CAREER TRANSITION PROGRAMS FOR PROFESSIONAL WOMEN

PAULA G. LEVENTMAN

NORTHEASTERN UNIVERSITY, BOSTON, MASSACHUSETTS

The widely recognized under-representation of women in all fields of engineering is a serious national problem. Renewed efforts to work with pre-college women and intensified recruitment and retention efforts in all engineering colleges are required. An important additional source of technical professional women can be found among those who have the potential for technical careers but originally chose non-technical educational and occupational paths. Two successful graduate level career transition and re-entry programs have been available for qualified women since 1983 at Northeastern University in Boston.

Women in Information Systems (WIS)

WIS is the larger of the two programs. 25-30 women with strong academic records and demonstrated technical potential are accepted each year. WIS is designed to help women with non-technical backgrounds acquire the necessary skills to be placed in computer applications positions. Program participants are full-time graduate students for six to nine months. They take an intensive series of academic courses and they are provided with career transition counselling and job placement services. After this initial period, most program participants work full-time in the computer applications industries and finish the Master of Science in Information Degree on a part-time evening basis, over the subsequent two years.

Data is collected from program participants, in an attempt to understand the dynamics of the career transition process. Students fill out questionnaires when they begin taking courses. They are interviewed about mid-way through the program, and, finally, a few months after they graduate.
Academic Program Specifics

Transitional/prerequisite courses begin the academic program - COBOL, Pascal, Assembly Language, Concepts of Mathematics for Information Systems, Accounting. Required graduate courses include: Analysis and Design of Information Systems, Data Structures, Data Base Management, Computer Architecture, Operating Systems, Information Systems in a Microprocessor Environment, Networks and Telecommunications. A series of evolving electives presently includes such courses as C Language Programming/UNIX, Software Engineering and Design, and Microcomputer Applications further strength each student's credentials.

Career Development and Placement

An important reason for the success of WIS is that the academic program and preparation for the new career happen together. Northeastern University Department of Career Development and Placement professionals provide students with individualized counselling services. Students are introduced to the computer industry and the information systems environment through a series of pre-employment seminars which are frequently conducted by industry representatives.

Students are assisted with resume preparation, interview preparation and job placement. Counselling in and support for the career transition process is key to the success of WIS. For each of the seven years the program has been in operation, 100 percent of those students who took advantage of the career development program, were placed in appropriate positions.

The Corporate Advisory Council

An advisory council of private sector managers meets annually with faculty, staff and students to review curriculum and job placements for continuing relevance to professional positions in computer applications. Current WIS Corporate Council Membership includes: Bull Information Systems, Blue Cross of Massachusetts, Clearpoint Research Corporation, Digital Equipment Corporation, Federal Reserve Bank of Boston, IBM, Index Technology Corporation, John Hancock Mutual Life Insurance Company.

Demographic Characteristics of WIS Program Participants

The median age of program participants is 31 years. Twenty-eight percent are younger than 26 years of age, 36 percent are around 30, 18 percent are 34-38, 12 percent are 39-44 and 5 percent are 45 years of age and older.
Women in Information Systems have a wide variety of undergraduate majors: 30 percent in the humanities, 31 percent in the social sciences, 19 percent in the biological sciences, 10 percent in the physical sciences, mathematics or engineering, and 1 percent in education. (Many had undergraduate minors in education). About 30 percent of WIS program participants had previous graduate degrees and about half of these were in education related fields.

The previous career fields of Women in Information Systems are highly diverse. 24 percent were teachers. 12 percent were human service professionals. 26 percent had business backgrounds (many of these were secretarial/administrative assistant level positions, 16 percent came from health care related fields (nursing, pharmacy and 1 physician), 8 percent were biologists, technologists or engineers, and 14 percent were from many other fields such as architecture, horticulture, music, dance, and library science.

Some were in dead-end jobs and looking for a way out and up. Most sought intellectual challenge and the opportunity for upward career mobility. A minority were unemployed. A few had been "at home with children." Many sought a credential which would bring them employment security. And most were attracted by the "fast track to change" offered by WIS.

Academic achievement

A very high level of motivation had been the predominant characteristic of women in this program over the years. This is a self-selected group of risk takers. While some call the academic program "academic boot camp," and others call it "data tortures," the median grade point average for the group is 3.5; and 31 percent have GPA's of 3.8 and above.

The vast majority of those who start the academic program finish it, despite the pressures of demanding new jobs. Fifty-two percent have graduated and another 26 percent are well on the way. Fifteen percent will probably not complete the degree and 8 percent made successful career transitions on the basis of the front-end courses alone.

First job placements

All who wanted jobs were placed: 40 percent in co-op or trainee positions, 50 percent at entry level and 10 percent put previous career and new skills together to start in higher level positions. Of all first placements, 63 percent were programmer/analysts, 17 percent were in
technical support, 3 percent were in quality assurance, 4 percent were in sales/marketing, 8 percent were in software engineering, 3 percent were technical writers and 1 percent went directly into middle management.

Dollar increases from highest pre-WIS annual earnings to first WIS placement salary were dramatic. Median first job salaries were: $22,000 in 1984 (average increase of $6,305); $24,000 in 1985 (average increase of $4,620); $25,000 in 1986 (average increase of $6,347); $28,000 in 1987 (average increase of $6,831); $26,000 in 1988 (average increase $5,550); and $27,500 in 1989 (average increase $4,736).

WIS Career Path Analysis

Career path data is based on the most recent interview with each student, subsequent to first placement, and as of January 1990. Several career patterns are present among program participants. They are employed by major high tech companies and software vendors as well as in insurance, banking, medical and other types of computer applications environments. Some start and remain in predominantly technical positions, while others are heavily involved with colleague and client interaction.

Fifty-one percent held Programmer/Analyst positions (MIS programmer, database analyst, project analyst, scientific programmer), 25 percent were high level technical staff (software engineer, software developer, project leader), 6 percent held technical support positions, 9 percent were in middle management positions (MIS Director, Technical Support Supervisor), and others were in quality assurance, technical support, technical writing, or marketing/sales positions.

Women in the program are upward mobile in terms of salary increase. The average salary increase from highest pre-WIS salary to salary at time of last interview (from one and a half to three years after starting the program) was $16,500 for those who began in Fall 1983, $13,747 for those who began in 1984, $12,708 for those who began in 1985, $12,380 for those who began in 1986, and $11,315 for those who began in 1987.

Seen another way, 12 percent of the sample as a whole experienced salary increases of less than $5,000, 12 percent experienced salary increases of from $5,000 to $10,000, 36 percent experienced salary increases from $10,000 to $15,000, 29 percent experienced salary increases from $20,000 to $25,000 and 5 percent reported salary increases of over $25,000.

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Approximately one third remained with their first employer through several promotions. Others changed once or twice to find the "right" position and a strong mobility path. Those who experience very significant mobility are usually women who find ways to combine knowledge and interests of their previous careers with their newly acquired computer skills. Sometimes this happens at time of first placement, more typically it takes a year or two longer.

Job satisfaction is at least as important as salary to most program participants. They were asked to rate six satisfactions of each of their jobs on a 7 point scale (1=not satisfied to 7= extremely satisfied). The mean scores as shown below, indicate that job satisfaction ratings are high, and they increase from first to third job.

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<thead>
<tr>
<th>Job 1</th>
<th>Job 2</th>
<th>Job 3</th>
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<tbody>
<tr>
<td>Overall Job Satisfaction</td>
<td>5.2</td>
<td>5.7</td>
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<tr>
<td>Professional Autonomy</td>
<td>5.6</td>
<td>5.8</td>
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<tr>
<td>Reward for Effort</td>
<td>4.9</td>
<td>5.5</td>
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<tr>
<td>Professional Challenge</td>
<td>5.2</td>
<td>6.0</td>
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<tr>
<td>Opportunities for</td>
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<tr>
<td>Career Advancement</td>
<td>4.2</td>
<td>6.0</td>
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<td>&quot;Fit in&quot; as Career Changer</td>
<td>5.5</td>
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Cross tabulations of major independent variables indicate that academic success, type or level of new position, salary increase mobility pattern and reported degree of job satisfaction are not significantly influenced by age at the time of program entry, prior education, or previous career field.

At the time of the last interview, MSIS graduate were asked to rate their degree of satisfaction with the career transition experience: 90 percent are highly satisfied, 10 percent are fairly satisfied and none are dissatisfied. Most say WIS was the best thing they ever did for themselves. They talk of the challenge and excitement of new careers and the joys of financial independence. And almost everyone reported increased feelings of self-confidence and empowerment.

Women in Engineering (WIE)

WIE is a small but stable career change and re-entry program (Participants range in age from 23 to 56 years with the median at 32). WIE is designed for women who

Women in Engineering Conference: A National Initiative
have technical but non-engineering backgrounds and want the MSE Degree. This is a long and arduous program.

Students must take "transitional" courses in calculus, physics, circuits, electronics, field theory, control theory. If they maintain a 3.0 grade point average they take all graduate courses required for the MSE with majors in computer engineering, communications and signal processing, field, waves and optics or power systems. Cooperative education placements are available to those women who want industrial experience once they have completed the transitional program and before they graduate.

The entire program takes from three to five years depending on how many transitional courses are needed and how much of the program is done on a part time or full time basis. Due to the difficulty and length of the program, the number of students who become discouraged and withdraw is as great as the number who finish.

The success of WIE is marked by its 16 graduates who are now doing important research and development work at companies including: AT&T Bell Laboratories, IBM, Raytheon Company, Analog Devices, Digital Equipment Corporation, and Polaroid Corporation. Currently, there are 15 active students, two hold Department of Education Fellowships to continue graduate work through to the Ph.D. and careers as engineering educators.