# AN INTERVENTION STRATEGY TO RETAIN WOMEN STUDENTS IN ENGINEERING: ENGR 194 SEMINAR AND SMALL GROUPS

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The longevity of the Women in Engineering Programs at Purdue University has provided the opportunity to analyze and perfect an effective intervention strategy for the retention of women students in engineering. The strategy described here is a one credit course for first year women engineering students, ENGR 194: Women in Engineering Seminar. The course is an elective which does not carry credit towards an engineering degree and 50-60% of first year women students elect to take it each fall. Depending on the particular cohort group, students who take ENGR 194 are retained at a rate four to sixteen percent greater than students who did not take the course. The current format includes a weekly lecture/discussion, which has almost 100 students enrolled in each of its two divisions, supplemented by a weekly small group meetings of 8 to 10 students. The lectures are given by dynamic women engineers and the small groups are led by dedicated and inspirational senior or junior women engineering students.

As part of the course requirements, students frequently elect a writing option to keep a weekly journal. For the instructors, the journals provide a valuable reflection of student concerns, challenges and satisfactions. This has led to adjustments in the course content and format to keep pace with the evolving needs of college students as they prepare to enter a rapidly changing profession.

## CHANGES IN COURSE CONTENT

Twenty years ago, lecture topics focused on areas of engineering that were thought to have special appeal to women, such as the environment and energy and speakers emphasized survival skills for being the first or only woman in a particular engineering position. Presently, speakers continue to highlight areas of engineering popular with women students, but a concerted effort is made to also include speakers from areas of engineering with lower proportions of women such as electrical and mechanical engineering. Students still show interest in information on specific fields of engineering, but they also want to learn more about the viability of engineering as a career for women. In response this concern, several dual-career couples are invited to speak each semester; all speakers are asked to share strategies for pursuing personal interests; and speakers with non-traditional career paths such as law, medicine, management and teaching participate to show the flexibility that an engineering career could provide.

## CHANGES IN COURSE FORMAT

At its inception, in 1977, the course consisted of three major components: lectures/discussions, hands-on laboratories, and career planning sessions (LeBold, 1982). The hands-on labs and career planning modules eventually developed into independent

courses at Purdue, however the lectures/discussions remain a primary focus of the current course. The increased participation of women engineering students (647 in 1977 to 1,434 in 1995), and those enrolled in the course (from 58 in 1977, to almost 200 the last three years), suggested other changes to course format. Participating in an engineering class with relatively large numbers of other women became less important as a critical mass of women engineering students provided multiple opportunities for interactions. Journal comments such as, "I didn't expect the class to be so large, I expected something more personal" implied, instead, the students' need for a sense of community.

Before 1991 speakers had been providing information on what it is like **to be** an engineer, but students seemed to be struggling with what it means **to become** an engineer. It was helpful for course instructors to focus on the first year as a transition period—providing support for the personal development of students as well as for their academic progress. Course content traditionally included presentations on self-esteem, assertiveness, time management, study skills and/or other types of personal competencies. Although students' journals frequently indicated that they had already heard " all this stuff" from their parents, it was evident that the students were still struggling with these issues. These young women were in an important developmental stage—concerned with becoming independent, becoming academically competent, becoming an engineer. They needed to hear the same content, but the delivery of that content needed to be changed.

In response to the need for connecting and belonging, as well as the need for a new delivery system for personal development content, small peer groups were added to ENGR 194 and juniors and seniors were trained as leaders. The student leaders had knowledge about engineering courses and student work experiences; they were motivated to listen and to help freshmen deal with the myriad of problems; and they were eager to learn and be trained in group counseling skills and small group dynamics. In addition to "who" should deliver the content, student journals helped to pinpoint the issues that needed to be discussed in group leader training. Group leaders were reminded of the low period first year students face before and after the first round of tests. They were told to expect problems with homesickness, with roommates, with loss—whether it be the death of a grandparent or breaking up with a boyfriend. The importance of confidentiality was stressed and group leaders learned about appropriate and immediate referral sources. Shared goals and expectations among the group leaders added structure to the small group sessions, while additional social times outside the classroom group setting aided in bonding among group members. In the sharing of common concerns, the age old power of universality as a therapeutic factor came into play. In the safe confines of a same sex group, over time, amid the laughter and the tears, students got and gave each other the confidence and encouragement that was needed for this time of transition.

## EVALUATION

Both formative and summative evaluation indicated that the changes to content and format over time resulted in positive experiences and increased retention for first year students. Sample comments for end-of-course surveys and journals showed how well students responded to the addition of the small groups (from Fall, 1995):

> "I loved my small group. We got along so well. I always looked forward to going. I cannot think of any suggestions (for improvement of format). "
>
> "The small group was a vital part of my making it through 1st semester. It was wonderful having a scheduled break where I could talk to friends."

"I thought that the small groups were extremely beneficial...It was a way to meet people and a place to ask the "dumb" frosh questions..., as well as an outlet for problems/frustrations."

"My small group was awesome, my favorite part of this class."

Summative evaluation using data provided by the university Registrar indicated the positive effect on retention:

**Table 1**
**Engineering Retention of Female Students**

| Year | ENGR 194 | Cases | Percent Retained in Engineering | | |
|---|---|---|---|---|---|
| | | | Semester 2 | Semester 4 | Semester 6 |
| 1990 | No | 187 | 90 | 68 | 57 |
| | Yes | 173 | 95 | 71 | 61 |
| 1991 | No | 217 | 93 | 67 | 55 |
| | Yes | 183 | 93 | 75 | 61 |
| 1992 | No | 229 | 93 | 73 | 58 |
| | Yes | 170 | 96 | 82 | 74 |
| 1993 | No | 196 | 95 | 70 | |
| | Yes | 197 | 97 | 70 | |
| 1994 | No | 154 | 92 | | |
| | Yes | 185 | 91 | | |

## CONCLUSION

Few students leave engineering because they are academically ineligible to continue, so it is reasonable to believe that positive experiences for education and personal growth may be strong contributing factors to retention. The journals and small group discussions, supported by retention statistics, indicate that ENGR 194 provides such a positive experience for first year women students in engineering at Purdue University. More detailed information on course organization and delivery is available (Reklaitis, 1990).

## REFERENCES

LeBold, W. K. (1982) Putting It All Together, A Model Program for Women in Engineering. WEEA Publishing Center, Education Development Center: Newton, MA.

Reklaitis, J. K. (1990) "A Support Seminar for Freshman Women in Engineering". Women in Engineering Conference. A National Initiative. Conference Proceedings. Purdue University: West Lafayette, IN.