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WIP: Exploring First Generation Engineering Technology Students Acquisition of the Engineering Identity

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Abstract

This paper is a work in progress (WIP) for an NSF project that explores first-generation students (FGS) in engineering technology (ET); specifically, their academic performance, engineering identity development, and use of social capital all compared to continuing generation students (CGS) peers. Despite the growing number of engineering technology degrees awarded annually, there is a scarcity of research focusing on the acquisition of engineering identity, particularly among FG students. Overall, this project will utilize a two phase, mixed methods approach. In the first phase, we will quantitatively assess academic performance comparisons between first generation and continuing generation engineering students and utilize the theoretical frameworks of engineering identity development [1] and social capital [2] to explore their experiences. In the second phase, we will delve into qualitative methodologies in order to gain a deeper understanding of the experiences of selected students. The goal of the project is to inform the design of a robust program to enhance support for ET students as they progress in their programs, utilize their forms of capital, and develop an engineering identity. The data collected will also allow an understanding of their development as it relates to demographic information such as first-generation status, race, gender, age and more. Within this paper, we outline our project at its current state, in order to draw feedback and support from the ET community.

Introduction

Engineering Technology programs, including both two year and four year tracks, continue to grow. Engineering and Engineering Technology by the Numbers [3] published that there were 14,312 degrees awarded in the year 2019 alone. These degrees come from 111 institutions that grant Engineering Technology degrees [3]. Despite the considerable number of degrees awarded in Engineering Technology disciplines, there is little research conducted on the experiences of Engineering Technology students.

Like Engineering Science degree earners, Engineering Technology students may test for professional engineering licensure in 35 states. Although the procedures in testing for a license may vary, Engineering Technology graduates may pursue careers as professional engineers. The interests and career pathways of engineering technologists are analogous to engineering science degree earners. Despite the growth in engineering technology programs and overlap in career pathways, there is little research conducted to understand the experiences of engineering technology students. In order to begin research for the experiences of ET students, the focus was narrowed to understanding first-generation students and continuing generation students.

With this two year project we seek to address the following research questions:

1. To what extent do the academic performance metrics of first-generation engineering technology students compare to the performance of continuing-generation peers?

2. How do first-generation engineering technology students conceptualize and consolidate their engineering identity as part of their education as compared to their continuing generation peers?
    a. How do first-generation engineering technology students describe their engineering identity development?
3. How do first-generation engineering technology students understand and leverage forms of capital to persist in their program as compared to their continuing-generation peers?
    a. How do first-generation engineering technology students describe their uses of social capital within their engineering education?

Literature Review

First Generation Engineers

First generation students in colleges and universities have been studied to understand their experiences by various researchers. From these studies, it was found that FGS students experience difficulties with academic integration [4], [5], struggle with adjustment to rigors of STEM [4], feelings of alienation [5], higher levels of stress [5], and mental health challenges [5], [6]. Furthermore, systemic barriers such as difficulty with gatekeeping courses early on in STEM majors [7], [8], lack of preparation by high schools for the level of rigor [7], [9], and that FGS disproportionately come from low-income backgrounds which produces more challenges throughout college were found. These barriers make it difficult for first generation students' path toward persistence and degree completion.

First generation students who persist in engineering and STEM, did so through personal agency [9] motivation [9], self-efficacy [10], [11], familial support [9], [12], [13], and institutional support [9], [13], [14]. It was found that often these support relationships were related; parental support predicted student engagement, and strong familial relationships resulted in willingness to seek mentors and support in college [12]. Sense of belonging was also a crucial factor for persistence. Smith and Lucena [15] found that first generation and low-income students experience a lack of sense of belonging in engineering, and that these students were aware of perceived differences between their continuing generation peers. Nevertheless, these students brought assets to the program through their life experiences and felt a sense of belonging when these strengths were recognized by faculty [15], [16]. It was also found that faculty and peer mentoring, and first year communities positively influenced a sense of belonging, confidence, and identity development for FGS [14], [16], [17].

Engineering Identity

Identity is constructed from how one recognizes self, and how others recognize them. A widely studied topic, engineering identity, is developed through one's sense of interest, recognition, and performance or competence in engineering [1], [18]. Much of the topics of focus have been on persistence in engineering as noted by Choe et al. [19], Godwin & Lee [18], and Morelock [20]. Engineering identity development is an important topic to study within engineering education

because of its educational and vocational outcomes [1], [21], [22], [23], [24], [25], [26], [27], [28], [29].

Environmental factors, such as campus culture, affect an engineer's identity development [21], [22], [30], [31], [32]. Tonso [22] suggested that campus culture and organization of life within the engineering campus played a key role in how engineering project teams operated. Fleming et al. [30] found that the sense of community for Black and Hispanic students at a minority serving institution (MSI) provided support for successful engineering identity development, leading to persistence and retention in the profession. It was also found that the culture of higher education highly affects mental health, and that engineering students' mental health is an urgent concern because of high levels of stress, anxiety, and depression [33].

For first generation college students, engineering identity had a positive effect on students' sense of belonging, which in turn had a positive effect on persistence and effort within engineering [34]. Determination and continuation of effort was present for FGS when they saw themselves as the kind of person that can do engineering and feel a sense of belongingness in the field [34]. Although this study by Verdin et al. [34] looks at the relationship between engineering identity, grit, and sense of belonging, it does not look at the specific factors that contribute to identity development. To our knowledge, no studies have assessed what fosters and supports engineering identity development for first generation college students in engineering technology.

Social Capital

Outside of engineering, the concept of social capital has been widely studied and conceptualized in various ways (e.g. Bourdieu [35], [36]; Colemen [37]; Lin [38]). Social capital are the assets, relationships, and resources that have potential to advance an individual. Within engineering, social capital has been addressed for various demographic groups. Skorvetz et al. [39] surveyed 11 engineering programs across the U.S. for the social capital among different demographic groups. They found few differences between genders, but many among ethno-racial groups, which suggests varying levels of social capital could influence students' persistence and retention [39]. Martin et al. [2] studied the experiences of Hispanic women with Lin's [38] theory and found that school personnel, peer groups, and institutional support systems were important sources of capital.

Of particular importance to this project, Martin et al. [13] studied the social capital of FG and CG students using the "Name and Resource Generator" instrument. They found that there were FGC students who had access to many resources to engineering-related social capital, although this access is lower than that of CG students [13]. Furthermore, Martin [14] studied the assets and social capital that FG students bring, highlighting the positive roles of educational personnel, institutional programs, and mentors. For FGS in engineering majors, many of the studies that were conducted looked at the barriers for FGS and posed the research in a deficit model. We aim to reframe this mindset and look at the capital and assets that FGS possess and how they navigate structures of engineering. We also want to understand what culture and support leads to success in engineering. Martin et al. [13] began the turn in questioning the "deficit" framing of this

group. We aim to build on this research with our study. We will use mixed methods to understand their experiences and the capital, beyond networks, that they used to persist in engineering. Building off of Martin et al.'s [13], [14], [40] work, this project focuses on identity development alongside social capital for engineering tech students, specifically understanding their engineering identity development, social capital, peer interactions, and participation in college and activities both major related and extra-curricular.

Methodology

This project consists of a two phase, mixed methods approach that both focus on current undergraduate students in engineering technology programs. Phase one is currently underway. In this phase we are collecting quantitative data from students who attend various engineering technology programs. The initial phase of the project begins with the implementation of an Engineering Identity and Belonging survey. This survey will be administered to students enrolled in engineering technology programs across the United States. In total, we will invite 500 students to complete the survey from various colleges and universities. By extending the invitation to participate across institutions of varying sizes, we are effectively strengthening the breadth and depth of our findings.

The 28-question survey seeks to understand the decision-making process that led students to pursue the engineering technology program of study and their intended plans for the future upon completion of the degree. Questions also ask students to consider their degree of preparedness to enter the engineering technology program and their confidence that they will ultimately succeed in completing the degree. Additional questions ask students to reflect on how they handle academic challenges, and to whom they turn when such challenges arise. A series of questions ask students to rate the quality of their interactions with peers, faculty, and staff in their engineering technology program. Finally, we pose three Sense of Belonging questions which ask students to rate their degree of agreement that they f*eel valued by the faculty and staff* in their program, *feel like part of the engineering technology community*, and that *they feel comfortable being themselves* within the program. All questions, with the exception of an optional open-ended social identity question, are quantitative in nature (see Appendix A for the full survey).

The survey design was influenced by three existing surveys, all of which have been tested successfully for reliability and validity. The first, the measure of Engineering Identity Survey [1] evaluates three engineering identity constructs: recognition (by others), interest (in the engineering subject), and performance and competence (student's belief that they can perform well in the engineering subject). The second survey that informed the design of our instrument was the Name and Resource Generator instrument [13]. This instrument explores forms of capital first-generation engineering technology students recognize and leverage compared to their continuing-generation peers in the major. With influences in the sociological sciences, Martin et al. [13], created this instrument specifically to measure social capital among engineering students both prior to and during their studies in engineering.

The belonging questions are modeled after the Sense of Belonging questions asked on the National Survey of Student Engagement (NSSE). NSSE is a national survey administered annually to first-year and graduating seniors enrolled at four-year colleges and universities across the country. The instrument measures how undergraduate students spend their time and asks them to rate the quality of their experiences. The Sense of Belonging questions were initially added to the instrument in 2020 and have since been tested successfully for strong reliability and validity [41].

As part of the survey, students will be asked demographic questions including race/ethnicity and sex. To mirror institutional data in the analysis phase, we utilized language aligned with the Integrated Postsecondary Education Data System (IPEDS). However, as our goal is to be as inclusive as possible, we have included an optional open-ended question inviting students to share other social identities as desired.

The survey also asks students to report whether or not they are the first in their immediate family to attend college as this is our operating definition of first-generation for the study. And yet, we recognize that there are nuances in experiences across the spectrum of college enrollment family histories. As such, we have included two additional questions to explore further. These questions ask students who indicated they were not the first to attend college to share whether or not a member of their immediate family earned a college degree and whether that earned degree was in engineering.

In the analysis of phase one, we will explore this data at an aggregate level using descriptive statistics. We will also disaggregate our data using inferential statistics to investigate any significant discrepancies between race/ethnicity and sex subgroups. Additionally, we will explore whether any uncovered differences between first- and continuing-generation engineering technology students are statistically significant. The initial findings from the survey results will then inform the design of interview protocols for the second phase of the study.
Upon completion of the survey, students will be invited to complete a second survey to provide contact information in order to enter an incentive drawing for 10 $100 Amazon gift cards. The gift card entry is presented as a separate survey to ensure that no responses provided on the Engineering Identity and Belonging survey can be linked to the identity of any individual participant. This added step will ensure that student responses will be kept anonymous and confidential.

The second phase of this project will take a qualitative approach to understanding FGS experiences related to their decision of engineering technology, belonging, support, persistence, social capital, and engineering identity development. The theoretical frameworks guiding the qualitative methodology are Lin's [37], [42] Social Capital, Godwin's [1] engineering identity development, and sense of belonging. We aim to interview 10 participants chosen at random from Phase 1's survey data. We are not targeting any specific students or experiences because we want to know about all experiences, not just the exemplary, in order to understand various aspects of first-generation students' experiences in engineering technology. Participants will be given $50 Amazon gift cards for their time.

Qualitative data will be collected through semi-structured interviews, in person and virtually over Zoom. We anticipate that interviews will last about an hour, and participants will be compensated for their time with gift cards. The first half of the interviews will be used to build rapport and gain an understanding of their backgrounds and decisions thus far for their majors. The second half of the interviews will dive into social capital and engineering identity development. We will ask questions in a way to generate stories and storied responses; example prompts include:

- How does your undergraduate education affect your interest in engineering?
- How did people in your undergraduate education treat you in regard to being an engineer?
- How did your undergraduate education affect your performance or abilities to perform engineering tasks?
- Describe a particular event that stands out in your mind about your undergraduate engineering tech experience.
- Who helps support your academic journey?
- Can you describe your community in engineering tech?

Interviews will be transcribed and pseudonymized. They will be analyzed through a narrative coding approach, similar to Pawley and Phillips [43]. This consists of multiple readings through various lenses in order to create an overarching narrative of what the participants' experiences were. *A priori* codes based on our theoretical frameworks (i.e. engineering identity [1]; social capital [38]; sense of belonging) will be created to analyze the interviews. We will read through the interviews multiple times highlighting instances where these codes occur. Peer debriefing will be used to aid in the trustworthiness of the findings.

Preliminary Results

In June 2022, in preparation for this project, we secured permission from our Institutional Review Board (IRB) to collect and analyze institutional performance data. In this preliminary analysis, we sought to investigate whether any significant differences existed between our first-generation and continuing generation engineering technology students at the University of North Carolina at Charlotte. We examined performance data from Fall 2014 to Spring 2022, a time frame selected due to confidence in the quality of the data from 2014 to present.

Our preliminary findings demonstrate that while not significant, our first-generation engineering technology students earned a lower term GPA (2.85) compared to their continuing-generation peers enrolled in the same programs (2.91) as shown below in Table 1. As we explored further, a notable difference emerged within individual course grades. We compared the number of unsatisfactory final course grades among first- and continuing-generation engineering technology students. For our purposes, unsatisfactory included grades of: "D", "F", "W" or "WE" for course withdrawals, "N" for no credit earned, and "I" for incomplete. First-generation engineering technology students earned significantly more unsatisfactory grades than their continuing-generation peers. In total, 22% of all grades earned by first-generation students were

unsatisfactory, whereas 18% of all grades earned by their continuing-generation peers were unsatisfactory. This can be seen in Table 2 below.

Table 1. Term GPAs of First- & Continuing-Generation Students

	Term GPA
First-Generation	2.85
Second-Generation	2.91

Note. The difference in term GPA between first- and continuing-generation engineering technology students were not statistically significant (p= 0.09).

Table 2. Unsatisfactory Course Grades of First- & Continuing-Generation Students

	% of total grades earned that were "Unsatisfactory"
First-Generation	22%
Second-Generation	18%

Note. Course grades include grades of "D", "F", "W" or "WE" for course withdrawals, "N" for no credit earned, and "I" for incomplete.
Note. First-generation engineering technology students earned significantly more unsatisfactory grades than their continuing-generation peers ($p< 0.001$).

Table 3. Attempted to Earned Course Ratio of First- & Continuing-Generation Students

	% of courses attempted & successfully completed
First-Generation	87%
Second-Generation	89%

Note. First-generation engineering technology students successfully completed less of their attempted courses when compared to continuing-generation peers. The difference was statistically significant ($p< 0.05$).

This trend continued when we examined the ratio of attempted hours to completed hours. As shown in Table 3 above, our first-generation engineering technology students have successfully earned approximately 87% of the courses they attempted between Fall 2014 and Spring 2022. While strong, this was lower than the success rate of continuing-generation students who completed 89% of all courses attempted. The difference between the two was statistically significant.

A final point we explored in our analysis was the preparedness of students to enter the engineering technology programs at UNC Charlotte. A limitation here is that the concept of preparedness is complex. We agree wholeheartedly with Conley [44] that true "college readiness" cannot be defined as merely a demonstrated history of academic success. Prior academic success is but one factor that indicates a student is prepared for the increased rigor of postsecondary education. Other factors including behavior, attitudes, and understanding of higher education structures also play an important role in college preparation [45].

Still, as research has indicated that high school GPA is a strong predictor of academic performance in college [46], our preliminary analysis examined the high school GPA data for our engineering technology students. Interestingly, while our first-generation students demonstrated lower term GPAs in college and lower success rates in completing the courses they attempted when compared to continuing-generation peers, our first-generation students earned higher GPAs while in high school. This was true of both weighted and unweighted GPAs, although the differences in all cases were not significant.

Given the math-intensive curriculum of our engineering technology programs, we elected to examine the Math SAT scores. Here our first-generation students earned an average score of 565 on the Math portion of the SAT compared to the score of 580 earned on average by continuing-generation peers. In this case, the lower performance of first-generation engineering technology students was statistically significant.

What this communicated to us is that our first-generation students enter UNC Charlotte having earned stronger GPAs while in high school than their counterparts who were not the first in their families to attend college. While the standardized test scores were lower, research has long indicated that high school grades are a far better predictor of academic success in college [46], [47], [48], [49]. And yet, our institutional data indicates that the performance flipped once students arrived at UNC Charlotte with continuing-generation students outperforming first-generation peers in the major in both term GPA and successful completion of courses.

These preliminary findings suggested there is more going on once first-generation students arrive on our campus and begin the engineering technology program. Armed with this knowledge, we are now investigating this phenomenon both within the context of our institution and beyond.

Current Status and Future Work

Currently, we are in the pilot stages of our project (Spring 2024). We have created our quantitative survey and are testing it with a few participants. From the pilot findings, we will assess and iterate our survey and then launch the quantitative investigation (Spring- Summer 2024). Once we open our quantitative collection, we aim to get 500 participants across the nation. As results come in we will understand our findings, generalizations, and patterns, as well as brainstorm what we want to know more about. This is where our study will shift into qualitative research (Summer 2024). We aim to interview at least 10 participants in this phase. In Fall 2024 we will analyze our qualitative data, and compare it to the quantitative findings. The last phase of our research (Spring 2025) We will work on publications, conference presentations, and plan for future research.

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Appendix A

Engineering Identity & Belonging Survey

Hi, there! We are glad you're here.

This survey is part of a two-year National Science Foundation (NSF) research project studying the process of assuming the "engineer" identity for engineering technology students. Other studies have explored how and when college students go from seeing themselves as an "engineer major" to an "engineer." But there's a problem here. So far, these studies have only been done with engineering science students. This leaves a pretty big gap without engineering technology student feedback. We believe that this question can't be answered without engineering technology voices - and NSF agreed. With your help here, we can start to fix that.

Don't worry, this survey is confidential. We will report larger findings, but no identifiable information will be shared.

At the end of the survey, you'll be prompted to enter your name into a drawing for a $100 gift card. We'll collect your email address there, but it will not be linked to your responses to this survey.

First, tell us a little about you:

1. Are you the first in your immediate family to ***attend*** college?
   [Yes, No, I'm not sure]
2. ***Logic: If "Yes" to Q1***
   Has a member of your immediate family ***earned*** a college degree (Associate's or Bachelor's)?
   [Yes, No, I'm not sure]

3. ***Logic: If "Yes" to Q2***
   Has a member of your immediate family earned a college degree in ***engineering***?
   [Yes, No, I'm not sure]

4. Did you transfer to your current institution from a different institution?
   [Yes, No]
5. What is your current major?
   - Civil Engineering Technology
   - Construction Management
   - Electrical Engineering Technology
   - Fire Safety Engineering Technology

- Fire Protection Engineering Technology
- Mechanical Engineering Technology
- Computer Engineering Technology
- Manufacturing Engineering Technology
- Other, please specify

These next questions are to help us understand how you got to your engineering technology major, how you're feeling about it, and what you plan to do with your degree post-graduation.

6. Initially, what led you to decide to major in engineering technology? (Check all that apply):
    - I am good at math or science
    - It was recommended to me by a high school teacher or counselor
    - Participated in engineering or STEM/STEM related experience prior to college
    - Parents, relatives, or friend is an engineer
    - Parents, relatives, or friend majored in **engineering technology**
    - The major I want is part of engineering technology
    - The engineering technology major was recommended by friends or family members
    - Received an academic scholarship to major in engineering technology
    - Wanted to pursue a major that would lead to a high-paying career
    - Appreciate the hands-on experience in the engineering technology major more than the design-based engineering science degree
    - Engineering technology was second choice
    - I'm not sure
    - Other (Please specify)
7. Before you enrolled at your current college, did you complete any of the following course subjects either as an **advanced or honors level high school course** or a **college-level course**? (Check all that apply)
    - Engineering
    - Algebra
    - Biology
    - Chemistry
    - Pre-calculus
    - Calculus
    - Geometry
    - Physics
    - Public Safety courses/Academy
    - Trigonometry

8. Do you feel like your previous education adequately prepared you to be successful in your engineering technology curriculum?
   [Yes, No, I'm not sure]
9. **At the beginning** of your engineering technology degree, how confident did you feel that you would complete it?
   [Very confident, Fairly confident, Not confident at all, Unsure]

10. **At this time,** how confident do you feel that you will complete your engineering technology degree?
    [Very confident, Fairly confident, Not confident at all, Unsure]

11. When you experience an academic problem related to your engineering technology coursework, what do you do? **Select up to 3 and rank in order of preference:**
    - Form a study group with my peers in the class/major
    - Talk to a faculty member
    - Talk to my academic advisor
    - Talk to a mentor outside of the college
    - Talk to other students and/or friends
    - Talk to my parents, siblings, or other relatives
    - Increase my study time/efforts
    - Nothing
    - I never feel this way
    - Other (Please specify)

Rate your degree of agreement with the following statements:

12. I feel comfortable being myself in my Engineering Technology major.
    [Strongly agree, Agree, Somewhat agree, Somewhat disagree, Disagree, Strongly disagree]

13. I feel valued by the faculty and staff in my Engineering Technology major.
    [Strongly agree, Agree, Somewhat agree, Somewhat disagree, Disagree, Strongly disagree]

14. I feel like part of the Engineering Technology community.
    [Strongly agree, Agree, Somewhat agree, Somewhat disagree, Disagree, Strongly disagree]

15. After you graduate with your engineering technology degree, what are your plans? Check all that apply:
    - To work in the industry related to my engineering technology major
    - To work for a government agency
    - To attend graduate school in either engineering or engineering technology
    - To attend graduate school, but in a different program outside of engineering

- Teach at a college or university-level
- Teach in K-12 schools
- Start my own business or participate in a business start-up
- Enter or re-enter the military
- I'm not sure
- Other (Please specify)

You are halfway there! This next section will ask you to think about the people in your life who are influential in your academic and career decisions.

16. Please rate the quality of your interactions with the following people or entities so far in your major of study:

	Positive	Somewhat Positive	Somewhat Negative	Negative	N/A
Instructors	●	●	●	●	●
Students in your major	●	●	●	●	●
Students outside your major	●	●	●	●	●
Student Organizations	●	●	●	●	●

17. Thinking about this semester, how have the following individuals supported you? A checked box indicates "YES" to each statement.

	Challenges me to do my personal best	Checks on my progress	Discusses school & academic career decisions	Helps me with course selection	Encourages me about my studies	Suggests networking opportunities	Supports me with other resources
Parent or Guardian	●	●	●	●	●	●	●
Instructor	●	●	●	●	●	●	●
Peers in the major	●	●	●	●	●	●	●
Peers outside	●	●	●	●	●	●	●

the major							
Academic Advisor	●	●	●	●	●	●	●
Other, please specify	●	●	●	●	●	●	●

18. Still thinking about this semester, have the following individuals discussed any of the following with you? A checked box indicates "YES" to each statement.

	Your mental or emotional health?	Your physical health?	Disappointments you've had?	Difficulties you've faced?	Asked you how classes were going?	Encouraged you to keep going when you struggled?	Asked about your levels of stress?
Parent or Guardian	●	●	●	●	●	●	●
Instructor	●	●	●	●	●	●	●
Peers in the major	●	●	●	●	●	●	●
Peers outside the major	●	●	●	●	●	●	●
Academic Advisor	●	●	●	●	●	●	●
Other, please specify	●	●	●	●	●	●	●

19. This semester, have any of these individuals:
A checked box indicates "YES" to each statement.

	Parent or guardian	Instructors	Peers in the major	Peers outside the major	Academic Advisors	Other, please specify

talked to you about their own work as a professional in your field.	●	●	●	●	●	●
Gave you information about the type of work that professionals in your field do	●	●	●	●	●	●
Talked to you about career options with your major	●	●	●	●	●	●
Encouraged you to stick your major	●	●	●	●	●	●
Gave you specific advice when you faced an academic obstacle	●	●	●	●	●	●
Introduced you to people in their professional network	●	●	●	●	●	●
Helped you with the content your courses	●	●	●	●	●	●
Helped you with a specific assignment (homework, project, etc)	●	●	●	●	●	●
Recommended courses you should take	●	●	●	●	●	●
Gave you advice about your academic options	●	●	●	●	●	●
Gave you a good reference for a scholarship, job, or award	●	●	●	●	●	●
Alerted you to scholarship opportunities	●	●	●	●	●	●

Alerted you to job or graduate school opportunities	●	●	●	●	●	●
Gave you general information about the type of work that professionals in your field do	●	●	●	●	●	●
Advised you or gives you specific information about the curriculum in your school	●	●	●	●	●	●

20. Do you have a mentor or advocate in the engineering field who you can go to with questions?
    Yes
    No
    I don't know

You are almost there! These last questions tell us a little more about you.

21. Rate your degree of agreement with the following recognition statements:

	Strongly Disagree	Somewhat Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree
My parents see me as an engineer.	●	●	●	●	●	●
My instructors see me as an engineer.	●	●	●	●	●	●
My peers see me as an engineer	●	●	●	●	●	●

22. Rate your degree of agreement with the following interest statements:

	Strongly Disagree	Somewhat Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree

I am interested in learning more about engineering.	●	●	●	●	●	●
I enjoy learning engineering concepts.	●	●	●	●	●	●
I find fulfillment in working in engineering.	●	●	●	●	●	●

23. Rate your degree of agreement with the following performance statements:

	Strongly Disagree	Somewhat Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree
I am confident that I can understand engineering in class.	●	●	●	●	●	●
I am confident that I can understand engineering outside of class.	●	●	●	●	●	●
I can do well on exams in engineering.	●	●	●	●	●	●
I understand concepts I have studied in engineering.						

Others ask me for help in this subject.						
I can overcome setbacks in engineering.						

24. Do you work during the school year?
    [Yes, No]

25. ***Logic: If "Yes" to Q23***
    On average, how many **hours per week** do you work during the school year?
    - 0-9
    - 10-19
    - 20-29
    - 30-39
    - 40+

26. With which category do you **most** identify?
    - American Indian
    - Any 2 or more races (non-Hispanic)
    - Asian
    - Black
    - Hispanic (of any race)
    - International
    - Pacific Islander
    - White
    - Prefer not to respond to this question

27. How do you describe yourself?
    - Male
    - Female
    - Other, please specify
    - Prefer not to respond to this question

28. The response choices in questions 25 & 26 are aligned with the Integrated Postsecondary Education Data System (IPEDS), however our goal is to be as inclusive as possible in our reporting. To that end, are there other social identities you would like to share with us? This question is optional.
    [open-ended]

That’s a wrap! Thank you for taking the time to complete this survey. We promise that no identifiable information will be reported with our findings.

Before you go, don’t forget to enter the drawing for a $100Amazon gift card. Click here to list your email address to enter. Your incentive drawing response will not be linked to your responses to this survey.