THREE COLLEGIATE/CORPORATE APPROACHES TO THE INTEGRATION OF WOMEN INTO THE INFORMATION TECHNOLOGIES

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ABSTRACT

Despite expanding opportunities and substantial financial incentives, women are significantly underrepresented at the collegiate and corporate levels of the information sciences. This paper examines some of the ongoing strategies employed to enhance the integration of women into the discipline. Collegiate/corporate integrated programs are discussed at three institutes of higher learning in three widely-divergent areas of the nation. Surveys of corporate problems, practices and strategies are also presented as a prelude or input to the designs of the individual colleges.

Keywords: Information technology curriculum, information technology gender issues, corporate discrimination, graduate technology programs.

Recent government studies have shown that, despite expanding opportunities and significant financial incentives, women are underrepresented at the collegiate and professional levels of the information sciences. 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. 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 1998. There is much evidence that women experience a cumulative disadvantage, in computer terms, that begins in the grade schools and continues through the college experience, where it too often leads to disillusion and drop-out (4). This report focuses on the ongoing strategies employed for the integration and retention of women in the computer information systems discipline at the University of South Alabama, Robert Morris College of Pennsylvania, and Bay Path College of Massachusetts, with emphasis on the interaction or partnership of the corporate community with collegiate curricular offerings.

The Robert Morris Program

We will exam first the Robert Morris Undergraduate and Doctoral programs, since they involve the largest number of students over the longest period of time. The strategies developed at Robert Morris to enroll, retain and integrate women students into the computer technology program originated as an open-ended and ongoing plan to enroll and retain all students (not specifically females) in the computer information systems major.

The first elementXand nucleusXof the program took the form of a far-reaching and expansive curricular innovation. A narrow computer programming discipline was replaced by a track system that was more responsive to student needs, yet dove-tailed cleanly into the escalating corporate demand for specialty skills. Students would normally enter on the Aopen≅ track, which would allow time to ponder the relative merits of each specialty. Five tracks are available to the student:

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

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 traditional areas of female interest and aspiration, but still solidly grounded in the computing sciences. Moreover, the programming and networking tracks were not abandoned by women majors, but were no longer the predominant choices.

The rapid growth of the Robert Morris computer systems 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 policies.

Corporate Strategies

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 (5). This is marginally better than the national average.

A 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. These corporations and institutions range from large multi-national corporations to health-care institutions, government facilities and small businesses. 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?

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 (6). This would not indicate optimum usage of women=s potential. Would professional women in the Information Technology field descend to these dismal levels?

Most corporate managers of information technology, both male and female, have suggested various reasons for unequal treatment of male and female technology workers. Few believe that a formal Aglass ceiling≅ exists. Those who grudgingly speculated on that possibility suggested that it is a surmountable obstacle, not an immovable object.

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. The most recent finding resulted in significant financial penalties levied against a large corporation in the Pittsburgh area that is one of the 47 companies included in this survey (7).

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. 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. Most managers downplayed its importance to the female aspirant. 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 (8). 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 percent at the senior managerial levels. The senior managerial level is considered to range from the technology director through the vice-presidential and CIO levels.

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 (8). 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 of Robert Morris College attempts to incorporate similar flexibility into its structure.

Enlightened corporations and institutions that are severely impacted by the shortage of information and knowledge workers are rushing headlong into the development of formal mentoring programs. When in place, such programs have resulted in increased employee retention and upward mobility (9). How could this process be integrated into the doctoral program? Would it be as effective for women as for men? Would it produce results as significant as undergraduate program innovations?

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 Aspecialized 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. Of paramount importance to all facets of the program is a distinct overlay of the corporate and education experience. A required endorsement and qualified commitment from the applicant's employer or sponsoring organization merges the educational experience of the students to her/his 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. These women were quite special in that they constituted the majority in a technology-based program that was the equivalent of a high-risk venture--a first year program with neither a history nor a reputation.

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. This structure creates a work environment that values people-oriented skills, diversity and team effort, which are generally acknowledged to be prime areas of women's strengths.

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.

The University of South Alabama Program

The School of CIS has approximately the same ratio of men to women in the discipline as the national norm. Majors in CIS consist of approximately 24% women and 76% men. The School of CIS offers three specializations: Computer Science, Information Science, and Information Technology. While attracting females to technology disciplines is critical to satisfying the increasing demands of these progressions, at the college level resources are better focused on retention of females who present themselves in classes. Barriers to female retention in universities has been attributed to a lack of peers in the classroom, a lack of representative faculty, ergonomics of laboratories ill-designed for comfort of the female population, and a scarcity of role models for females. This paper will focus on improving retention among women currently enrolled in CIS by addressing one of the four inhibitor categories: The scarcity of appropriate role models.

Our observations support current studies conducted at other universities, that the highest attrition occurs in the freshman and sophomore programming courses for females. The question asked in this study: Will focus on the retention of women in the early programming sequence increase the number of women receiving bachelor's degrees in technology, thus increasing the IT workforce?

In an effort to jump-start the role model pipeline, eligibility requirements for our existing internship program were modified to allow women to enter the program earlier in the academic process. The theory was that if we could not currently provide a "critical mass" of role models, both in number and appropriateness, on campus, then we would strategically place women in technology related work environments with women co-workers and managers.

The five-year-old program has had 219 participants. The number of industry partners has grown by a factor of six. The total of 219 interns consists of 168 males and 51 females. Currently, there are 58 interns in the program, 16 are female, 42 male. Of the 161 former interns, 131 have graduated, 23 females and 108 males.

In an effort to increase retention of female students, the internship program was viewed as a resource to provide additional role models for our students. The prerequisites for the program were restructured to allow female students to enter the program earlier. This change allowed qualified female students to enter the program as freshman (early entrance females), thus allowing them early exposure to additional role model support at a critical time in the degree program. Our program has proven to be similar to the majority of CIS programs that lost a significant number of majors during the first year in the CS1-CS2 course sequence.

The initial change was implemented in spring of 1998. Since that time, 23 females have become interns under the alternate prerequisite structure. Six have graduated, five left the program to accept another position outside the internship program or to concentrate on studies, four withdrew from school and eight are still in the program.

The first goal of the study is to determine if early placement in a work environment will significantly increase the retention rate of women in computing disciplines. Comparison of retention rates of women participating in the internship program and non-intern women will be collected over the five-year study period. Data is being collected on the retention of the females entering the CIS program beginning in the fall of 1999 to make comparisons between the females in the internship program and students not in the program. Thus far, results are promising but still insufficient to draw any statistically significant conclusions.

The subsequent goal of the longitudinal study is to compare the graduation rates of women participating in the internship program to the non-participating women in the CIS major.

The Bay Path College Program

Bay Path College is a woman's college at the undergraduate level; co-ed at the graduate level. The college has been revising the information technology area since early 1999 trying to meet the needs of the current and prospective students, as well as the needs of the firms and corporations hiring IT graduates. The number of computer information systems majors at the undergraduate level has increased significantly since that time.

Bay Path, in 1999, moved to a track system with specialized skills. Students working toward a Bachelor of Science in Information Technology may choose specializations in Business Administration, Communications and Media Production, Dispute Resolution, and Legal Studies. These skill areas were defined by Bay Path women as not only of special interest to them, but also readily adaptable to current corporate technology needs. There is also a general Information Technology track, which allows the student to work with her advisor to choose specializations in networking, management information systems, or electronic commerce.

A corporate/collegiate formal partnership has been forged and implemented that utilizes inputs from the corporate entities that match the student to each individual corporation. Every IT major is required to fulfill a minimum of three credits, maximum of six credits, internship to qualify for graduation. This experience prepares the student for life experiences after graduation. The college has also found that most successful interns are offered permanent positions at the firm where they have interned, making the program very desirable to women who are hoping to make a career change via this degree.

There has been an influx in IT majors from the non-traditional area (older than 24) through the Saturday One-Day program and the evening Continuing Education program. These women are highly motivated to achieve their goal in IT, and most state they have chosen to attend Bay Path College for the experience of women in IT teaching and working with them. These women feel they can succeed in the IT field because they are mentored by women who have experience not only in the education area, but also in the corporate sphere.

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