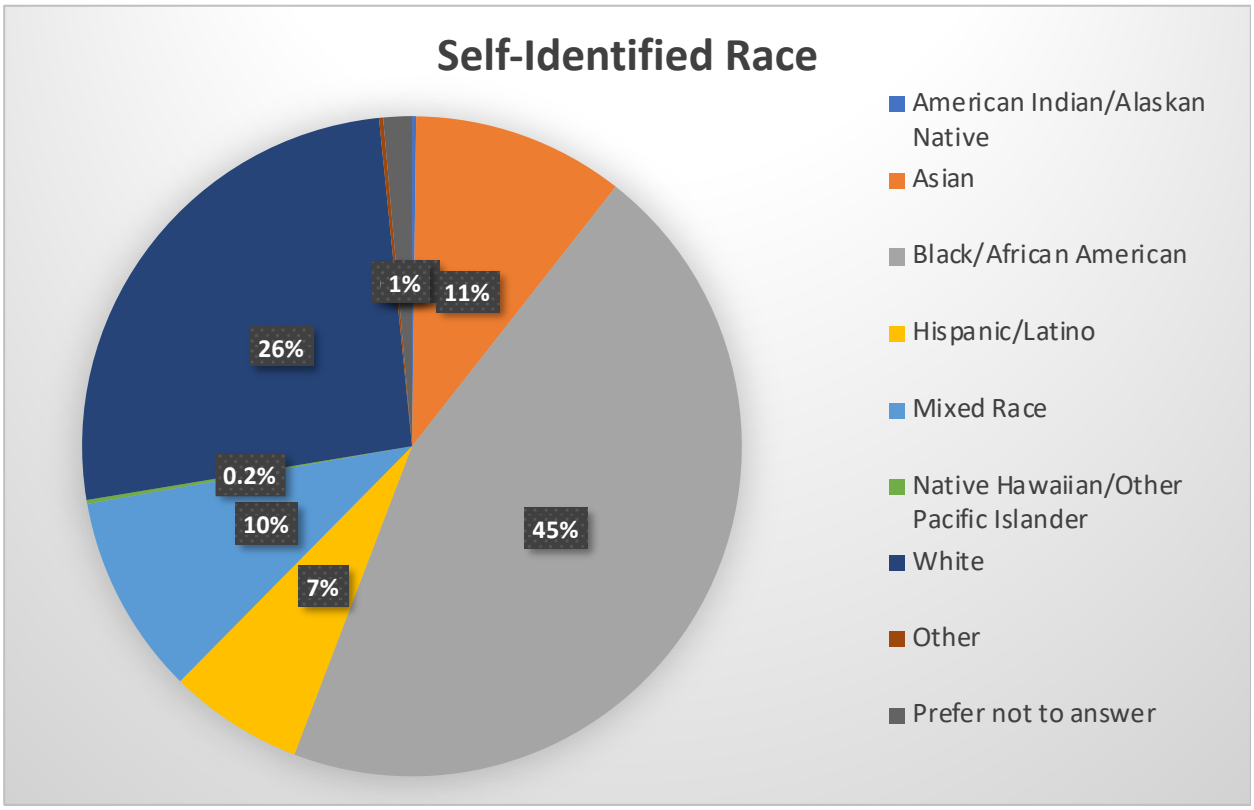

Figure 2 : Racial breakdown of participants

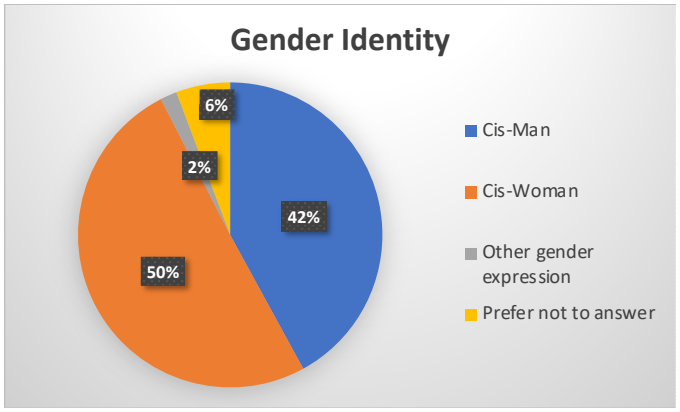

Figure 3 : Gender identities of Criteria 1 participants

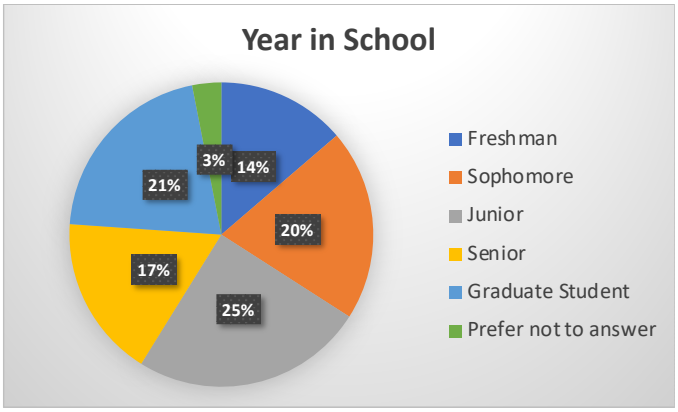

Figure 4 : Year in school of Criteria 1 participants

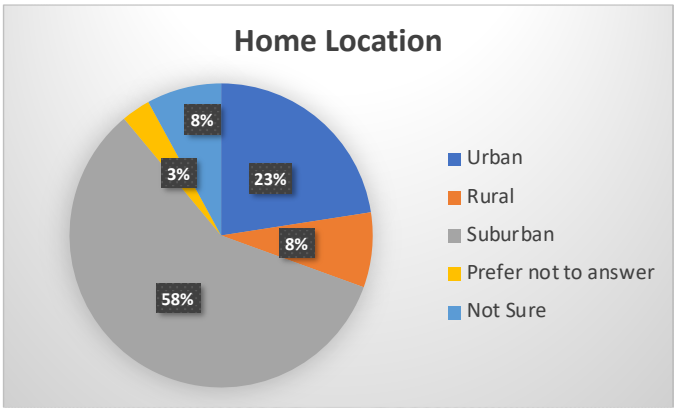

Figure 5 : Home locations of Criteria 1 participants

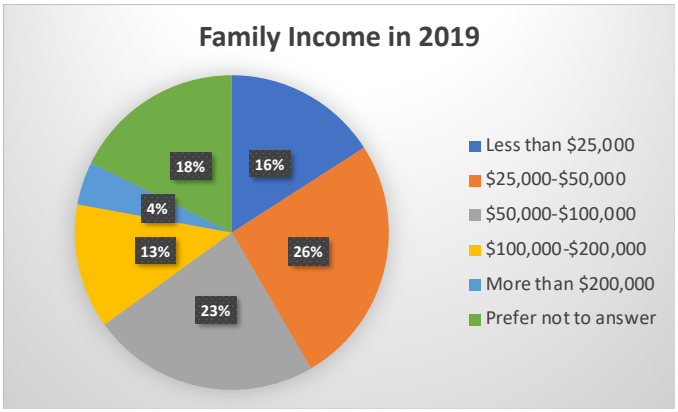

Figure 6 : Family income in 2019 of Criteria 1 participants

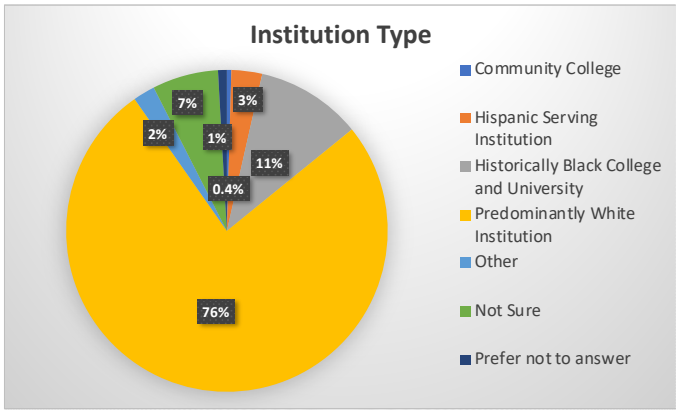

Figure 7 : Institution types of Criteria 1 participants

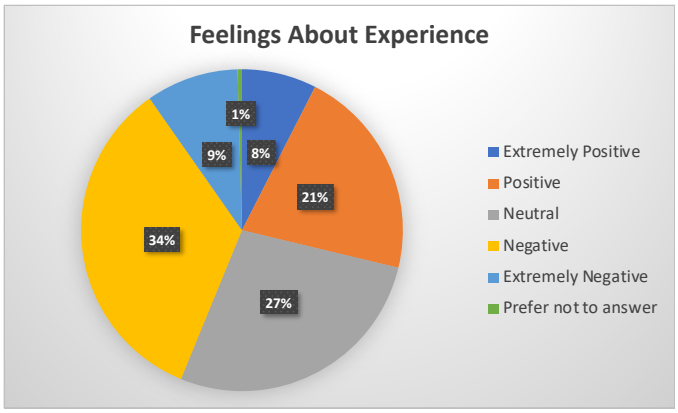

Figure 8 : Feelings about experience of Criteria 1 participants

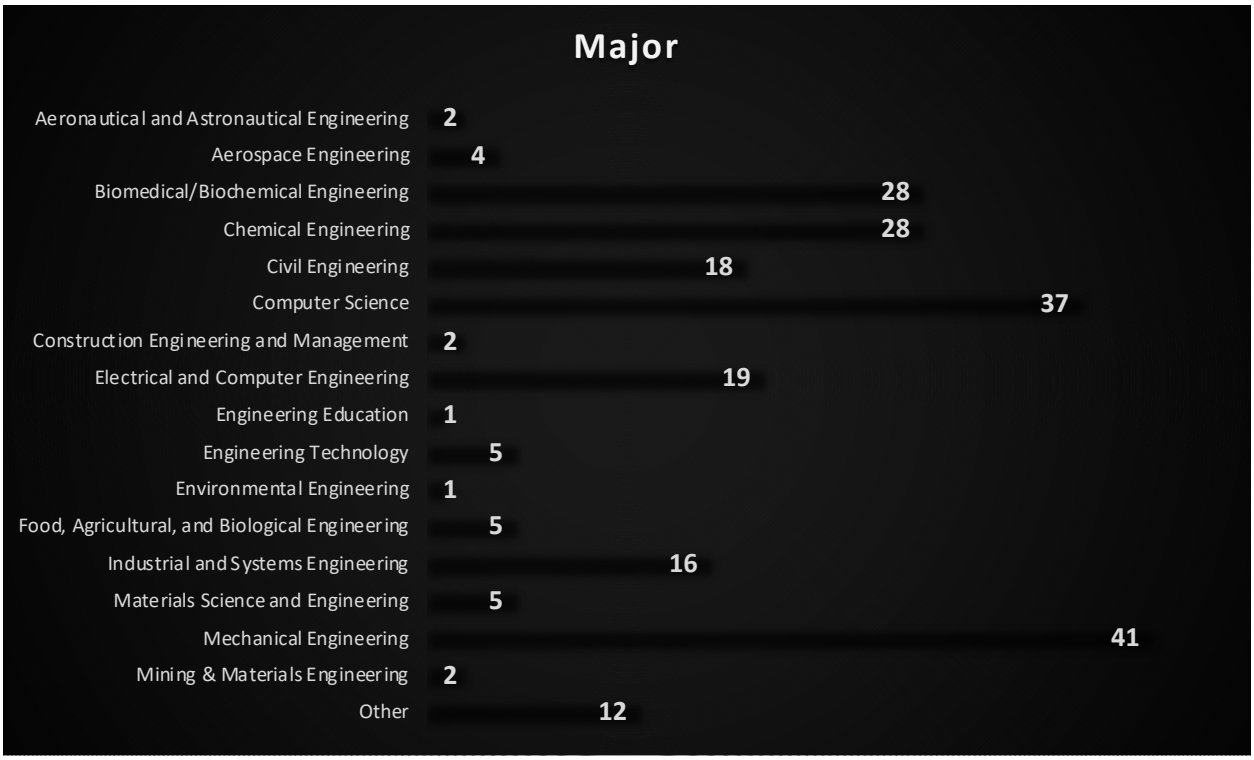

Figure 9 : Majors of Criteria 1 participants

Qualitative Results

1. Anxiety or Stress

Eight stories that indicated being stressed, weary, nervous, etc. were categorized under the theme of "Anxiety or Stress". Participants shared worrying feelings regarding the death of people that looked like them such as [G3-2F3-U1] who stated "This has caused me great stress knowing that there are literal people suffering and dying because they're being denied care because of the color of their skin or folks out there on the front lines as essential workers" and [G4-1F2-6S] who shared "I have been greatly saddened and overwhelmed because of what is going on in the world as it relates to racial injustices."

2. Fed Up

"Fed Up" was defined as feeling tired or disgusted beyond endurance. Of the seven stories analyzed, many participants experienced this sentiment due to the events of the dual pandemic. One participant gave this explicit perspective: "I think in the time of this, people are focusing more on the increase of police brutality and all the symptoms that come with the white supremacy

capitalist patriarchy. People are fed up." [G3-2F3-U1] Another participant shared that "So many young, African American adults like myself share my frustration and restlessness during this time and want to see changes being made in response to the death of George Floyd." [F1-6F2-6S] Other participants shared stories that did not mention frustration explicitly but still shared responses like the others. An example of this is by [J6-2F0-3S] who shared "But I do not know what this Nation stands for anymore and a Nation that stands for nothing is not a Nation."

3. Isolation

Five stories mentioned "Isolation", which was defined as being separated from others and while the nature of the global pandemic required isolation and quarantine for safety, some participants felt an additional layer of isolation due to the increased racist events during this time. [S2-1F3-6N] shared the following story:

> *As an engineering student, it is already hard for me to find/make friends in my classes. So, the transition from in-person classes to everything being online for the new quarter was difficult. I feel like it would have been easier if the transition happened in between a quarter because I would already have relationships with some students and the professors in those courses. However, it did not, so connecting with my peers was difficult. As the quarter came to a close, and finals started to creep up, I was really looking forward to finding a study group/buddy. […] Being that the classes I really needed to study for were my Computer Science classes, that rarely have any Black people in them, I was nervous to reach out. Due to my past experiences with racists zoom-bombing zoom calls, I was afraid to experience that traumatic event again so I held out on reaching out to others.*

Another participant [F1-6F2-6S] shared a similar story when they wrote:

> *While I have been isolated at home, away from my peers, professors, and college community, I have had much time to evaluate the global events taking place. I have found myself deeply troubled by the way members of my local community have responded to the issues that have been brought to light in the recent days, and, frankly, it makes me weary and concerned at what lies ahead of me as an African American woman seeking a career in engineering.*

4. Protests and Engagement

"Protests and Engagement" was defined by participants who shared four instances about the protests in general, their participation in the protest, and/or general engagement with activities during this time. One participant stated how they were unable to participate in the protests when they shared "Protests erupt all over the country because people who look like me are subject to dehumanization and murder by the police. I'm still working from home. I can't go to protests" [G3-2F1-4S] Another shared being overwhelmed which thus led to a general lack of engagement with anything during this time. "I am not even sure how to stay engaged in the issues at hand while continuing to be a student." [F1-6F2-6S]

5. Fear

Three instances of "Fear" were shared which was defined as being afraid to engage with their present or afraid of their future due to their identity as Black people in the U.S. One participant [F1-6F2-6S] shared the following story about their fear of engaging in their present:

> *I'd like to think that most of my peers and faculty members do not support the aggressively racist mentality that some individuals in our country have; however, I am almost more concerned about the racist microaggressions that may be communicated unknowingly. These microaggressions may even be more harmful than the outward attack on the marginalized because they only perpetuate the denial of the institutionalized oppression that so many are protesting against today.*

They further went on to discuss their fear to engage with their future by stating "I wish I could have the assurance of knowing that, when I do return to school, and even further in the future when I begin my work as an engineer, the people around me will understand the challenges present to the African American community and commit themselves to creating change." The story shared by [S2-1F3-6N] was also coded as "Isolation" and thus will not be included again here to reduce redundancy.

6. Lack of Care

"Lack of Care" was defined by three instances where participants shared that they were engaging with someone or perceived society as not having enough empathy given the dual pandemic. One participant shared the following story:

how do you tell your only Black student, that everybody else is going through the same things that I am? I had to explain to him how the pandemic affected African American communities the most, and that just in life in general, nobody of a different race will EVER have the same experience as me. I did not like how he downplayed my whole situation and experiences, and his word choice of me looking for a "break." He disregarded my whole situation and did not care that my family was struggling financially, I was dealing with my cousin's death, my community being affected, my mental health, and just well being in general. To make a long story short, no matter how much I tried to explain it to this Professor, he did not care. [J7-1F1-3S]

7. Reflective

"Reflective" was defined by participants who shared three instances in which the events of the dual pandemic gave pause to "normal" life and enabled people to think more about the realities of others; realities that they may have never given much consideration to otherwise. An example of this is seen by one participant who shared "I believe with the cancellation of most major sporting events or anything with a gathering of large crowds, we are forced to look at these things a bit more." [G3-2F3-U1], another who shared "I think the greatest challenge that I have experienced as our community grieves the loss of George Floyd and many like him is the challenge to engage in conversation and find community support in quarantine isolation. […] While I have been isolated at home, away from my peers, professors, and college community, I have had much time to evaluate the global events taking place." [F1-6F2-6S]

Discussion and Future Work

While many students struggled during this time, Black students seemed to carry additional burdens due to COVID-19 (both financial and personal implications of a global health crisis), the filmed executions of Black people, and the rigor of engineering which is often coupled with isolation due to being one of few or the only. Even though the results of this analysis reflect a small portion of the overall data sample, these stories are important and deserve further exploration. It is worth reiterating that the stories shared in this paper were provided unprovoked given the broad scope of the original prompt provided to participants. Thus, we suspect that there may be many more stories like those presented in this paper that has yet to be shared simply due to the lack of empirical exploration. Our findings also unfortunately are aligned with a campus climate study

conducted by Brown, Morning, and Watkins, whose results indicated that Black/African American engineering students had negative perceptions relating to racism and discrimination and those perceptions became increasingly more negative the longer they were in school [9], [10]. The fact that racism and discrimination against Black/African American students are still prevalent almost 20 years later is an indicator of the work that still needs to be done to eliminate this experience for this population of students, especially since racism and discrimination negatively impact on Black/African American students in various areas such as academic experiences, social experiences, institutional commitment, and persistence [11]. Additionally, the lack of empathy felt by Black engineering students in the classroom seemed to be more tangible evidence of the misalignment of universities' efforts to diversity, equity, and inclusion; efforts of which were only seen through statements released after traumatic events impacted the Black community nationwide [12].

Using the SenseMaker platform for this study presented unique differences in how it has been employed in industry settings [8]. SenseMaker is a great opportunity for a research study to gain qualitative and quantitative insights quickly and widely. However, in broad studies such as this one, using the data iteratively to create meaningful, positive shifts in the data is more challenging given 1) there is no guarantee that the original participants would be able to give specific feedback on the overall data and trends and 2) a variety of systems are involved for our participants that could delay positive changes based on data and trends (i.e. one school may be more comparable to one company than assessing all PWIs or all HBCUs). Through dissemination efforts (webinars, seminars, publications) we are working to combat the first limitation, so while we were unable to know if we were speaking with anyone who participated in the survey, we have spoken to those who were eligible to participate in the study if they received the call for participation during the data collection period. The second limitation is beyond our control given that we can provide recommendations based on our findings but acting on those recommendations would be up to the administration of individual institutions. It is also important to note that when considering using SenseMaker for a research project the ability to probe deeper into a particular aspect of one's experience is limited, and researchers' conclusions should be supported by existing literature when participants' narratives do not explicitly state factors that influence their experience.

Conclusion

The COVID-19 pandemic has had an unprecedented impact on higher education institutions. For Black engineering students, this impact was further exacerbated by the change to virtual instruction, increased difficulty of courses that were already rigorous, and managing additional personal responsibilities such as finances and caretaking. Our findings show that many students had less than positive experiences during this time as students managed the aforementioned challenges and lived in a country built on anti-Black racism. As we move forward since the inception of COVID-19, it is important that we continue to dismantle the oppressive systems that impact Black engineering students on and off university campuses.

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Appendix A – Participant Label Legend

(class)(major)-(gender)(feelings)-(income)(home)

Class

F – Freshman

S – Sophomore

J – Junior

L – Senior

G – Grad Student

Gender

1 – Cis – Woman

2 – Cis – Man

3 – Non – Binary

4 – Trans Woman

5 – Trans Man

6 – Prefer Not to Answer

7 – Other

Income

1 – Less than $25,000

2 – $25,000-$50,000

3 – $50,000-$100,000

4 – $100,000-$200,000

5 – More than $200,000

6 – Prefer not to answer

Major

1 – Mechanical Engineering

2 – Computer Science

3 – Biomedical/Biochemical Engineering

4 – Civil Engineering

5 – Electrical and Computer Engineering

6 – Chemical Engineering

7 – Industrial and Systems Engineering

8 – Aero- Engineering

9 – Materials Science and Engineering

10 – Food, Agricultural, and Biological Engineering

11 – Environmental Engineering

12 – Mining & Materials Engineering

13 – Engineering Technology

14 – Other

15 – Engineering Education

16 – Construction Engineering

Feelings About Experience

F5 – Extremely Positive

F4 – Positive

F3 – Neutral

F2 – Negative

F1 – Extremely Negative

F0 – Prefer Not to Answer

Home Location

U – Urban

R – Rural

S – Suburban

N – Not Sure

P – Prefer Not to Answer