

## FEMALES INVOLVED FROM REGIONAL SCHOOLS IN TECHNOLOGY AND ENGINEERING (FIRSTE): Reaching Out to High School Females

Joan A. Begolly, Tracie L. Brockhoff  
Penn State University

### Justification

Seventy-three percent of the increased college and university enrollment in the last decade is attributable to women, according to the Department of Education's Center for Education Statistics. In 1991, a greater proportion of female high school graduates (67.1) enrolled in college than male (57.6). Although the trend continues with an increased percentage of females (52.0) planning for doctoral or advanced degrees in 1993, a study of the five most often planned fields of study by 1993 seniors indicated "about 81 percent of those who chose engineering were men."<sup>1</sup>

According to the 1994 edition of *Information Plus*, although "women have made important inroads into the life, physical, and computer sciences" they still lag behind men proportionately "in degrees of all levels of physical and computer sciences, and especially in engineering where they earned about 15 percent of the bachelor's and master's degrees and only 9 percent of the Ph. D's."<sup>2</sup>

The FIRSTE program provides a vehicle for Penn State University and the New Kensington Campus to capture the interest of this growing community of college-bound young women, and to introduce them to nontraditional careers in engineering and engineering technology.

### Problem Statement

The Registrar at the New Kensington Campus reports that less than 10 percent of enrolled engineering and engineering technology students are female, and proportionately fewer are of a minority group.

The problem is twofold: 1) young women are seldom encouraged by school teachers or counselors to consider or investigate careers in engineering because engineering continues to be a traditionally male choice, and 2) we are not reaching female and minority candidates early enough to encourage and guide them in preparation for matriculation in engineering or engineering technology.

### Purpose

The objectives of the FIRSTE program are to foster involvement of females in engineering and engineering technology careers by reaching them during the career-formative years and, consequently, increase recruitment efforts and enrollment at Penn State University and the New Kensington Campus. This effort is in direct relation to the New Kensington Campus Recruitment and Retention Plan (Objective 3) which seeks to "integrate women from diverse educational backgrounds into the engineering and engineering technology programs at the [PSNK] Campus to ensure their success and retention."

The New Kensington Campus' size and low student-to-teacher ratio (18: 1) serve to "foster students' abilities" (Goal E). In surveys conducted at the New Kensington Campus students consistently indicate that the personal interaction offered by the academic community (i.e., advising and mentoring) has enhanced their academic success. Consequently, our campus serves as an excellent transition for students who must transfer to University Park in order to complete their degree in a four-year engineering program or, for students' direct involvement in the operation of machines and equipment, enrollment in one of our excellent Engineering Technology programs completely housed at the New Kensington Campus.



## Approach

Informational brochures and application forms are mailed to 9th through 11th grade students via community high school contacts within an approximate 25-mile radius of the campus, and to 25 minority churches and organizations. Students express an interest in the program by submitting the application form (in 1994, 30 applications were submitted), and 12 are selected. The "undecided" and minority females are given selection preference over those who have already chosen engineering or engineering technology as a career. Once selection is made and acceptance confirmed, the students and their affiliate schools are listed in a news release.

In order to improve upon recruitment strategies, a formal FIRSTE Planning Committee was recently established, consisting of the two program directors and two female engineers from local industries. It was decided that visitations to area high schools, not limited to the 25-mile radius, are necessary and should coincide with National Engineer's Week (February 19-23, 1996). By direct distribution of the program materials, the committee hopes to expand its audience by attracting young females who are rather indifferent toward engineering/technology/science-related fields as a career.

The brochures will be revised to include quotes from former FIRSTE participants for better appeal. Eventually, successful participants will be asked to return to the program, which they themselves had passed through some years earlier, but in the capacity as mentors. Hopefully, this activity will encourage these same women to become active in the recruitment of young females into engineering.

One member of the planning committee has contacted various professional societies within the area as possible sources of funding as well as to promote the FIRSTE Program. Interested members could be approached to serve as mentors or program volunteers. In any case, they will be asked to market the program should such opportunities arise.

Increased contact with local industries is also essential to the visibility of the program. By the strengthening of such ties, the Penn State New Kensington Campus could potentially recruit the children of these corporations such as suggested by the current corporate sponsors. It is this sort of involvement which could prompt even greater support from the industries within the service area.

## Program Agenda

The proposed agenda for the 1996 Summer FIRSTE Program includes "hands-on" workshops, which are held to stimulate an interest in and provide a realistic view of engineering and science-related careers. Under the direction of select faculty and staff, these sessions span the course of two days and generally run for one or two hours. Topics include biomedical, chemical and mechanical engineering, biotechnology. Also computer-aided drawing is introduced, and the participants then apply these drafting skills toward the creation of a design project of their choice. They also receive training on the World Wide Web.

In addition to workshops, a tour is conducted at a local engineering firm or corporation so that these young women can observe the engineering workplace, current methods and techniques, and women in engineering careers at work. This past year, Cheryl Richards, a senior research engineer with PPG Industries, arranged a tour which illustrated the processes required in the manufacture of fiberglass. Previously, Alcoa and Westinghouse arranged similar field trips to their sites.

In order to establish role models, female engineers employed in local industries are invited to participate as mentors. This informal session serves as an opportunity to discuss any concerns or questions that the participants may have regarding engineering and for the mentors to share their personal and professional experiences as well.

The program concludes with the recognition banquet in which parents are invited to share in the achievements of their children. At this time the creative design projects are judged and prizes are awarded to the winning team.

## Budget

The total cost of the FIRSTE Program for 1995 was \$3,761.15, thanks to cost containment, volunteer efforts and creative programming.



Equal Opportunity Planning Committee (EOPC) contributed \$780 toward lodging and meals for the participants and their parents along with unit support of \$1,200 by the Penn State New Kensington Campus to cover faculty. Additional funding of \$1,500 was awarded by the Division of Undergraduate Studies through a Diversity Grant to cover mailings, copying, supplies and meals. General support was also provided by PPG Industries in the form of transportation services and a luncheon.

The cost of the FIRSTE Program for Summer 1996 is estimated at \$4,500.

### **Outcome**

This summer, the participants from the first three years were surveyed by phone. Of the 36 contacted, 17 had reached college age. Six have chosen a science-related field. At least 8 have selected engineering as a career choice, most notably architectural, environmental and biomedical, with 7 of these planning to attend Penn State; 4 particularly at New Kensington Campus. In fact, a 1995 FIRSTE participant has committed to engineering at Penn State New Kensington Campus as a direct result of her involvement in the program.

The influence of the FIRSTE Program is further reflected in some of the participants scheduling Applied Chemistry rather than General Chemistry, in order to better prepare themselves. Another student is taking an additional calculus course even though it is not required for graduation.

The highest GPA among the 21 participants is 4.3 ; the lowest, 2.7. It appears that the FIRSTE Program has encourages its participants to set high standards for themselves with the realization that their goals can, in fact, be achieved.

No official survey was distributed to the parents because they were directly involved at the recognition dinner. All parents expressed their support for this kind of program and extended sincere appreciation for the committee's efforts.

I"Women's Changing Role," *Information Plus*, cd., Alison Landes, Carol D. Foster, and Cornelia B. Cessna, Wylie, Texas, 1994 Edition, pp 142-145.

<sup>2</sup>Ibid.

JOAN A. BEGOLLY earned her Bachelor's and Master's degrees from Penn State University in Civil Engineering with an emphasis in Structural Analysis. She spent a few years in industry as a structural engineer and has been on the Engineering and Mechanical Engineering Technology faculty at Penn State New Kensington Campus for the past nine years. Her personal interest is in the recruitment of females, including minorities which led to the development of the FIRSTE Program. Active in SWE, WISE and WISET.

TRACIE L. BROCKHOFF earned her Associate Degree in Science with Medical Laboratory Technology as her option. She currently works at Penn State University New Kensington Campus as a laboratory instructor in Biology. Her personal interest is the support, education and training of youth. She is actively involved in the Boy Scouts of America.

