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Utilizing Engagement Survey to Improve ECE Equity and Culture

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Abstract:

While many universities offer centralized student support systems, these offices often are not equipped to address the specific needs of students within particular majors. This paper explores the initiatives of a school level office established to support electrical and computer engineering (ECE) students. In Spring 2024, an engagement survey was conducted to gather data on student experiences, leading to several impactful changes.

The Office, created by a service-focused faculty member, centralizes student resources and provides a unified approach to student engagement. The survey, which garnered ~10% response rate without incentives, identified key areas for improvement, including addressing the equity gap for Black or African American students and enhancing support for transfer students. The findings have driven changes in ECE events, initiatives, and first-year courses, and have increased faculty awareness of available student resources.

Overall, the survey has been pivotal to implement significant changes and provide more support within the ECE community. Moving forward, the survey will be conducted annually to continually enhance student engagement in the School.

Introduction

Many universities and higher education institutions have developed centralized, institution-level systems to provide student support, such as advising, engagement, and career development. These are necessary and useful resources for students; however, they may not address students' major-specific needs such as community building, discipline-specific academic advising, and targeted interventions. This paper describes the efforts of a School-level Office – ECE Office of Student Engagement & Well-Being (SEWB) that was recently created to address student support, engagement, and well-being specific to electrical and computer engineering (ECE) undergraduate and graduate students. A recent effort to collect data about the student experience culminated in an engagement survey conducted in the spring 2024 semester in the School of ECE at the Georgia Institute of Technology (Georgia Tech).

The SEWB Office was borne out of the hiring of a service-focused faculty member whose primary responsibility was to establish such an office for the students. The formation of the *Office* allows for the centralization of a variety of student resources within the School and at the university, a cohesive strategy to address the wellness of students, and a singular point of contact for students [1]. The goal of the *Office* is to both further the welcoming and community focused environment in the School of ECE and establish programs and initiatives to aid student growth and well-being. A lot of the responsibilities and roles of the office are not novel, but traditionally spread across multiple positions with different primary responsibilities at the school/major level.

The centralization into one *Office* and position is unique and serves both the undergraduate and graduate student population in the School. The ECE School is large and is comprised of many degree programs. In Spring 2024 there were a total of 2,587 students, and 11 degrees over both undergraduate and graduate degree programs.

Overall, the effectiveness of the *Office* has been difficult to gauge outside of anecdotal experiences, this survey provided a first step towards understanding impact of the *Office* and equity gaps that still exist in the School and that must be addressed. This is important as it has been noted that the culture within a School can impact the experience of the students within [2-6].

Methods

The survey was conducted in the Spring 2024 semester. Students received the survey via email, and a QR code was displayed at ECE events. The survey was provided to students via Qualtrics. Questions types ranged from multiple choice, matrix tables, and short response. IRB approval for the survey was received, and the survey was open to all undergraduate and graduate students in the School. The survey was anonymous and voluntary – no incentives were provided for feedback. The questions comprised of categories: Matriculation Information, ECE Organization Participation, ECE Event/Initiative Awareness, ECE Culture, Free Response Feedback, and Demographic Information.

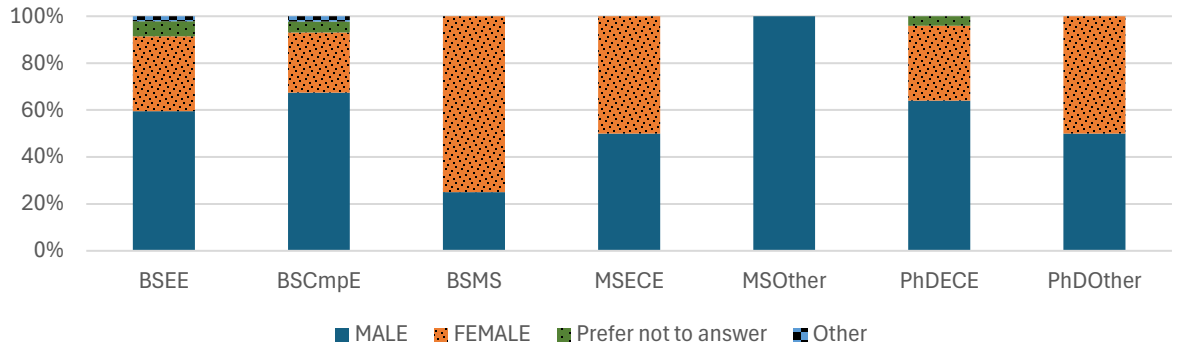
For matriculation information, students were asked to provide their matriculation year, matriculation path, and specific degree program through a series of multiple choice questions. Regarding ECE Organizations, the first question ask students to select the ECE organizations they were participating in, with logic to measure how much they felt their participation benefitted them for each organization they participate in. Additional short response questions were included to provide constructive and positive feedback to current organization efforts.

Students were also asked to list their level of awareness and interest in ECE events and initiatives that occurred throughout the year, along with a short response for event feedback. To gauge the culture and community in the School a series of statements were provided and students were requested to select their level of agreement for each. Finally, demographic questions regarding gender, race, and international status were followed by final short response questions for additional feedback. There were a total of 254 responses, of which 138 were complete responses.

Results

Once the end of the semester passed, the survey was closed, and results were analyzed. The undergraduate student responses were more representative of the program than the graduate student responses. Breaking down the multiple degree pathways, two are undergraduate degrees – BS in Electrical Engineering (BSEE) and BS in Computer Engineering (BSCmpE), there are traditional MS (MSECE) and PhD (PhDECE) degrees in ECE as well as a number of interdisciplinary programs, additionally, there is a BS-MS pathway. As there were a very small number of responses for the interdisciplinary MS and PhD students, analysis when disaggregated by degree paths were focused on the four major degree programs – BSEE, BSCmpE, MSECE, PhDECE. Results for the interdisciplinary students, were combined into two categories – MSOther for the interdisciplinary MS programs, and PhDOther for the interdisciplinary PhD programs. The survey demographics are broken down in Figure 1 by programs as described.

a



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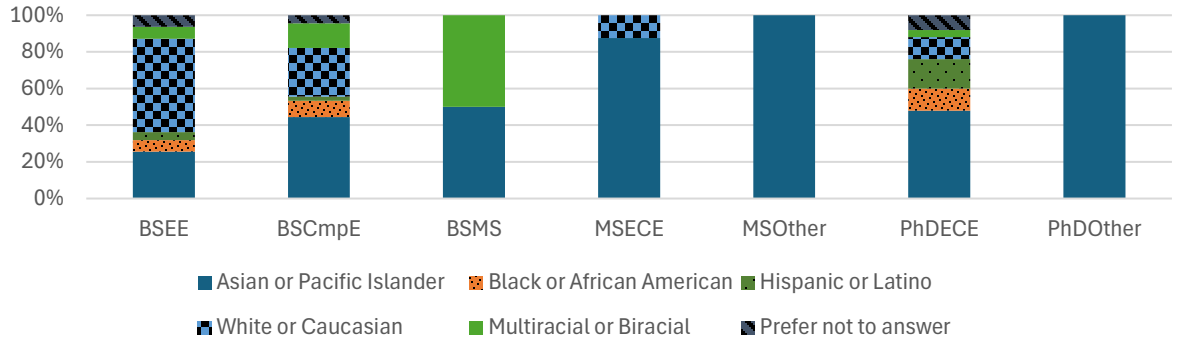

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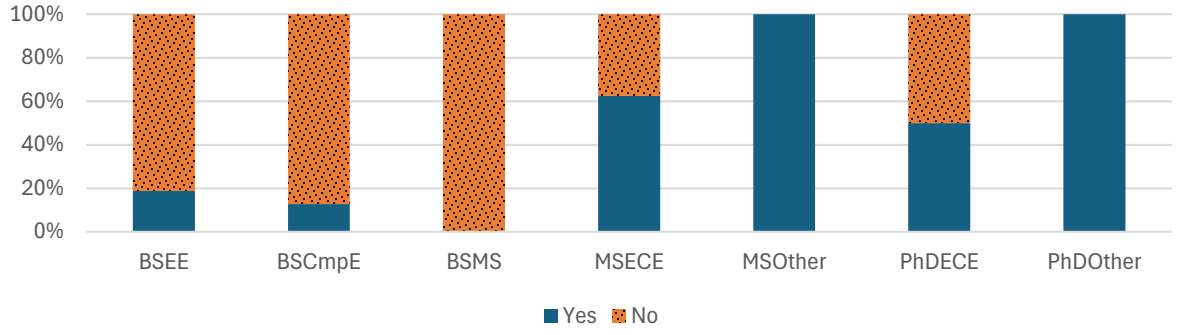

d

Gender				Ethnicity								International	
Male	Female	Prefer not to answer	Other	Asian or Pacific Islander	Black or African American	Hispanic or Latino	Native American or Alaska Native	White or Caucasian	Multiracial or Biracial	Prefer not to answer	Other	Yes	No
80	42	6	2	56	10	7	0	40	12	7	1	36	101

Figure 1: Survey Demographics – 100% Stacked Columns show the survey demographic responses for (a) gender, (b) ethnicity, and (c)international status disaggregated by degree program. Figure 2d shows the total number of responses disaggregated by the same demographics.

The responses were disaggregated along demographics, and degree programs and compared the enrollment data to understand survey representativeness as shown in Figure 2.

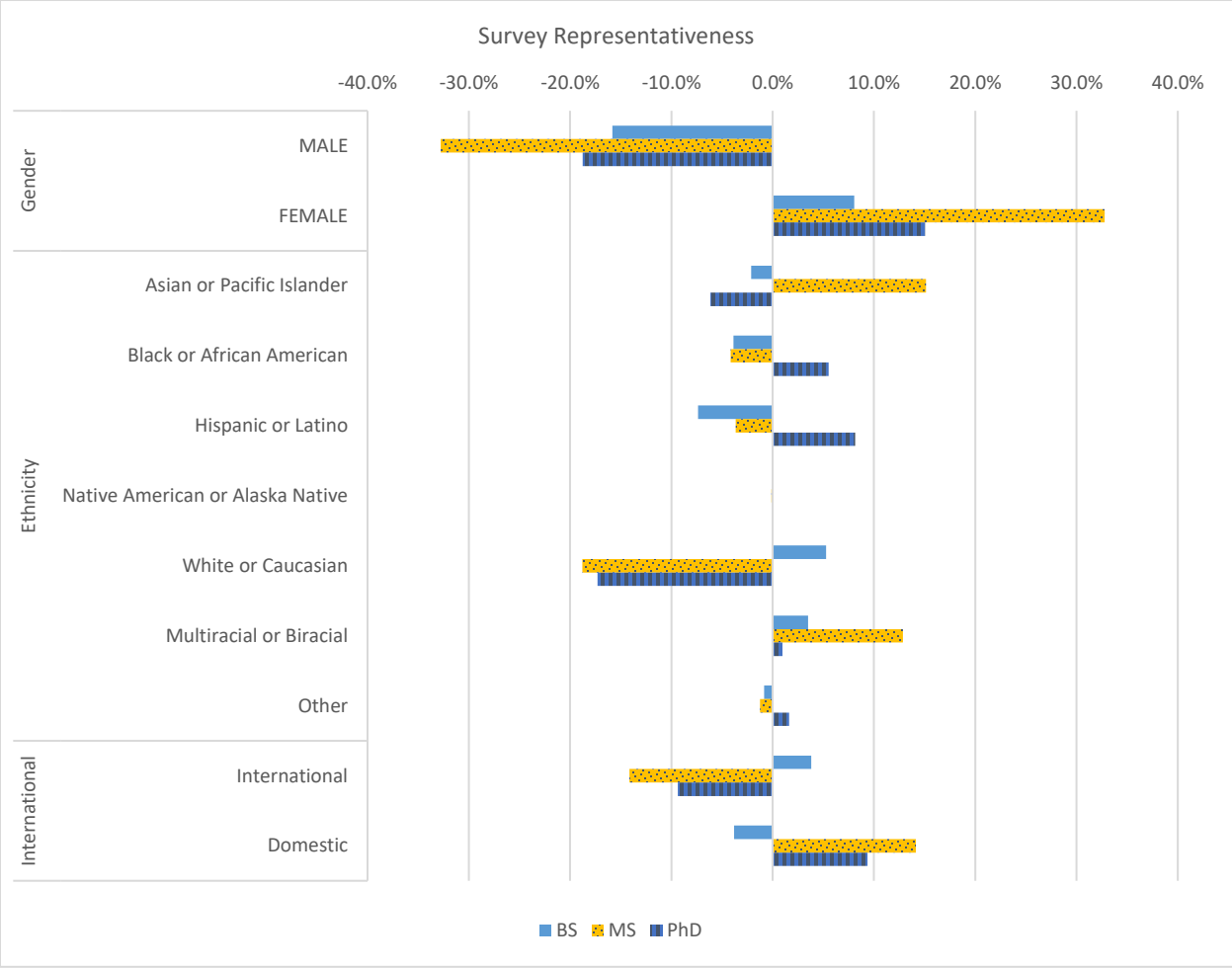

Figure 2: Survey Representativeness – Enrollment demographic percentages were subtracted from demographics results from the survey as percentages to understand any overrepresentation or underrepresentation in the results. An overview of the representativeness for gender, ethnicity, and international status is provided in this figure for BS, MS, and PhD students in the School.

An additional area of disaggregation is in the undergraduate realm. ECE undergraduate students come from a variety of backgrounds including a large percentage of transfer students. In Spring 2024, 301 of the 1,176 undergraduate students were transfer students – yielding a 25.6% transfer student population. The survey respondents were 14.56% transfer students, so the demographic is underrepresented in the data by 11.04%.

There were two survey sections related to awareness – ECE Events and ECE Initiatives. For the ECE Event section, the following question was asked – "Please select all ECE Events you have participated in during the 2023-2024 Academic year." Response options were a scale from 'Attended' to 'Did not know about, would not have attended if aware'. The responses to this question were used to understand if the various marketing efforts were reaching students for events, and even if students were aware of the events, if they were interested in the events, mostly housed in the SEWB Office. The major change prompted by this response was related to the ECE Town Hall event. Traditionally, one town hall event has been held every semester. On occasion, this is an opportunity for leadership to gather feedback on upcoming changes, but generally, it is a chance to hear student feedback and for students to get access to ECE leadership. The event has recently had low turnout, the Spring Town Hall event had 7 students attend, which at the time was attributed to under-marketing. However, results of the survey showed that students, while aware of the event, chose not to attend – indicating non-interest in the event as is. In Fall 2024, this prompted a rebrand of the event to a less formal networking opportunity with ECE leadership. The rebrand led to a turnout of 30 students in the fall, which, while still low, is a marked improvement from the Spring semester.

The other awareness section was for the ECE Initiatives all started by the SEWB Office, and had an additional important purpose, as each initiative was hyperlinked so that students unaware could learn more if interested. Results of this section have altered marketing of these initiatives, initiatives with good awareness have maintained similar marketing, and those lacking, have had additional targeted marketing based on demographics – such as increased collaboration with ECE organizations.

A very important component of the community in the School, are the ECE Organizations. Students were asked which ECE organizations they participated in, and if they participated in an ECE organization did they feel that the participation benefitted them. The results were very promising and are shown in Figure 3. The figure is a combined plot that shows the benefit of participation as the orange line plot, and the percentage of survey respondents in the demographic who indicated participation in an ECE organization. The response options ranged on a Likert Scale: Strongly Agree (5) – Strongly Disagree (1). Overall, across demographics, participation in ECE organizations was above 4, which means between somewhat agree and

strongly agree. This indicates that ECE organization participation is beneficial to students, and should continue to be supported, if not additionally supported by the School where possible.

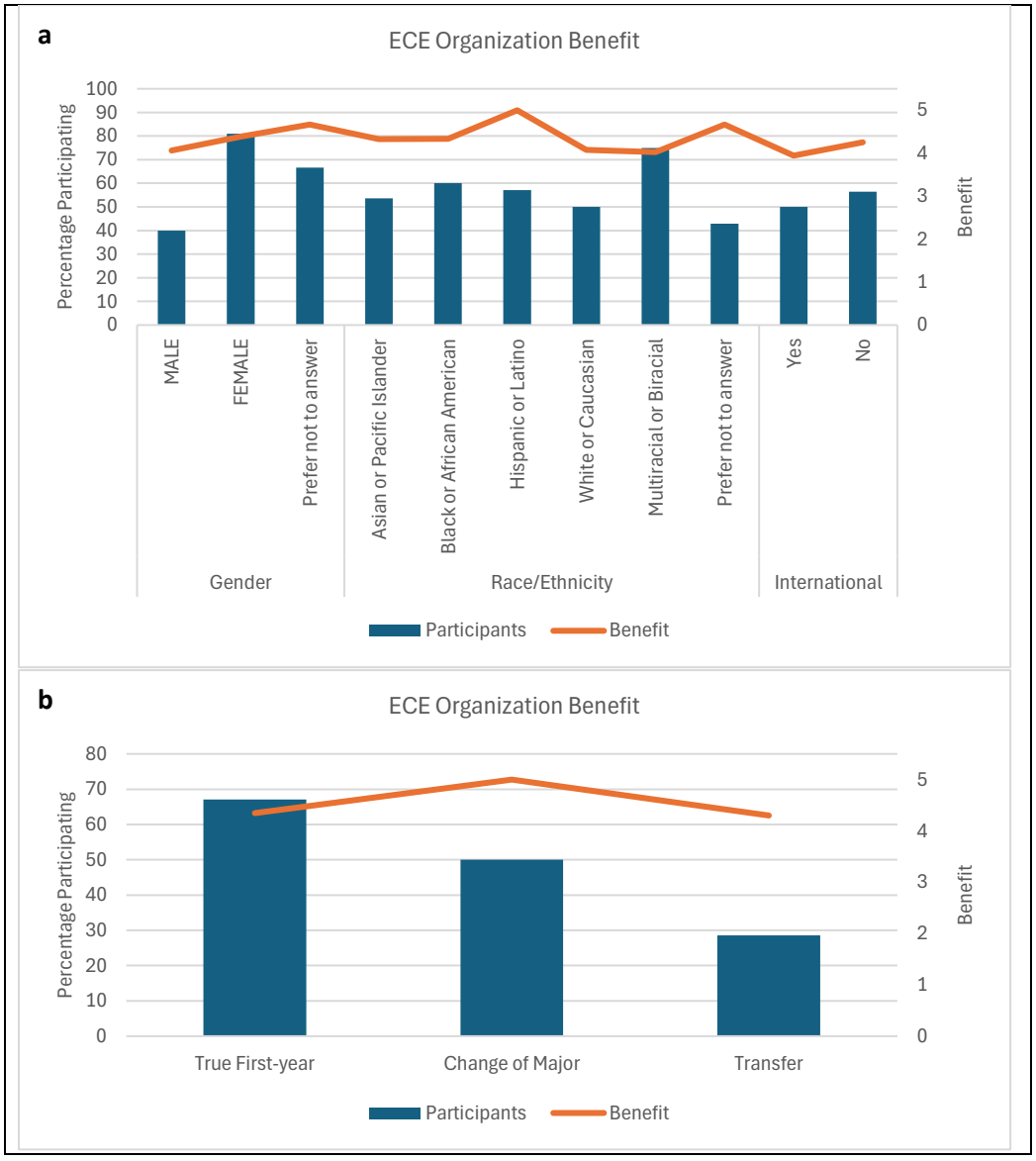

Figure 3: ECE Organization Participation – Figure 3a shows the percentage of students in a demographic that indicated participation in ECE organizations through the bars on the plot. The secondary y-axis on the right-hand side is for the orange line plot that describes the experience of students in that demographic who did participate in ECE organizations, specifically if they thought the participation benefitted them. The responses were scaled to a Likert scale: Strongly Agree (5) – Strongly Disagree (1). Figure 3b shows the percentage of students in the listed matriculation pathways who participated in ECE organizations through the bar graph. The orange

line using the secondary y-axis on the right-hand side indicates the level of agreement of participating students that their participation benefitted them scaled to a Likert scale: Strongly Agree (5) – Strongly Disagree (1).

The Figure 3b describes the ECE organization participation disaggregated by undergraduate matriculation pathways. There is a clear difference in the experience of a transfer student, and the experience of a true first-year student as illustrated in the plot. Transfer students in the survey are underrepresented by 11.04%, as mentioned earlier. Transfer students have a much lower level of participation (28.6%) as compared to true first-year students (67.1%); however, both the transfer student (4.30) and true first-year students (4.34) benefit values are quite similar. This indicates that the transfer students who are participating in ECE organizations are receiving the same benefit from that participation, and that encouraging transfer students to get more involved can only positively influence their experience.

The final section of questions was related to the ECE culture and community in the School. A series of questions was asked, and students were asked to rank agreement on a Likert Scale: Strongly Agree (5) – Strongly Disagree (1).

Questions:

1. I have access to enough academic resources in order to succeed in ECE.
2. I have access to enough technical resources in order to succeed in ECE.
3. I am valued by the School of ECE.
4. If I am struggling, I know there is someone I can contact in the School of ECE.
5. I feel lonely in the School of ECE.
6. I feel like the School of ECE has prepared me for the future.
7. I feel the School of ECE has a collaborative environment.
8. I feel that I can ask faculty in the School of ECE for help when I am struggling.

As a note, question five was opposite scaled. For all other questions, a higher response was indicative of a positive agreement, for question five, a higher response is indicative of a more lonely experience, the results are shown in Figure 4.

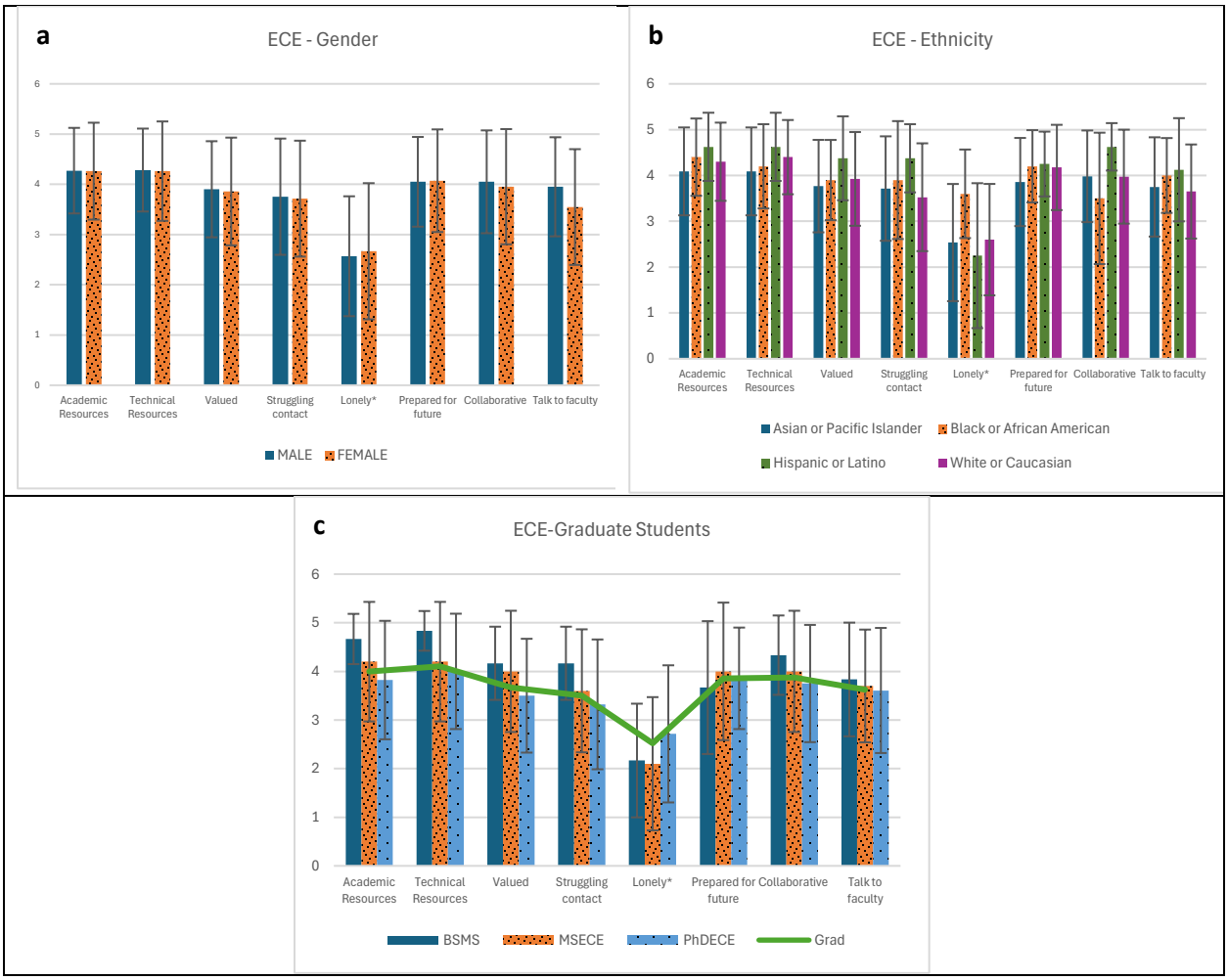

Figure 4: ECE Culture Responses - Results for the eight questions outlined in the text related the student experience in the school are shown in this figure, disaggregated by (a) gender, (b) ethnicity, and (c) graduate programs. *The fifth question was opposite scaled, so unlike the other questions, a higher bar is indicative of a more lonely experience.

The results of this question were disaggregated by gender, ethnicity, undergraduate matriculations pathways, and graduate degrees. Looking at Figure 4a, the gender plot indicates that there is only a slight difference is the experience of male and female students as it pertains to the community in the School. The difference is primarily noted in the response to question 8 - I feel that I can ask faculty in the School of ECE for help when I am struggling, and smaller difference for the response to question 5 – I feel lonely in the School of ECE. Referring back to Figure 1, female students are overrepresented in the results, so Figure 4 shows that the concerted efforts to narrow the equity gap between men and women in the school has been fruitful but should continue.

However, looking at the ethnicity plot in Figure 4b, we can see that another equity gap exists that is not being well addressed. The largest disparity here, is in the response to question 5 for Black

or African American students, indicating that they feel lonelier than students of other ethnicities. Additionally, the response to question 7 - I feel the School of ECE has a collaborative environment, also shows a disparity. Again, it is important to note from Figure 1, that while Black or African American students are underrepresented in the survey, it is in a range of 3.9-5.5% for the three degree levels (BS, MS, PhD).

Finally, in the Figure 4c, we can see that of the graduate students, PhD students feel the loneliest, while BSMS students seem to have an advantage in almost all questions, likely due to the combined experience at the school as an undergrad.

Students also had the chance to provide written feedback through a few open-ended questions spread throughout the survey. For ECE organizations, two questions were asked – Are there any changes you would like to see to any of these ECE organizations, and Are there any events/initiatives from any of the ECE organizations you would like to highlight? Responses for the ECE organization section were shared with the various organizations in the school. Additionally, at the end of the survey, open-ended questions to understand what needs to be changed, what should continue or grow, and what initiatives should be introduced. Major opportunities for growth can be aided by faculty awareness of available student resources, and more graduate student focused programming. In terms of strengths, some comments indicated that programs that exist should continue to be supported, such as academic advising, technical resources like the maker space, faculty/student engagement, and professional development events.

Conclusion

Overall, the survey provided the first comprehensive, data-driven insight into the engagement of students in the School. Results have prompted changes, such as rebranding of the ECE Town Hall, and increased collaboration with ECE organizations. Addressing the equity gap experienced by Black or African American students is a priority. The survey coincided with the creation of an ECE organization focused on Black, Latino, and Indigenous students in the School. Additionally, due to the survey results, one recent SEWB Office initiative utilizing a new travel grant prioritizing undergraduate students, has been to enable a cohort of ECE students to attend NSBE conventions to provide these students more opportunities to grow their professional identity.

The disparity of the transfer student experience, has additionally, prompted changes in a first-year ECE course intended to introduce students to the major, to provide more guidance and mentorship to transfer students, as well as all other first-year students to the program.

Importantly, the survey results have helped our faculty better understand the student body in the School. Results have been shared and discussed at various faculty meetings throughout the semester and have been used to provide faculty with an understanding of the student profile, and

varied experiences. One opportunity pulled from the survey was to increase faculty awareness of student resources so that there was another stronger point of dissemination to students. This is made possible through the use of the survey to highlight the importance of the current initiatives, and where there is room for improvement in the circulation of student resources and opportunities. Additionally, the results of the survey have also helped reinvigorate a faculty committee aimed at improving student-faculty interactions. In general, this survey has been part of a School-wide effort to make more data-driven decisions to improve the undergraduate program.

Although this survey is specific to the unique student experience of the studied program, its context can be applied to similar inquiries about the student experience in engineering programs. Additionally, it can serve as an example for surveys designed to gain insight into the student culture in engineering programs.

In conclusion, the survey has been instrumental in measuring current initiatives and driving meaningful changes to foster a more supportive environment for all students in the program. To ensure continuous improvement, the survey will be conducted annually, with adjustments made to enhance its impact each year.

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