PRE-COLLEGE PROGRAMS AT MICHIGAN TECHNOLOGICAL UNIVERSITY

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History

In 1972, administrators at Michigan Technological University were concerned about the underutilization of the campus facilities in the summers. The charge was given to the then new Dean of Special Academic Programs to "develop a program that will bring people onto the campus during the summer months." Just a note about the Michigan Tech campus location - it is located in the Keweenaw Peninsula of the Upper Peninsula of Michigan. The University is 500 miles north of its largest pool of undergraduate students. Attracting people in large numbers, aside from tourists, was not an easy assignment. However, as a result of the desire to utilize the buildings, the Summer Youth and the Women in Engineering Programs were conceived. Both programs will be celebrating their 17th year this summer.

More recently, 3 additional pre-college programs have been initiated; the Minorities in Engineering Program, the Summer Institute for the Arts and Sciences, and the Native American Science and Mathematics Workshops. The common goal of each of these Programs is to provide to its participants career information, the opportunity to gain new skills, and the chance to experience a mini version of college life.

The Summer Youth Program

The Summer Youth Program (SYP) is the most extensive program, offering over 60 different exploration choices (35 in Engineering/Science and 5 in Computer Technology). Depending on the exploration topic, participants may be 12-18 years of age; 45% of the 1000 students per year are young women. SYP is funded by tuition, with the University paying for the printing of literature and overhead costs.
A week-long SYP schedule involves approximately 37 hours of instruction time, Monday-Friday. The instructors strive to keep lecture at a minimum, stressing laboratory and field experiences. Role-models include the faculty member who is teaching the exploration, as well as his/her graduate teaching assistants.

The evening and weekend residence hall activities play an integral part in making this Program a success. Students work hard during the day, but look forward to the evening recreational events. Their residence hall counselors also act as role-models; the majority of them being upper level, undergraduate engineering students at Michigan Tech.

Women are not specifically targeted for the SYP engineering/science explorations. However, the Program brochure is sent to a number of educators and corporate contacts with a request to encourage young women to participate, especially in the engineering/science explorations. Several corporations also sponsor scholarships in these areas for women.

Minority students (65% of whom are female) are targeted more directly through the Minority College Access Program (MCAP). MCAP provides Summer Youth Program scholarships to 7th-10th grade minority students. They are encouraged, through the efforts of key school personnel, and through parent information sessions, to consider engineering and science for their future. Special partnerships have been developed with 6 schools that receive the scholarships. The partnerships facilitate continued contact with the students who might be potential engineers/scientists. The scholarships are completely funded by Michigan Tech at this time. Corporate support is being sought.

**Women in Engineering**

The Women in Engineering (WIE) Program is designed to encourage women to pursue engineering as a career. Approximately 400 women apply to the Program each year and 210 are selected to attend. This program has been, up until 1987, completely funded by corporate monies. Since 1987, 75% comes from corporations and 25% from the University's special funds.

An orientation and keynote speaker from industry begins the Women in Engineering Program. A typical WIE workshop week includes an introduction to 10 different areas of engineering and engineering technology. The faculty provide short overviews of their area and department. The students then participate in a laboratory exercise that is typical of that particular engineering area. For example, the chemical engineering sessions guide the women through one of five experiments using the facilities in the Unit Operations Laboratory. Chemical Engineering, Mechanical Engineering, and Electrical Engineering sessions also offer role-model speakers.
from industry. Their presentations are given at a more personal level, highlighting their experiences and pointing out opportunities.

Portions of the evenings are spent in team competitions, (straw structures, egg drops, etc.), options night and recreational activities. Students use the Student Development Complex, visit with financial aid and admissions personnel, produce a talent show, and still have time to shop around the local secondhand stores! Frequently, they are discussing careers in engineering with the corporate representatives who stay on for a little longer and the residence hall counselors who are also upper level undergraduate or graduate engineering students.

The daily schedule is rigorous, but it does help young women make career decisions. Ninety-seven percent of the respondents to a survey of 1984-89 participants indicates that the Program did just that. Forty-five percent said they had definitely decided on engineering and sixty percent knew which specific area.

**Minorities in Engineering**

The Minorities in Engineering (MIE) Program was modeled after the Women in Engineering Program. This summer approximately 100 minority students (60% women) have been selected to participate. Because funding is much easier to acquire for MIE than WIE, the workshop has been extended so that students experience the campus and a set of mini sessions before they begin their complete immersion into engineering.

Role models from industry are an important component to MIE. The corporate representatives tend to stay longer to interact with students on an informal basis. The keynote at the Sunday Orientation is experienced in giving an inspirational message as well as stressing to the students the need to prepare for college in high school.

**Summer Institute**

The Summer Institute for the Arts and Sciences is a two week program developed by Michigan Tech and funded by the Michigan State Board of Education. The Institute focuses on talented 11th graders, 50% of whom are female. Two years ago, an intensive class in engineering design was introduced. This year, two sections in engineering design are offered—one in the area of bioengineering, and the other in mechatronics. The intensives enroll approximately 12 women out of 30 slots. The chemistry intensive enrolls 16/24 and physics 5/24.

High School counselors and/or teachers must recommend students for this Program. A large percentage of women are recommended for chemistry, a smaller percentage to engineering, and an even smaller number to physics. Effective methods for increasing the number of applications for science/engineering intensives from women have not been determined as of yet.

*Women in Engineering Conference: A National Initiative*
Those women who do participate in the engineering intensive spend 10 very full mornings investigating engineering design problems in the environment of a research laboratory. Afternoons are spent sampling and being exposed to different topics in such areas as science, engineering, economics, ethics, etc.

**Native American Program**

The Native American Science and Mathematics Workshop is an attempt to encourage Native American students to consider engineering/science careers for their future. This workshop emphasizes the need to develop skills in math and science while in high school, so that admission to an engineering curriculum is an option when they graduate. Fifty percent of the 26 participants will be young women, grades 7-9. The one week format is similar to the Summer Institute in that the students concentrate on intensive topics in the morning and explore other areas in the afternoon. At this age level, much emphasis is put on variety in activities and providing Native American role models who can offer encouragement as well as instruction. It will be funded by the King-Chavez-Parks State Initiative.

**Comments**

I believe that pre-college programs should provide the participant, especially the high school student, the opportunity to: develop skills; network; experience a smoother transition from high school to college; make informed decisions about high school courses, college level curriculum and careers. In addition, skills such as oral and written communication and working as part of a team are emphasized. Young women particularly benefit from interactions with other women, both their peers and the role-models, who have similar interests and dreams.

Michigan Tech is one of the largest undergraduate engineering degree granting universities in the country. The opportunity for pre-college students to have positive educational and personal experiences on our campus, before they graduate from high school, gives them in general an edge above students who do not have these experiences. If they select one of Michigan Tech's undergraduate engineering programs, they may already know some of the faculty and student services personnel, be familiar with facilities, feel comfortable with the campus and residence hall system, and know where they can go for help if they do need it. This is a much easier situation to walk into then coming to a University for the very first time or with no previous pre-college experiences.
Finally, our office has now added an Outreach Coordinator who is beginning to develop a more aggressive program of keeping in regular contact with Youth Program alumni. A newsletter is in the works, and frequent visits or phone calls maintain relationships that were formed while students were here as youth program participants.

A more accurate tracking system using social security numbers will allow us to determine if Youth Program alumni are enrolling in our engineering curricula. The WIE survey indicates that 35% return to Michigan Tech. An estimate of 25-30% return from the Summer Youth Program.

Future

Michigan Tech is looking toward a Program that will allow WIE and MIE participants the chance to do research with MTU faculty the summer before college or immediately following their WIE or MIE week. Students could take advantage of laboratory and environmental research opportunities at Michigan Tech and, perhaps, begin to consider graduate work.
WOMEN IN ENGINEERING CONFERENCE: A NATIONAL INITIATIVE