FIRST SEMESTER OBSERVATIONS
Engineering Success Program

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Objective

The University of Missouri-Columbia College of Engineering has initiated the *Engineering Success Program* - ESP, a new living/learning community for women students in engineering. The objective of the program, which became available Fall 1994, is to combat the sense of isolation so often experienced by women students in engineering. We believe that the creation of an environment that is conducive to the formation of networks, with aspects of social as well as academic interaction, will enhance the retention and ultimate success of women students in the engineering curriculum. The overall goal of this project is to increase the number of women who successfully complete an engineering degree program and enter the work force.

Campus Support

The Vice Chancellor for Student Affairs at the University of Missouri-Columbia is a proponent of the living/learning community concept and has been very supportive of the Engineering Success Program. His research clearly demonstrates that students who reside in academically oriented learning communities excel both academically and socially, engage in more mutually supportive interaction, are retained at much higher levels in both the residence hall system and the University, graduate at higher rates, and have more stable academic pursuits. His division has collaborated with us in this endeavor by providing both the space and the equipment for a computer laboratory without additional charge to the students or the college.
Program Development

Mark Twain Residence Hall was selected as the site for the ESP floor because it is close to the College of Engineering and has several amenities, such as air conditioning, 2-bedroom suites with an adjoining bath, a dining hall on site, and a swimming pool. In the engineering degree programs at MU, freshman and sophomore students are enrolled in predominately math and science courses which are not typically scheduled in the Engineering buildings. The close proximity of ESP to the Engineering facilities encourages students' involvement in general engineering activities.

Engineering students make up only a part of the floor's total population. It is important to note that careful attention was taken not to isolate these women students in a setting unlike the diverse engineering environment in which they will work as professionals. ESP students share dining facilities and common space, such as the residence hall swimming pool and laundry facilities, with other student residents. One resident noted that, "We also have psychology students, journalism students, and others on our floor. That's good. It reminds us that we need to interact with a variety of people."

A computer lab is available on the floor to offer hands-on experience with computer programs in a non-threatening environment. Available software packages include Mathematica, word processing, spreadsheet, and electronic mail. Computers are networked to the Engineering Computer Network to provide access to specialized programs needed by engineering students. Currently there are four IBM machines on the floor. There is a need to either expand the cluster or restrict access since use by other residents has increased.

Because women, on average, have less previous experience with laboratory equipment and feel less prepared for the laboratory classroom sessions, equipment donations have been solicited from the manufacturers of oscilloscopes, voltmeters, power supplies, etc. Both the computer lab and equipment lab, when fully equipped, will be available to residents on a 24-hour basis. This arrangement will address one of the students' (and parents') safety concerns. It will no longer be necessary for students to walk to remote computer or test equipment sites across campus at night in order to complete assignments.

WOMEN IN ENGINEERING CONFERENCE: IS SYSTEMIC CHANGE HAPPENING?
1995 WEPAN National Conference
When the program was initiated, the College strongly lobbied for engineering students to fill both the residence hall floor government positions. In reality, the curricular demands placed on an engineering student often limit the students' ability to meet the time commitment required by these positions. From the students' perspective, it is important for the community advisor (CA) to be able to relate to what engineering students are experiencing and the amount of work that is expected of them. The current CA is a chemistry major, enrolled in many of the same calculus and chemistry courses. Students have acknowledged that it would be helpful for the CA to be an engineer, but they also agree that it is not realistic to expect so much from the community advisor.

The College of Engineering Dean's Office currently sponsors a free tutoring service for all engineering students. In daily sessions each semester, tutors provide group assistance for all required math, physics, and chemistry courses, as well as introductory engineering courses taken by all engineering majors. A tutor has been hired to spend a minimum of one session per week in the ESP residence hall. Every effort has been made to hire an upper-class female student who is familiar with the Mathematica software program.

Lounge space is also provided to encourage peer tutoring and study groups. When a student exits the elevator the first thing she sees is a list of study groups for the various math and science courses required in the engineering curriculum. It was envisioned that the attractive and comfortable lounge provide an ideal location for engineering student organization meetings and guest lecturers. For example, we encourage the Society of Women Engineers to hold some of their meetings at that location.

One of our original initiatives was to establish a library in the ESP lounge. The collection would include both written (books, magazines, etc.) and video format. A listing of alumni who are willing to talk to engineers (gathered through a recent Alumni Directory questionnaire) would be included in the library resources. The library has not materialized primarily because of the security issues involved. The students have requested the library service, and it is a problem that we are attempting to resolve.

We are still trying to identify the correct level of faculty/staff interaction. At the students' request, the College sponsored a special panel
presentation, given midway through the first semester. The all female panel consisted of one faculty member, one graduate student, one undergraduate student with two co-op experiences, and a locally employed engineer. The group addressed issues that are of particular interest to women entering a professional field and offered encouragement and tips for success in a male-dominated field. The College plans to make this panel presentation an annual event.

The students have indicated a preference for meetings rather than informal gatherings. The College sponsored two receptions for all female engineering students at the Residence: one the first day of class and the second close to the beginning of the second semester. Student participation was greater at the panel presentation. Residents were polled regarding their preferences for future events; and many of the topics suggested are already available on a continuous basis in the College, i.e. tips on class registration, co-op and internship employment, etc. We would prefer not to isolate the residents from the mainstream student activities. The College has purchased and installed a bulletin board in the computer lab (most heavily trafficked area). It is hoped that posting currently scheduled events on the computer lab bulletin board will alleviate some of these simple communication problems with the ESP students.

Participation

There are currently 223 undergraduate women enrolled in the College of Engineering which represents 16.4% of the college's undergraduate population. We anticipated 20-30 freshmen and an equal number of upperclassmen who would take advantage of this option for a total of roughly 50 students. A letter from the Dean was mailed to all female applicants who applied for admission outlining the benefits of this housing arrangement. Currently enrolled female students were also offered this option with the added incentive of no increase in housing fees over the 1993-94 academic year rate.

The first semester, twenty women chose to participate in the program. Sixteen of the residents on the floor were interviewed individually during the second semester, and the students were quite eager to discuss the advantages of living at Mark Twain. Overall, the responses were positive. They liked being with other engineering students and felt
that it is important to see other students studying. Most students felt that living on the floor helped them feel more involved in Engineering without isolating them from the rest of campus. Of the 20 students living on the floor this year, 13 are returning in the fall. Early returns tallied 15 incoming freshmen with signed contracts for ESP housing (compared to a total of 14 in Fall 1994) and requests continue to be received. The demand for the 1995-96 academic year is sufficient to expand the program to a second floor.

Findings

Thus far, we know that the program has helped students earn higher grades. Data for Fall semester 1994 show that freshmen women across campus achieved an average grade point average of 2.66. Freshmen engineering women not enrolled in the program recorded an average gpa of 2.5. While the freshmen women on the ESP floor earned an average grade point average of 2.84.

Retention and graduation rates are being tracked for all engineering women students, with particular attention to those women who are enrolled in the Engineering Success Program. Because the program has been in existence one year, the data reported is for retention of freshmen to the beginning of the sophomore year. The Fall 1993 to Fall 1994 retention rate for women engineering students at the University of Missouri-Columbia is 89% compared to 84% for women students campus wide. At the end of the first year, 91% of the freshmen living in the ESP residence hall have enrolled in Engineering courses for Fall 1995.

The Engineering Success Program housing alternative could level the playing field for women in engineering by improving both recruitment and retention rates for women in engineering. The opportunity to develop support systems and networks that help young women succeed in a male-dominated profession as well as the opportunity to gain hands-on experience with computer programs and, hopefully, other engineering equipment in a non-threatening environment are valuable incentives for pursuing a non-traditional career choice.