

Strengthening the Community College Engineering Pipeline

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1. From your perspective, what are the two things that your disciplinary professional organization or discipline-based NSF-funded project does particularly well in support of your work as an educator? Please be specific about how this activity works and why it is effective. Add web links if available.

NSF-Funded Programs:

Cañada College currently has three projects through three NSF Programs: NSF S-STEM, NSF IEECI, and PAESMEM.

The NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) at Cañada College is a five-year project that provides a total of 141 scholarships (\$3000 to \$4000 a year) to students intending to transfer to a four-year university as a STEM major. Currently in its fourth year, the program has helped create a core group of engineering student scholars who attend college full time with little or no need to work off campus, allowing them to take on leadership roles in students clubs and become an important role model and leaders for other students. The program has also done well in leveraging existing academic, professional and social support services for students, and creating new ones to promote success among students. The program has allowed the College to better understand the needs of students, which has led to the improvement of support services delivered not only to the program participants but to all STEM students in general.

Cañada's NSF Innovations in Engineering Education and Curriculum Infrastructure (IEECI) grant project titled "Online and Networked Education for Students in Transfer Engineering Programs (ONE-STEP)" has developed the Summer Engineering Teaching Institute, a workshop on using technology, specifically Tablet PCs and synchronous online delivery, to improve engineering education and increase the number and diversity of successful transfer students. It has also developed the Joint Engineering Program, a partnership among 16 California community college engineering programs to align curriculum and develop online courses available to students from any of the participating institutions. The ONE-STEP project has done well in promoting effective use of technology in teaching engineering, and in creating an active regional and statewide collaboration to help deal with challenges in supporting community college engineering programs (diverging curricula, declining enrollments and budget cuts).

Cañada's Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring (PAESMEM) grant has allowed the College to further mentoring activities of faculty to promote students success, and has provided funds for additional professional development opportunities for students through professional conferences.

Professional Organization:

Being from a community college where the focus is on teaching, the American Society for Engineering Education (ASEE) is my main professional organization. One thing that ASEE does

particularly well is sponsor conferences. I regularly attend ASEE section, zone and national conferences where I get to share what I do in the classroom as well as learn about what others are doing in order to continually improve my teaching. One other good thing about ASEE conferences and publications is that they cover all fields of engineering. Being the only engineering professor at my college, I teach a variety of engineering courses that the major fields of engineering (mechanical, electrical, civil, materials). ASEE covers all areas of engineering, as opposed to other professional organizations, which focus on only one specific engineering field. ASEE conferences have also given the opportunity for my community college students to present papers and posters in a technical conference – something I did not get a chance to do until grad school. For instance, at the last ASEE Pacific Southwest section conference, my students (sophomore community college students) presented two papers and three posters on the work they did during their summer research internship.

ASEE has also done well in developing resources for engineering educators. The ASEE First Bell is a daily custom news briefing on engineering, technology, and engineering that is emailed to all ASEE members. The PRISM, ASEE's monthly flagship publication, is also very useful; it has some articles that are written in a less technical manner, making them appropriate for my freshmen or sophomore engineering students. The eGFI (Engineering Go For It!), both the magazine and the website, has a ton of useful resources for promoting engineering to middle and high school students.

2. If you could propose (and obtain funding for) one new activity to engage community college instructors in professional associations and other discipline-based projects related to teaching and learning, what would it be? Describe the activity, explain why it is needed and why it is not currently available.

One area that needs attention (and funding) is strengthening Engineering Transfer Education. Currently, NSF's main program that is focused on community colleges, the Advance Technology Education (ATE), focuses on technician education and not on engineering transfer education. A new NSF funding opportunity needs to be developed and should focus on developing, implementing, and disseminating successful strategies that promote recruitment, retention, success, completion and transfer for community college students to four-year engineering programs, as well as research on approaches on the challenges and barriers to success (specific to community college engineering students) and approaches to overcoming them. This new program should encourage (require) collaborations between community colleges and four-year institutions, with community colleges as the lead institution, and four-year institution providing support in developing and implementing the research component of the project. This funding opportunity should be available to institutions seeking to disseminate strategies they have developed, as well as institutions seeking to adopt successful practices developed by others.

An example of a project that can be funded through this program is improving student preparation for college-level course work, specifically in math and sciences. Cañada College has developed (and institutionalized) a high successful program called Math Jam. It is a two-week intensive Math review and preparation program that has been successful in improving student initial math placement test results (and hence accelerate entry into STEM curriculum), and improve student retention and success in subsequent terms. Our Math Jam program has been visited by over a dozen different institutions (both two-year and four-year) who have sought our assistance in developing a similar program. We have prepared materials and worked with as mentors/advisers for these institutions but currently do not have funding to support such activities.