GRADUATE REENTRY/CAREER CHANGE PROGRAM in INDUSTRIAL ENGINEERING

Dr. Mary R. Anderson, Director

Arizona State University Tempe, Arizona

A Graduate Reentry Program, established at Arizona State University (ASU) in 1982, has proved to be a "win-win-win-win" proposition. There is no quick cure for the low number of women in engineering, the dissatisfied woman worker with a college degree, the demand for engineers in industry, and the need for more American graduate students in U.S. universities. However for the past eight years efforts at ASU to help solve these problems have had very encouraging results.(1)

In the United States very few women choose a career in the physical sciences or in engineering. Women comprise the largest untapped source of potential engineers and scientists to stem shortages in these areas of critical national need. The low numbers are due to a lack of awareness of opportunities for women in these fields and to general myths that still prevail regarding science and technical fields.(2) In addition, women usually need to be encouraged before they will enter these male-dominated fields for which they often have little background.(2,3)

As many as 85% of all American workers are dissatisfied with their jobs, according to the results of a recent survey. Many of these discontents are obviously women, since over 50 million women are employed in the US today. Surprisingly, also, many of these are professionals with college degrees.(4) Many female graduates find themselves dead-ended in a career after only a few years. In addition, many women graduate from college and are unable to find a job related to their degree. Other women have spent a period of time at home raising children and now find it difficult or impossible to obtain a position in the work force utilizing their educational background.

At the same time, many sectors of this nation's industrial base seek qualified technical professionals, especially in the fields of engineering and science.(4)
In particular, there is a demand for industrial engineers and advanced degree engineers. Women have a unique viewpoint that is valuable to the field of engineering. Very few women engineers are in management. In addition, most engineering graduate schools in the US are seeking additional American students. Many vacant engineering faculty positions exist in US universities.

The ASU Graduate Reentry/Career Change Program has enabled women who were unemployed or employed in a non-technical field to enter a career in engineering in a few years. The program graduates have found challenges, satisfaction and rewards in engineering careers. Industry has hired the program participants as interns and the program graduates as permanent employees. The graduates have proven to be versatile and valued engineers. In addition, the program at ASU has had a positive impact on the graduate program and its enrollment.

Preparation for the Graduate Reentry Program in Industrial Engineering at ASU began in the summer of 1981. This program was partially funded by an NSF Career Facilitation Project grant. Unlike many other projects begun about this time, the ASU project has a master's degree in engineering as the end product for successful participants and the program is still in existence.

In June 1982 a group of 28 women formed the first class. These women had held bachelor's degrees for at least two years and had completed at least one year of calculus. In addition the women were unemployed in a technical area or underemployed in terms of potential. Although some of the students entering this program, which is now called the Graduate Career Change Program, already had a master's degree, none of the degrees, undergraduate or graduate, were in engineering.

Most students in the first class completed a 30 hour Master of Science (MS) degree in Industrial Engineering in 12 to 19 months. Students in subsequent classes have earned a Master of Science in Engineering (MSE) in Industrial Engineering in a 36 hour program with the option of writing an Engineering Report or taking a written comprehensive examination. Students currently enrolled in the program are earning an MSE in a 30 hour program with a six hour thesis or written comprehensive examination option. In addition to three semesters of calculus, approximately 20 semester hours of undergraduate coursework have been identified as essential to the background of students who wish to earn an MSE degree in Industrial Engineering. Career Change participants are required to take any of these 20 hours that they have not already completed as deficiency credits in addition to the standard program of study.
Since the women and men in the program do not usually have an engineering background, they typically take two years to complete the degree on a full-time basis after the calculus has been completed.

Six concentration options are available: computer-aided processes, computer-integrated manufacturing, information systems engineering, management of technology, operations research, and quality/reliability engineering. Some students choose computer-aided processes or the quality area. However, most participants choose information (computer) systems as their area of concentration. The career change students are encouraged to stress technical courses on their programs of study and then to supplement this core with management or management support classes. The program is designed to prepare women and men for meaningful, productive and rewarding careers as information systems specialists or other careers related to industrial and management systems engineering.

Although participants in the program are responsible for the same academic program as any other graduate student in the department, the program does give special support to these students. Perhaps most important to the actual survival of the participants in the program has been the peer group support. Friendships and study groups are very beneficial to the older career change student. In addition occasional social events are held at the home of the director.

The career change program features a professional development seminar. The seminar, usually held monthly, includes speakers from industry, career services, the department chair, and graduates of the program. Through the NSF grant and then an Exxon Education Foundation grant, tuition support for an academic year and a summer was available to the first four classes. Under this second grant men were also admitted to the program. However, the large majority of the career change students continue to be women. Students who have entered the program since 1985 have not had any special tuition support. The main feature of the program, however, is the option of a paid half-time industrial internship (non-credit) while attending classes during the last semester or two.

Since 1981, the director has spoken with well over 1,000 people who have inquired about the career change program. For many people, to pursue this master's degree requires over a year's preparation time taking deficiency courses in addition to the two years of the master's program. Many of the women seeking career change are single parents with children to support. In most cases
it is very difficult to make a commitment to come back to school and to give up an income. With tuition help, more women would be able to join the ASU program.

ASU has made a commitment to this program to ensure its survival. The department has allowed the director some release time during the academic year. A secretary is needed to assist in record keeping and in the gathering of followup information on the graduates.

The ASU Career Change Program is proven. Before the program began in 1982, there were 13 women graduate students in IE (13%). Each year since, approximately 35-40% of the US graduate students in the IE department have been women. In recent years ASU has been a national leader in the number of women receiving IE master's degrees. Over 50 students have graduated with a master's degree from this program. Others completed all the coursework and are now successfully employed using their engineering background.

There are currently ten students in the program. Four students received their master's degree in December 1989. Approximately ten others are working on deficiency courses in order to apply for the program. Without funding, the advertisement for the program has been primarily by word of mouth by pleased program participants and graduates. It is assumed that were the program to receive tuition support, the program numbers would increase. A very thorough screening and interview process for the admission of new people to the career change program has assured a uniformly high graduation rate.

Graduates of the ASU Career Change Program have found very satisfactory employment in the Phoenix Valley and across the nation with a variety of job titles and a variety of job descriptions. They report that they are extremely satisfied with their new careers. Industry in turn has found the graduates to be well qualified, mature, capable, and dedicated employees. The ASU Graduate Career Change Program has indeed proved to be a "win-win" program.

REFERENCES


2. _______________, "Women in Science and Engineering: A Case of Awareness and Encouragement," Contributions...


OTHER PUBLICATIONS ON PROGRAM BY DIRECTOR


"Graduate Reentry Internship Program," Proceedings of ASEE Gulf-Southwest Section Annual Conference, New Mexico State University, pp.102-110, March 1985.


In addition, numerous presentations have been given on this Graduate Career Change Program.