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## **Diversity and Inclusion in Engineering: A Collaboration with the Students**

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# Diversity and Inclusion in Engineering: A Collaboration with the Students

## Abstract

At Santa Clara University (SCU), we have had several programs and efforts in place to increase diversity in the school of engineering. We have offered summer programs for underrepresented students to encourage them to consider engineering. We offer day programs for local high school students and have several outreach efforts in the local community. These efforts are not aimed at recruiting to SCU, but at recruiting for the engineering disciplines at large. We cannot measure the impact of these programs accurately, as we do not have sufficient contact with the participants once the programs finish. We also have very active and well-supported student groups at SCU for underrepresented students, such as SWE, SHPE and NSBE. However, we have been made aware that we need to do more to foster an inclusive environment for our underrepresented students

This awareness came from the students themselves who ran a student forum on diversity and inclusion in the School of Engineering (SOE). They were unaware of any efforts we had in place, and thus assumed none existed. In addition to being more public about our efforts, we wanted to know about their experience. The students ran a student forum on diversity and inclusion in the school of engineering, and wrote a report about the climate in the SOE that was both enlightening and alarming. Based on the forum and the report we have developed a partnership between the administration and students to improve the climate for diverse students in the SOE. This paper focuses on the recommendations of the students and the school's response to the recommendations.

## Introduction

Despite our efforts to recruit and retain a diverse student body in engineering, we do not have a sufficiently diverse student population. It is easy for an administration, with the best of intentions, to continue to provide programs aimed at improving diversity while remaining out of touch with the actual experience of students. On April 26, 2017, several student organizations representing underrepresented populations in Engineering held a forum on Diversity and Inclusion in the School of Engineering. The students discussed their experiences and recommended ways to improve the climate for diversity and inclusion within the school.

The organizers of the forum presented a summary at one of the regular Chairs and Deans meetings. The students then wrote a formal report and presented the results at the spring SOE all-hands meeting. The faculty and administration of the SOE were in general dismayed at hearing the specifics of some problematic interactions among students and between students and faculty. We realized that we could not ignore this issue and needed to take action.

## The Report

The students identified several issues and made several recommendations in a formal report on their forum “Let Your Voices Be Heard: Forum on Diversity and Inclusion in the School of Engineering.” The report was delivered to the engineering leadership on June 5, 2017, by the leaders of SHPE, ACM-W, NSBE, and SWE, with the express purpose of offering “recommendations for improving diversity and inclusion in the School of Engineering (SOE) so that minority engineering students (color, female, LGBT, etc.) are better supported by the school.” The forum consisted of approximately 25 students. To put this in perspective the SOE has around 1000 students.

The report summarized the design of the forum as well as the results generated. The first half of the forum focused on the expression of the experience of underrepresented students.

Students worked in small groups to discuss the following questions:

1. When has there been a time in which your race or gender led to you being treated differently, by either a faculty member, staff, or student?
2. In the School, when have you felt proud or confident as a student of color or woman student?
3. When have you felt ashamed or marginalized as a student of color or woman student?
4. How supported do you feel in the School of Engineering?
5. How accepted do you feel in the School of Engineering?

The groups then reconvened to share the results of their first discussion. After discussing the results, the small groups were asked to generate ideas and ways to resolve these issues. They were now asked to discuss:

1. What would experiencing respect and acceptance look like?
2. What could faculty change in terms of their curriculum, teaching style, and classroom management to improve experiences for students of color and women students?
3. What policies/practices in the SOE could be amended or instituted?
4. What do you expect from leadership of the SOE?

Six themes emerged from an analysis of the results of the discussions. These themes, briefly, were: inadequate faculty-student relationships, prejudice and bias in student-student relationships, benefits of underrepresented student organizations, problems with advising, lack of communication of School of Engineering policies, procedures, and initiatives, and finally, excessive expectations of student organizations to improve the student experience.

The six recommendations of the report highlighted concrete steps the school could enact to improve the environment for all students.

1. Create a Center for Engineering Diversity – dedicated to working with minority engineering students. The goals of the center would include:
  - a. Increase the diversity of students who apply, enroll, and graduate from the School of Engineering,
  - b. Increase awareness of engineering careers by underrepresented groups,
  - c. Provide academic, professional, and personal support for students through the vast network of alumnae/i and professional connections,

- d. Provide resources and support to engineering student organizations that support the mission of the school and promote the inclusion of minority groups in engineering. Currently, these groups include student chapters of the National Society of Black Engineers (NSBE), the Society of Hispanic Professional Engineers (SHPE), the Society of Women Engineers (SWE), the Association of Computing Machinery – Women’s Chapter (ACM-W), and Women in STEM.
2. Establish structured project and lab teams. Defining lab and project teams will not eliminate the bias students experience from their peers, but it allows all students an equal opportunity to work with their peers and contribute positively.
3. Form a stronger alumnae/i network and database. Aside from providing a more easily accessible source of mentors for underrepresented students, such a database could be used by student organizations to bring in more diverse guest speakers, and provide greater access to potential internships and job opportunities.
4. Hold mandatory training for all faculty, staff and teaching assistants. Two examples of this training are the UndocuAlly Training and Safe Space workshops run by SCU’s Office of Diversity and Inclusion. These sessions raise awareness of issues that underrepresented groups face, and provide faculty and staff with the resources needed to properly support minority students.
5. Revamp ENGR 1: Introduction to Engineering. Students believe this would be the perfect opportunity to introduce and emphasize ethics and empathy in engineering. Students also expressed a desire for career development in this class, outlining the major steps to graduation, and how to find a job afterward, addressing skills such as resume building, interviewing, and networking.
6. Make alterations to syllabi. In addition to the standard statements regarding academic integrity, disability accommodation, and Title IX, students believe that an additional statement is required to inform students of the process for reporting discrimination and the confidentiality guaranteed by the process. Along with including the statements on the syllabus, faculty should thoroughly explain these items and processes the first day of each class.

## The Response

The students submitted their report in June. Because the leadership of the school was in transition, there was no formal response until November 2017. However, action did not wait for the formal response. The new dean, who started August 1, had a workshop on implicit bias on the schedule at his first retreat with all the faculty and staff in the School of Engineering in September. In addition, the SOE along with Science faculty ran a pilot workshop in the fall on ways of teaching for diversity and inclusion. This workshop was based on the Bryn Mawr College Teaching to Increase Diversity and Equity in STEM (TIDES) workshop. To encourage faculty to attend future workshops on diversity and equity, the SOE had a raffle for staff and faculty who took the implicit bias tests found at the Harvard site: Project Implicit: <https://implicit.harvard.edu/implicit/takeatest.html>.

The formal response addressed each of the students' recommendations. In some cases, we were able to inform the students of activities already in process of which they were unaware. In others, we shared plans to address their issues, and in one case, we had to redirect some of the effort to another office on campus (the Career Center).

The students report was both eye-opening and impressive. In our response to the students, we responded to their points in the following way.

#### 1. Create a Center for Diversity and Inclusion

We are in the midst of designing a new Campus for Discovery and Innovation, a center for all STEM disciplines. We have a working group on STEM diversity and student engagement, and they are charged with identifying appropriate space in the center devoted to diversity and inclusion. This would be the future home of the Center for Engineering Diversity. The new dean is not going to wait for the new building to get started on this effort. He has committed to getting university approval to create a new position, Director for Engineering Diversity and Inclusion, within his first 18 months at SCU.

Until the new director is appointed and the Center created, we will continue to provide resources and support to the student organizations that promote the inclusion of underrepresented groups in engineering (NSBE, SHPE, SWE, ACM-W, and Women in STEM). In addition, we are consulting with the Admissions office regarding strategies to attract more minority students to SCU Engineering.

We offer mentoring receptions with industry professionals every term. We plan to increase the participation of minority alums in these receptions by reaching out through our LinkedIn groups, and by creating a LinkedIn subgroup specifically for alums who wish to mentor underrepresented students. We co-sponsor events with the Career Center, from an Engineering-only career fair to professional etiquette dinners. The Career Center also offers many services the students identified, but we need help in making these known to the students.

#### 2. Establish Structured Lab and Project Teams

While some faculty have assigned lab and project teams as a matter of course, it was enlightening that this was not a common practice. Instructor-assigned lab and project teams have been known to produce better results, as well as to increase inclusion. We are creating a policy statement that strongly recommends that each faculty member follow this best practice as a classroom standard. Faculty members will be expected to report in their annual Faculty Activity Reports how they have implemented these practices. The topic was introduced to all the faculty at the retreat in September, 2017, and we expect to have a policy adopted and in place by fall 2018.

### 3. Form a stronger alumni/ae network and database

We have started to reach out to underrepresented graduates to ensure they are aware of the alumnae/I LinkedIn network and the new subgroup specifically in support of mentoring for underrepresented students. We expect this initiative to be maintained by the new Director for Engineering Diversity.

### 4. Hold mandatory faculty, staff, and TA training

The university already requires mandatory harassment and discrimination prevention training for faculty and staff. We are adding training for equity and inclusion as part of the mandatory training for teaching assistants. We held a one hour training session on bias-busting at the fall engineering retreat for all faculty and staff. We offered a pilot workshop on teaching for equity and inclusion this fall, which has been repeated in winter. We plan to include a workshop at each fall retreat, and also request that it be included in the new faculty orientation sessions each year.

### 5. Revamp Engineering 1

While we may be making changes to the current Introduction to Engineering course, the students' suggestions here are not felt to be appropriate for that class. The Career Center offers expert help with resume building, interviewing, and networking skills. They offer resume writing seminars, LinkedIn labs, and mock interviews, in addition to counseling sessions to help students discern their vocational aspirations. In terms of unconscious bias training and learning to work with other students with empathy, there is a proposal to do that within the context of Core curriculum classes for all first-year students in the university. This issue is not peculiar to engineering, but needs to be addressed campus-wide.

That said, we are creating a task force to look at the first-year experience of engineering. The task force is charged with researching best practices elsewhere and making recommendations regarding what may work at SCU.

### 6. Make alterations to syllabi

Current syllabus statements include several mandatory sections, including on reporting discrimination and confidentiality in doing so. We plan to remind faculty of the importance of emphasizing these statements on the first day of classes in the training for faculty and teaching assistants, rather than relying on the students to read the entire syllabus on their own to learn about these issues and how to report them.

## Future Directions

We plan to meet with the student leaders on a regular basis to discuss the School's progress and possible future initiatives. The school leadership met with the student authors of the report and the current leaders of the student organizations involved in January. We have begun work on setting up a Council on Diversity and Inclusion. We expect that the Director for Engineering Diversity, once in place, will facilitate the work of the council and use it to inform development of additional programs. However, we felt the need to continue the conversation without waiting for a new administrative position to be approved and funded. The membership of the council consists of faculty, staff, and students interested in improving the sense of inclusiveness and respect for diversity within the school. A climate survey of all faculty, staff, and students in the university is currently being conducted. We expect to learn from that survey and brainstorm about improvements to our climate.