

2006-2640: INCREASING ENGINEERING ENROLLMENT AND RETAINING STUDENTS

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Increasing Enrollment and Retaining Students

The challenge to incorporate engineering into middle and high school curriculums and have students prepared for the rigors of an engineering program is a persistent problem colleges and universities face throughout the country. Therefore schools have to be creative in this tight economy to get the 'biggest bang for the buck.' The University of Connecticut, School of Engineering has two initiatives that have yielded positive results. One outreach residential outreach program for middle and high school science, mathematics and technology teachers and the second initiative is a post-secondary school residential summer program for our entering underrepresented engineering students.

The University of Connecticut, School of Engineering has developed programs to alleviate these very problems. To help post-elementary schools integrate fundamental engineering concepts into the classroom, we developed the da Vinci Project. It is a program geared toward math, science and technology teachers of grades 7-12, as well as administrators and guidance personal. Student interest in engineering often begins with the influence of a teacher in math or science. The nuances of how these teachers influence their students' interest in engineering and then ultimately resulting in majoring in engineering is not clear. To aid in the direct encouragement of promoting engineering to students and eliminating the uncertainty of how science and math teachers inspire these students to enter engineering we bring the math and science teachers to the UConn campus for a week long residential summer workshop. They work along side engineering faculty in their research laboratories to get a clear idea of what engineering disciplines exist and their potential. The teachers, in addition to strengthening their math and science backgrounds, then serve as spokespersons for engineering in their respective classrooms by being able to discuss engineering as a career option and act as a guide for those students interested in engineering.

Participants chose from a menu of 6-7 workshops, these workshops represent a wide variety in engineering disciplines and are hands-on in nature. Teachers spend 16 hours during the week with our faculty in their focused workshop, i.e., designing, building and testing a fuel cell, LCD panel or fiber optic communication device. Our staff also invites our attendees to participate in another 18 hours of a wide variety of seminars, lab tours, demonstrations put on by our civil, mechanical, chemical, electrical, computer science and materials engineering departments. They visit laboratories, learn about cutting-edge technology being developed and tour state of the art facilities currently being used on this campus all emphasizing the importance of engineering. While engaging in these activities the teachers are immersed in discussions with our faculty about the ways universities and teachers can work together to help inspire their students to consider entering into the field engineering.

Since 2000 the daVinci Project has hosted 109 teachers from around the United States. We would like host thirty teachers a year. Various efforts have been made to advertise and promote this event through mailings, mass emails and conferences.

Our second initiative was developed as a means to prepare incoming underrepresented students for the rigors an engineering curriculum. The University of Connecticut's School of Engineering has hosted the BRIDGE Program for the past eighteen years. This

program, run by the Engineering Diversity Program (EDP), seeks to “prime” students for the engineering curriculum through preliminary coursework in core mathematics, chemistry, physics and computer programming. BRIDGE is a residential five-week, intensive summer readiness program designed to prepare our underrepresented students for the engineering freshman-year experience. The University of Connecticut’s EDP sends all underrepresented engineering students that have been accepted, information and applications about and to the BRIDGE program. Eligible individuals include women, African Americans, Hispanics, Puerto Ricans, and Native Americans.

The program is geared toward serious, committed students who wish to enhance their success in earning a bachelor’s degree in engineering at University of Connecticut. Students complete mandatory classroom training in mathematics, chemistry, physics and computer programming. All students participate in mandatory 2 hour evening group study sessions. During these sessions, students along with their teachers and peer tutors solve and discuss homework problems, practice potential test and exam questions, and strengthen individual and group problem solving skills.

Four hundred and forty four students have had the opportunity to participate in the BRIDGE Program. The goal is to encourage higher retention rates of underrepresented groups in the School of Engineering. The BRIDGE Program, in its 19th year, has been a huge success. Since 2001 72% of the students who participated in the BRIDGE Program are actively seeking degrees in engineering; 80% are still at the University of Connecticut, indicating an increased retention rate, one that is significantly higher than our overall engineering retention rate.

Programs evolve over the years and minor changes are inevitable but occasionally drastic changes are needed to make the program more effective. The most significant change occurred in 1994 when EDP began to accept all females into the BRIDGE Program. The inclusion of all women into this program has given the group a much wider variety of educational backgrounds. The wider mix of women has had a positive impact on the overall tone of the program in that there are a higher percentage of students having excellent study skills and habits. This gives us many more students that serve as role models on how to be an effective and productive student.

The BRIDGE Program has undergone a major overhaul over the last five years. An important change occurred when the school hired a director with engineering and high school teaching experience. The Director now teaches one of the classes during BRIDGE and by virtue of this increased contact time has strengthened the bond between the Diversity Office and its’ students. The Director has developed a mentoring, advisor and friendship role that would not have been achieved otherwise. This increased amount of contact with the students has resulted in EDP getting a better handle on our student’s strengths and weaknesses and has allowed us to aid the students in their pursuit of success and help them achieve as students.

During this same period of time the focus of inviting a more academically diverse student has become a greater priority. Enrollment in the BRIDGE Program has increased by an

average of 50% over the preceding 5 year period. The BRIDGE Program's services in prior years were centered on students that were in need of remediation classes because for various reasons they were not given the proper learning tools and background to succeed in an engineering program. The program's increased enrollment has allowed EDP to use our more academically advanced students to act as role models and to form strong bonds of friendship and support between these significantly different populations to the benefit of both. Initially BRIDGE subjects included chemistry, calculus and computer programming. Five years ago physics was introduced into the curriculum, which for most of the students was their first experience with the subject. Over the last 5 years with these changes and others the BRIDGE program has become more academically rigorous. Mandatory study hours are strictly adhered to by the students and enforced by instructors and tutors. The tutors live with our students and are former BRIDGE students that have gone on to become scholars themselves at the University; they serve as examples of what is expected of the students.

The UConn School of Engineering is very excited about the successes of both of these programs and would very much like to participate in the dialog that ASEE provides through its many workshops at the annual conference.