Addressing the Freshmen Need for an Engineering Experience

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Abstract

A plan was inaugurated three years ago to give incoming freshmen a chance to view the engineering program at Michigan State University well before their junior year. The course was taken because when students find a connection with their major early in their college careers, they stand a much better chance of actually graduating in that major. The Residential Option for Science and Engineering Students (ROSES) program provides students with not only close proximity to fellow engineers through centralized housing, but classes that group these students together in math, physics, and chemistry. The students are also required to enroll for a customized engineering course housed in the College of Engineering. This course addresses issues that are commonly experienced by most freshmen, but it also focuses on highly specialized topics involving engineering in particular. Topics range from introductory material on their chosen majors to ethics. It is also an important time in which to make clear the necessities of studying, time management, networking, and coping with the normally difficult engineering freshman’s course load. This beginning effort shows great promise in bringing freshmen into the departments of engineering much sooner than in the past. An overview of the ROSES program and specifically the required engineering course will be addressed.

Introduction

Moving from life as a high school student into the arena of the university where there may be 6,000 other freshmen preparing for positions in the future may be traumatic and career threatening. Concern with the environment that is created for these students has become one of the most important topics of conversation among individuals and departments where the student really does have significance. It is vitally important that all schools of higher learning make an effort to create a smooth transition for students entering the new experience with education. It is even more important that departments realize that they cannot wait until a student completes a battery of pre-requisite courses leading toward those first engineering courses before connections are forged to bind the student and department together. This is especially critical at institutions where students are not formally brought into their majors until they have reached junior status.

With this concern in mind, Michigan State University through the Colleges of Engineering, Agriculture, and Natural Science began a process to make the transition from high school into the university a more valuable experience. The Residential Option for Science and Engineering Students (ROSES) was initiated three years ago to allow students to live together with other students who had more similarity than simply being freshmen. The need for creating long term personal networks for these students, immediate bonding with the many facets of the university, and a concern for retention of interested engineering students were addressed. Students are accommodated in one of the university’s smallest housing units, which allows closer bonding of the group and also allows supervisors of the program to bring the individuals
together both a living unit and a cohesive group of engineers. The students are enrolled in special ROSES sections that further cement the networking that is going on in the housing units. Directions are given to promote both teamwork skills and connections that can be used to improve performance and longevity in the engineering curricula. It is also necessary to create an atmosphere of investigation outside of the normal required freshmen courses. Investigation that will encompass the university; faculty, staff, and students: history; and the student’s place in all of it.

**Engineering 291**

All incoming freshmen who decide to become part of the ROSES program are required to live in central housing and take a ROSES oriented course, Engineering 291. The course serves to form another link for the students in their path to an engineering degree. Before classes begin in the fall mixers connected to the course are held in the housing unit, Here students can talk to the rest of the ROSES contingent through activities that require conversation and teamwork, These activities will continue through the semester in the form of success seminars, movie nights, and social gatherings. The course itself focuses on aspects of university life and studies that are critical to success in the engineering programs. Meeting only once a week, it is necessary to get the students involved with the process of finding out all that they can about the career path that they have chosen. Along with this, it is vital that students understand the workings of the university and the methods that they can use to make their university experience a positive one.

Table 1. SYLLABUS - ROSES 1995

<table>
<thead>
<tr>
<th>August 29</th>
<th>Introduction</th>
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<tr>
<td></td>
<td>Start collecting any information that you see that relates to engineering - newspapers/pictures/stories/products</td>
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| September 5 | Lecture -- History of MSU and Engineering |
| September 12 | Lecture -- Intro to Computing Center |
| September 19 | Lecture -- Learning about e-mail |
| September 26 | Lecture -- Teamwork |
| October 3   | Lecture -- Time Management |
| October 10  | Lecture -- Engineer as Hero |
| October 17  | Lecture -- Word Processing |
| October 24  | Lecture -- Communicating with your Teaching Assistant |
| October 31  | Lecture -- The Practical Approach to/ Linking of the Engineering Building to the World of Classes and Theory |
| November 7  | Lecture -- Job Preparation |
| November 14 | Lecture -- Ethics |
| November 28 | Lecture -- Internet and the web |
| December 5  | Lecture -- Our final day together |

One of the first activities in which the students participate is a university wide scavenger hunt. Here the students are given the chance to see what the university and the College of Engineering are really like. Working alone or in groups they can discover much more than the average student who simply
concentrates on course work.

Table 2. Scavenger Hunt - Selective Questions

- A mistake you find in the State News (you define what a mistake is).
- Get a bookmark, plastic bag, or receipt from the bookstore of your choice.
- Get a pamphlet from Olin Health Center.
- Get a leaf from the most prevalent tree on campus.
- Get a bicycle registration form or a copy of one you filled out for your bicycle.
- Get a pamphlet on bicycle security.
- Get a map of bicycle routes on campus.
- Get a ride on Craig Gunn's special bicycle.
- What is the procedure for reporting sexual harassment.
- Get the name of an MSU bus driver.
- Who built the Bogue Street bridge.
- Where is the Red Cedar Yacht Club.
- When were the following buildings built:
  - Ag Hall
  - Dorms (Eastern, Northern, and Western)
  - Administration Building
- Where was the Administration building located before the present one was built.
- Some people say the present Administration building looks the way it does because of the time period in which it was built. Why?
- Where is the largest ceramic sculpture on campus/world?
- Find a number of sculptures on campus. Where are they?
- Where is the original Engineering building?

Sent to all reaches of the campus, students dredge the archives for information about the institution that they have chosen to attend. They discover how the university works and who can open doors that seem to be locked to them. In their first weeks on campus they discover more information than most juniors and seniors ever come in contact with. Since the scavenger hunt requires contact with engineering faculty and staff, freshmen students are able to talk to actual engineering personnel, an activity that in the past may have not occurred until two years had passed after entry to the university. The hunt also provides a jumping off point for questions about the university and their role in it. One student after spending a great deal of time collecting information across campus commented, "I really discovered in a short period that what I have always wanted to be is a veterinarian and not an engineer. I got to talk to people (in the veterinary school) who really gave me insights into the program and where I want to go." Here the goal of retaining students in the engineering programs seems to be violated, but it really isn’t. An underlying goal of the entire ROSES program is to make students aware of all the avenues open to them. They need to be happy in the careers that they have chosen. If fine tuning these students places them in career paths that will make them both successful and happy, the program has been worthwhile.

As the scavenger hunt is under way, students are also collecting information on engineering, their impressions of it. "The Engineer as Hero" assignment forces participants to look at the real world and see the engineer’s place in it. Students collect as much data as possible to form as picture of what they see in
the real world that reflects their impressions of how the world looks at engineering and how they look at it. Material collected may range from disasters concerning a wide range of products to feats in mechanical engineering. Movies like *China Syndrome* and *Falling Down*, when found by the students, may create some very lively conversation. Again it is a learning experience that most students have never attempted. They have never looked at how they and the world look at engineering.

The rest of the semester focuses on a variety of initial skills that a student will need for future success. Computer skill, although commonplace for certain students, is a tool that all will need to fine tune in order to achieve the best positions. The students are immediately made aware of the need for computer immersion in their careers. Login procedures are learned, e-mail is practiced, and the world of face-to-computer-screen is opened. Some students come with favorite word processors; others simply need to be pointed in the direction of something that will work well for them. Lastly, the Internet opens a whole new avenue of exploration, but exploration that must be carefully used so as not to consume too much of the student’s time. Ethics is a subject that has become critical in an engineer’s life; therefore, this too is investigated by the students. Discussion will range from how do you handle illegal, but ethical activities to illegal and unethical activities onto legal but unethical activities. These can be exercised in groups or by individual thinking.

Communication skill and language have also been found to be lacking in many engineering students, so here too is an area that requires a considerable amount of time so that students will be aware that these items are important to their careers.

**Student Response to the Program**

The response to the program has been very positive. Students see that the contacts they make at this early part of their careers will be beneficial to academic pursuits not just to social activities. The contact with faculty and staff has made them aware of the interest that these two groups have for their future success. Many students have commented on how the clarification of very simple matters on campus at this beginning stage at the university has made a significant difference in their plans for the remaining time at the university.

**Conclusions**

Contact with the College of Engineering early in students’ university careers is one means to ensure that students will be retained by their departments. By clearly indicating the important areas both within and outside technical engineering courses in which a student must be competent, there is a much better chance that students will succeed and be interested in non engineering subjects. This concern must be raised by engineers so that students will see the importance of the specific issues. Carefully pinpointing issues like communication, university information, ethics, computer competency, and teamwork will give a clear indication that engineering is not enough for engineers of the 21st Century.

**CRAIG JAMES GUNN**

Craig James Gunn is the Director of Communication for the Department of Mechanical Engineering at Michigan State University. Having his degrees in English makes him a unique addition to the department. He was educated at Michigan State University and he returned to the university in 1986 after teaching in the public school system for thirteen years.