# The Gender Issue in Information Technology: Collegiate and Corporate Solutions

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A paradox is occurring today in the Information Technology (IT) field. At the very moment that a large unmet demand for IT workers exists, approximately one-half of our work force is largely declining the offer. The Information Technology Association of America estimates the number of IT jobs languishing at a staggering 840,000 (1). Though women in IT earn 60 percent more than women in other occupations, their numbers have dropped from 40 percent in 1986 to 29 percent today (2). The White House Council of Economic Advisors (3) estimates that women are leaving the IT job market at twice the rate of men.

This report focuses on the ongoing strategies employed for the integration and retention of women in the collegiate and the corporate sphere (4).

Inequality of computing does not start at the corporate level. The U.S. Department of Education reports that the number of women computer science graduates declined from 37% in 1984 to 28% in 1994. Robert Morris College developed a program to remedy this problem.

The first elementCand nucleusCof the program took the form of a far-reaching and expansive curricular innovation. Simply stated, the previous Information Systems offering was a one-dimensional Alove it or leave it@ affair that concentrated mainly on the development of competent computer programmers. It was replaced by a track system that was more responsive to student needs. Five tracks became available to the student:

(1) Computer Information Systems
(2) Health Care Information Systems
(3) Network Administration
(4) Accounting Information Systems
(5) Office Information Systems

Prior to the curricular change, only the programming-oriented Computer Information Systems option was available.

The five-track option quickly became the catalyst for the entire program. Previously, students who were unhappy with the narrowly defined major had but two choices: drop out of college or transfer to a new major. With the introduction of the track system, students could concentrate on the specific niche within the discipline that energized and rekindled the learning process. While the rate of retention increased for both men and women students since the program took hold in the fall of 1993, the retention rate for women advanced from 60.11% to 79.35% by 1997. The corresponding data for men show an advance from 69% to 83% over the same time frame. Thus, the retention improvement factor for women was 32%, while the male factor improved by 20%. The rationale, as voiced by the women students, was that health care, accounting and office information systems were more traditional areas of female interest.

We believe that the rapid growth of our department from less than 400 students in 1991 to 915 students in 1998, while somewhat a reflection of the steady rise in the vitality and prominence of the computing marketplace, is also a result of innovative collegiate and departmental policies. The remarkable improvement in the retention of women in computer system studies indicates that it is a stubborn but solvable problem.

## CORPORATE STRATEGIES

As part of their cooperative education job responsibilities, the authors make approximately one hundred on-site visits each year to the 47 corporate workplaces where our students are employed. Along with reviews of student performance, information is gathered from various levels of information systems management concerning the corporate environment, employee job duties, salaries, mobility, hardware, software, employment criteria, legacy systems, subcontracting and myriad other subjects. These corporations and institutions range from large multi-national corporations to health care institutions, government facilities and small businesses with less than 15 employees.

Pittsburgh, as the fifth largest U.S. commercial software center in the United States, would seem to be an ideal city for the rapid assimilation of women into the computing field. A small-city ambience, combined with a low cost-of-living ratio, a lessened incidence of crime and highly concentrated health-care and research facilities are advantages that seem to indicate equality in cyberspace. There is some encouragement in the fact that 36% of computer science workers in the area are women (6).

The survey of 47 corporations in the Pittsburgh metropolitan area has attempted to determine the corporate response to the recruitment, retention and promotion of women in the Information Sciences. Specifically, the following questions have been posed:

1. What specific strategies are employed by corporations to capitalize on the resources provided by women in Information Technology?
2. Has the Aglass ceiling@ been shattered at the middle and upper levels of the corporate technology world?
3. What are the three specific barriers, according to highly placed Information Technology managers, that are most often raised to suggest the reason for the absence (if such absence exists) of women at the highest levels of Information Technology?

It is interesting to note that some inconsistencies exist in the Pittsburgh metropolitan area. The Report of the Progressive Policy Institute stated that Pittsburgh, in concert with the state of Pennsylvania, scored 19% above the national average for the extent in which it used information technology to deliver services, an indicator of the area=s ability to fully utilize its resources (8).

However, according to the University of Pittsburgh=s Center for Social and Urban Research 6th Annual Report, women with college degrees in the area earn less than 50% of the wages of their male counterparts, and were 50% less likely than men to be employed in executive or managerial capacities, a considerable notch below that of other American cities (9).

Most corporate managers of information technology have suggested various reasons for unequal treatment of male and female technology workers. Few believe that a formal Aglass ceiling@ exists.

In fact, the U.S. Department of Labor, in conducting Aglass ceiling@ reviews since 1992 in the Pittsburgh (Mid-Atlantic) area, has verified that nearly 40% of reviewed corporations have been identified as Anon-compliant@ practitioners of subtle practices that discriminate against women (10).

The corporate failings most often noted by female IT employees (1) were the dearth of female role models, the lack of respect and consideration by fellow employees, and the refusal of managers to recognize the people-oriented skills of the IT women.

The most difficult task of this study was to determine what, if any, strategies existed to retain and promote women. Nearly every manager felt that the corporation had in place a number of initiatives to further the careers of women, but it was difficult to nail down exactly what they were, how they worked, and how formally they were integrated into actual company policy. It was felt that mentoring, for example, was always available to the Information Technology employees of the company. Yet, little was known concerning the implementation of the plan, and whether it was available to (and used by) women as well as men. In fact, most studies have shown that mentoring is arguably the most important factor affecting the female corporate progression. A recent survey by CIO Magazine found that 70% of upper-level Information Technology women considered that the lack of a mentor was the greatest barrier to corporate advancement (11). The following statistics display the most often-mentioned strategies, and the percentage of companies that employed them in a somewhat structured or formal manner.

Strategies for women in Information Technology:

| | |
|---|---|
| Recruitment and retention | 23% |
| Career development | 17% |
| Identification of high-potential women | 47% |
| Mentoring by upper-echelon employees | 6% |
| Providing internal support | 17% |
| Establishing training programs | 6% |
| Providing Clear paths of responsibility | 53% |

The majority of managers did agree, however, that the relatively smaller number of women with computer-related degrees, the corporate inflexibility on family issues, and the simple fact that women have not been in the information technology pipeline long enough to become fully integrated into the corporate design for career advancement, were the deciding factors resulting in the less-than-satisfactory use of the female technology resource in the corporate sphere.

Rationale of information technology managers:

| | |
|---|---|
| Family/flexibility issues | 64% |
| Not in pipeline long enough | 55% |
| Fewer women with IT degrees | 19% |

A critical factor in determining the viability of women at various corporate Information Technology levels is the percentage of workers at the entry and lower managerial level, and the percentage at the senior managerial levels. This information is derived from the 47 corporations surveyed in the Pittsburgh area.

Percentage of women technology workers.

| | |
|---|---|
| Entry/lower managerial | 38% |
| Senior managerial | 8% |

In light of these statistics, it would appear that there is no significant lack of job potential for women at the corporate hiring level. At the upper strata of the Information Technology hierarchy, however, it is apparent that women are in a distinct minority.

## THE DOCTORAL PROGRAM IN INFORMATION TECHNOLOGY

The responses of the local corporate community, as well as national statistics, served as input into phases of the doctoral program. As an example, consider that only 18.8 percent of those seeking doctorates in computer science in the United States are women (12). Certainly, this became a program priority issue to be addressed. Because technology allows for mobility and remote accessibility, women are empowered by taking advantage of flexible work schedules, telecommuting facilities and job-sharing. The doctoral program attempts to incorporate similar flexibility into its structure.

Additionally, a survey of 252 students at Robert Morris College was initiated. The purpose of the survey was to find the mentoring preference of male and female IT students at the undergraduate, master's, and doctoral level.

At the undergraduate level, 87 percent of the women would accept either gender, 13 percent preferred female mentors, and no respondent chose male mentors only.

At the master's level, 96 percent of the women would accept either gender, 40 percent preferred female mentors, and no respondent chose male mentors only.

At the doctoral level, 67 percent of the women would accept either gender, 8 percent preferred female mentors, and 25 percent preferred male mentors.

It is interesting to note that women at the highest educational level leaned more towards acceptance of the male mentor than either of the lower educational levels.

The Doctor of Science in Information Systems and Communications (D.Sc.) degree program was debuted in the Fall of 1999. This doctorate was conceived as a professional degree to meet the needs of industry for "specialized generalists" who are capable of performing rigorous applied research and problem solving. Specifically, the program was designed to address the expanding needs of professionals who manage information resources, and solve information, communication and technology-related problems in businesses and other organizations. The program has three distinct characteristics: it is a full-time program in an executive format (three year program with one seven day residency and three weekend residencies in each of the six terms), it is cohort based, and it is interdisciplinary. An endorsement and qualified commitment, often financial, from the applicant's employer or sponsoring organization merges the educational experience of the student to his/her ongoing professional practice.

After the admission review process was completed, fourteen applicants were admitted. Of these, ten were women. These ten women included three CEO's, the Chief Information Officer of a major urban metropolitan police department, a technology section leader of a large international corporation, and two executives in the steel industry.

When the admitted women were informally asked why they were attracted to this program, they all stated the three unique characteristics cited previously: executive format, cohort-based study, and interdisciplinary composition within a team concept. The most interesting comment, however, was that they perceived

that the cohort support and administration of the program with a faculty member assigned to each student to be the mentoring ideal that was essential to their success.

During the student=s final term, a comprehensive critical technology infusion project will be designed and implemented in conjunction with local corporations and their key information technology managers, who will function as facilitators, consultants and knowledge experts, thus completing the mentoring cycle.

Three rationales were reported in this study to explain the lack of upward mobility of women in corporate information technology. Two of those rationales—the time-in-the-pipeline issue and the family/flexibility issue can not be properly addressed in this study. The third rationale, which underscores the relatively low number of women with information technology degrees, is a pervasive but solvable problem that we have begun to address. In tandem with this rationale, more effort needs to be directed to the closely-related problems of retaining women and promoting them into the upper echelons of the corporate world, lowering the barriers of discriminatory practices, and effectively deploying the unique qualities of the female IT practitioner.

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