

## SLOAN FOUNDATION INITIATIVE AT PURDUE UNIVERSITY

**Emily M. Wadsworth, Ph.D.**  
**Assistant Director, Women in Engineering Programs**  
**Purdue University**  
**West Lafayette, Indiana**

### BACKGROUND

The Women in Engineering Program at Purdue University was initiated in 1968. Since its inception, the main goal of the program has been to extend the participation of women in engineering. Activities have been created, implemented and altered in order to encourage more females to apply to, enroll in and remain at the Schools of Engineering. Recruitment events in the form of Career Days and Summer Programs have been targeted at high school female students. These events involve undergraduate engineering students, engineering alumni, prospective students and their parents. Retention efforts, like the seminar for first year engineering students, also include upperclass coeds majoring in engineering as well as engineering alumna, some of whom represent dual-career families. As a result of program operations, Purdue attracts, enrolls and graduates more women in engineering than any other university in the nation.

This past fall, the Alfred P. Sloan Foundation awarded the Women in Engineering Program at Purdue University a three-year grant, to further expand the number of women earning engineering degrees. The foundation was established in 1934 by Alfred P. Sloan Jr., Chairman of General Motors Corporation, and, it has been a major supporter of higher education programs for numerous years. This paper will discuss primary objectives, program activities and conclusions about the grant at Purdue University.

### PRIMARY OBJECTIVES

The Sloan Foundation Initiative at Purdue has three primary objectives:

**1. To increase the proportion of outstanding women students who consider engineering as a career.**

This first objective relates to those who are interested in and actually apply to Purdue. This past year, 1141 women out of a total of 4460 students, or 26%, were applicants to the Department of Freshman Engineering. Our plan is to increase the percentage of women applying to 30% of total applicants in three years. Currently, colleges are competing with one another for a declining pool of women students who are interested in combining fields of study for professional careers, for example, engineering with law or medicine<sup>1</sup>. Therefore, institutions need to develop activities that illustrate how women in engineering can utilize their area of expertise in other fields of endeavor.

**2. To extend the proportion of outstanding women students who actually matriculate in engineering.**

This past fall, 421 (25%) out of a total of 1,704 women students enrolled for their first year in engineering at Purdue. Our intent is to expand this percentage by several points each year of the grant. Since research by Campbell & Metz (1986) indicates that personal encounters with individuals encourages the enlistment of female students, then, it is fitting that colleges set up situations where people can make contact with prospective students<sup>2</sup>. In this way, additional women can be encouraged to enroll in engineering curriculums.

**3. To advance the proportion of outstanding women students who really remain and graduate in engineering.**

One accomplishment of the Women in Engineering Program at Purdue has been to increase the retention of women students from 20% in 1968 to more than 50% in the past decade. An aim during the next three years is to improve our retention rate to at least 70%. Further, the percentage of women receiving B.S. Degrees in Engineering has climbed from 2% in 1972 to 22% in 1992. Recent findings by Brush (1991) indicate that women students experience isolation and an indifferent climate on engineering campuses<sup>3</sup>. Thus, it would be important to create campus experiences that would enhance individual attention and small group support for women, thereby aiding them as they pursue an engineering education. Augmenting the pool of women students who apply, enroll and remain at Purdue University should lead to larger proportions of females graduating with B.S. Degrees in Engineering. Therefore, participation of women in engineering would be advanced.

## **PROGRAM ACTIVITIES**

The first year of the SLOAN FOUNDATION INITIATIVE we have worked at achieving the above primary objectives through specific new activities, Videotapes, a Personal Connection Program and Peer Assistance Project.

### **Videotapes**

The number of women who participated in postsecondary education and who were interested in engineering as a probable major began to rise during the later part of the 1980's<sup>4</sup>. At the same time, women were also inclined towards careers in medicine and law.

Awareness of the above career interests coupled with a desire for more effective recruitment materials, led Dr. Jane Daniels to develop three VIDEOTAPES this past year. The new tapes are to be used in contacting potential students for admission to Purdue University. These items will augment the existing recruitment techniques, like brochures and posters, which are utilized to arouse the interest of top quality women candidates.

---

NOTE: Outstanding woman students are those with a combined SAT score of 1300, who are in the top 5% of their high school senior class and who earn GPA's of 5.5 out of 6.0 at Purdue.

The main goals of the VIDEOTAPES are to:

- \* attract students to a career in engineering
- \* draw students to an education at Purdue University
- \* interest students in applying to the Schools of Engineering

These particular materials are very personal, upbeat and visually intriguing. The tapes showcase the campus, engineering students and faculty, Women in Engineering Program, some of the excellent facilities, professional organizations and social activities. The videos are designed to generate excitement about future professional careers in law and medicine that are open to women with engineering degrees. One video focuses on students who are still undecided about their college major.

Plans are to mail cards to potential students, inquiring about their interest in engineering and asking them to return the card to Purdue. One of the videos will then be sent to all interested students and they can retain the tape or pass it on to a friend who expresses interest in the same area of study.

Hopefully, these marketing products will appeal to young female students and broaden the base of pre-college women who consider engineering as their career.

### **Personal Connection Program**

It seems that prestigious universities utilize both current and former students as well as parents in their efforts to enroll new women into engineering<sup>5</sup>. Further, some of the common elements of successful Women in Engineering Programs are cultivating network experiences that include undergraduate women, providing opportunities for female students to interact with professional engineers and encouraging the involvement of student's parents<sup>6</sup>. For these reasons, a Sloan Team of women engineering students was formed and the PERSONAL CONNECTION PROGRAM launched by Dr. Emily Wadsworth. These efforts involved the following series of steps:

#### **STEPS 1 & 2: Selection and Orientation of the Sloan Team**

- ❖ 1. Women Engineering Students at Purdue were interviewed and six junior and/or senior women were selected to become members of a Sloan Team.
- ❖ 2. The Sloan Team met weekly and at first they were oriented to the Women in Engineering Program at Purdue as well as the objectives of the Sloan Grant. They also learned that they would aid in constructing and presenting the Personal Connection Program. Further, members became aware of the impact of role models, such as female engineering students and practicing women engineers, on the enrollment choices of prospective students.

#### **STEP 3: Initial Structure and Tasks of the Sloan Team**

- ❖ 3. The team members were then divided into three partnerships. One set of partners led focus groups with high school seniors in order to decide what materials were most effective in recruiting prospective students. Another set conducted a pre-pilot study with current women engineering students for the purpose of determining what forms of communication should be utilized by engineering alumna when contacting prospective students. A third pair considered a research design for the Personal Connection Program, they contemplated important variables to measure and constructed response forms so that program activities could be evaluated.

#### STEP 4: Restructuring and New Responsibilities of the Sloan Team

- ❖ 4. The third month into the initiative and after feedback from members, the Sloan Team was restructured into two triads. Three women became Programmers who took responsibility for developing letters and sending materials to current women engineering students (Coeds) and their guardians (Parents) and former women engineering students (Alums). The other three women were Evaluators who produced reply cards and response forms for Coeds, Alums and Parents.

#### STEPS 5 & 6: Pilot Study and Personal Connections

- ❖ 5. A pilot study with 20 Coeds, 20 Alums and 20 Parents was conducted for the expressed intention of obtaining feedback on materials (logo, letters, invitations, reply cards and response forms) to be used with the Personal Connection Program.
- ❖ 6. After coding responses from pilot participants, materials were altered and printed. Labels were generated and letters sent to 4132 possible Personal Connection Program Participants, 1316 Coeds, 1552 Alums and 1264 Parents. A total of 791 people (241 Coeds, 273 Alums and 277 Parents) returned reply cards which indicated that they would be happy to become "personal connections."

#### STEP 7: Stratification of Sample and Matching of Participants

- ❖ 7. The sample of prospective students were stratified according to their zip code and expected GPA, then, groups were assigned to programs (Coeds, Alums, Parents or a mixture of the three). Finally, prospective students and their parents were matched by zip code with Coeds, Alums and Parents.

#### STEPS 8, 9 & 10: Components, Contacts and Evaluations of Program

- ❖ 8. The components of the Personal Connection Program were titled Coeds for Seniors, Alums for Seniors and Parents for Parents. There were 168 Coeds, 153 Alums and 165 Parents involved with the various components. Letters, checklists, and useful pieces of information such as Purdue Brochures and Parent Handbooks were sent to the 486 Personal Connections who also received the names, addresses and phone numbers of accepted female applicants and/or their parents.
- ❖ 9. Coeds, Alums and Parents then made their contacts over a period of two months. Through phone calls, business visits, meals and letters, information about engineering was shared and questions about Purdue's housing, academic courses and cooperative programs, etc. were answered.
- ❖ 10. At the end of the contact period, 266 Personal Connections (81 Coeds, 63 Alums and 122 Parents) completed and returned the program evaluation form for a group response rate of 55%. Many noted additional comments such as "...this is a very worthwhile and beneficial program!" Interestingly, 89% indicated that they would participate again in the Personal Connection Program.

The number of young women planning to enter the Schools of Engineering at Purdue went from 475 in May, 1991 to 513 in May, 1992, thus, the Personal Connection Program might be having a positive effect on enrollments.

### Peer Assistance Project

Findings by Fidler & Hunter (1989) indicate that freshman seminars conducted for credit are effective in improving the retention of beginning students<sup>7</sup>. Specific strategies suggested by the authors for promoting student persistence are: taking a personal interest in students; structuring seminars to be support systems; and utilizing an assessment component. Further, the National Research Council in 1991 recommended that support groups be established for women engineering students, in order to reduce the isolation and alienation that they experience on college campuses.

Engineering 194, a one credit seminar at Purdue, is designed to give first year female students an overview of the emerging role of women in engineering. The class provides contact between beginning female students and practicing women engineers, raises students' awareness of career possibilities and demonstrates the various ways women combine commitments to professional careers and personal families. This past September, nearly 200 women elected to take this class taught by Dr. Janine Reklaitis. A new element added to the seminar was the PEER ASSISTANCE PROJECT. The effort centered on small group discussion meetings that were held once a week and led by junior and/or senior women engineering students. The seven leaders attended one lengthy training session before the fall seminar began. Then, they had weekly meetings where they covered topics like confidentiality, group dynamics and responsibilities. Each of these seven women were assigned three groups consisting of about ten students, and, each group developed their own agenda. Some groups focused on academic issues like difficulties in chemistry class or the benefits of cooperative programs. Other groups dealt with personal concerns such as problems with roommates or male friends.

At the end of the 1991 fall seminar, an evaluation survey was distributed to class members and leaders. Results from that part of the survey which dealt with small group sessions indicate that over 90% of class members agreed that leaders were well prepared, approachable and responded to the needs of the group. Also, approximately 70% enjoyed group interactions and checked that relevant topics were discussed. A little over 50% of the students felt that weekly group sessions were worth their time.

The participatory approach utilized in the Peer Assistance Project is designed to encourage retention of students. In the coming years we hope to double the number of women who will be graduating with B.S. degrees in engineering from Purdue University.

### **CONCLUSIONS**

According to the National Science Board, selection of a career in engineering is a complex decision<sup>4</sup>. Potential students need both encouragement from parents and affirmation from professionals when choosing their lifework in the traditionally male dominated field of engineering. And, as Marsha Matyas, an education specialist with the American Association for the Advancement of Science (AAAS) stated, engineering schools need to attend to campus climates and support women students who have been recruited into this line of work<sup>8</sup>. Also, rapid technological changes during the 1990's will generate a demand for engineers. An expanded supply of women with engineering degrees could assume responsible positions in the labor force and help the United States to compete effectively in the world market<sup>9</sup>.

The Sloan Foundation Initiative at Purdue University which involves new activities for students at the critical points of application, enrollment and retention will hopefully result in larger percentages of women who participate in engineering.

## REFERENCES

1. Engineering Manpower Commission Bulletins (1991). *Women in Engineering*. American Association of Engineering Societies, Inc., Number 109, May, 1991.
2. Campbell, P. & Metz, S. (1986). *An Investigation of Women in Engineering Education*. Office of Special Programs for Women, Stevens Institute of Technology, Hoboken, NJ, 07030.
3. Brush, S. (1991). Women in Science and Engineering, *American Scientist*, 79, 404-419.
4. National Science Board (1991). *Science and Engineering Indicators: 1991*. Tenth Edition. Washington, D.C.: U.S. Government Printing Office, 1991.
5. Daniels, J. (1987). *Testimony to the Task Force on Women, Minorities and the Handicapped in Science and Technology*, October 29, 1987, Chicago, Illinois.
6. National Research Council (1991). *Women in Science and Engineering. Increasing Their Numbers in the 1990's*. Washington, D.C.: National Academy Press.
7. Fidler, P. & Hunter, M. (1989). How seminars enhance student success. In M. Upcraft & J. Gardner (Eds.). *The Freshman Year Experience*. San Francisco, CA: Jossey-Bass, pp.216-237.
8. Raymond, C. (1991). Continuing Shortage of Women in Science Decried; Many Dropout, *The Chronicles of Higher Education*, December 11, 1991.
9. Wadsworth, E., LeBold, W. & Daniels, J. *Trends in Women Engineering Programs and Degrees: Harmony or Discord?* Proceedings, 1991 ASEE Frontiers in Education Conference, pp. 233-239.