Encouraging Students in Engineering

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There are many ways to encourage high school students to enroll in engineering. Some of them require direct contact with middle and high school students. Others may be effective by interacting with the teachers or linking both teachers and students with industry. Faculty research programs are ideal for getting students involved with engineering. These projects can lead to winning entries in various competitions including robotics clubs, science fairs and the Science Olympiad. To be effective the three pillars of recruitment must include personal contact, planning and funding.

The first step in developing a good outreach program for recruitment is to review and evaluate your current program. What is working? What is not working? What is not being done? Where should your effort be focused?

The next step is to develop an outreach strategy. Reaching both middle and high school students and their parents and teachers are important. Equally important is focused publicity for the recruitment project.

The WEB is an important tool for planning and as a source of ideas for interaction with students. There is a community college recruitment tool kit at www.pathwaystotechnology.org/recmitmenti?asics.html that is very helpful. Using a search engine to find best practices on the WEB is also very helpful.

Worcester Polytechnic Institute "has a unique and rigorous K-12 outreach program" (www.wpi.edu/admi.n/k 127). The University of Wisconsin -Madison College of Engineering provide an example of an extensive series of outreach programs (www.ysa. en.gr.wise. edu/outreachpro grams .html). Professional engineering societies normally provide career guidance information on their web sites. ASEE has a website (engineeringkl2.org) which permits students to explore different engineering fields and to participate in interactive games. The site also provides lesson plans and other activities on many subjects for K-12 teachers. A second site, teachengineering.com provides a digital library collection with 70 tested projects for use in elementary-secondary science programs. These projects meet state curriculum standards in match and science. In addition to this professional society web sites, science and engineering honor societies also provide sites that encourage K-12 students into science and technology.

This presentation will discuss various alternatives in the development of a recruitment plan including:

Programs at Middle and High Schools
Programs at Higher Education Institutions
Programs in Industry Teacher Mentoring Funding Opportunities

Programs in Schools: opportunities include giving general presentations on engineering to assemblies, providing lectures and demonstrations on specific topics to science classes, being available, on a routine basis to tutor students, to assist in after school projects or to provide technical assistance to teachers. While faculty, and graduate and undergraduate students can participate in these activities, undergraduates from the particular school can have the biggest impact on the students.

Programs at Higher Education Institutions: Tours for individuals and for school groups provide a way to introduce students (and parents) to opportunities in engineering. However hands-on activities such as after school, Saturday and summer programs are better recruitment tools. Hosting competitive events such as a bottle rocket, LEGO or robot contests and JETS competition are another way of gaining student interest, especially when guidance is provided prior to the event. Participation on research projects are normally limited to areas where students can assist by taking samples or recording data.

There are a number of programs educational institution can host. One example is JETS (Junior Engineering Technical Society)- JETS.org. This organization serves as a link between the pre-college community and the engineering community. One of the activities is the Annual "JETS Team Competition" in which students apply principles of science and mathematics to solve real world engineering problems. More than 14,000 people participated at 90 Colleges and Universities each year.

Other programs include GEMS - Great Explorations in Math & Science (LHS GEMS.ORG) and SMILE - Science and Mathematics Initiative for learning Enhancement (IIT.EDU). Local chapters of these organizations can be established to foster interest in Science and Mathematics.

Programs in Industry: Normally plant tours are part of a Saturday or summer program or arranged in conjunction with a high school chemistry or physic course. For instance a tour of a soap factory could supplement discussion on surfactants. In addition many companies have their own outreach program to schools in their area.

Teacher Mentoring

As pan of in-school programs faculty can offer to provide background material on specific topics to individual teachers including information on the ASEE websites. However a more effective way would be to arrange either Saturday or summer workshops on appropriate topics of interest. Whenever possible, arrangement should be

made through the state department of education to provide continuing education units (CEUS). This will require that the workshop has relevance to the science curriculum and includes a model lesson plan. A faculty member from the Department of Science Education should be enlisted in this type of endeavor. One category of workshops might be in the area of renewable energy.

Funding Opportunities:

While there are many funding sources, finding the right source depends on where you are and what is being proposed. For Connecticut schools "The Grant Seekers" Bookmarks K-12 grant resources on the net" (www.groton.K12.ct.us mts.mtsint2.html) provides an extensive list of sources. Another source is the National Science Teachers Association (NSTA.org/programs/tapestry/). Information on K-12 grants can be obtained from Technology Grant News (technologygrantnews.com) in their newsletters. In addition their web site, include excerpts from recent newsletters. An extensive list of funding sources can be found on the Wake Forest web site: (www.wfu.edu/rsp/docs/k-12sm.doc).

In conclusion - it is important that the operation of the outreach programs must be a long term effort which is coordinated within the College and meshes with Institutional Outreach Programs.