FOCUSING ON PROGRAMS FOR WOMEN THAT PROMOTE RETENTION

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THE WOMEN IN ENGINEERING RESEARCH FELLOWS PROGRAM

The WIE Research Fellows Program is currently in its fourth full year of implementation. Since the program began in Fall 1994, 88 undergraduate women students, under the advisement of 54 faculty members in the A. James Clark School of Engineering, have been awarded research fellowships. As established in the 1994 Women in Engineering Program grant proposal to the Alfred P. Sloan Foundation, through the WIE Research Fellows Program “women students will be encouraged to work with faculty on meaningful research projects. This experience will significantly enhance their basic understanding of the engineering discipline as well as improve their self-confidence about their abilities. Engineering, science, and mathematics will not be seen as abstract concepts, but as challenging tools that can be relevant and enjoyable” (Berman, 1994).

Thus, the primary purpose of the WIE Research Fellows Program is to provide undergraduate women the opportunity to work with engineering faculty on research projects in their discipline. In addition, the program seeks to foster self-confidence in participants, to provide them the opportunity to enhance their knowledge, skills, and practical experience in conducting engineering research, to facilitate mentoring relationships between students and faculty, and to encourage undergraduate women to pursue engineering at the graduate level and in the professional world. In doing so, research fellows tend to participate in a number of different aspects of the research process in addition to their work in the labs, including collaborating with graduate students, meeting with their faculty advisors for supervision, writing papers on their projects, conducting extensive literature reviews, and presenting their research at conferences and symposiums. Research fellows also participate in the WIE Research Forum and Celebration, where they have the opportunity to present their research projects to an audience of peers, faculty, friends, and family.

Applications for the WIE Research Fellows Program are made available during the Spring semester each year. Letters and e-mail are sent to all female undergraduate engineering students and faculty to inform them of the program and explain the application process and deadlines. Faculty and student teams are invited to submit a research proposal that outlines the structure of the research project and the mutual responsibilities of the faculty advisor and student. Upon acceptance, research fellows make a two-semester commitment to the program and are awarded a stipend of $500.00 per semester.
Who are the WIE Research Fellows?

Over the past four years, the WIE Research Fellows Program has been extremely successful in recruiting a diverse group of women students from a variety of academic disciplines, class years, and traditionally underrepresented groups in engineering. From Fall 1994 through Spring 1999, the following engineering majors have been represented: Aerospace (10 students), Biological Resources (2 students), Chemical (18 students), Civil (8 students), Computer Science (1 student), Fire Protection (5 students), Electrical (25 students), Mechanical (16 students), Engineering-Undecided (1 student), Environmental Science (1 student), Nuclear (1 student). In addition, 48.8% of the research fellows were White/Caucasian (43 students), 22.7% Asian/Asian-American (20 students), 11.3% Black/African/African-American (10 students), 9% of Middle Eastern descent (8 students), 4.5% Hispanic/Latina (4 students), 2.2% Biracial/Multiracial (2 students) and 1.2% Other (1 student).

Within the Fall 1998 and Spring 1999 cohort, the following engineering majors were represented: Aerospace (3 students), Chemical (4 students), Electrical (3 students), Mechanical (3 students), Materials (1 student), Nuclear (1 student), and Fire Protection (1 student). In terms of class standing, 62% were seniors (9 students), 37.5% were juniors (6 students), and 6.5% were sophomores (1 student). In addition, 69% were White/Caucasian (11 students), 6% Black/African/African-American (1 student), 19% Asian/Asian-American (3 students), and 6% Biracial (1 student).

Evaluation Process

In order to evaluate the quality and effectiveness of the WIE Research Fellows Program each semester, participants attend a mandatory hour-long focus group, fill out surveys and are encouraged to provide informal feedback to the WIE Program Office throughout the course of their two semesters as research fellows. During the Fall 1998 semester, one focus group was held on October 13th. During the Spring 1999 semester, one focus group was held on March 10th. The focus groups are designed to build a sense of community among the fellows. The following topics were explored in depth: the quality of participants’ overall experiences as research fellows including activities they are involved with and the challenges they’ve had to endure; the research fellowship’s impact on their interest to further pursue engineering and research; experiences with their faculty advisors; and suggestions for improving the structure of the program. A final Research Forum presentation and celebration was held on November 18, 1998 and May 7, 1999.

Evaluation Results

Based on both the focus group and survey results, it appears that the research fellows have benefited personally, academically, and professionally through their participation in the WIE Research Fellows Program. During orientation a pre survey was distributed and completed by 13 of the 16 research fellows (an 81% response rate) who began their
research in the Fall or Spring. During the conclusion of the research forums a survey was distributed and completed by 14 of the 15 research fellows (a 93% response rate).

WOMEN IN ENGINEERING E-MENTORING PROGRAM

Introduction

Committed to increasing the retention rate and to enhance the personal and professional development of women engineering students, the Women in Engineering Program at the University of Maryland, College Park (UMCP) has successfully kicked off the Electronic Mentoring Program in Fall 1998. E-mail based relationships were established between women students in the A. James Clark School of Engineering and professional women, mostly alumnae, in their engineering field. There were 76 student applicants (73 undergraduates and 3 graduate students) and 46 alumnae applicants around the nation (including one from Canada), resulting in 46 Mentor/Mentee(s) pairs in the pilot program. Mentors are encouraged to share their college and work experiences with their Mentees; to serve as a resource for internships, networking, career exploration, and professional development; and to help orient their Mentees in the area of professionalism and the engineering work environment. Prior to the E-Mentoring Program, WIE has established and implemented traditional mentoring programs for two consecutive years.

Why E-Mentoring

E-Mentoring was chosen over a traditional mentoring program for two reasons: first, communicating via email allows the use of all mentor resources of out of state mentors; second, it allows the participation of many corporate employees whose time schedules would prevent them from participating in more traditional mentoring relationships with college students. E-mentoring is practical because email has been widely available, prevalent on college campuses and corporate settings. It transcends constraints of geography and time and opens up new mentoring opportunities.

Goals and Objectives for the E-Mentoring Program

The goals and objectives of the E-Mentoring Program are: (1) to provide undergraduate and graduate engineering students contact with positive female role models; (2) to facilitate personal, career, and professional development among Mentors and Mentees; (3) to encourage female students to continue their study of engineering; (4) to ease the transition from campus life to the world of work and to prepare women with realistic expectations of the workforce environment; and (5) to increase alumnae involvement in the University.
Implementation

1. Recruiting
In spring 1998, letters and applications were mailed to 1500 engineering alumna of the A. James Clark School of Engineering. 71 alumnae returned the mailing with 65 volunteering for mentoring (55 as E-mentors and 10 traditional mentors) and 6 volunteering to be in an alumnae database. Of the 55 alumnae that volunteered to be E-mentors, 46 actually participated in the program. The opportunity to be involved in the E-mentoring program was advertised to all female undergraduate and graduate students. The responses from students were overwhelming with 76 students submitting their application.

2. Match
In October 1998, 46 Mentor/Mentee(s) pairs were made mainly based on engineering disciplines and mutual personal and professional interests. One mentor typically got one or two Mentees, in some special cases, one got three Mentees. On the other hand, some people were unable to get a match in their own field because of lack of counterpart in that particular field.

3. Orientation
On October 15, 1998, a Mentee orientation was conducted. Materials gathered about match information, program expectations, and topics for discussion with their Mentors were handed out. Part of the materials was gathered on line or from references written by mentoring experts. A survey was distributed at the end of the orientation to assess the benefits of the session. The survey showed that 92% (11 out of 12) of the attendees said the orientation provided useful information about how to begin an email based relationship and what they could expect out of the program.

On the other end, the Mentor orientation was conducted through email. Before establishing a formal link between Mentor/Mentee pairs, the program coordinator sent three emails and one letter to Mentors notifying them of their match, stating expectations of the program, and recommending topics they could discuss with their Mentees. Also, since Mentors were coming from the UMCP alumni pool, the newsletter of current school programs was sent to keep them connected and in touch with their alma mater.

4. Facilitation
Following the match, separate files of each pair were set up. The program coordinator of WIE started biweekly inquiries about the mentoring status and provided some generic topics of communication. Individuals were encouraged to contact the coordinator with any problems. While it has been difficult to get feedback from Mentees, more than half of the Mentors kept regular contact (at least once a semester) with the coordinator, touching base on how the mentoring relationship was evolving.
At times, the coordinator got customized requests from Mentors asking how to find more topics to discuss with their Mentee(s), and how to approach their Mentee(s) if they worked in a different field other than engineering after graduation. All questions were answered promptly. Also, some frustrations were expressed when Mentees didn't reply to their email for weeks. In such cases, the coordinator emailed or called the Mentees to encourage them to communicate with their Mentors and Mentors were encouraged to have another try while at the same time they were assured of rematching if the relationship still didn't work out.

5. **Newsletter**

Mentees were found to be curious to know about "life after school" and how an engineering degree prepares them for a rewarding career. Two Mentors volunteered to be interviewed for the WIE newsletter sharing their experienced point of views. Their profiles were compiled as the cover story for the spring 99 issue of the newsletter.

6. **Chance of face to face meeting**

On March 17, 1999, WIE sponsored a panel discussion called "Focus on Engineering Careers" in honor of the Women's History Month. 6 Mentors working in various engineering disciplines volunteered to be on the panel. The speakers shared how their careers had progressed, their experiences, and advice on succeeding in engineering. Participants of the Mentoring Program were strongly encouraged to take the opportunity to meet each other face to face. The event was very successful with approximately 50 individuals attending including at least 5 pairs of Mentor/Mentee(s).

7. **Mentor-Mentee highlight**

In an effort to promote the Mentoring Program and also in honor of Women's History Month, a mentoring pair—one Mentor with her three Mentees were selected to showcase the success of the program. Their experience about working, studying, and mentoring were summarized and put on the WIE bulletin board.

8. **Focus group**

On April 14, 1999, a Mentee focus group was conducted. Five Mentees attended and shared their personal experiences in participation of the program. In addition, discussion focused on how the WIE office could better serve the students in facilitating the program. Mentees expressed one thing in common--appreciation of their Mentor and the program. They all got off to a very good start in building a relationship with their Mentor and they kept close contact, especially in the first half of the program, with their Mentor. When things got hectic, they notified each other in advance. They all wanted the same mentor next year. They pointed out that their Mentor had been helpful in several aspects--encouraging them in pursuing an engineering degree, suggesting some face to face meetings, giving them a work perspective etc.

All attendants confirmed that it is beneficial for them to get reminders from the coordinator. They explained that when they were involved in a school project or some
hard courses, emailing to their Mentor was back in their mind, if they got a message of "have you done it," they would be more likely to bring it up from the bottom of their priority list. When asked how many messages they would like to get from the coordinator next year, the answer was "I don't think any more are necessary, certainly don't send less."

When asked about "do you prefer a male Mentor or a female Mentor," the 5 attendants gave out three different answers. A returning student with five children strongly advocated for a female Mentor. In her case, having a woman to walk through problems that she may come upon in balancing school and family was extremely helpful. She also thought that males might be afraid of telling women Mentees some "hard" things about engineering. On the opposite side, another female Mentee insisted that a male Mentor would be preferable. In her view, a female Mentor may only tell you what is expected as a female while a male Mentor may tell you what's expected of you as an engineer in general. In comparison, three other attendants stated that "either would be fine, but I would choose a female one" or "having both would be perfect."

Attendants also suggested that WIE arrange some program events for all Mentors and Mentees. They expressed that Mentees may feel more comfortable when lots of people are together rather than feeling the pressure in a one-on-one situation.

I. Evaluation of the E-Mentoring Program (from Mentees' perspective)
In an effort to evaluate the effectiveness of the WIE E-Mentoring Program, a three-page survey was sent out through both mail and email to all Mentors and Mentees at the end of April and the beginning of May 1999. The survey included both qualitative and quantitative questions. 20 out of 76 Mentees completed the final surveys, resulting in a response rate of 27%. The survey result was analyzed in the following categories:

Demographic:
Of those who filled out the survey, more than half (55%) identified themselves as white, 15% as black, another 15% as Asian. Please notice that it may not correspond exactly to the actual distribution of races among all participants while the latter was not available due to the reason that quite a few applicants were reluctant to reveal their ethnic identity when applying.

Conclusions
Findings from the surveys suggest that both Mentors and Mentees found their E-Mentoring relationships to be a viable, valuable and personally rewarding experience. E-Mentoring proved to transcend the geography limit. More than half of the out of state Mentors were just as effective than in state Mentors in being role models of college women. The survey responses also indicated that WIE is currently meeting its goals of providing undergraduate and graduate engineering students contact with positive female role models and facilitating opportunities for personal and professional development among Mentors and Mentees participating in the program.