

## DESIGN AND EVALUATION OF A GRADUATE PROGRAM FOR WOMEN IN ENGINEERING

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### INTRODUCTION

Since its inception in 1989, the Women in Engineering Initiative at the University of Washington has focused on the needs of graduate students. Relatively unstructured in the beginning, the program tended to focus more on the individual needs. As the demand increased, it became clear that a structured approach towards creating a supportive and intellectual community was needed. To that end, a strategy was developed which encompassed the recruitment of undergraduate students into graduate school and the retention of graduate students already in engineering.

While recognizing that the University of Washington (UW) was slightly above the national average in terms of the percentage of degrees granted to women in engineering, as illustrated in Figure 1<sup>(1)</sup>, the University realized that the relative number of women obtaining graduate degrees was still very small. To address this issue, a program was developed for women in engineering.

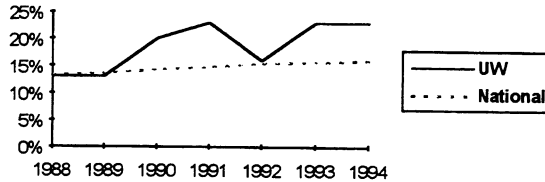
The goals of the Graduate Program are to 1) establish a supportive and intellectual community inclusive of and encouraging for undergraduate students to pursue graduate degrees; and 2) foster an academic climate which encourages degree completion in a career-pleasing field. The purpose of this paper is to provide a brief description of the Graduate Program, results of the evaluation and findings of a climate survey.

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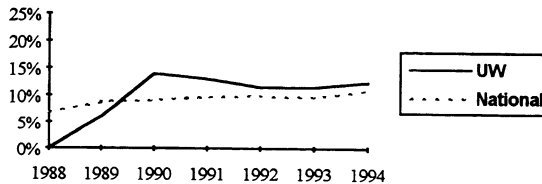
(1) Vetter, Betty M. (1994). Commission on Professionals in Science and Technology, *Professional Women and Minorities: a Total Human Resource Data Compendium (Eleventh Edition)*

**Figure 1: Percentage of Engineering Graduate Degrees Granted to Women at the National Level and at the University of Washington (UW)**

**Percentage of Masters Degrees Granted to Women Nationally & at the University of Washington (UW)**



**Percentage of Doctoral Degrees Granted to Women Nationally & at the University of Washington (UW)**



## INTERVENTION ACTIVITIES

### Recruitment Activities

Over the past year, different activities were designed for undergraduate and graduate students. For those students at the undergraduate level, an information seminar was delivered in Autumn and Spring Quarter entitled, *Your Guide to Graduate School*, and covered myths and realities, choosing the right school, application procedures, financial assistance, future trends and the University of Washington resources. The objectives were to: a) dispel the common misconceptions about graduate studies; b) provide information about the curriculum and environment in graduate school; d) discuss financial assistance and how to obtain it. For each seminar a diversity of female students and faculty were invited to be presenters. Male and female undergraduate students, as well as, incoming graduate students were invited to participate.



## Retention Activities

### *Welcome Reception*

A reception held as an orientation session, at the beginning of the Autumn Quarter 1994 welcomed the incoming female students. The ***Welcome Reception*** provided an opportunity for students to meet and interact with incoming and current graduate students, department chairs, female faculty, and the Associate Dean of the College of Engineering. A short panel presentation from departmental representatives made it possible for students to ask questions in an open forum. The purpose of the reception was to introduce the students to a supportive community of peers, faculty, and to help build realistic expectations.

### *Seminars*

***How Governmental Agencies Work for You and Fundamentals of Grantsmanship*** were held in Winter Quarter and Spring Quarter 1995. The first seminar included speakers from the National Science Foundation, the National Institutes of Health and the Department of Energy. Targeting students working on Ph.D.'s, postdoctoral research or those interested in academic careers, the seminar emphasized understanding the organizational structure, funding priorities and different ways of obtaining grants. The second seminar focused on explaining the basic elements of writing grants for federal agencies and the common "mistakes" of beginning grant writers.

### *Gatherings*

Three informal sessions referred to as ***Gatherings*** were held during the Autumn Quarter 1994. The gatherings were held in an informal and relaxed environment usually outside of the University. The objectives of the gatherings were to: a) promote communication and social interaction among engineering female graduate students; b) promote open expression of their feelings about the academic climate; and c) create mutual support.

### *Brown Bag Seminars*

During the Winter Quarter 1995, Brown Bag Seminars were held. One-hour in length seminars were held over lunch and topics ranged from career building skills to finding scholarships or fellowships for graduate and postgraduate women in the fields of engineering.

### *WISE Conference*

At the annual ***Women in Science and Engineering (WISE) Conference***, a panel discussion was dedicated to issues concerning graduate studies and academic careers for women. The panel discussion consisted of three faculty members, who shared their experiences in searching for a job and in the hiring process.

### *Other Activities and Services*

Emphasis was put on **Collaboration** with engineering departments within the University and with other national and international institution of higher education. This was done by: a) advertising academic and postdoctoral positions through electronic mail; b) hosting visitors in search of female candidates for academic positions, such as identification of the pool of female graduates interested in academic positions, arranging interviews with those students, arranging meetings with female faculty and chairs, and organizing tours of the engineering departments; and c) providing technical assistance to institutions in establishing graduate retention programs.

An **Electronic Bulletin Board** was used to post all the upcoming events, and to regularly inform the students about topics of interest varying from openings of academic and postdoctoral positions, availability of fellowships/scholarships, and industrial positions to possibilities of obtaining child care support from the University. Such an interactive list also allowed informal discussions among graduate students.

Different marketing strategies were used, including: sending individual letters and invitation postcards to the students' campus address, placing advertisements in the campus newspaper, society publications, and the WIEPRESS and posting flyers in different buildings often visited by the targeted audience.

Packages containing information about graduate school as well as about WIE services and programs were sent to students who expressed interest in pursuing their graduate studies at the UW. A similar package was also included in the departmental information package and sent to the students admitted to graduate school for Fall Quarter.

### **EVALUATIONS**

Evaluation questionnaires were administered at the end of each event. They assessed audience satisfaction, effectiveness of speakers, overall quality and other needs of students. The analysis of the results provided information to determine the students needs and level of satisfaction with the program. The results of each evaluation were used to plan or to modify the following quarter's activities.

The major criteria defining success of the Graduate Program were: a) significant representation of female students in the audience; b) large participation of both male and female graduate students; and c) the participants' expression of satisfaction.

To illustrate how one event was evaluated, the results are briefly presented below. Students from nine of the 10 engineering departments participated in a seminar entitled **Fundamentals of Grantsmanship**. The results of the participation in the seminar are shown in Table 1.

**Table 1: Participation Rate of Graduate Students at *Fundamentals of Grantsmanship Seminar***

Participants Status	Participation Rate	
	Number	Percent
Postdoctoral Students	2	6%
Ph.D. Students	25	75%
Master's Students	6	19%
<i>Total</i>	33	100%

Female graduate students currently represent 25% of the students in the engineering graduate school at the University of Washington. Thirty five percent of the participants in the seminar were women. The results of the questionnaire showed that 92% of the participants found the presentation, the question-answer session and the handouts very informative. Fifty percent of the participants requested more seminars of the same nature.

An annual evaluation is also conducted. Questionnaires are mailed at the end of Spring Quarter to all female graduate students. Questions include: their assessment of the program's value to them; the value of the program in general; its impact on encouraging them to remain in school; on their self-confidence; on facilitating their academic career as a graduate student; and, finally a request for suggestions to improve the program. The questionnaire mailing is usually followed, two weeks later, by an electronic mail message reminder. Finally, follow-up telephone calls are made to those who do not return the completed questionnaire.

In addition to the evaluation of the WIE Graduate Program, general questions were asked pertaining to the quality of the climate in graduate school. Graduate students were asked to rate the influence of various factors on their academic experience. A total of 40 completed questionnaires were returned. As illustrated in Table 2, only 12% and 13% respectively perceived their advisors and male professors as having a negative influence. The primary positive factors were male friends and their interest in the engineering curriculum.

**Table 2: Factors Influencing Female Graduate Students' Academic Experience at the UW**

Factors	Influence		
	Positive	None	Negative
Your Advisor	86%	2%	12%
Male Professors	78%	9%	13%
Female Professors	68%	30%	2%
Male Friends	90%	6%	3%
Female Friends	86%	11%	4%
Mentor(s)	50%	50%	0%
Interest in Curriculum	94%	2%	4%
Career Opportunities	85%	13%	2%
Professional Societies	54%	44%	2%
Conference/Events	76%	22%	2%

Table 2 illustrates the factors perceived as barriers to degree completion. About 40% of the students feel that lack of self-confidence was a negative factor in their academic pursuit. Forty eight percent felt that balancing family, work and academic study was a negative factor. In general, most students did not feel that lack of interest in the subject, family issues or lack of finances were barriers.

**Table 3: Factors Perceived by UW Female Graduate Students as Barriers to Degree Completion**

Factors	Response	
	Yes	No
Poor Advising	23%	77%
Lack of Interest in the Subject	4%	96%
Family Issues	13%	88%
Lack of Self-Confidence	40%	60%
Isolation	19%	81%
Balancing Finances with Time for Studies	19%	81%
Balancing Family/Work/Academics	48%	52%
Lack of Financial Support	19%	81%

University of Washington, 1994

## CONCLUSION

As indicated by the participation rates, the Graduate Program for Women in Engineering is meeting the needs of many of the students. It appears that the primary barriers for students are balancing family, work and academics, lack of self-confidence, and poor advising.

Next year, the evaluation forms will be analyzed by gender to compare male and female satisfaction with the WIE Graduate Program and their perception of the climate in graduate school. Those issues which a majority of students perceive to be barriers to degree completion will need to be addressed by WIE and the College administration for possible solutions.