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Students' Perceptions of their Engineering Identity Development and REU Summer Program Experiences: An Equity-Centered Analysis

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Abstract— **In this research paper, we contribute to extensive research that suggests hostile racialized and gendered engineering climates can negatively affect students of color and women, as they often experience racial microaggressions, stereotype threat, isolation, exclusion, and feelings of not belonging. Research suggests providing historically marginalized and underrepresented students with opportunities to develop their engineering identity may improve their sense of belonging and confidence in their skills and abilities, especially when coupled with structured support through undergraduate research experiences and mentorship. Past research has examined engineering students' participation in research experience undergraduate programs. Further, we contribute to the research literature with our focus on students' experiences before they enter the program, which can shape their engineering identity development during their mentored undergraduate research training. We draw on a larger multi-year sequential explanatory mixed methods case study, and focus in this manuscript on the qualitative data and analysis. Employing a case study research approach, we use individual interview and survey data to examine five undergraduate students' engineering identity development as it relates to their experiences in a ten-week mentored Research Experiences for Undergraduates (REU) summer internship program based at a Historically Black University. In this study, we assess the following research questions: (1) How do students make sense of their engineering identity in the context of their experiences in an REU summer internship program? (2) What academic and non-academic factors influence their engineering identity development? Milem et al.'s campus racial climate framework informs our study. This case study approach aligns with our conceptual framework as it allowed us to situate participants experiences and perceptions in their university context. Our study findings reveal students' participation in the REU summer internship program positively affected their engineering identity development as students developed increased confidence in their ability to conduct research and pursue a career in engineering. Additionally, students' interactions with mentors, faculty, peers, and community members seemed to influence their engineering identity development as well as their career and educational goals. Lastly, students' described how their families—and in particular, their fathers—shaped their engineering identity development. Taken together, our study indicates the importance of students' identities and supports as factors shaping their pathways through undergraduate research experiences and onward towards careers in these fields. Thus, structured mentorship opportunities including and beyond funded REU summer internship programs may encourage students to develop a plan to continue to develop STEM identities by participating in meaningful experiences and opportunities at their home institutions. Continued opportunities for personal and professional development may further create more equitable opportunities for students to develop. As such, grant funding and research opportunities may be allocated to creating more inclusive opportunities for undergraduates, even in the earlier stages of their studies, to aid in strengthening and support underrepresented STEM scholars' pathways to engineering degrees and careers.**

Keywords— undergraduate research, internships, engineering identity development, student success

I. INTRODUCTION

In this research paper, we explore the relationship between undergraduate students' engineering identity development and their experiences before and during a materials science REU summer internship program. Insufficient diversity in engineering—and STEM fields overall—may impede scientific advancement and stifle innovation [1]. Yet, people of color and women remain highly underrepresented in engineering. According to the National Center for Education Statistics [2], there have been slight increases between 1998 and 2018 in the percentage of engineering bachelor's degrees awarded to women (from 18.6% to 22.2%) and to Latino citizens and permanent residents (from 6.8% to 10.9%). Meanwhile, the percentage of engineering bachelor's degrees awarded to Black U.S. citizens and permanent residents decreased from 5% in 1998 to 3.9% in 2018. This entrenched underrepresentation suggests a persistent and systemic problem remains in engineering, as demonstrated in other recent studies [3], [4]. Accordingly, our research examines the experiences of students participating in a broadening participation intervention while attending to their prior experiences in engineering and how their postsecondary experiences in and beyond the intervention shape their engineering identity development.

Several factors may contribute to this systemic underrepresentation in engineering. Black, Latino, and low-income students typically have less access to advanced math and science courses in their high schools, which may negatively affect students' access and success in STEM higher education programs [5], [6], [7]. Notably, extensive research suggests overrepresentation of White and Asian men in engineering programs can perpetuate hostile racialized and gendered environments that harm students who hold disadvantaged or marginalized social identities [8], [9], [10], [1]. Such campus climates can negatively affect students of color and women, as they often experience racial microaggressions, stereotype threat, isolation, exclusion, and feelings of not belonging [11], [12], [13].

Researchers have also examined the engineering identity development of women and students of color who often experience invalidating engineering programs and accordingly may struggle to envision themselves as engineers [14], [15], [16], [13]. Research suggests providing historically marginalized and underrepresented students with opportunities to develop their engineering identity may improve their sense of belonging and confidence in their skills and abilities, especially when coupled with structured support through undergraduate research experiences and mentorship [17], [18], [19], [20].

II. METHODOLOGY

A. Purpose and Research Questions

Past research has examined engineering students' participation in research experience undergraduate programs, often with a focus on program evaluation. This qualitative case study adds to the existing literature by examining undergraduate students' engineering identity development as it relates to their experiences in a materials science REU summer internship program. Further, we contribute to the research literature with our focus on students' experiences *before* they enter the program, which can shape their engineering identity development during their mentored undergraduate research training. In this study, we assess the following research

questions:

RQ 1. How do students make sense of their engineering identity in the context of their experiences in an REU summer internship program?

RQ 2. What academic and non-academic factors influence their engineering identity development?

B. Conceptual Framework

Milem et al.'s [21] campus racial climate framework informs our study. Building on Hurtado et al.'s [8]-[9] seminal work, Milem et al. [21] posit a campus climate consists of the observations, perceptions, and attitudes of individuals as well as the institutional context. An institution's context includes the impact of historical inclusion or exclusion practices, the compositional diversity of the campus, the psychological dimension, the behavior dimension, and the organizational or structural dimension [21]. Additionally, internal, and external forces form and impact the campus racial climate and ultimately contribute to differences between institutions [8], [9].

Many higher education institutions primarily focus on the compositional diversity of their institution, or the racial and ethnic makeup of a campus. However, we primarily focus our data analysis on three areas of Milem's [21] campus racial climate model: (1) the impact of historical inclusion and exclusion such as segregation and desegregation policies and practices that affect the diversity of an institution; (2) the behavioral climate dimension which involves the social interactions that occur on campus, how individuals with different ethnicities and races interact, and the quality of intergroup interactions; (3) Lastly, we are interested in the structural practices and policies that benefit privileged groups, including curriculum designs, admissions policies, and tenure decisions. Focusing on these dimensions of the campus racial climate can assist us in understanding how students make sense of their experiences in engineering undergraduate research and their perceptions of institutional and structural factors which shape their engineering identity development and experiences in engineering programs.

C. Analytic Strategy

While the larger study is a sequential explanatory mixed methods case study (quan→QUAL→ quan) [22], [23], this manuscript focuses on the qualitative data and analysis. A case study research approach consists of studying one or more bounded systems, or cases, over time [24]. Using a case study approach allowed us to bound our analysis by the context of the REU summer internship program where our participants conducted their research projects. This case study approach aligns with our conceptual framework, as it allowed us to situate participants' experiences and perceptions in their university context. The interview questionnaire (see appendix) was piloted with a smaller group of earlier REU participants in a similar program, and draws on broadening participation theories such as those cited above to inform question item content and ordering.

D. Study Site

We leverage the diversity of a Historically Black University setting, where the REU program is a joint partnership with a neighboring public predominately white institution. In addition, at both campuses, Latino students comprise 20% or more of the undergraduate population. Multiple research institutes and national centers are affiliated with the REU program and its faculty. How do REU programs function? The National Science Foundation funds research opportunities for

undergraduate students through partnerships with structured research assistantships for currently enrolled U.S. college students, across the country. In this funded program, students are selected to participate in various additive manufacturing design, processing, and fabrication research projects. Over a ten-week program, students are mentored by faculty, post-docs, and graduate students, and participate in training via coursework as well as guided and tiered mentoring within and across materials science laboratories associated with project investigators and their teams.

E. Sampling

The sample included in this study consists of five representative students sampled from a larger group of 60 REU student participants surveyed and interviewed by the author team (Black and/or Latinx women) across five cohorts. These students were drawn from the most recent pre-pandemic cohort (Summer 2019), to limit potential noise associated with COVID-19 experiences and limit any cohort-year variation. We selected the five participants using maximum variation and criterion sampling to draw an intersectionally diverse sample by race/ethnicity and gender. While socioeconomic status and experiences did not inform the sampling design, identities beyond race/ethnicity and gender emerged as salient. Table 1 displays demographic and attributes data for each of the students included in the study sample. We included students from different types of institutions, as research suggests institution type may influence students' experiences [25], [26]. Three of the students attended HBCUs and two students attended predominantly white institutions (PWIs). Including a sample of students from different identities and backgrounds provided a more nuanced understanding of the ways students make sense of their participation in the FAMU-FSU REU Summer Internship Program and the ways their identity and background may shape and influence their experiences.

F. Data Analysis

The first author of this paper worked as a research graduate assistant under the direction of the second author who served as the REU summer internship program evaluator. The first author conducted the data analysis which consisted primarily of transcribed interview data. Each participant participated in a 30-minute interview with the program evaluator during the summer of 2019. We also used survey data to capture students' demographic information (e.g., gender, race, home institution). Lastly, we used data from institutional documents and observations to further triangulate our interview data.

The first author used NVivo software to analyze the transcribed data using two levels of coding. During first-level coding, she inductively coded the interviews by identifying high-level concepts and themes which emerged from the interview data [27]. To increase the trustworthiness of this study, the author used annotations to capture her evolving reflections, questions, and feelings [27], [28]. During second-level coding, the author used an iterative process of revising and combining

Table 1
Student profiles: pseudonym, gender, race, institution type, major, and year in college

Pseudonym	Gender	Race	Institution	Major	Year
Diego	Male	Black	HBCU	Mechanical Engineering	3rd
Alexandra	Female	Black	HBCU	Materials Science/ Engineering	3rd
Jocelin	Female	Black	PWI	Industrial Engineering	3rd
Sebastian	Male	White	HBCU	Electrical Engineering	3rd
Ignacio	Male	Latino	PWI	Chemical Engineering	2nd

the codes to better conceptualize and validate the emerging themes. Eventually, we narrowed down the findings to three major categories: REU summer internship program experiences, home institution influences, and family and community influences.

Despite our efforts to increase the trustworthiness of our study, there are some limitations worth noting. First, given our unique case study site, our findings may not be representative of students' experiences in engineering REU summer internship programs at other types of institutions (e.g., historically white institutions). Nevertheless, by using a purposeful sampling strategy, this study provides insight into students' perceptions of undergraduate research experience programs and their relation to their engineering identity development.

III. RESULTS

Our study findings reveal students' participation in the REU summer internship program positively affected their engineering identity development and provided opportunities for career exploration. Students also described how their experiences at their home institution and in their communities influenced their engineering identity development. We provide greater insight into these findings in the following sections.

A. RQ 1: REU Summer Internship Program Experiences and Engineering Identity

Students' participation in the REU summer internship program improved students' confidence in their ability to conduct research. Jocelin echoed these sentiments as she explained how her experience in the REU summer internship program challenged her and exposed her to engineering research: "it's just really cool to be able to not only do research and learn a bunch of things, but also step outside of my comfort zone, and do things I've always wanted to do." Jocelin went on to describe how excited she was to talk to professors about topics such as "*3D printing"* and *"carbon fiber."* By participating in the REU summer internship program, Jocelin was able to overcome the intimidating nature of engineering research and see herself as a scientist. Additionally, she benefitted from exposure to valuable resources and experiences she did not have access to beforehand thus broadening her participation in engineering and research.

In addition to increased confidence in their ability to conduct research and greater access to resources, students considered the engineering coursework and workshops they participated in

during the REU summer internship program to be beneficial. For example, Alexandra explained:

> *"I'm glad that I'm here, because I think it's going to help me a lot when I go back, and I'm taking those classes, because I won't be going in completely blindsided. Yeah. So, this has been a nice transition for me."*

Alexandra found the REU summer internship program coursework would help prepare her for future engineering coursework at her home institution. It seems her early exposure to engineering coursework in the safe and supportive environment created in the internship program increased her belief in her ability to persist in engineering coursework at her home institution.

In addition to increasing students' comfortability with engineering coursework, students also believed the REU summer internship program coursework, workshops, and mentored training provided opportunities for them to explore their educational and career aspirations. For example, Diego described the ways his participation led him to reconsider his major at his home institution:

> *"At first, I wanted to be a mechanical engineering major, and now, that I'm working with chemists and biomedical engineers, it's part of my interest, because the things that they could do and the solutions they can make."*

Diego's exposure to chemists and biomedical engineers on his research team seemed to spark a newfound interest in these fields and helped him refine his educational and career aspirations and plans.

In addition to exploring and refining career aspirations, some participants enjoyed building community and valuable social connections with individuals from their research teams. For example, Alexandra described feeling a sense of belonging as she collaborated with her research team and received support and direction along the way:

> *"[My PI] has been kind of more hands on with helping me, preparing everything last week, to actually get ready for my lab. And then there's also two other students...and so we're kind of all working on different aspects of the project, but we all have the same common goal. So, I like that. I like having my little team, so even though they're not doing the same specific thing as me, I can go to them for any advice, or questions that I might have."*

Having support from her mentors and PIs contributed to Alexandra's positive experience in the REU program and may have also contributed to a positive research climate that helped foster her self-concept and confidence in her ability to conduct research.

While most students like Alexandra described having overall positive experiences in the REU summer internship program, some students described some frustrations with working with their mentors and PIs, specifically at the start of their research project. Students described wanting more direction and support in choosing a research topic and understanding important engineering concepts. However, in some instances, graduate mentors stepped in to support students such as Alexandra who explained:

> *"Being able to talk with [them] really helped me get through that, because they were feeling the same way. So, I was like, 'Okay. Well, I'm not crazy….' So, we kind of helped each other to figure it out. Yeah, we helped each other through it."*

Collaborating with her mentors also helped quell feelings of self-doubt about her ability to conduct research, as some of her mentors shared similar frustrations surrounding their research project. Additionally, these experiences may have assisted Alexandra in learning how to overcome obstacles during the research process by leaning on support from her peers and mentors.

In summary, autonomy from mentors is appreciated, but structured opportunities for support from other mentees and supervisory staff may assist students towards success and help increase their self-efficacy or their confidence in their ability to conduct research and understand complex engineering concepts.

B. RQ 2A: Academic and Home Institution Influences

Students also reflected on the ways their experiences at their home institutions shaped their engineering identity development as students interacted with faculty, students, athletic departments, and clubs and organizations on campus. For example, Jocelin described building leadership skills by taking on elected roles in her engineering student clubs, while Ignacio mentioned building technical experience and skills as a member of his engineering student club through competitions and projects:

> *"So, we're going to go to Nationals, which is going to be here, actually, in Florida. So, I come back in October, I think. So, I mean, that's what I've been doing, and I helped build the power source for the car."*

For both Ignacio and Jocelin, their involvement in student engineering clubs helped them develop valuable skills and engineering concepts they otherwise may not have been exposed to.

Students also made sense of their experiences having to manage competing responsibilities and described the ways their social networks supported them and helped them persist. Diego explained the difficulties he experienced as a student-athlete juggling his academic responsibilities, "At first it was extremely hard, because you have practice at six every day, and then to go to classes and, you know, so…." He went on to explain that he formed a study group with his teammates who were also studying engineering:

> *"We studied together and all that. Sometimes, what we used to do is when…since it's three of us, one person is too tired, one person stays up, and they're the next of us to sleep, and then we'd just rotate during the semester."*

He explained that having this group helped him better balance his academic and athletic demands.

Students' support systems included not only peers but also mentors and faculty. Alexandra spoke about how she doubted her ability to succeed in a biochemistry course until her mentor encouraged her to step outside of her comfort zone. Alexandra went on to explain:

> *"So, chemistry was not my favorite thing at all. [Laughs] So I was a little skeptical, but the research was biochem, so it was kind of in between, and plus, I really like my mentor. So, I was like, "Okay, I'll trust that I'll be okay."*

This encouragement and mentorship helped increase Alexandra's confidence in her ability to succeed in an advanced engineering course and gave her some comfort knowing her mentor would support her through the process.

Faculty were also influential in exposing participants to career and professional opportunities in engineering. For example, Sebastian described the influence one of his professors had in exposing him to graduate school opportunities and shaping his self-concept as an engineer and future scholar:

> *"And, really, having him as a professor kinda sparked my interest in getting a Ph.D. just because seeing him as a role model for me, seeing the things he's done, it's really great*

opportunities coming down through that program."

Sebastian was able to relate and identify with his professor which increased his confidence in his ability to pursue a graduate education. Additionally, Sebastian's professor's accomplishments inspired Sebastian and helped him believe he too could achieve academic and career success in engineering.

Students also described the ways institutional practices and programs shaped their engineering identity development as students were given opportunities to explore academic and career opportunities in engineering thanks to programming aimed at increasing access and success in engineering for historically marginalized populations of students. For example, Alexandra explained the influence her program had on exposing her to the materials science field and ultimately assisted her in choosing her minor:

> *"So last December, I decided to add a minor in material science and engineering. There's just a program at my school that pushes STEM students to get involved in the material sciences, so that's why I did it. And yeah, again, I kind of had this fear. I didn't know how it was going to go, because I know I wasn't an engineer, I know that's really, really math- and physics-based."*

As a biology major with plans to attend medical school, Alexandra felt she *"wasn't an engineer"* and was hesitant to pursue an engineering minor out of fear that she may not succeed in the engineering coursework. However, her confidence in her math skills coupled with encouragement from her program helped her overcome her fears and improve her confidence as she began to develop her engineering identity. In addition to academic and institutional factors, students also described the influence their families and communities had on their engineering identity development and their career and educational aspirations.

C. RQ 2B: Family and Peer Influences

Students' families—and in particular, their fathers—shaped their engineering identity development. Students discussed the ways their families and communities helped spark a love for STEM from an early age and led students to ultimately study engineering in college. For example, when asked when he first started to think of himself as a scientist or engineer, Sebastian explained the ways his dad inspired his love for engineering:

> *"When I was six years old, maybe, I don't know. My dad was a mechanical engineer, and just saw some fun projects he was doing and thought, "Wow, that's really cool." You know, it'd be fun to do."*

Having exposure to mechanical engineering from an early age had a profound impact on Sebastian's love for science and his self-concept as Sebastian believed a career in engineering was possible for him. Similarly, Alexandra described the ways her dad exposed her to STEM at an early age:

> *"He used to try and get us interested in stuff like that, and I remember at Home Depot, on the weekends, they used to have this thing where you could go and build different things. They would teach you how to build things. Like, we built cars, and then we raced them, little wooden race cars. Yeah. So I guess he kind of instilled that engineering-ish thing in me from a young age. I never really thought about that."*

By exposing Alexandra to science programs from an early age, Alexandra's dad helped foster her interest in constructing and creating things. For both Sebastian and Alexandra, their fathers helped cultivate their love for STEM as children thus creating a nurturing and supportive

environment that helped strengthen their engineering identities and ultimately influenced their decision to study engineering in college.

Students' peers also affected their engineering identity development as their peers often influenced their decision to pursue a degree in engineering. For example, Alexandra shared how her decision to minor in materials science engineering stemmed from her realization that she would have a friend in her minor that could help support her:

> *"I had another friend who was going to do the minor, as well, so I knew I would have her to help through it. So that was where engineering came into play. That's a more recent part."*

As a biology major, Alexandra worried the engineering coursework would be unfamiliar or difficult. However, having peer support encouraged Alexandra to pursue an engineering minor despite her hesitation and helped increase her confidence in her ability to persist in engineering coursework. Similarly, Ignacio described the influence his friends had on his decision to return to college to study engineering after graduating from high school and entering the workforce.

> *"I think it was it was probably with my ex-girlfriend and meeting her friends. And all her friends were engineers, surgeons, —or like on their way— lawyers. And I was thinking, "I could probably do this also." Like if they could do it, I could probably do it as well."*

Ignacio's exposure to STEM professionals in his peer group helped improve his self-concept as he believed he too could succeed in a STEM career and encouraged him to pursue an engineering degree. Taken together, having peer support seemed to be crucial for students' engineering identity development as seeing their peers major in engineering and other STEM majors increased their confidence in their ability to succeed in an engineering program and pursue a career as an engineer.

Students also expressed the ways their peers exposed them to valuable resources and information. For example, Sebastian expressed how his friends exposed him to an REU summer research program at his home campus:

> *"So, I think, the way I found out about it is I had roommates that were actually participating in this program, not in <u>this</u> program … and they kinda mentioned some of the work they were doing there. So, I reached out to [their mentor], and I kinda got a feel for the program that wasn't during the summer to see what kind of research they were doing and whatnot. And so, that's where it kinda sparked my interest."*

Thanks to Sebastian's social network of peers, he was exposed to research opportunities which ultimately sparked his desire to conduct research.

Across our analyses, students' interactions with mentors, faculty, peers, and community members seemed to influence their engineering identity development as well as their career and educational goals. Next, we discuss the implications of these findings and offer recommendations for research and practice.

IV. DISCUSSION

While research on student success in materials science and engineering often focuses on skills and motivation—individual-level characteristics—our qualitative case study indicates the importance of students' identities and supports as factors shaping their pathways through undergraduate research experiences and onward towards careers in engineering fields. Notably, we observed that STEM and engineering identity development were distinct among some of our students, who found their engineering identity take shape later, including during their engagement in engineering peer

networks, mentoring relationships, and research activities. Moreover, we found that students currently involved within campus organizations with an emphasis on STEM identity development may be particularly poised to be successful in STEM majors/careers than those who do not. Despite this, students may have difficulty engaging in and feeling successful in mentored research opportunities which may further their STEM and engineering identity development. Resilience when encountering such obstacles may be especially important when managing pressing financial, social, or familial responsibilities [29]. Such challenges may be especially felt by students from racially minoritized backgrounds, who experience cumulative disadvantage from systemic disparities in access to hands-on STEM programs and learning opportunities [30].

Thus, structured mentorship opportunities including and beyond funded REU summer internship programs may encourage students to develop a plan to continue to develop STEM identities by participating in meaningful experiences and opportunities at their home institutions. Continued opportunities for personal and professional development may further create more equitable opportunities for students to develop. These may include participation in mentorship programs with industry professionals and recent graduates. Mentorship opportunities may be less accessible for historically marginalized students, as they tend to recruit and select students who are available to volunteer or intern in laboratories without pay or at hours that conflict with on- or off-campus paid work or other obligations [4]. The dual crises of ongoing racial trauma and the COVID pandemic especially affected students of color and low-income students [31], [32]. Such students may be especially well-positioned to benefit from mentored laboratory research opportunities.

Despite targeted efforts to increase diversity in STEM fields over the past few decades, student recruitment and retention remain a challenge at multiple stages within the pipeline. This is concerning for engineering as well as potential engineers, given research that suggests young adults who earn STEM bachelor's degrees or higher experience greater economic outcomes (e.g., median income) than individuals who earn non-STEM degrees [33]. Given the first and second years of undergraduate study are when most underrepresented students switch away from STEM programs within their freshmen or sophomore years, more research should be done to understand the influence of participating in structured research programs during the early years of college enrollment [34]. As such, grant funding and research opportunities may be allocated to creating more inclusive opportunities for undergraduates, even in the earlier stages of their studies, to aid in strengthening and supporting underrepresented STEM scholars' pathways to engineering degrees and careers.

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APPENDIX A: INTERVIEW GUIDE

1. What year of study are you starting this fall?
2. What is the primary university institution (where are you enrolled?):
3. How did you find out about [this] program?
4. Have you ever done anything like this program before?

Next, these questions ask about your personal experiences in engineering knowledge, skills, and courses.

5. When did you first start thinking of yourself as a scientist or engineer? Do you remember?
    a. Can you tell me a little more?
    b. What is the first time you thought you could or should be an engineer?
6. Has your interest in engineering changed over time?
    a. Can you tell me more?
    b. Has this changed while you've been at school here?
        i. Tell me more.
7. Are there any other career paths you have considered?
    a. Like what?
    b. When?
    c. How did you think of that?

The next questions ask about your personal and professional goals.

8. How important is it to you to be a scientist or engineer, in your career?
9. How if at all has your experience working with this research group affected your career goals?

Which engineering field are you majoring in?

When did you become interested in this major or intended field of study?

Can you tell me about your earliest experience in an engineering course? What was it like?

Have you been involved in any student organizations relating to engineering or STEM more generally? In high school or in college?

Now, specifically with respect to the REU Scholars experience.

Can you tell me about the activities you've been involved with this summer?

What group were you in?

What has your role been in developing the projects you're working on?

Is there anything specific you learned about that you didn't know about before?

It's often challenging working in a group. What has your experience been like in the lab groups? What has your housing been like this summer? Are you living with other RISE scholars? How has that been?

Many students experience financial and housing challenges during the academic year, as well as the summer.

Sometimes the commitment it takes to be in a lab can prevent you from paid work and work study. Could you tell me a little about your financial experiences during the past years here, and currently?

There are entrepreneurship trainings this summer. Do you see yourself as an entrepreneur? How so? Why?

How if at all has this experience affected your career goals, at this point in the summer?

Finally, it would be helpful to have a little more information about you.

Are you an international student?

Are you or have you been an athlete?

How would you describe your race or ethnicity?

How would you describe your gender?

Could you tell me a little about the high school you attended and the math and science courses you took there?

Is there anything else that would be helpful to know?
Would you be interested in a brief follow-up interview later in the summer?

Thank you for your time and honesty!