

**THE FRESHMAN INTERVENTION PROGRAM
AT THE
UNIVERSITY OF WASHINGTON**

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INTRODUCTION

Despite increases in the enrollment of women in the last ten years, retention rates for women, that is, the fraction of entering students that complete the program, have decreased drastically. In the 1972-76 classes, the retention rate peaked at about 90%; by the 1983-87 classes, the retention rates had dropped to less than 61%¹. Bowen² points out that retention rates, defined as the ratio of the number of graduates in a given year to the number of freshmen enrolled four years earlier, is overestimated because this definition does not account for student transfers into engineering after the freshman year.

Far too many female freshmen leave engineering before earning the baccalaureate because they find that they do not like the field, they feel isolated, or they are made to feel incompetent. Other reasons include fewer perceived opportunities for combining a family and career advancement opportunities, and preferences for business³. Rarely do women leave engineering due to failing grades, because the women who have persisted to this point are highly filtered achievers. Thus, to address the issues facing freshman women in engineering and to improve the retention of these women, the Freshman Intervention Program (FIP) was initiated by the Women in Engineering (WIE) Initiative at the University of Washington in the fall of 1991. The specific goals of the FIP are the following:

- * To increase the number of women completing the freshman year of an engineering curriculum
- * To determine the specific barriers facing female freshman students
- * To provide information on Women in Engineering (WIE) services and support to freshman women

The methods that are being used to achieve these goals are discussed in this paper. In addition, some of the preliminary results of the first year's effort are presented. The FIP is made possible by a generous grant from the Alfred P. Sloan Foundation.

DESCRIPTION OF METHODS

LOCATING/CONTACTING STUDENTS

The WIE Initiative conducted a Freshman Interest Survey in the summer of 1991 to determine how many females are interested in pursuing degrees in science or engineering. This survey identified 110 students interested in either engineering or 'hard' science (physics, chemistry, mathematics, or computer science). Throughout the year, various other methods were used to attract additional students to the program. These methods are described in the "Marketing" section of this paper.

ORIENTATIONS

To acquaint the students with the engineering programs and the Women in Engineering Initiative (WIE), two orientations were held at the beginning of fall quarter. All 110 of the original interest letter respondents were invited to these "orientation receptions". During these sessions, presentations were made on the programs and services offered by WIE. In addition, advisors from the college of engineering presented material on course and major selection within the college. The orientations were well attended, and several of the students immediately signed up to participate in WIE programs.

STRUCTURED INTERVIEW

To gather data, and to address the needs of each student individually, each student was invited for a personal interview. The interviews were based on a structured interview form (this form was approved by the University of Washington Human Rights Committee). During the interview, the following information was obtained:

- * Demographic Information
- * Educational/Professional Background
- * Interests
- * Amount of Support (financial and otherwise)
- * Confidence Level

The individual concerns of each student were also discussed. Students usually asked about the differences between specific engineering majors, administrative questions about pre-requisites, etc. Finally, all WIE programs and services were described, and the students were encouraged to participate in any programs from which they felt they could benefit. All interviewed students also received the WIE Resource Directory, which describes the requirements of the engineering programs and summarizes services offered by WIE, the university, and the community.

STUDENT ACTIVITIES

To promote interest in the FIP and to examine issues pertaining to women in engineering, a 'Women in Engineering Film Series' was organized. Two Film series events were held (one in the fall, and one in the spring), and two different films were shown at each. The films addressed various issues relating to women in non-traditional careers and women in society. While the events were primarily aimed at the freshman students, interest was shown at all levels (including some professional engineers from the WIE Mentoring Program). These events gave the freshman students the opportunity to learn more about WIE, as well as an opportunity to meet female students and professionals in engineering. Each event was well attended.

MARKETING

To ensure as many students as possible were contacted, the FIP was continually marketed. The FIP was announced (by WIE staff members) to freshman engineering classes. Letters were sent to sorority presidents and dorm resident advisors asking them to encourage their freshman residents to participate in the FIP. An article explaining the FIP was included in each (quarterly) issue of the WIEPRESS (sent to all female students in the University of Washington). Lists of names and addresses of possible participants were obtained from MSEP (Minority Science and Engineering Program) and SWE (Society of Women Engineers). Finally, students that had participated in the FIP often encouraged their friends and roommates to also participate. Several new students were reached through these channels.

FOLLOW-UP INTERVIEW

To gauge the success of the program, and to continue to address the needs of the students, all of the originally interviewed students were called for a formal year-end follow-up interview. The follow-up interview is based on a structured interview form. During these interviews, the following information is either obtained or updated (from the original interview):

- * Demographic Information
- * Interests (Still studying engineering?)
- * Support (Financial and otherwise)
- * Confidence Level
- * Involvement in WIE (which programs they participated in, which ones they found most beneficial, and if they have any comments on the WIE Initiative in general)

Again, individual concerns of the students are addressed. Specific WIE programs would be recommended if it seemed the student would benefit (e.g., tutoring would be recommended if the student was concerned with her grades). At the time of this presentation, approximately 60% of the originally interviewed students were called. Some of the preliminary results from these discussions are presented in the following section.

PRELIMINARY RESULTS

Follow-up interviews have been conducted with approximately 60% of the originally interviewed students, the results that are presented are thus preliminary. The data, however, does show some interesting trends.

The ethnic breakdown of the freshmen students is as follows: 54% Caucasian, 41% Asian or Pacific Islander, and 5% African American. With only slightly above half the population being Caucasian, the freshman women in engineering include a diverse ethnic background.

As is shown in Figure 1, when the students were asked whether they are still pursuing engineering, 82% indicated that they were. Considering that the national retention average is 60%, the data appears to show a positive effect of the FIP.

Seventy-seven percent (77%) of the students stated they enjoyed their technical classes (Figure 2). While this may seem to be a characteristic inherent to engineering majors, the entry level classes are among the largest (200+ students) and most competitive courses the students will encounter. If the students can still state that they have enjoyed their classes despite these hardships, we feel they will have a greater likelihood of continuing.

Competition is a significant issue to freshmen, especially to women. Having not been trained to compete (as are their male counterparts), many female freshmen are uncomfortable with classroom competition. This phenomenon can be seen in our data (Figures 3 and 4). Eighty-seven percent (87%) of the students felt their classes were competitive. Most students indicated that while competition provides incentive to study, it also causes anxiety and intimidation. Because of these mixed feelings, most students responded that the competition was both good and bad (see Figure 4). The WIE Initiative provides several workshops throughout the year addressing issues such as dealing with competition, time management, and study skills to help students better deal with the classroom competition.

When studying female engineering students, it is a common assumption that their self-confidence declines during their college experience. Very few investigations, however, show actual evidence of this decline. Our data verifies this decline (Figures 5 and 6). The differences between the first interview and the follow-up interview are dramatic. It should be noted that in the first interview, the students compared themselves to their high school

classmates (when they were at the top of their classes), while in the follow-up interview, the students compared themselves to their college peers (where they are more likely to be "average"). One of the WIE Initiative's primary focuses is on maintaining and improving the self confidence of female engineering students. Programs such as Peer Mentoring, Tutoring, and confidence-building seminars specifically address building self confidence.

The next question, "What was the hardest part of adjusting to college?", indicated that most of the issues facing young women are not gender specific (see figure 7). Nonetheless, the programs offered by WIE can help in making the adjustment by providing seminars, a support network, as well as a place for students to study in (the WIE Study Center).

Finally, it is encouraging to see that 50% of the students felt no barriers to their completing their engineering degree. The most frequently noted barrier was that of a fear of not being accepted by an engineering department (at the University of Washington, students apply to specific engineering departments at the beginning of their junior year. Admission is based on grade point average and is very competitive).

The preliminary results appear to indicate the WIE Freshman Intervention Program (and the subsequent involvement of the students in other WIE Initiative Programs) has helped to improve the retention rates for women in the freshman year of an engineering curricula.

PLANS FOR THE FUTURE

During the summer, the original interview form will be modified and updated, and the first annual progress report to the Sloan Foundation will be prepared and submitted. At the end of summer, a new batch of interest letters will be sent out to the new entering freshman class. In the fall, new orientations will be arranged, and interviews will begin again with the new class. To encourage their continued involvement, the participants in the first year's program will be encouraged to participate in the Big Sisters (peer mentoring) Program to act as "big sisters" to the new freshmen. Thus the cycle will begin again.

REFERENCES

- 1) Manpower Comments (Commission on Professionals in Science and Technology: Volume 25, Number 7, September 1988).
- 2) Bowen, J. R., "What will be in the Engineering Pipeline in the 1990's?", *European Journal of Engineering Education*, Volume 15, Number 4, 1990, pages 299-308.
- 3) Vetter, Betty M., "Demographics of the Engineering Student Pipeline", *Engineering Education*: May 1988, Pages 735-740.

Response to: "Are you still pursuing an Engineering major?"

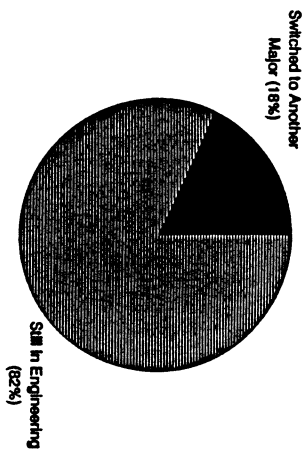


Figure 1

Response to: "Do you enjoy your technical classes?"

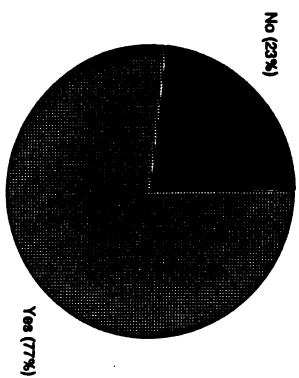


Figure 2

Response to : "Do you feel your classes are competitive?"

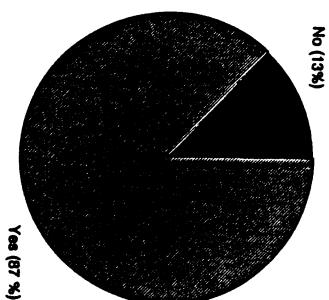


Figure 3

Response to : "If you feel your classes are competitive, is the competition good or bad?"

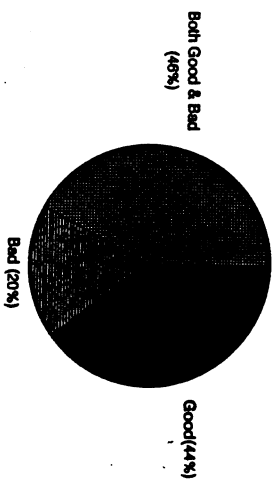


Figure 4

Response to : "What has been the hardest part of adjusting to college?"

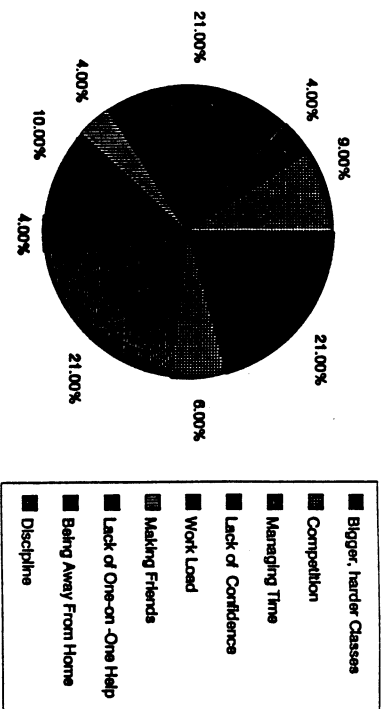


Figure 5

Response to : "Do you feel any barriers to your continuing in engineering?"

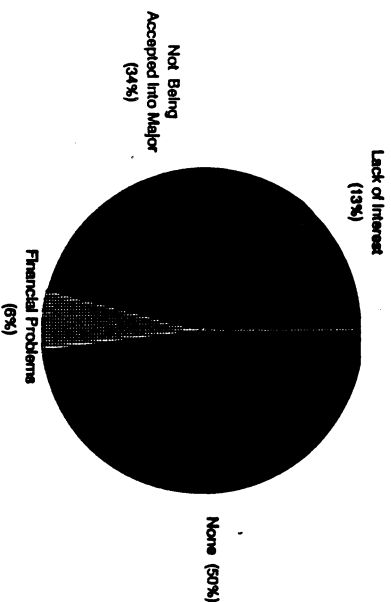


Figure 6

Confidence Level, Original Interview: "On a scale of one to five (one being excellent, five being poor), how would you rate yourself as a math and science student?"

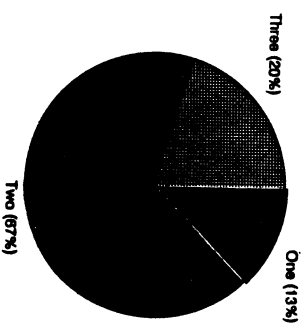


Figure 7

Confidence Level, Follow-up Interview: "On a scale of one to five (one being excellent, five being poor), how would you rate yourself as a math & science student?"

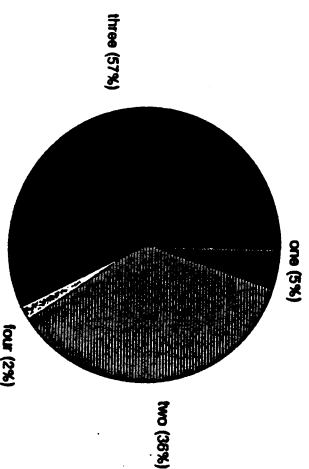


Figure 8