

NUTS & BOLTS OF RETENTION PROGRAMS

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The purpose of this paper is to provide a systematic and comprehensive approach to designing and implementing university level retention programs for women in engineering. The paper is divided into five sections: I) prerequisite conditions for retention programs, II) assessing and profiling student needs, III) determining appropriate intervention strategies, IV) marketing and implementing program services, and V) evaluating program effectiveness.

I. Prerequisite Conditions for WIE Retention Programs

Six conditions have been identified as prerequisites for insuring the successful implementation and continuation of retention programs for women in engineering. These include:

- A. Commitment and Support from the Engineering Dean. As a role model, the Dean's commitment to women in engineering makes a statement of his/her priorities and, in turn, is usually reflected in the behaviors of faculty, staff and students.
- B. Designated Director of Program. An individual must be charged with the responsibility of management, delivery of services, and accountability. The Director of a Women in Engineering is a full time position and should not be combined with the responsibilities of another position, such as the Minority Program.
- C. Reasonable and Adequate Budget. At a minimum and particularly during the start-up phase, the budget should include the Director's salary, a full-time secretary and operating funds. Although varying with institutional size and number of students, the average annual cost of running a comprehensive women in engineering program ranges from \$100,000 to \$150,000.
- D. Assistance in Fundraising. Recognizing that institutions are not sources of unlimited funds, fundraising will probably be a necessity to cover program operations and expansion. Given this situation, the Director will need assistance in fundraising efforts. Fundraising is a long-term strategic activity. It is also very time consuming and, as a result, minimizes the amount of the Director's time with students.

- E. Faculty Commitment and Involvement. Faculty commitment and participation are essential to the success of a program. Male as well as female faculty need to be involved. Both serve as role models and their attitudes shape the academic climate of an institution. If only female faculty are involved, the program can easily be perceived as isolating female students and faculty from their male counterparts.
- F. Student Participation in Designing the Programs. When students are involved in the process of setting up the programs and having input into the services to be delivered, the program reflects the perceived needs of (most) students. In addition, students have an investment in the success of the program and are often then critical links in the marketing process.

II. Assessing Student Needs

Several studies have been conducted to examine barriers to women's success in engineering. Identified barriers have included: inadequate preparation in math and science, negative attitudes toward math, low self-confidence, lack of interest, lack of awareness of opportunities, low academic capability, sex bias and discrimination, teacher and faculty insensitivity. Despite recent improvements, women students still report feelings of isolation, lack of acceptance by faculty and male student peers, and lack of acceptance of their career goals by friends, family and their universities.

One of the first tasks in designing retention programs for women in engineering is to identify the problems facing the female students in that particular educational institution. As mentioned above, there are a group of problems common to females in traditionally male-dominated areas. However, there are also other problems either intrinsic to a geographic region or the type of educational institution (e.g., research, public, private, gender mixed).

For simplicity's sake, retention problems for women in engineering can be divided into three categories: academic climate, general (this is used loosely) personality characteristics of female students, and societal roadblocks. Examples of specific problems falling within each of these categories are illustrated. These lists are by no means meant to be all inclusive.

RETENTION PROBLEMS

- I. Social & Academic Climate
 - Inequality of opportunity
 - Sexist or racist attitudes
 - Inaccessibility of faculty
 - More frequently interrupted
 - Inappropriate faculty behavior
 - Lack of acceptance by peers
 - Faculty insensitivity
 - Confrontive communication
 - Few female faculty

RETENTION PROBLEMS

- II. Personality Characteristics
 - Unrealistic expectations
 - Downgrade capabilities
 - Victimize themselves
 - Feelings of not "belonging"
 - Feelings of isolation
 - Low Self-Confidence

- III. Societal Roadblocks
 - Self-supporting
 - Critical Mass
 - Dual career conflict
 - Lack of acceptance of goals by family and friends

In summary, before designing and implementing programs for women in engineering, it is necessary to identify the specific problems facing women students. The process of identifying the problems can be done formally with questionnaires and designed studies or informally through focus groups, one-on-one or small group interviews. To run women in engineering retention programs without assessing the specific needs of students is like trying to sell bubble gum to someone with no teeth. The students must feel a "need" or they will not use the services offered. And, if retention programs are focusing on interventions to solve certain problems that students do not feel they have, the students will not perceive that they "need" to participate.

III. Determining the appropriate interventions

When examining barriers for women in engineering, one must consider each stage in the 20 year educational process from grade school through graduate school and employment. To date a great deal of research and programmatic emphasis has been placed on the elementary and secondary levels to the neglect of the college level. A significant decline in enrollments and retention rates indicates major problems in this stage of the educational process. As each point on the educational continuum offers opportunities to influence student attitudes and career choices, so too does it offer opportunities to implement intervention programs for encouraging female students to continue pursuing their engineering degrees.

After having identified the specific set of problems facing female students, determining the appropriate mix of interventions becomes a much easier task. Again for simplicity, interventions can be grouped into categories: academic, social and work-related. Recognizing that there is overlap and that these lists are not meant to be all inclusive, examples of interventions within each category are illustrated below:

INTERVENTIONS FOR WOMEN IN ENGINEERING

- I. Academic Interventions
 - Peer Tutoring
 - Educational Advising
 - Seminars:
 - Learning to Network
 - Learning to Ask Questions
 - Learning to use your TA
 - Learning to be Pleasantly Aggressive
 - Interviewing Techniques
 - Preparing Resumes
 - Engineering Career Awareness
 - Expectations in the Work Environment
 - Undergraduate Assistantships/Graduate Fellowships
 - Mentoring
 - "Hands-on" courses with mechanics/machinery
 - Increased recruitment of female faculty
 - Presenting & defending research
 - Formulating & carrying out research
 - Participating in discussions about S&T issues
 - Quality time/interactions with Faculty Advisor
 - Faculty Sensitivity Training
 - Monitoring or Tracking Student Progress

- II. Social Interventions
 - Big Sister (helping less experienced students)
 - Support Groups
 - Counseling
 - Re-entry Focus: address needs of older students
 - Freshmen Orientations
 - Role Models
 - Dormitory/Housing arrangements
 - Interactions with graduate students
 - Informal interactions with Faculty
 - Involvement in professional associations
 - Involvement in student organizations
 - Presentations to high schools/community colleges
 - Involvement in Outreach Programs
 - Recognition and Awards
 - Contact with Parents

- III. Work Related Interventions
 - Summer Internships
 - Cooperative Programs
 - Company Tours and Campus Visits
 - Job Search and Career Days
 - Internships

Numerous sources of information exist for model programs and effective retention interventions. Of particular relevance are the publications from the Project on the Education and Status of Women from the American Council on Education and the comprehensive summaries provided by the Commission on Professionals in Science and Engineering.

IV. Marketing and Implementing Retention Programs: Techniques

One of the most frequently heard complaints among minority and women program administrators is that few students take advantage of the services offer. Have you ever sponsored a seminar and had few if any students show up? Then you understand the frustrations.

We have found that there are a few “rules” for marketing to students that have helped to increase the participation rates in the Women in Engineering programs. They include the following:

- A. Perceived Need. One of the key concepts in marketing is identifying the perceived need of the target market, before trying to sell a product or service. No matter how wonderful a product or service is, if it does not fill a need (real or not), no one will buy it. The same holds for delivering services to students. Marketing success is partly determined by how well we are able to understand, predict and influence the students' attitudes. Therefore, identifying and understanding the problems facing women students is critical to assessing the perceived needs.
- B. Synergy: Student Participation. If a core group of students are involved in designing and implementing programs, there is a synergy that occurs. Students design programs that they would want to attend, they get other students involved, word is spread through the informal grapevine and participation rates increase.
- C. Timing. Events and Programs must be scheduled when students can or will attend. Clearly, mid-terms, finals and vacations are not times that draw large crowds.
- D. Joint Sponsorship of Events. One of the most successful ways to increase student participation is to have the the Women in Engineering Program jointly sponsor an event with another organization, e.g, Society of Women Engineers (SWE). Sponsoring events with Minority Programs, Pre-engineering groups or other women's groups also can be successful. Joint sponsorships have a number of benefits: more students are involved, each organization markets to its own membership, each organization has a vested interest in a successful event and, in general, cooperation and team building are fostered.
- E. Location. The location of an event or program needs to be accessible to the students. Events held off campus often pose problems for students who have no transportation. On the other hand, if

vans and buses are made available to transport students to events, more students will participate.

- F. Marketing Strategy. Given that you have designed an event or program that meets a perceived need, you still need to advertise or get the information to the students. Marketing strategies will vary depending on institution, however, on each campus there are certain places that most students go and certain things that most students read. Identify these key sites and documents and advertise. Examples might include: newsletters, campus newspapers, posting on bulletin boards in engineering buildings and classrooms, posting E-mail messages, student unions, dining halls and so on. Faculty announcements in classes, as well as student grapevines, are very effective in reaching large numbers of students. Recognize that your marketing strategy will require trial and error before finalizing and will require constant monitoring as things change.
- G. Frequent Student Contact. Meeting with students frequently is often one of the most effective ways of keeping them informed of what is happening. Also, it is reinforcing to students to know that you feel that it is important that they attend events or seminars. It also adds one more link in the student grapevine.

V. Building in Evaluation

The design and implementation of an evaluation plan is crucial to any organization. It provides an opportunity to measure the program's effectiveness and to modify program components on an ongoing basis. Further, evaluation provides a mechanism for accountability and should be built into the program from the beginning.

An evaluation plan is usually designed to measure the effectiveness and efficiency of the program objectives. Thus, if the objective of the Women in Engineering Program is to increase the numbers of women enrolling and obtaining degrees in engineering, statistics on female enrollments, retention and degrees obtained need to be maintained on a quarterly basis. In this manner, it is possible to measure the change that occurs as a result of a Women in Engineering Program. Clearly, other factors, such as demographic shifts will impact these statistics. Nevertheless, they do provide a good indicator of the success and impact of a program.

Coupled with collecting and analyzing data on enrollments, retention and degrees obtained, it is helpful to set up a longitudinal data base to follow the trends and changes in an effort to predict profiles of successful students. In addition, program documentation needs to be maintained, anecdotal data should be recorded, services need to be evaluated by students and so on. Reports need to be prepared and disseminated. Not only will these tasks clarify where program modifications need to be made, they will enhance fundraising and development capabilities.