Engineering Educators Bringing the World Together
2025 ASEE Annual Conference & Exposition
Palais des congrès de Montréal, Montréal, QC • June 22–25, 2025 ASEE
Paper ID #48112

A Cross-Campus Study of Experiences of Women Engineering Students and the Role of Campus Libraries

Wynn Tranfield, University of California, Santa Cruz

Wynn Tranfield is a STEM Librarian at University of California, Santa Cruz.

Shelby Hallman, University of California, Los Angeles

Shelby Hallman is the Physical Sciences & Engineering Librarian at the University of California, Los Angeles.

Ms. Emily Halan Dovan, University of California, Los Angeles

Emily Dovan Access Services Lead at the Science and Engineering Library

A Cross-Campus Study of Experiences of Women Engineering Students and the Role of Campus Libraries

Abstract

Despite decades-long efforts to increase intersectional diversity in STEM fields, engineering lags behind other STEM disciplines in representation of women. In the United States, women comprise 27.5% of the undergraduate engineering enrollment and 29.1% of graduate engineering enrollment. Increasing recruitment, retention, and improving post-graduate outcomes is an area of deep interest to universities. University libraries are essential for student success, contributing to both academic achievement and feelings of belonging on campus – key factors in retention and post-graduate outcomes. How the library may impact engineering students specifically remains understudied.

Engineering librarians on nine Californian campuses implemented an anonymous survey open to woman-identified graduate or undergraduate engineering students. In addition to library use habits, respondents shared their involvement with student organizations, access to mentors, and representation in classroom examples or event series. Responses also considered how students felt about presentations in class, asking questions, and claiming credit. Librarians were also curious about how students used library services and spaces.

The coordinated, cross-institutional survey helped librarians collectively learn about experiences shared by women-identified engineering students in California. Insights identified impactful outreach approaches, including connecting with student organizations to more directly reach underrepresented populations, create programming, and build relationships. Findings also allowed for the development of system-wide learning materials and interventions optimized to reach this student group.

Introduction

Libraries are essential for student success, contributing to both academic achievement and feelings of belonging on campus – key factors in retention and post-graduate outcomes. Despite longstanding efforts to increase diversity in STEM fields, computer science and engineering programs contain proportionally fewer women than other STEM fields, both in engineering programs [1] and in professional roles [2].

Researchers sought to engage with libraries as already well-established nodes of student engagement, outreach, and campus presence. Engineering librarians implemented a coordinated, cross-institutional survey to reveal commonalities facing women-identified engineering students. Results informed services and programming the library could engage to positively impact the

success and retention of women-identified students enrolled in our respective institutions' computer science and engineering programs.

Background & Related Literature

This literature review is organized into three sections. The first section discusses the role of university libraries in computer science and engineering student success by identifying the unique needs of this population. The second section explores what we know about diversity in computer science and engineering, noting the myriad factors that contribute to student identity. The final section situates this study within the context of our connected institutions and interdependent library consortia.

1. Libraries and Engineering Student Success

Researchers in academic libraries study student identity groups to better inform programming and services such as workshops, research consultations, asynchronous learning materials, classroom instruction, and space facilitation. Academic libraries have been identified as crucial components to promoting feelings of belonging on campus, and provide meaningful contributions to other student success benchmarks [3], [4]. These factors in turn directly contribute to student persistence and eventual degree completion [5], [6].

Engineering library divisions serve a distinct user group with unique information needs. Undergraduate engineers find computational work heavily weighted early in their curriculum but often transition to more project-based assignments in junior and senior years. These project tasks are often designed to support collaborative information activities where students practice conceptualizing as a group [7]. Feelings of belonging contribute to identity building aspects of the program, which encourage students to see themselves as engineer trainees [8]. Engineering students are unlikely to seek research assistance from library workers or navigate high-friction library catalogs, however, libraries themselves are seen as essential study spaces [9], [10]. Within their programs, engineering trainees will prioritize rapidly accessible information [11], carrying this behavior on to the professional engineering workplace. Ethnographic studies suggest that since time is always a high priority in any given project, internal communications and the suggestions of colleagues or superiors were preferable to external or library sources [9].

2. Diversity in Engineering

Gender Diversity

Increasing diversity and inclusiveness in engineering education has been a priority for decades, however, engineering continues to lag behind other STEM disciplines when compared

by relative gender or racial representation [12]. Reasons for this disparity are complex and influenced by a tremendous number of factors, however, the Society of Women in Engineering's annual review of literature has identified psychological or cultural factors as the leading cause of professional attrition [13].

A survey by Conrad, Abdallah, and Ross compared the experience of women in university STEM programs, noting that more women in engineering programs experienced institutional/cultural barriers compared to women in STEM programs or male identified students [14]. The responses also emphasized a greater reliance on professors and mentorship programs as a support system than other STEM disciplines or male identified students in engineering. Ong et al.'s study of women of color in STEM found that both participation in formal campus groups and peer relationships positively impacted persistence when the groups provided a counterspace (Appendix I). Student groups, mentorship programs, and peer-to-peer relationships were most frequently cited as helpful to students' persistence [15]. In another study, the importance for mentors near the beginning of a program was highlighted, with the caveat that same gender faculty and mentors were preferred by students [16]. Women identified students noted that same-gender faculty and mentors were more approachable and made them believe they could accomplish more in their chosen field.

Studies indicate that the undergraduate experience can influence the decision of students to enter a career as an engineer. Women identified students are less likely than male counterparts to agree that they will be working in an engineering-related field ten years post-graduation [17]. When this was further interrogated, it was found that women-identified students in the study identified a lack of effective female role models in the department, problems getting along with other students in the major, and feeling disrespected by male students. Study participants reported that female role models or guest speakers offset feelings of isolation. Amelink and Creamer noted that female students encountered tokenism and stereotypes within their department, and that undergraduate experiences were formative to workplace expectations [17].

Many women in computer science and engineering fields report fundamentally different education and workplace experiences than male-identified counterparts. Beginning at the undergraduate level, Women and Students of Color report fewer positive relations with colleagues than men and White students [18]. Discrimination, harassment, and microaggressions disproportionately impact women, particularly Women of Color [15]. In Reddit posts by women in STEM, there are reports of harassment, inequality, lack of representation, and imposter syndrome at the workforce level [19]. In a comprehensive review of the issue in computer sciences, one recent study advocates for educational preparation programs and institutional support that empowers women professionals [20].

Intersectionality

Diverse populations of students experience university differently and will encounter group-specific barriers to success. Underrepresented minorities and low-income students are at the greatest risk of attrition. Intersectional issues compound challenges for students, but the heterogeneity of campuses means these issues aren't universal. Black female engineering students at predominantly White campuses have reported feeling isolated, hypervisible, exposed to microaggressions, and struggled to form study groups [21]. A single-campus study of second year engineering students found that woman-identified non-Asian minority students were more likely to feel anxious, worried, or discouraged than any other demographic. These feelings, however, were mitigated by frequent interactions with instructors, emphasizing the importance of emotional engagement, access to mentorship, and feelings of belonging in the program [22]. A longitudinal study found that racial or gender discrimination from professors was a major factor in lower retention rates of minority students [23], but faculty and teaching staff also contribute to success. An interview with Latina students at a predominantly White campus revealed that meaningful interactions with responsive faculty are important factors in their persistence.

3. Local context

For this study, we sought to explore the relationships between consortia linked University of California campuses. With one application, students may apply to each of the nine undergraduate campuses simultaneously, then decide which acceptances match their unique needs. Libraries on each campus participate in resource sharing agreements, and there are close relationships between subject librarians across the campuses. Each campus has a unique culture, but there are demographic similarities between campuses. For example, over 60% of UC Merced's undergraduate population is classified as a first generation student, whereas other campuses' undergraduate populations hover close to each other around 30%. All nine campuses are classified as minority serving institutions, with nine considered Asian American and Native American Pacific Islander-Serving Institutions (AANAPISI), and five classified as Hispanic Serving Institutions (HSI).

National trends were repeated across the consortia, where in Fall 2023 a total of 53% of undergraduates and 47% of graduate students identified as female. In computer science and engineering, only 27.6% of undergraduates and 28% of graduate students identified as female, though these numbers vary slightly by campus [24]. UC Berkeley is number 6 in the nation for awarding engineering bachelor's degrees to women. UC Irvine, 16th; San Diego, 28th; UC Los Angeles, 34; Davis, 48. UC Irvine, UC San Diego, UC Riverside, UC Merced, UC Berkeley, UC Davis and UC Santa Cruz all made the list of top 50 U.S. institutions by number of degrees awarded to underrepresented minority students in engineering [25].

Faculty representation and demographics also vary by campus. At a national level, the American Society of Engineering Educators reports that 20.1% of tenured or tenure-track faculty in computer science and engineering identify as female. Some campuses in our consortia reached the list of the top 50 institutions with the highest percentage of female identified tenured or tenure track faculty, or the top 20 with highest numbers of female identified tenured/tenure track faculty [25]. These numbers, however, are proportional and the impact varies depending on the size of the institution. The College of Engineering at UC Berkeley reports that approximately 27% of their 238 engineering faculty are women [26]. UC Merced's School of Engineering comprises 72 ladder-rank faculty members, with 30% identifying as women [27]. Specific data about UC Los Angeles, UC San Diego, UC Irvine, UC Santa Cruz, and UC Santa Barbara was not readily available.

Purpose/Hypothesis

Institutions have identified the need to support underrepresented student enrollment in engineering, increase retention, and facilitate successful degree completion. Programs designed to recruit and retain women-identified engineering students exist at several campuses considered in our study, but each campus takes a different approach. For example, UC Los Angeles has WE@UCLA, institutionalized student support program within the UC Los Angeles Henry Samueli School of Engineering and Applied Science (HSSEAS) Dean's office, that is also run by full-time professional staff. All UC campuses, except UC San Francisco, host student-led chapters of the Society of Women Engineers [28]. UC Berkeley also has a Gender Equity Resource Center that serves the wider campus, and UC Irvine supports Women in Technology at UCI, an organization that also serves the wider campus.

Each of the nine campuses have at least one established library that serves as a node for students. Certain campuses have dedicated engineering, or more broadly science, libraries. Library workers are already mission driven to support a myriad of student needs, including the discovery and access of scholarly information, and supporting spaces for learning, collaboration, and research. Each campus operates independently; however, shared library resources and consortia subscription agreements necessitate statewide collaborative frameworks. There is significant collection overlap between institutions. Librarians that support engineering departments across the consortia regularly meet to discuss collections, services, instruction, and professional development as it pertains to divisions they support.

The collective impact of consortially-supported library initiatives aimed at underrepresented student groups is yet unexplored. We theorized that a coordinated, cross-institutional survey would reveal commonalities facing women-identified engineering students and expose a framework for scaled interventions. We recognized this as an opportunity to deepen our understanding of the role of library support in student experiences, and to

potentially multiply our efforts by using shared infrastructure to move beyond shared collections to shared support programming. By conducting a coordinated, cross-institutional survey, researchers have a better understanding of the commonalities facing women engineering students and the potential opportunities for library intervention system-wide.

Through the survey we aimed to explore the following research questions:

1. Are there sufficient commonalities between campus populations to generalize findings?
2. How do respondents use the library?
3. Do women identified students experience bias, safety concerns, microaggressions, or discrimination? Do women identified students have access to mentors?

Methods

1. Context for the study

A multi-campus research team partnered with engineering librarians on nine different Californian campuses supporting engineering programs to implement a Qualtrics survey. The campuses support a cumulative twenty-four unique majors within nine engineering departments. The engineering undergraduate populations range in size from roughly 373 to 2,542 students. Graduate programs range from 50 to 1,343 students. Undergraduate engineering enrollees comprise 18.6 - 33.5% of their programs, and graduate engineering enrollees comprise 16.2-34.8% of their programs. These ranges align with the national average of women-identified enrollees, accounting for 23% of engineering bachelor's degrees and 28% of engineering master's degrees [29].

2. Survey Deployment

The survey was deployed in Spring 2024 and remained open for four weeks. Several factors impacted the success of survey uptake and completion. Researchers supplied librarians on each campus with promotional materials and email templates to facilitate survey dissemination, and encouraged them to collaborate with campus departments, resource centers, and student groups to further recruitment efforts. It was important to us that the survey dissemination on each campus was facilitated by a librarian involved with that campus community. Not only would those librarians have existing relationships with departments, but those established relationships could then be revisited when sharing findings. Researchers conducted additional meetings with campus liaisons to onboard them to the project, checked in regularly, and provided opportunities for survey instrument feedback.

Several campuses experienced shutdowns and disturbances due to protests during the four-week period the survey was open. During those periods of heightened institutional response,

survey release dates were staggered. Each campus was offered an equal number of days to complete the survey.

3. Participants and procedures

This study followed ethical procedures approved by the Institutional Review Boards at University of California, Santa Cruz, where data was collected and housed (HS-FY2024-218), and the University of California, Los Angeles (IRB#24-000478). The fully anonymous survey was open to self-identified women graduate or undergraduate students enrolled in an engineering program at one of the nine campuses considered. We hoped for a response rate of 5-10%, in line with national estimates for reliability [30]. Approximately 11,024 undergraduate students and 4,296 graduate students were eligible to participate. UC Los Angeles was the only campus to reach 5% response rates for both graduate and undergraduate students. UC Santa Cruz reached 5% for undergraduate students. Respondents were given the opportunity to enter a random drawing for one of one hundred fifty-dollar gift cards, but did not have to complete the survey to be eligible for the gift card. Entries for the drawing were gathered in an instrument separate from the survey to maintain respondent anonymity.

The online survey consisted of chiefly multiple-choice questions, including nine demographic questions, twelve situational reflective questions, twenty-six library use questions, and seven programmatic questions (outlined in Appendix V). The survey produced qualitative and quantitative data, each considered separately. Campuses were considered individually and in aggregate. Qualitative metrics were analyzed using iStats software in Qualtrics. The analysis did not present significant differences in demographic responses between different campuses, supporting our theory that separate campus libraries could be considered together.

Campuses that did not meet response thresholds for statistically significant results were excluded from relational tests by campus. However, since we found no significant relationship between campus affiliation and library use, or representation, all responses were included in analyses that did not consider campus affiliation. Qualitative data was analyzed using inductive qualitative coding facilitated via Dovetail and analyzed in Excel. Additionally, cluster analysis methods were used to uncover complex pattern groups.

4. Gender as a constructed variable

The yes/no qualifying question allowed students to self-select by asking “Do you identify as a woman in engineering?” The self-identification was intended to provide an opportunity for any potential respondent who identified as an underrepresented gender in engineering. Researchers recognize that enforcing a binary does not reflect the diverse and nuanced lived

identities of respondents. Researchers elected to limit the scope and granularity of demographic questions to protect the anonymity of respondents in a relatively small population.

5. Positionality

The authors of this study are aware that our social identities inform the design and conduct of the research and interpretation of data. The first two authors of this study are White and the third is Vietnamese American, all identifying as women.

This study sought to use our combined experiences as librarians and library staff working in Engineering Libraries to evaluate and interpret the results. Our background in library work informs our analysis of how library interventions may play a role in encouraging retention for women in engineering. We aim to understand the needs of women in engineering to provide better services and resources to support them in their academic and professional careers.

Findings

Our findings align with five distinct categories: demographics; employment and leadership; gendered experiences; mentorship role models, and leadership; and library use and resources.

1. Demographics

The survey provided 386 total responses across the state, 78% of which were undergraduate students. Relying on campus liaisons offered mixed success, as evidenced by lower response rates on select campuses, as outlined below (Table II).

Table II
Demographics by Campus Location with Response Rate

Campus	**Number Female* Undergraduate Engineering Students (2023)**	**Overall Undergraduate Engr & Comp Sci Program % Female***	**Undergraduate Survey Response Percentage** (count)	**Number Female Graduate Engineering Students (2023)**	**Overall Graduate Engr & Comp Sci Program % Female**	**Graduate Survey Response Percentage** (count)
UC Berkeley	2,542	33.5	.35	1,343	34.8	1.34
UC Davis	1,507	30.6	.86	408	32.4	0
UC Irvine	1,840	27.5	3.69	530	30.2	.18
UC Los Angeles	1,236	31.5	6.79	661	25.8	6.05
UC Merced	505	19	0	50	22.9	0
UC Riverside	851	22.6	.11	175	16.2	0
UC San Diego	1,815	27.2	1.15	759	24.4	.39
UC San Francisco	0	0	0	84	48	2.38

UC Santa Barbara	373	20.2	.26	146	25.7	0
UC Santa Cruz	355	18.6	10.98	144	25.9	1.38

Data: University of California, Fall Enrollment at a Glance [24]

Four out of ten campus' response rates were too low to consider individually, however, responses were included in aggregate analysis. Responses from UC Berkeley and UC San Francisco were combined due to enrollment redundancies. Most respondents self-identified as Asian (52.7%), White/Caucasian (29.3%), or Hispanic/Latino (15.8%) (Table III).

Table III
Percentage of Respondents by Racial Identity

Identity (Race)	Percentage of sample	Percentage in program
Asian	52.7%	39.6%
White / Caucasian	29.3%	15.4%
Hispanic / Latino	15.8%	15.2%
Black or African American	5.1%	2.5%
Southwest Asian / Middle Eastern / North African	4.8%	No data
American Indian or Alaska Native	1.8%	0.3%
Native Hawaiian or Pacific Islander	1.5%	0.2%
Multiple ethnicity / Other	4.1%	No data
Prefer not to say	2.6%	No data

83.9% of the respondents were between the ages of 18-24 (Appendix II). 13.3% of respondents attended schools outside the United States or Canada during their high school years, indicating that they were likely international students. Most respondents were in their first or second year of study (Fig. 1, below). Only twenty-one respondents identified themselves as transfer students, more than half of which were in their third or fourth year. There were no significant differences in demographic characteristics between respondent campuses.

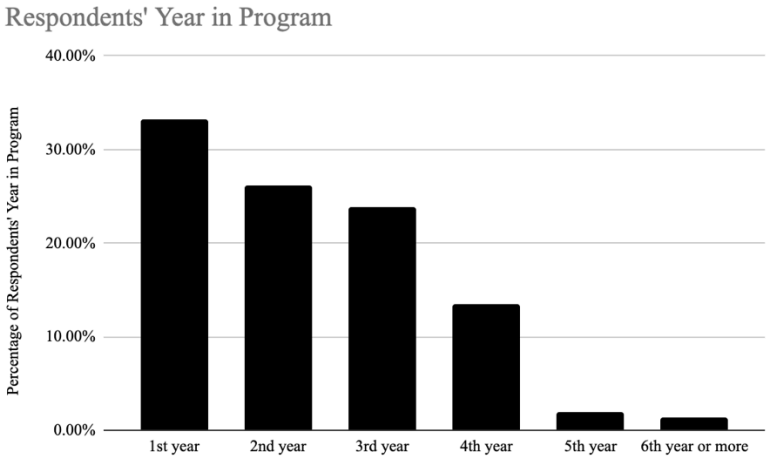

Fig. 1: Graph of respondent's year in program.

2. Employment and Leadership

When analyzed in aggregate, statistically significant relationships were found between campus affiliation and hours worked per week during the academic year (p-value: <0.00001). In aggregate, 68.4% of students reported working outside their degree program at some point during the school year. Most (47.4%) respondents worked from 1-20 hours per week. Respondents from UC Berkeley and UC Los Angeles were most likely to work 30+ hours per week.

Table IV
Hours worked per week during academic year by statistically meaningful campus

	UC Berkeley	**UC Davis**	**UC Irvine**	**UC Los Angeles**	**UC San Diego**	**UC Santa Cruz**	**Total**
0	∨∨ 0.7%	1.10%	8.50%	∧ 15.4%	1.80%	4.00%	31.60%
1-10 hours	1.10%	1.80%	7.00%	8.50%	4.00%	2.60%	25.00%
11-20 hours	1.50%	1.80%	4.40%	∨ 6.3%	2.60%	∧∧∧ 5.9%	22.40%
21-30 hours	1.50%	0.00%	1.10%	2.60%	1.10%	0.40%	6.60%
30+ hours	∧∧∧ 5.1%	0.00%	∨∨ 0.4%	7.00%	1.50%	∨ 0.4%	14.30%
Total	9.90%	4.80%	21.30%	39.70%	11.00%	13.20%	100%

Most respondents from UC Berkeley, UC Los Angeles, and UC San Diego also reported performing in a leadership role since their program commenced (p-value: 0.00285). Most

students who reported working 30+ hours a week also reported significant experience in leadership positions. Students who did not work during the academic year were less likely to have experience in leadership positions (p-value: 0.000260), as were students who worked 21-30 hours per week (Fig. 2).

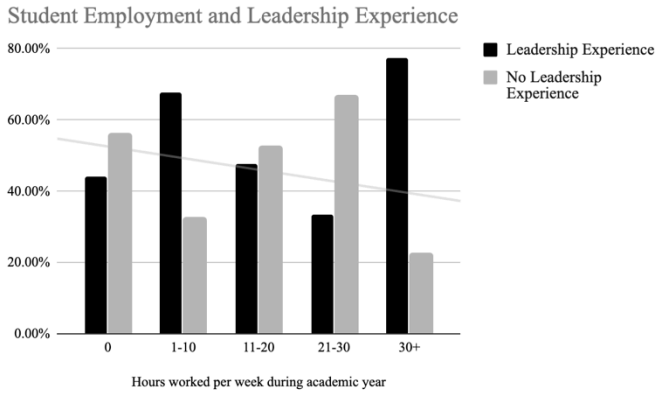

Fig. 2 Graph of student employment and leadership experience.

When asked how they feel they are doing in their program, most students who responded reported feeling "somewhat good" about their performance. Only 8% of respondents had negative feelings about their performance in their program.

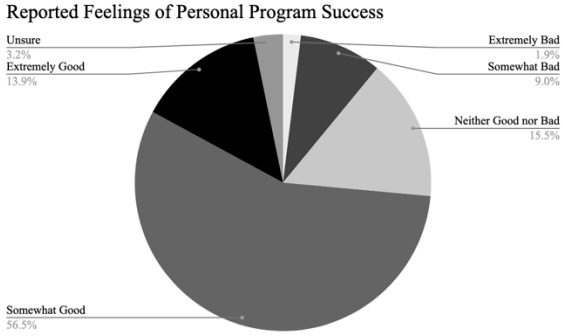

Fig. 3 Graph of feelings of personal program success.

Respondents who reported a high level of confidence asking questions in front of an audience of peers (*n=198*) were also more likely to feel comfortable presenting work and claiming credit. Conversely, respondents who were less confident asking questions in front of an audience of peers (*n=51*) were also less likely to feel comfortable presenting work and claiming credit.

3. Mentorship, Role Models, and Future Success

Questions investigating visible representation are of deep interest to libraries and program supporters. A cluster analysis with a silhouette score of 0.576342 identified relationships between access to mentors and role models that reflect respondents' experiences and feelings of professional preparedness. Four distinct groups were identified. Most respondents who described having low levels of access to mentors and role models that reflected their experiences as a woman in engineering felt moderate (*n=113*) or low (*n=59)* levels of preparedness to move forward professionally. Most respondents who identified a high level of access to mentors and role models that reflected their experiences also felt highly prepared for making professional progress (*n=99)*. A small group of outliers identified low levels of access to mentors but felt highly prepared for professional progress (*n=7)*.

Almost half of the graduate student respondents reported that their PI or graduate advisor identified as a woman, despite faculty representation aligning more closely with the national average. Across both undergraduate and graduate levels, respondents indicated similar levels of access to mentors who reflect their experiences as women, with "a moderate amount" being most common around 40.6-40.7%. Comparatively, respondents reporting access levels of "none" and "a great deal" showed similarly low rates between 6.4%-8.5%. Respondents indicated access to mentors who support their experiences as a woman studying engineering (38%). However, only 24% report access to mentors who reflect their experiences.

4. Gendered Experiences

The survey instrument asked respondents to reflect on their experiences with gender-based discrimination. For respondents who worked or interned in a professional engineering environment, 25.5% of the 110 respondents indicated they were treated differently because of gender in that environment, while 56.4% indicated no. Similarly, when all respondents were asked if they have experienced gender-based harassment or discrimination since starting their program, the majority, 73.5% responded no. However, we did note a significant relationship (*p=0.00791*) between the program year and respondent experiences. Students in the first or second year of their program were less likely than third- or fourth-year students to report gender based harassment or discrimination (Table V).

Table V

Reported experiences with gender-based harassment or discrimination by program year

Experienced harassment or discrimination	Yes (%)	No (%)
1st Year	22.2	34.0
2nd Year	16.7	30.0

3rd Year	33.3	22.5
4th Year	20.8	11.5

Responses to the prompt “do you have any additional thoughts on being a woman studying engineering that you would like to share with the researchers” indicated a vast array of emotions, experiences, and concerns, highlighting that each student’s lived experiences are unique. 50% of responses included indications of feelings, such as negative feelings of isolation, emotional burdens or bandwidth, intimidation, imposter syndrome, and safety concerns. Certain responses correlated with neutral feelings such as accountability, awareness, and classroom perceptions surrounding gender equity. The amount and array of responses under the umbrella of expressed feelings could indicate an additional, emotional burden on women studying engineering. 29.55% of respondents mentioned professional themes, including the importance of mentorship, concerns or thoughts on professional identity as a woman, and workplace environment. Notably, 27.27% of respondents shared experience-based thoughts, such as the role of intersectionality in their lived experiences, discriminatory experiences, experiences as a student of color, and the need for conversations across identities.

Table VI

Categorized response themes on additional thoughts on being a woman studying engineering*

Category	Description of Codes	Percentage of Question Responses (%)
Campus	Campus resources, clubs & student organizations, funding	**13.64**
Events	General events	**6.82**
Experience Based	Intersectionality, BIPOC experience, discrimination, conversation across identities, support groups, welcomeness/belonging, working student	**27.27**
Feelings	Isolation, emotional bandwidth, awareness, classroom perceptions, intimidation, accountability, imposter syndrome, safety	**50.00**
Library Use	Library environment, space, and use	**6.82**
Outreach	Messaging	**9.09**
Professional	Mentorship, professional identity, workplace	**29.55**
No Answer		**27.27**

*See Appendix III Table VIII for full coded response categories

5. Library Use and Resources

Participants were asked about their feelings regarding their library use, as well as specifics regarding preferred locations, usage patterns, and the appeal of programs and services. Certain responses were predictable. For example, we noted a positive correlation (Pearson's r = 0.330) between high feelings of welcomeness in the library and student comfort levels with asking the library for research assistance. We also found that library use aligns with what we see in the literature for computer science and engineering students. That is, it's relatively low compared to other disciplines. Students who felt the most welcome in the library were not necessarily more likely to use in-person library resources such as checking out books or textbooks (Fig. 4). Feelings of welcomeness in the library had little impact on the use of online library resources, however, students who felt less welcome in the library were more likely to use online resources (Fig. 5).

Third year students felt less welcome in the library overall. This was interesting to us since students surveyed in their third year or above experienced online education for the first two years of their college experience due to disruptions from COVID-19, and had a radically different welcome to campus than students years past or current.

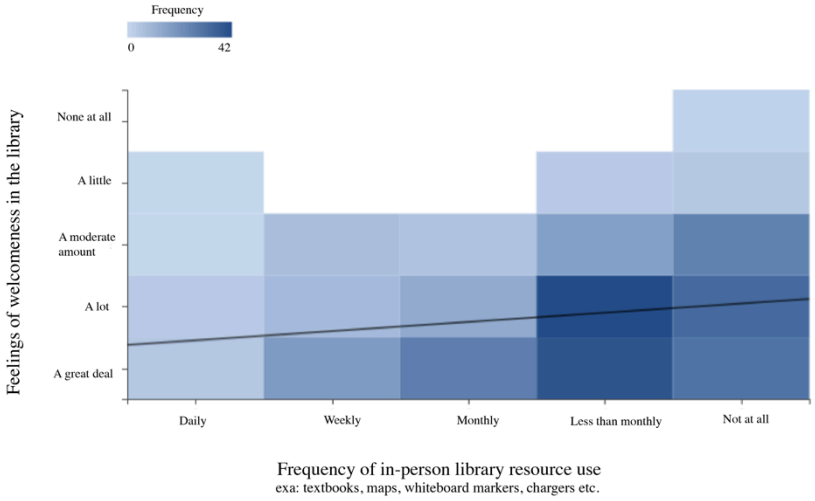

Fig. 4 Graph of frequency of in-person library resource use.

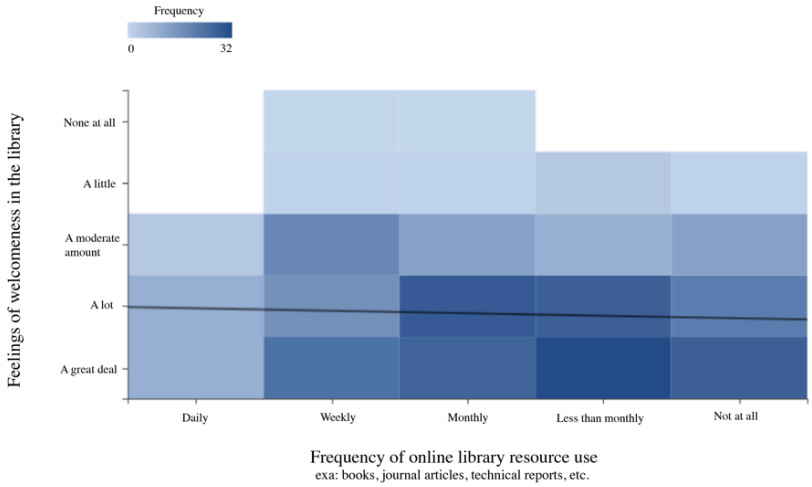

Fig. 5 Graph of frequency of online library resource use.

Responses considered how students felt about presentations in class, asking questions, and claiming credit – all integral to success in engineering career growth. Respondents reported that they were reluctant to ask questions in class but felt more confident presenting material they were familiar with. The survey also considered how engineering students use library spaces by collecting data about favored campus libraries. Respondents reported consistent use of library spaces, with 54% of respondents visiting a campus library at least once a week. Most respondents, ranging from 40.7-72.5% depending on campus, identified campus science or engineering libraries as their home libraries.

However, results show lower use of library research resources such as physical or digital collections, librarian consultations, or workshops. The results revealed that participants primarily use the library for solo study (Fig. 6), as a majority stated that they were most likely to be engaged in that activity “always” or “most of the time.”

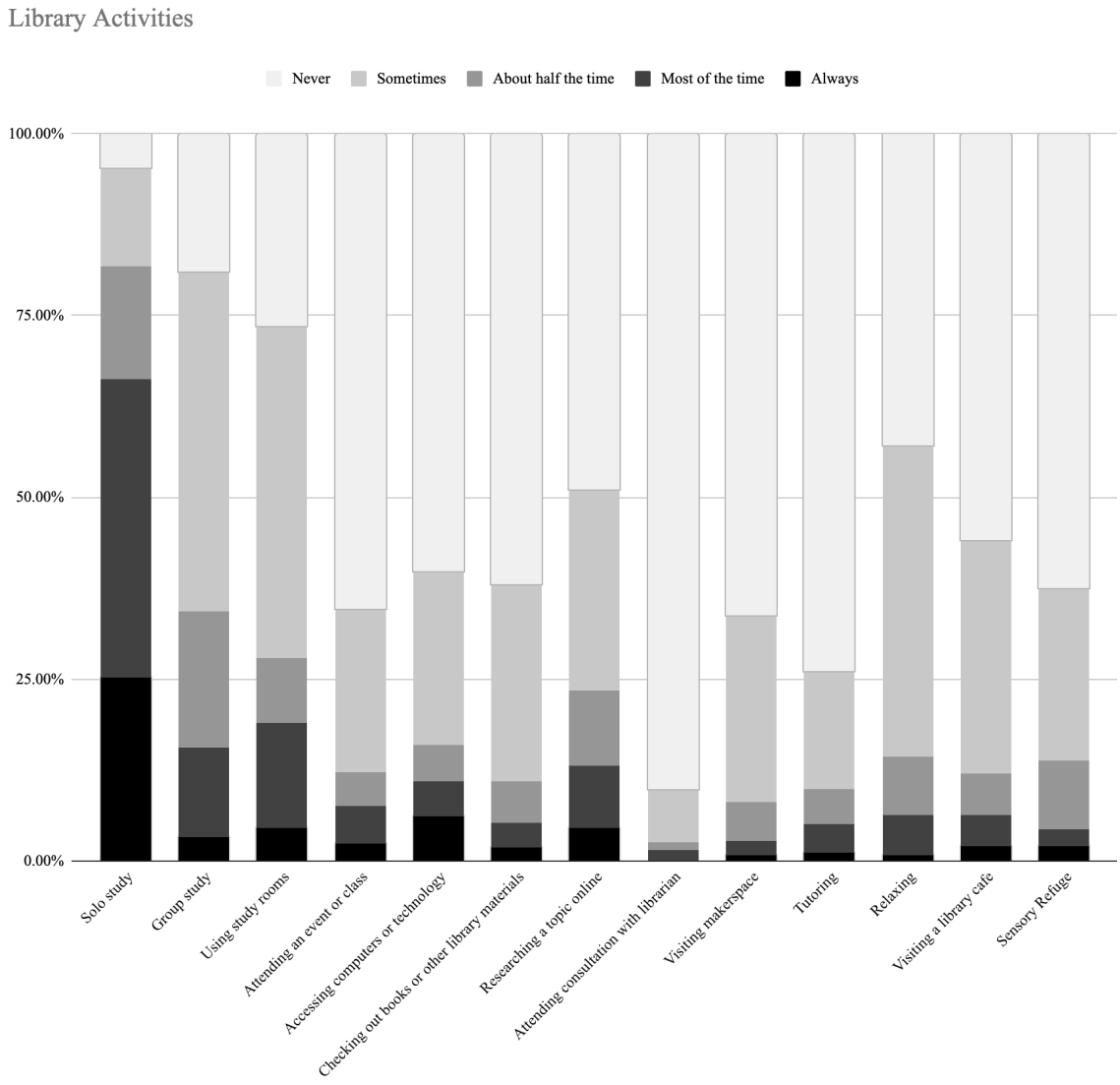

Fig. 6 Frequency of library activities.

When asked to reflect on the appeal of new library initiatives, responses revealed a non-homogenous group of library users with mixed interest in programmatic interventions from the library that were generally positive. The greatest amount of interest was expressed in library programs that would promote the work of minority and underrepresented groups in engineering, presented as either an event series or research guide. Respondents were the most ambivalent about the creation of child friendly study spaces (Fig. 7).

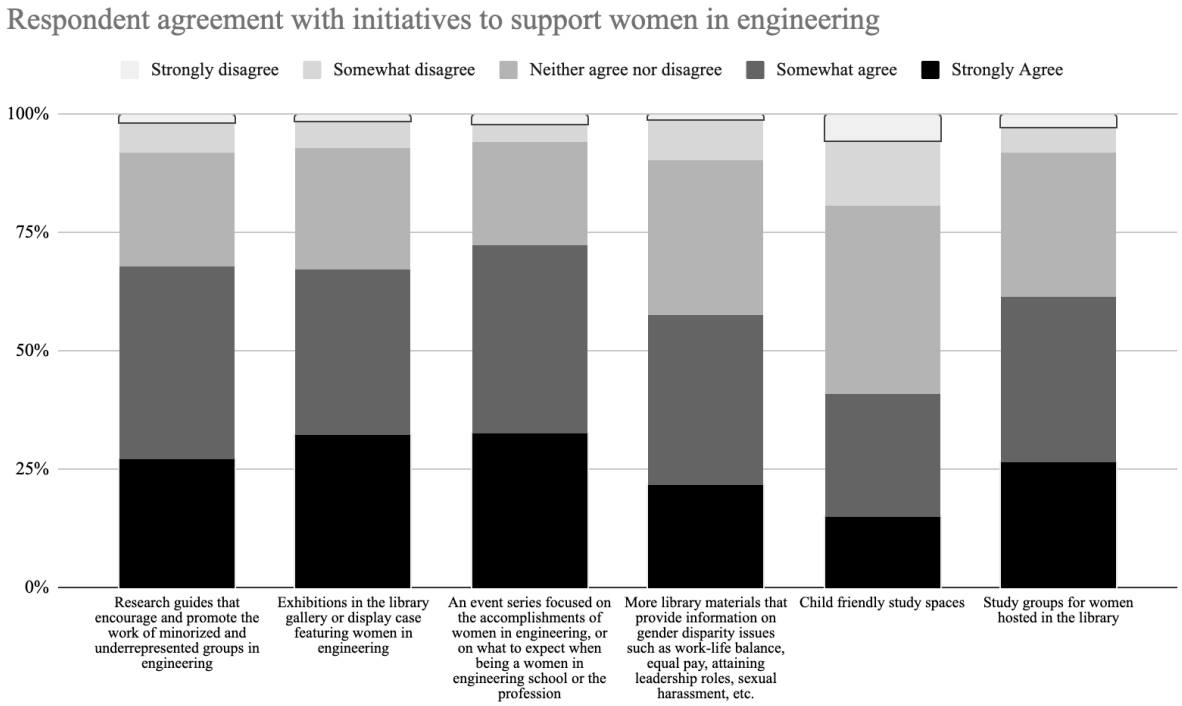

Fig. 7 Agreement with initiatives to support women in engineering.

When asked if there was anything else the library could do to support women studying engineering, 42.59% of responses mentioned general library use, including study and non-study spaces, physical environment, and library services. Events and experience-based answers were the next most frequent response categories, at 25.93% and 24.07%, respectively. Answers labeled events included mention of general events, workshops, webinars, and small group discussions. Experience based answers included mention of support groups, BIPOC experiences, conversations across identities, and welcomeness/belonging. The recurring themes of library spaces, library use, general events, and support groups could indicate a desire for increased contributions from libraries in creating women-focused services and spaces to facilitate events and support-style groups.

Table VII

Categorized respondents' thoughts on anything else the library could do to support women studying engineering*

Category	Description of codes	Percent of F1 Responses
Academic Support	Research skills, tutoring	**14.81%**
Campus	Campus resources, clubs & student organizations, funding	**16.67%**

Events	Small group discussion, webinars, workshops, general events	**25.93%**
Experience Based	Support groups, BIPOC Experiences, Conversations across Identities, Welcomeness/Belonging	**24.07%**
Library Use	General library use, study space, library spaces, library environment, and makerspace	**42.59%**
Outreach	Display/exhibits, collaboration, messaging	**14.81%**
Professional	Professional identity, mentorship, workplace	**20.37%**
No Answer		**14.81%**

*see Appendix IV Table X for full table of coded response categories

Discussion

This study was not exhaustive, and we recognize several limitations. Based on the total eligible population, the response rates were unevenly distributed among campuses. We believe this was partially due to inconsistent survey dissemination across campuses and disruptions from ongoing protests and encampments during Spring 2024. However, the results remain compelling. In particular, the commonalities across campuses and students despite differences in program sizes, offerings, and support services indicates targeted services and initiatives may be applicable beyond a single institution.

The centralized and consortial role of the libraries helped counteract limitations surrounding program size and offerings, as shared resources and collections benefit all campuses. Additionally, as a central campus service, the library acts as an impartial, often trusted, source. This campus position could encourage students to share their opinions without as many concerns for personal, programmatic, or departmental implications.

Additionally, we recognize that advancing gender equity in STEM requires acknowledging the experiences of not only women and girls, but those marginalized by gendered injustices, including those who are transgender and/or nonbinary. These populations are subject to many of the same challenges and pressures of women identified engineering students and may benefit from increased representation and programmatic support. A limitation of our survey was the provision of only two options for the gender of participants, allowing participants to self-select into the category that most closely matched their identity. This was not to impress a binary on a diverse landscape, but to simplify our analysis process and protect the anonymity of respondents on smaller campuses.

It is also important to note that the COVID-19 pandemic profoundly impacted the student experience beginning in March 2020. Students surveyed in their third year or above experienced

a radically different welcome to campus than current first or second year students. Post pandemic, colleges have had to adjust to find new ways to welcome students to the school during a key point in their social development. A growing trend amongst incoming students is a behavior of "clinging to safety," with noticeable changes in lodging preferences, orientation date selection, and information gathering habits [31]. To accommodate the ways in which student's social skills have changed coming out of the pandemic, some colleges are offering more small-group interactions, "low risk" activities, and online options. Libraries may need to adjust how they plan orientations to create a positive and welcoming experience for cautious students. We learned that students primarily use the library as a solo study space, but also see it as a safe space to gather for group work and networking.

Given all these considerations, our survey did tell us more about the lived experiences of women identified students within our consortia. We learned that women identified students are at risk of gender-based discrimination, but impacts aren't reported until the third and fourth years of a program. Most students work, and this influences their participation in extracurriculars. We learned that students are interested in connecting with mentors and peers who share their lived experiences. Our recommendations and reflections bring what we learned from the survey and literature together with our knowledge of library programs and services.

Recommendations

1. Employment and Leadership

Since most students reported working during their program, faculty and staff in support roles need to be aware of competing demands on student time. Initiatives that require synchronous participation may not be the best fit for students who are already pressed for time or limited by preset availability. Leaning into ways students could optimize existing responsibilities for professional development should be considered. For example, promoting paid internships and resources that help students articulate professional value in their casual positions help students make the most of necessary part-time jobs. Libraries can also partner with career services to provide asynchronous professional development and professionalization resources.

2. Mentorship, Role Models, and Future Success

Our results indicate that women-identified graduate students seek out representative PIs or advisors and are more likely to be accepted into programs with gender-diverse leadership. However, as only 24% of respondents indicated access to mentors who reflect their experiences, the results could indicate an area for further programmatic development, given the impact of mentorship on student success. Positive connections with faculty and teaching staff are crucial to success, belonging, and retention for underrepresented students.

This study indicates that libraries can play a central role in supporting the success of women in computer science and engineering. Librarians can challenge cultural stereotypes, promote allyship, and impact the visibility of diverse field membership by making resources authored by women active in the field more visible. When sharing how they thought the library could support women in engineering, one student mentioned that they were "*sick of hearing about Ada Lovelace*." Librarians can work with instructors to make representative examples easily accessible. Research narratives and popular science books could further expand possible spaces.

3. Gendered Experiences

The results indicated a shift between second- and third-year students as more third-year and above students reported experiences with gender-based harassment or discrimination. This is an interesting pattern and may coincide with programmatic shifts away from core classes into smaller, more specialized classes within their division. Students also emphasize the intersectionality of discriminatory interactions, and the emotional burdens experienced in academic and professional settings. They highlighted feelings related to imposter syndrome, isolation, and emotional burnout.

4. Library Use and Resources

Given the feedback received from this study, one potential avenue to increase visibility of women within the profession would be to coordinate more speaker series and events led by women engineers. These programs would be aligned with participant responses that reiterated the importance of having role models and mentors in the field. As a central resource to all engineering departments, the library is well suited as a forum for speaker series and workshops open to all engineering students. Furthermore, libraries can also support this need by fostering communities of practice, such as providing spaces for study groups, facilitating small group discussions, hosting webinars, and organizing networking events. This study reinforced that libraries hold immense value as a space and a service.

Additionally, the value of libraries as a non-classroom space is evident by the high use rates, particularly for solo study. Although students reported using libraries for group study only "sometimes," using libraries as collaborative spaces is also essential to fostering community. There is prime opportunity to develop and promote tailored resources to students within the space, and to gather feedback on new initiatives. Being valued as a safe, functional space is paramount to supporting student success.

Reflecting student identities in classrooms is a process. Libraries can also partner with department administration and faculty to update and change static curricular content. The increasing use of Open Educational Resources (OER) in engineering is an opportunity for faculty to critically examine course materials and adjust examples to reflect student identities.

5. Future Research

Future work on this topic should consider expanding the study to gather responses from all students regardless of gender identification. It was clear that students' other marginalized identities impacted their university experience. Additional research can be conducted to explore the intersectionality of other minority experiences including immigration status, sexual preference, disability status, economic class, religious background, age, etc. It may also be beneficial to learn more about the experiences of early career engineers since attrition continues after students graduate, and the support of early career graduates is a priority for many.

Conclusion

The main contribution of this paper is to identify lived experiences of women-identified students in computer science and engineering and highlight the role of academic libraries in supporting their studies and identity-making. This population remains underrepresented in engineering fields, and a significant number of respondents (26.47%) reported experiencing gender-based harassment or discrimination in their program. That reaffirms our efforts to investigate new ways to support this population as they matriculate.

The survey findings provide a foundation for advocating for and implementing data-driven, coordinated initiatives across system campuses. Our approach to surveying multiple campuses indicates that our findings are generalizable beyond an individual campus or singular student body, and librarians can work together to create shared programming and materials. Additional findings reflect the students' habits and utilization of campus services, including students' use of the library and feelings of welcomeness. Student responses indicate a robust use of libraries as study spaces. As students are present and feel comfortable within campus libraries, this positions science and engineering libraries to be partners with engineering departments and programs in developing success-focused services and initiatives for women in engineering programs.

Engagement in student organizations across campuses emerged as another key theme, and we encourage pursuing a new outreach approach that partners with campus organizations that already have relationships with underrepresented populations. Future research and work could aim to understand the individual goals and challenges of each student organization, in order to align impactful library and campus services. From the responses, a clear information

need for more real-life examples of women in the profession was exposed. Science and engineering libraries can work to make these examples more visible to faculty and students. Narrowing representation gaps in computer science and engineering will require many approaches well beyond the library, but as contributors to student success libraries can be a piece of the puzzle.

References

[1] National Center for Science and Engineering Statistics (NCSES) 2023, "Diversity and STEM: Women, Minorities, and Persons with Disabilities 2023," National Science Foundation, Alexandria, VA, Special Report NSF 23-315. Accessed: Jan. 06, 2025. [Online]. Available: https://ncses.nsf.gov/wmpd

[2] U.S. Department of Labor, Women's Bureau, "Percentage of women workers in science, technology, engineering, and math (STEM)," U.S. Department of Labor. Accessed: Jan. 24, 2025. [Online]. Available: https://www.dol.gov/agencies/wb/data/occupations-stem

[3] T. M. Freeman, L. H. Anderman, and J. M. Jensen, "Sense of Belonging in College Freshmen at the Classroom and Campus Levels," *The Journal of Experimental Education*, vol. 75, no. 3, pp. 203–220, Apr. 2007, doi: 10.3200/JEXE.75.3.203-220.

[4] M. L. Pedler, R. Willis, and J. E. Nieuwoudt, "A sense of belonging at university: student retention, motivation and enjoyment," *Journal of Further and Higher Education*, vol. 46, no. 3, pp. 397–408, Mar. 2022, doi: 10.1080/0309877X.2021.1955844.

[5] J. E. Nieuwoudt, "Psychological distress among students in enabling education: An exploratory study," *Australian Journal of Adult Learning*, vol. 61, no. 1, pp. 6–25, Jul. 2021, doi: 10.3316/informit.826968548542223.

[6] L. R. M. Hausmann, J. W. Schofield, and R. L. Woods, "Sense of Belonging as a Predictor of Intentions to Persist Among African American and White First-Year College Students," *Res High Educ*, vol. 48, no. 7, pp. 803–839, Nov. 2007, doi: 10.1007/s11162-007-9052-9.

[7] N. Saleh and A. Large, "Collaborative information behaviour in undergraduate group projects: A study of engineering students," *Proceedings of the American Society for Information Science and Technology*, vol. 48, no. 1, pp. 1–10, 2012, doi: 10.1002/meet.2011.14504801035.

[8] R. M. Marra, K. A. Rodgers, D. Shen, and B. Bogue, "Women Engineering Students and Self-Efficacy: A Multi-Year, Multi-Institution Study of Women Engineering Student Self-Efficacy," *Journal of Engineering Education*, vol. 98, no. 1, pp. 27–38, 2009, doi: 10.1002/j.2168-9830.2009.tb01003.x.

[9] S. Allard, K. J. Levine, and C. Tenopir, "Design engineers and technical professionals at work: Observing information usage in the workplace," *Journal of the American Society for Information Science and Technology*, vol. 60, no. 3, pp. 443–454, 2009, doi: 10.1002/asi.21004.

[10] E. Whitmire, "Disciplinary differences and undergraduates' information-seeking behavior," *Journal of the American Society for Information Science and Technology*, vol. 53, no. 8, pp. 631–638, 2002, doi: 10.1002/asi.10123.

[11] M. Hertzum and A. M. Pejtersen, "The information-seeking practices of engineers: searching for documents as well as for people," *Information Processing & Management*, vol. 36, no. 5, pp. 761–778, Sep. 2000, doi: 10.1016/S0306-4573(00)00011-X.

[12] "The National Engineering Education Research Colloquies," *Journal of Engineering Education*, vol. 95, no. 4, pp. 257–258, 2006, doi: 10.1002/j.2168-9830.2006.tb00899.x.
[13] U. Nguyen, "Women in Engineering: A Review of the 2020 Literature," *Magazing of the Society of Women Engineers*, no. State of Women, 2021, Mar. 15, 2021. Accessed: Jan. 03, 2025. [Online]. Available: https://swe.org/magazine/women-in-engineering-a-review-of-the-2020-literature/
[14] M. Conrad, A. R. Abdallah, and L. Ross, "Challenges of Students in STEM: A Closer Look at How Female Engineering Student Experiences Vary Compared to Those of Other STEM Students," presented at the 2022 ASEE Annual Conference & Exposition, Aug. 2022. Accessed: Oct. 12, 2023. [Online]. Available: https://peer.asee.org/challenges-of-students-in-stem-a-closer-look-at-how-female-engineering-student-experiences-vary-compared-to-those-of-other-stem-students
[15] M. Ong, J. M. Smith, and L. T. Ko, "Counterspaces for women of color in STEM higher education: Marginal and central spaces for persistence and success," *Journal of Research in Science Teaching*, vol. 55, no. 2, pp. 206–245, 2018, doi: 10.1002/tea.21417.
[16] K. Stillmaker, L. G. Oka, J. G. Plascencia, C. C. Schwartz-Doyle, and K. Lor, "Investigating the Role of Faculty Gender in Mentoring Female Engineering Students for Success," presented at the 2020 ASEE Virtual Annual Conference Content Access, Jun. 2020. Accessed: Jan. 03, 2025. [Online]. Available: https://peer.asee.org/investigating-the-role-of-faculty-gender-in-mentoring-female-engineering-students-for-success
[17] C. T. Amelink and E. G. Creamer, "Gender Differences in Elements of the Undergraduate Experience that Influence Satisfaction with the Engineering Major and the Intent to Pursue Engineering as a Career," *Journal of Engineering Education*, vol. 99, no. 1, pp. 81–92, 2010, doi: 10.1002/j.2168-9830.2010.tb01044.x.
[18] S. C. Davis, S. B. Nolen, N. Cheon, E. Moise, and E. W. Hamilton, "Engineering climate for marginalized groups: Connections to peer relations and engineering identity," *Journal of Engineering Education*, vol. 112, no. 2, pp. 284–315, 2023, doi: 10.1002/jee.20515.
[19] A. Jacobs, S. Chopra, and L. Golab, "Reddit Mining to Understand Women's Issues in STEM," presented at the EDBT/ICDT Workshops, 2020. Accessed: Jan. 03, 2025. [Online]. Available: https://www.semanticscholar.org/paper/Reddit-Mining-to-Understand-Women%27s-Issues-in-STEM-Jacobs-Chopra/ec0e555526b964abb65db99eb344e1d9aab05761
[20] D. S. Read, N. R. Werse, and L. Howell, "Why Women Go Elsewhere: A Study of Women's Underrepresentation in Computer Science," in *Handbook of Research on Exploring Gender Equity, Diversity, and Inclusion Through an Intersectional Lens*, IGI Global Scientific Publishing, 2023, pp. 311–329. doi: 10.4018/978-1-6684-8412-8.ch015.
[21] E. Blosser, "An examination of Black women's experiences in undergraduate engineering on a primarily white campus: Considering institutional strategies for change," *Journal of Engineering Education*, vol. 109, no. 1, pp. 52–71, 2020, doi: 10.1002/jee.20304.
[22] D. Wilson, "Women, Engagement, Stress, and Worry: Do They Have to Go Hand in Hand?," presented at the 2020 ASEE Virtual Annual Conference Content Access, Jun. 2020. Accessed: Jan. 03, 2025. [Online]. Available: https://peer.asee.org/women-engagement-stress-and-worry-do-they-have-to-go-hand-in-hand
[23] S. Y. Park, N. Andalibi, Y. Zou, S. Ambulkar, and J. Huh-Yoo, "Understanding Students'

Mental Well-Being Challenges on a University Campus: Interview Study," *JMIR Form Res*, vol. 4, no. 3, p. e15962, Mar. 2020, doi: 10.2196/15962.
[24] "Fall enrollment at a glance," University of California. Accessed: Jan. 24, 2025. [Online]. Available: https://www.universityofcalifornia.edu/about-us/information-center/fall-enrollment-glance
[25] American Society of Engineering Education, "Engineering and Engineering Technology By the Numbers," ASEE, Washington, D.C., 2023. [Online]. Available: https://ira.asee.org/by-the-numbers/
[26] UC Berkeley, "Facts and figures," UC Berkeley Engineering. Accessed: Jan. 24, 2025. [Online]. Available: https://engineering.berkeley.edu/about/facts-and-figures/
[27] UC Merced, "Facts, Rankings & Accolades | School of Engineering," UC Merced School of Engineering. Accessed: Jan. 24, 2025. [Online]. Available: https://engineering.ucmerced.edu/engineer-stats
[28] SWE, "Section & Affiliate Map," Society of Women Engineers. Accessed: Jan. 24, 2025. [Online]. Available: https://swe.org/membership/sections/
[29] National Center for Education Statistics, "Table 325.45. Degrees in engineering and engineering technologies conferred by postsecondary institutions, by level of degree and sex of student: Selected academic years, 1949-50 through 2020-21," Digest of Education Statistics. Accessed: Oct. 24, 2023. [Online]. Available: https://nces.ed.gov/programs/digest/d22/tables/dt22_325.45.asp
[30] M.-J. Wu, K. Zhao, and F. Fils-Aime, "Response rates of online surveys in published research: A meta-analysis," *Computers in Human Behavior Reports*, vol. 7, p. 100206, Aug. 2022, doi: 10.1016/j.chbr.2022.100206.
[31] M. Hicks, "Orientation Is the First Step to Finding Belonging in College. It Is Changing Post-Pandemic.," EdSurge News. Accessed: Jan. 24, 2025. [Online]. Available: https://www.edsurge.com/news/2024-07-18-orientation-is-the-first-step-to-finding-belonging-in-college-it-is-changing-post-pandemic

Appendix

Appendix I: Definitions

Counterspace: A physical, virtual, or emotional space that enables individuals from marginalized or oppressed backgrounds to engage in community building and support amongst their peers. In these safe spaces underrepresented students can collectively disrupt the dominant narrative of the larger institution.

Appendix II: Table VIII

Age Demographics of Respondents

Age Range	Count	Percentage
18-19	92	33%
20-24	144	51%

25-29	34	12%
30-34	7	2%
35-39	2	1%
Prefer not to say	2	1%

Appendix III: Table IX

Coded Responses from Question "Please share anything else you think the library could do to support women studying engineering"

Category*	Code	Percent of F1 Responses
Academic Support		**14.81%**
	Research Skills	7.41%
	Tutoring	9.26%
Campus		**16.67%**
	Campus Resource	9.26%
	Clubs & Student Organizations	5.56%
	Funding	3.70%
Events		**25.93%**
	Small Group Discussion	3.70%
	Webinars	7.41%
	Workshops	9.26%
	General Events	20.37%
Experience Based		**24.07%**
	Support Groups	16.67%
	BIPOC Experience	3.70%
	Conversations Across Identities	1.85%
	Welcomeness/Belonging	3.70%
Library Use		**42.59%**
	General Library Use	18.52%
	Study Space	22.22%
	Library Space	24.07%
	Library Environment	12.96%

	Makerspace	1.85%
Outreach		**14.81%**
	Display/Exhibits	9.26%
	Collaboration	7.41%
	Messaging	1.85%
Professional		**20.37%**
	Professional Identity	5.56%
	Mentorship	12.96%
	Workplace	3.70%
No Answer		**14.81%**

*Responses that include 2 or more codes within the same category are only counted once in the category count.

Appendix IV: Table X

Categorized response themes on additional thoughts on being a woman studying engineering

Category	Code	Percentage of Question Responses*
Campus		**13.64%**
	Campus Resource	6.82%
	Clubs & Student Organizations	4.55%
	Funding	2.27%
Events		**6.82%**
	General Events	6.82%
Experience Based		**27.27%**
	BIPOC Experience	15.91%
	Conversations Across Identities	9.09%
	Discrimination	13.64%
	Intersectionality	18.18%
	Support Groups	4.55%
	Welcomeness/Belonging	4.55%

	Working student	6.82%
Feelings		**50.00%**
	Accountability	4.55%
	Awareness	13.64%
	Classroom Perceptions	11.36%
	Emotional Bandwidth	22.73%
	Imposter Syndrome	4.55%
	Intimidation	6.82%
	Isolation	25.00%
	Safety	4.55%
Library Use		**6.82%**
	Library Environment	6.82%
	Library Space	2.27%
	Library Use	2.27%
No Answer		**27.27%**
Outreach		**9.09%**
	Messaging	9.09%
Professional		**29.55%**
	Mentorship	18.18%
	Professional Identity	11.36%
	Workplace	2.27%

*Responses that include 2 or more codes within the same category are only counted once in the category count.

Appendix V: Survey Questions

Q1 Do you identify as a woman in an engineering program?

- No (1)
- Yes (2)

Q2 Which [university] a location do you attend?
(program dropdown)

Q3 What program are you enrolled in? Please select the program category that best matches your program.
(program dropdown)

Q4 What is your program level?
- Undergraduate (1)
- Graduate (MS, ME, PhD, graduate certificate) (2)
- Post-doc (3)

Q5 Are you a transfer student?
- Yes (1)
- No (2)

Q6 What year are you in your program?
- 1st year (1)
- 2nd year (2)
- 3rd year (3)
- 4th year (4)
- 5th year (5)
- 6th year or more (6)

Q7 Overall, how do you feel you're doing in your program?
- Extremely bad (1)
- Somewhat bad (2)
- Neither good nor bad (3)
- Somewhat good (4)
- Extremely good (5)
- Unsure (6)

Start of Block: Graduate / Post-doc Progression Questions

GQ1 Did you work as an engineer or within the engineering profession prior to enrolling in a graduate program?
- Yes (1)
- No (2)

Q61 Does your PI or graduate advisor identify as a woman?
- Yes (1)
- No (2)
- Unknown (3)
- Not Applicable (4)

End of Block: Graduate / Post-doc Progression Questions

E2 For the following questions, please consider your own experiences in your coursework and your own professional development.

Q8 How often do you find yourself reflected in your **institution's** invited speakers series? (i.e., special guest talks, presentations, colloquiums)?

- A great deal (1)
- A lot (2)
- A moderate amount (3)
- A little (4)
- None at all (5)
- Not Applicable (6)

Q9 How often do you find yourself reflected in your **department's** invited speakers series? (i.e., special guest talks, presentations, colloquiums)?

- A great deal (1)
- A lot (2)
- A moderate amount (3)
- A little (4)
- None at all (5)
- Not Applicable (6)

Q10 When participating in group projects, how comfortable are you claiming credit for new ideas or portions of the work?

- Always (1)
- Most of the time (2)
- About half the time (3)
- Sometimes (4)
- Never (5)

Q11 In the classroom, how comfortable are you asking questions in front of an audience of peers?

- Extremely comfortable (1)
- Somewhat comfortable (2)
- Neither comfortable nor uncomfortable (3)
- Somewhat uncomfortable (4)
- Extremely uncomfortable (5)

Q12 How comfortable are you presenting work in front of an audience of peers?

- Extremely comfortable (1)
- Somewhat comfortable (2)
- Neither comfortable nor uncomfortable (3)
- Somewhat uncomfortable (4)
- Extremely uncomfortable (5)

Q13 Do you feel prepared for making professional progress? This could be job / internship interviews, or graduate school.

- Definitely yes (1)
- Probably yes (2)
- Might or might not (3)
- Probably not (4)

- Definitely not (5)

Q13.1 Since starting your program, have you worked in a professional engineering environment, including internships?
- Yes (1)
- No (2)

Q13.2 During your work in a professional engineering environment, did you feel like you were treated any differently because of your gender?
- Yes (1)
- No (2)
- Unsure (3)

Q14 Are you involved in student organizations?
- Yes (1)
- No (2)

Q15 Which three student organizations or clubs are you **most** involved in? List them below:
- 1 (1) _____
- 2 (2) _____
- 3 (3) _____

Q16 Since starting your program, have you held a leadership role in any form? This could be as president of a student organization, managing employees, or organizing an event.
- Yes (1)
- No (2)

E3 For the following questions, please consider your experience over the past year.

Q17 Over the past year, on average, how often have you visited the library on campus?
- Multiple times a week (1)
- Once a week (2)
- Once a month (3)
- Once a quarter/semester (4)
- Rarely or never (5)

QSub1 Which library do you consider to be your home library?
- (options dependent on campus selection)

Q18 When you're at the library, what activities are you most likely to be engaged in? (grid selection)
Rank: Always (1), Most of the Time (2), About half the time (3), Sometimes (4), Never (5), Not Applicable (6)

Activity List:
- Solo Study (1)
- Group Study (2)
- Using study rooms (3)
- Attending an event or class (4)

- Accessing computers or technology (5)
- Checking out books or other library materials (6)
- Researching a topic online (7)
- Attending consultation with librarian (8)
- Visiting makerspace (9)
- Tutoring (10)
- Relaxing (11)
- Visiting a library cafe (12)
- Sensory Refuge (13)

Q19 To what extent do you feel **welcome** in the library?
- A great deal (1)
- A lot (2)
- A moderate amount (3)
- A little (4)
- None at all (5)

Q20 How often do you utilize **online library resources** for your academic work (books, journal articles, technical reports, etc.)?
- Daily (1)
- Weekly (2)
- Monthly (3)
- Less than monthly (4)
- Not at all (5)

Q21 How often do you utilize **in-person library resources** for your academic work (books, textbooks, maps, whiteboard markers, chargers, etc.)?
- Daily (1)
- Weekly (2)
- Monthly (3)
- Less than monthly (4)
- Not at all (5)

Q22 Please select the option that most accurately matches how you feel about asking the library for research assistance:
- Extremely comfortable (1)
- Somewhat comfortable (2)
- Neither comfortable nor uncomfortable (3)
- Somewhat uncomfortable (4)
- Extremely uncomfortable (5)
- Not applicable (6)

Q23 To what extent do you agree that the library initiatives below would support women in your program: (grid selection)
Scale: Strongly Agree (1), Somewhat agree (2), Neither agree nor disagree (3), Somewhat disagree (4), Strongly disagree (5)

Initiatives:

- Research guides that encourage and promote the work of minorized and underrepresented groups in engineering (1)
- Exhibitions in the library gallery or display case featuring women in engineering (2)
- An event series focused on the accomplishments of women in engineering, or on what to expect when being a women in engineering school or the profession (3)
- More library materials that provide information on gender disparity issues such as work-life balance, equal pay, attaining leadership roles, sexual harassment, etc. (4)
- Child friendly study spaces (5)
- Study groups for women hosted in the library (6)

E1 For the following questions, please consider your own experiences in your coursework.

Q24 How much access do you have to mentors and role models that **reflect** your experience as a woman in engineering?

- A great deal (1)
- A lot (2)
- A moderate amount (3)
- A little (4)
- None at all (5)

Q25 How much access do you have to mentors and role models that **support** your experience as a woman in engineering?

- A great deal (1)
- A lot (2)
- A moderate amount (3)
- A little (4)
- None at all (5)

Q26 Over the past year, how often have instructors used case studies or provided examples of a professional engineer's work in class?

- Daily (1)
- Weekly (2)
- Monthly (3)
- Less than monthly (5)
- None at all (6)
- Unsure (7)

Q27 What proportion of those examples specifically reference the work of women engineers?

- A great deal (1)
- A lot (2)
- A moderate amount (3)
- A little (4)
- None at all (5)
- Unsure (6)

Q28 Since starting your program, have you experienced any gender-based harassment or discrimination?

- Yes (1)
- No (2)

Q27 What is your age range?

- 18-19 (1)
- 20-24 (2)
- 25-29 (3)
- 30-34 (4)
- 35-39 (5)
- 40-44 (6)
- 45-49 (7)
- 50 or older (8)
- Prefer not to say (9)

Q28 Please specify your ethnicity (select all that apply)

- Black or African American (1)
- Hispanic / Latino (2)
- American Indian or Alaska Native (3)
- Asian (4)
- Native Hawaiian or Pacific Islander (5)
- Southwest Asian / Middle Eastern / North African (6)
- White / Caucasian (7)
- Multiple ethnicity / Other (8)
- Prefer not to say (9)

Q29 Were you educated outside the United States or Canada from ages 14-18? (typically grades 9-12)

- Yes (1)
- No (2)

Q30 How many hours per week do you work during the academic year?

- 0 (1)
- 1-10 hours (2)
- 11-20 hours (3)
- 21-30 hours (4)
- 30+ hours (5)

F1 Please share anything else you think the library could do to support women studying engineering.

_____

F2 Do you have any additional thoughts on being a woman studying engineering that you would like to share with the researchers?

_____