



THE SE3[≡] PROJECT

STRUCTURAL ENGINEERING ENGAGEMENT & EQUITY

RACIAL EQUITY
TASK GROUP

2022-2023

Civil/Structural Engineering Student Experience Survey

Challenges and Career Plans Topic Brief

By the Structural Engineering, Engagement, and Equity Committee of the Structural Engineers Association of Northern California (SEAONC)



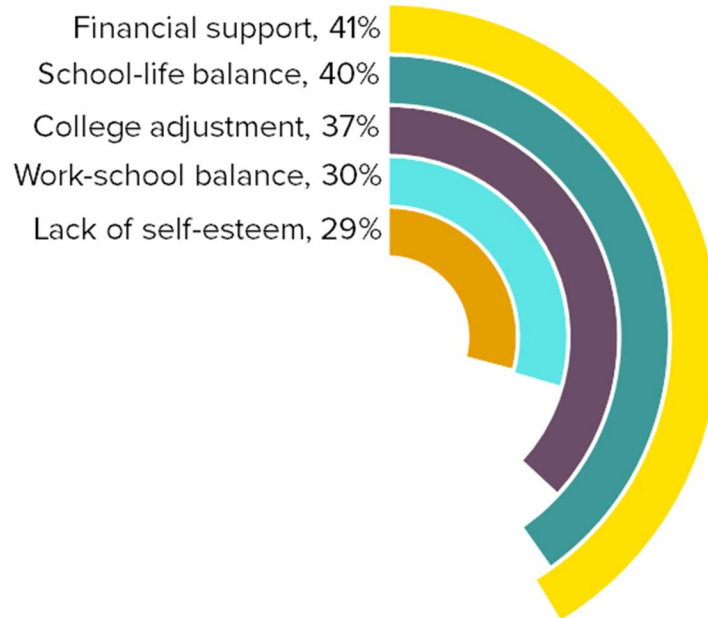
Challenges and Career Plans Topic Brief

The Racial Equity Task Group of SEAONC SE3 Committee distributed a survey to civil engineering undergraduate students, via department chairs and student groups, at a number of colleges across the US from November 2020 through February 2021. A total of 271 undergraduate students responded to the survey. The survey is part of an ongoing effort to better understand the undergraduate civil engineering experience in American colleges.

The purpose of this brief is to give an overview of the challenges faced by respondents during their undergraduate career and to become familiar with their interest in specializing in structural engineering, pursuing an advanced degree in civil engineering, and ultimately, pursuing a career in this field whether that be at the industry level or in academia.

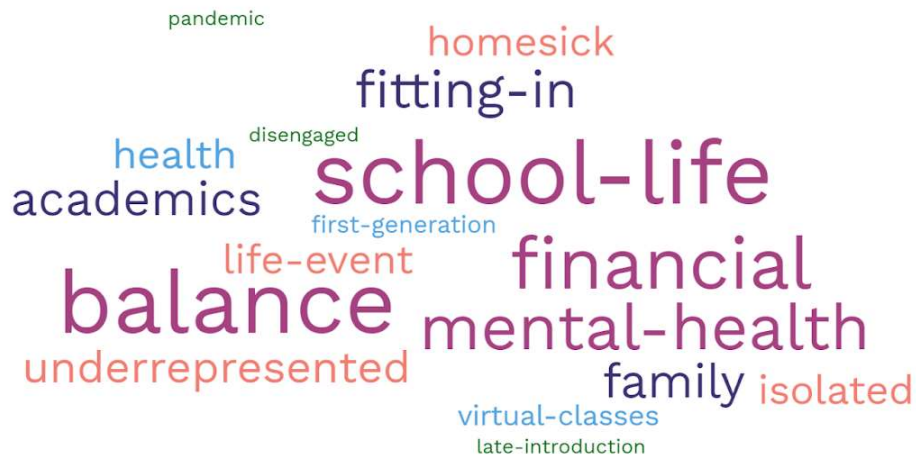
Challenges

Respondents were asked, “What types of barriers, if any, did you overcome to attend college and/or are overcoming to stay in college?” Across all 271 respondents, the top 5 responses are shown on the graph below.



The remaining options not shown included college readiness (23%), distance from home to school (19%), gender disparity/lack of gender diversity (18%), first generation status (18%), racial disparity/lack of racial diversity (14%), health (10%), college culture or resources (7%), family support (7%), and disabilities (6%). Note that respondents could select as many responses as they wanted for this question.

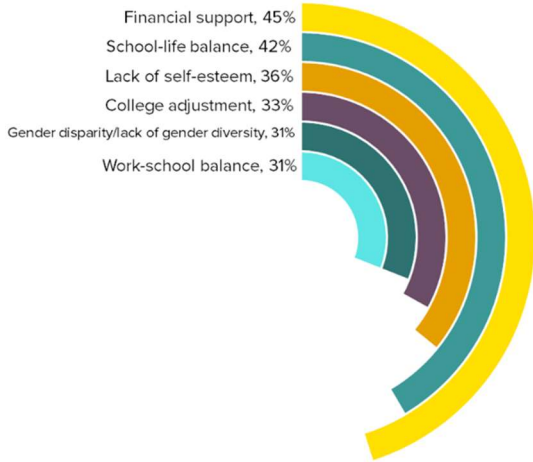
The following words appeared most often in the respondents’ answers when asked to elaborate on their barriers and challenges:



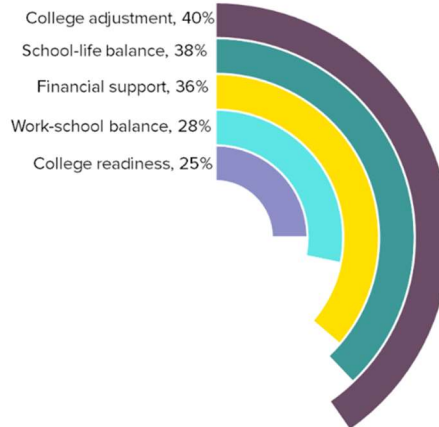
The remainder of this section presents subsets of the above data, separated by demographic groups. For background information on the demographics of the survey respondents, see the Demographics Topic Brief associated with this survey on the SEAONC SE3 website.

Gender

Female Respondents



Male Respondents



Women reported financial support as a barrier at higher rates than men (45% versus 36%). Notable barriers in women’s top barriers that do not appear in men’s include lack of self-esteem and gender disparity/lack of gender diversity.

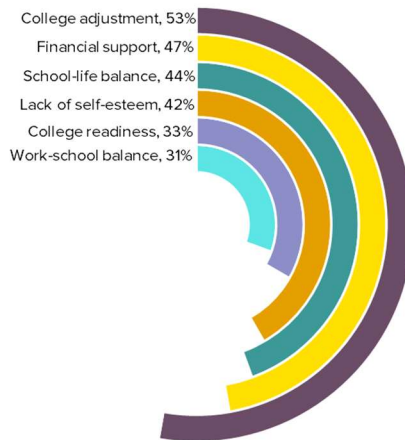
Race/Ethnicity

Non-white respondents reported financial support, school-life balance, and lack of self-esteem as barriers at higher rates than white respondents.

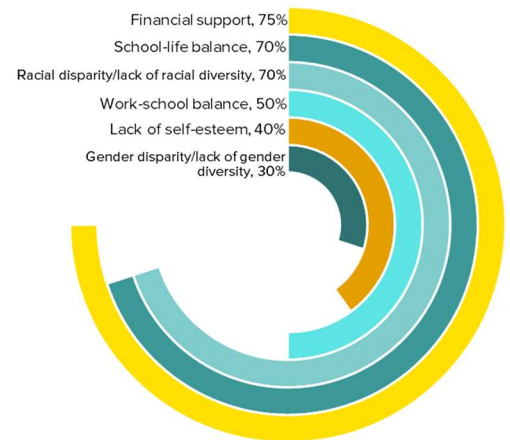
Additionally, respondents of color generally reported experiencing challenges in general at higher rates than white respondents.

Notably, the responses varied significantly across all racial/ethnic groups. This indicates that there is no single one-size-fits-all solution to supporting all under-represented groups.

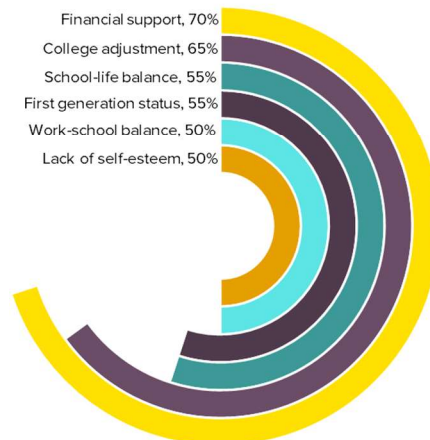
Asian Respondents



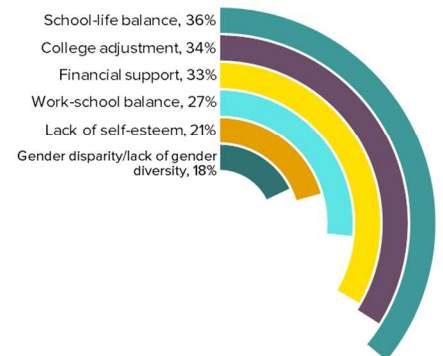
Black Respondents



Hispanic/Latinx Respondents

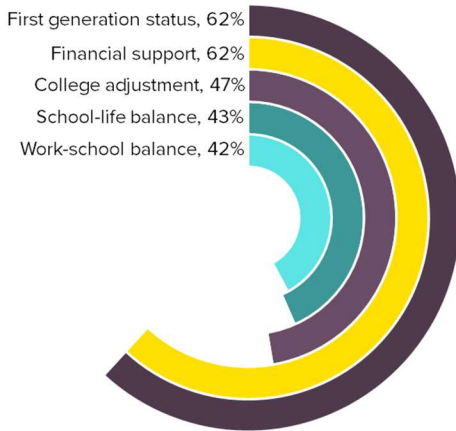


White Respondents

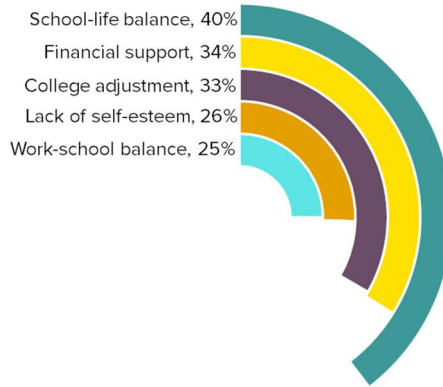


First Generation Status

First-Generation Respondents



Non-First-Generation Respondents

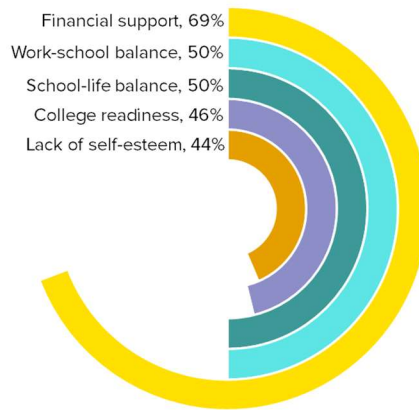


First-generation respondents reported that their first-generation status and financial support are their most common barriers in their experience as undergraduate students. These challenges (and all other challenges listed in the chart) were reported at much higher rates compared to non-first-generation respondents. Note that the first-generation respondents to this survey were more likely to also identify as being eligible for Pell Grants.

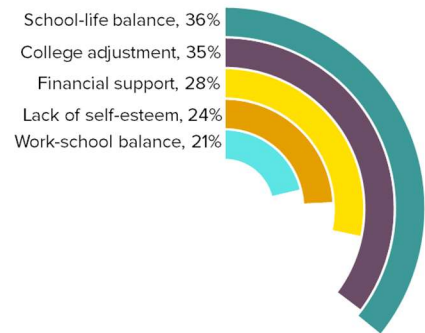
Pell Grant Eligibility

Pell Grant eligible respondents reported financial support as a barrier at over twice the rate of non-Pell Grant eligible respondents (69% versus 28%). Perhaps related, Pell Grant eligible respondents were also over twice as likely to select work-school balance as a barrier (50% versus 21%).

Pell Grant Eligible Respondents



Non Pell Grant Eligible Respondents



Pell Grant eligibility here is used as a proxy for students' socio-economic status. Pell Grant eligibility is need-based and is determined by a number of factors, but eligibility broadly indicates that a student is low- or lower-middle income.

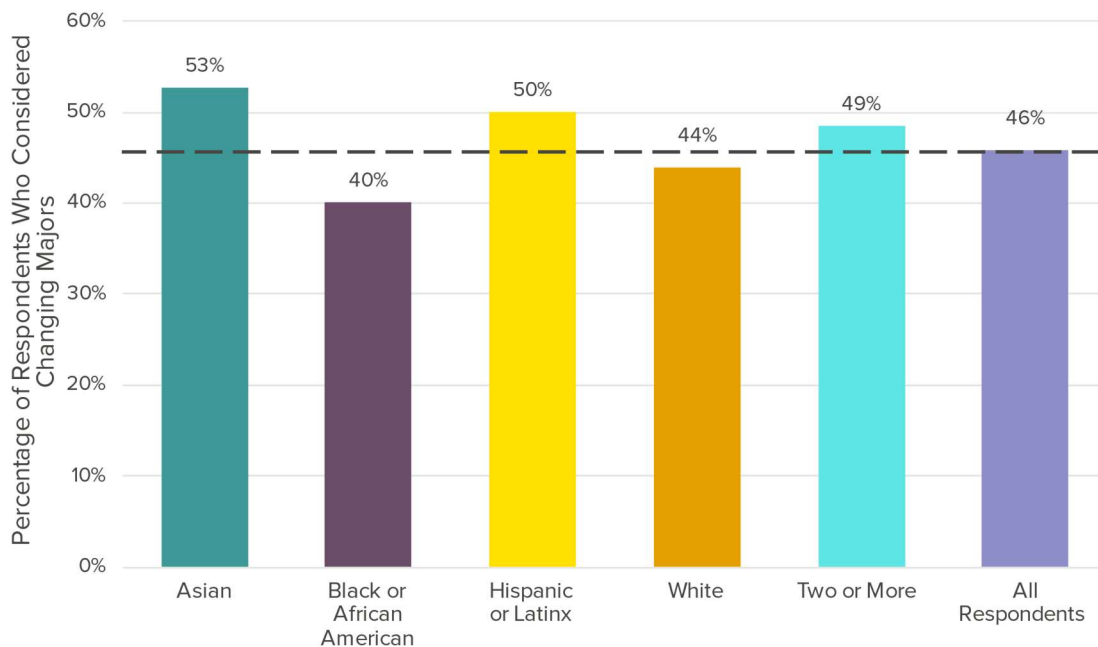
Retention

Overall, 46% of respondents reported that they have considered switching majors during their undergraduate career.

This statistic did not significantly vary across most identity markers collected in this survey. The following proportions of respondents considered switching majors:

- Female (46%) and male (45%)
- First generation (38%) vs. non-first generation (49%)
- Pell Grant eligible (49%) vs. non-Pell Grant eligible (44%)

The response to this question did vary slightly by race as shown in the graph below, with Asian respondents (53%), Hispanic/Latinx respondents (50%), and respondents of two or more races (49%) reporting that they have considered switching majors more than the overall surveyed population.

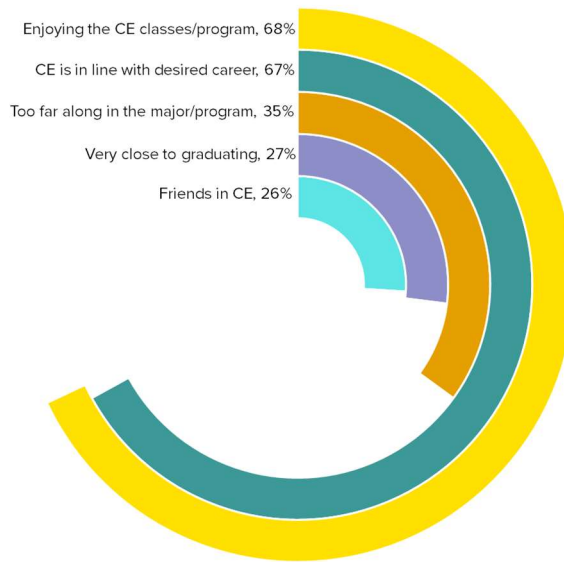


A total of 121 respondents gave reasons for considering switching majors. The top four most common responses were:

- “Other majors are less challenging” (46%),
- “I am more interested in classes for other majors” (37%),
- “I am not enjoying the CE/Arche/SE classes” (27%), and
- “I would have better career opportunities in other majors” (16%).

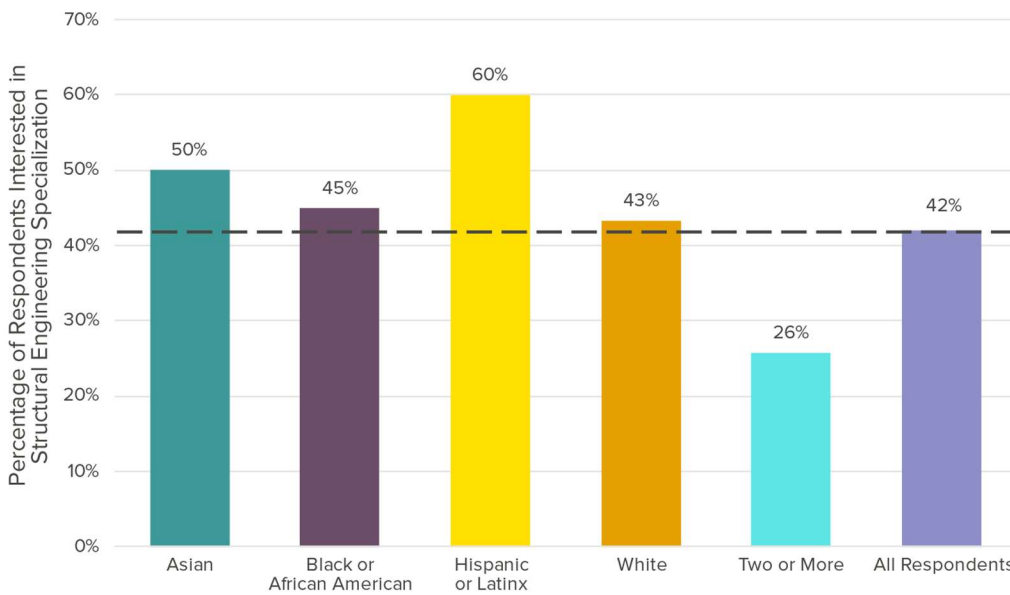
This trend remained the same when comparing white and non-white students, and when comparing respondents by first-generation status or Pell Grant eligibility. When comparing male and female respondents, the top four reasons to consider switching majors remained the same, but men were twice as likely as women to report that “I would have better career opportunities in other majors” was a factor in considering switching out of civil engineering.

Respondents were asked why they decided to stay in their CE/ArchE/SE majors. The top responses are shown below. Note that respondents could select as many responses as they wanted for this question.



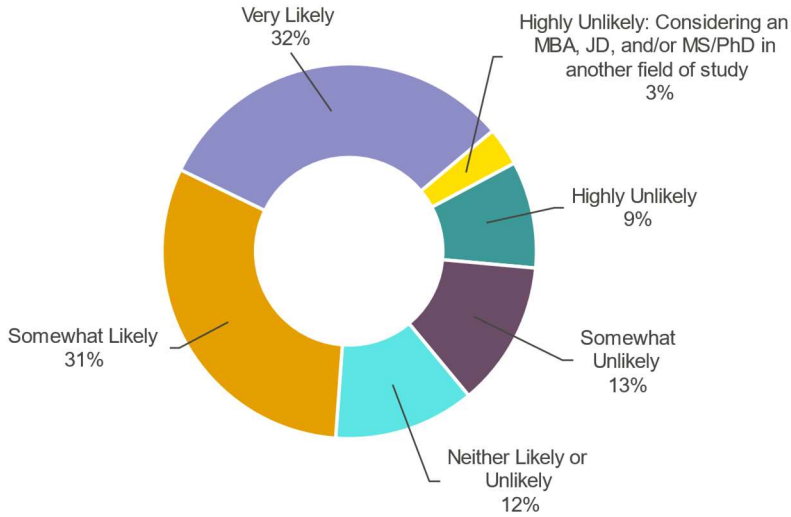
Career Aspirations

When asked, “Which of the following most closely describe(s) the branch(es) of civil engineering you are interested about or are you currently specializing in?”, 42% of respondents indicated some interest in structural engineering. Respondents were able to pick more than one response, but structural engineering was the most popular specialization indicated by the respondents, followed by construction (36%) and environmental engineering (27%).



The interest in structural engineering did not vary significantly across first-generation status or Pell Grant eligibility. Variation by race can be seen to the left. Men were somewhat more likely to select structural as a specialization of interest (45%) than women (38%). Yet, structural engineering remained the most popular specialization indicated by women, followed by environmental (31%).

Advanced Degrees

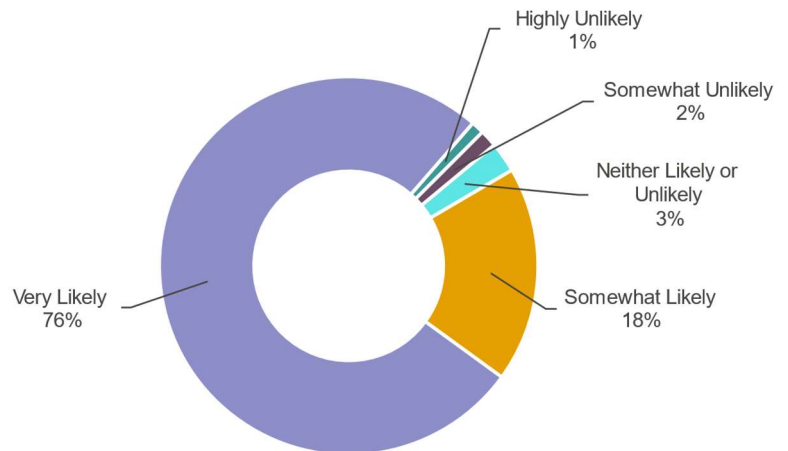


Approximately 63% of respondents reported that they were “Somewhat Likely” or “Very Likely” to pursue an advanced degree (MS and/or PhD) in CE/ArchE/SE. This trend is unchanged across gender, first-generation status, and Pell Grant eligibility. However, across race, respondents reported being somewhat likely or very likely to pursue an advanced degree at the following rates: Black (80%), two or more races (77%), Hispanic/Latinx (65%), Asian (64%), and white (57%).

Career Plans

Overall, 94% (257) of students responded that they will “Very Likely” or “Somewhat Likely” pursue a CE/ArchE/SE career (including careers in CE/ArchE/SE academia). In comparison, only 3% (7) respondents indicated that it is “Somewhat Unlikely” or “Highly Unlikely” that they will pursue a CE/ArchE/SE career.

This trend was unchanged across race, gender, first generation status, and Pell Grant eligibility.



Discussion Questions

We hope this topic brief provides the basis for further reflection and discussion with your colleagues. Below are some discussion questions to get you started.

1. Reflect on the challenges you faced while pursuing degree(s) in CE/ArchE/SE. How do they compare to the reported challenges of these respondents? How did you overcome those challenges? What assistance, if any, did you have to overcome those challenges?
2. Did you ever consider changing your college major or switching careers? What motivated you to continue and finish your CE/ArchE/SE degree(s)? Why did you decide to pursue structural engineering as a career?
3. Which demographic groups from this survey reported facing challenges at higher rates? Did this surprise you? Why or why not?
4. In the Career Aspirations section, Asian, Black/African American, and Hispanic/Latinx respondents reported higher rates of interest in structural engineering compared to the overall respondent percentage. What can we, as industry professionals, do to keep this interest and engagement level through graduation and after? Are we doing enough to invite these students to participate in our profession?

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Structural Engineers Association of Northern California

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