# Women, Technology, and Education

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## Women, Art, Technology, and Crisis

WOMEN FACE SEVERAL technological issues in the information professions. First, the work is changing rapidly as technological changes are introduced. Women need to respond to this change in the workplace—in both the content of work tasks and the coping with change itself. Second, women need to be willing to make a positive contribution to technological development. Finally, women need to seek out and use to the fullest the continuing-education experiences that can assist in developing the knowledge and strategies they need to respond to technological change. These are challenging issues which affect both today and tomorrow; a brief glimpse at history can be useful preparation in consideration of these challenges.

## Historical Perspective

The sexual division of labor was established in the first hunter/gatherer societies and has been maintained through successive stages of civilization.[1] Although industrial societies were built by the labor of both men and women, the work requiring the greatest aggressiveness, competitiveness, and daring was undertaken by men, leaving routine factory work and domestic work to women. The development of labor-saving modern conveniences for the home has not caused change in this division of labor.[2]

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Some women have bridged the gap in the division of labor, but they have been in the minority. Fox and Hesse-Biber emphasize that beyond the general constraints and restrictions that have operated on all women at work (e.g., concentration in the lower-ranking and lower-paying positions and in the less powerful and prestigious places and locations), women have been disadvantaged by certain other problems:[3]

> First, women's participation and advancement is hindered by cultural conflicts between a sex role requiring nurturance, empathy and support and an occupational role demanding aggressiveness, competitiveness and risk. Correspondingly, organizational attitudes reflect perceived disparities between (1) the characteristics and temperaments thought appropriate for women and (2) those thought appropriate for managers and professionals....
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> Second, these occupations make unusual demands on time and energy, which, when combined with family demands on women, create two imposing, and sometimes competitive, roles....
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> Finally, as a consequence of men's numbers and dominance, men share common "understandings" about rules and styles of competing, bartering and succeeding which ease men's communication but exclude women as outsiders.

In the library world, Heim states that:[4]

> If women legally have the same chance as men to rise to the upper echelons of library work they do not have the same chance sociologically. They are trying against their natures to conform to male models of leadership, they are finding themselves disproportionately represented professionally, and they are not making the impact on the scholarly world of librarianship by getting their ideas into print.

One illustration that is symbolic of the women's situation in the broad range of the information professions is the restrictions on the ability of women to operate within the mass media—an industry which has used state-of-the-art technology throughout its history. In the early nineteenth century, opportunities dwindled for women in printing and publishing.[6] The Civil War enlarged these opportunities once again as women assumed the positions left vacant by men departing for military duties. By the 1920s and the advent of commercial radio, women again found their opportunities limited. Newscasting was reserved for men because station managers and advertisers believed that men's voices alone carried authority and believability.[7] This situation has recently changed to a degree in the broadcast industry, as today's media women have assertively moved into the technological arena. However, the old role patterns and models still persist, and women fight their battle for career parity on two fronts: the professional sphere—where male dominance carries the strength of history and tradition; and the personal

sphere—where old role expectations remain entrenched, fostering unrealistic psychological demands on the professional woman.

The impetus for change is likely to come from the following factors. First, the shift from a manufacturing to an information economy has produced a corresponding alteration of the work-related reward system: physical strength is no longer a prime attribute; intellectual "strength" is the key in the Information Age.[5] Mind has replaced muscle as the qualifier for employment and advancement in a number of occupations. This shift in the workplace offers unparalleled opportunities for women. The traditional cultural attitudes can now be challenged if women are willing to do so. Women can grasp the very real potential presented by technological development and use various forms of continuing education to become "information experts" and to use the opportunities of the changing workplace to advantage.

Second, women can emphasize virtues such as compassion, caring, and nurturing—human attributes which can be most beneficial in a workplace where machines can so easily have a dehumanizing effect. The strength of intellect coupled with the nurturing virtues can create a work environment that is satisfying to both men and women.

## In Search of the Achieving Technological Woman

### *Technological Developments and Career Paths*

Women's responsibilities to Kinder, Kirche, Küche have changed little, in spite of the fact that women work in an environment designed for persons who are expected to devote themselves solely to their jobs. In addition, the jobs selected by women are still most often extensions of traditional activities—80 percent of employed women work in service, clerical, sales, or factory jobs.[8] These jobs are frequently low in pay, status, and power, due in part to the changes in work tasks precipitated by the adoption of new technology.

Changing technology has produced widespread changes in women's roles in information-related occupations. Sally L. Hacker, in her longitudinal case study of AT&T, examined sex stratification, technology, and organizational change. Hacker concluded:[9]

1. Technological displacement was seen to cut across management and nonmanagement categories, affecting most severely white women's employment and traditionally minority women's occupations. Sex and race were better predictors of structural change and of technological displacement than were traditional categories of management/nonmanagement.
2. Higher levels of skill and responsibility due to technological change reflected the elimination of traditionally women's work.

3. Under affirmative action, men gained more traditionally women's positions than the reverse.
4. Women do serve as a reserve labor army. Here, we can see the conscious manipulation of the push and pull factors operating at the same time, which affect women workers.
5. Corporations select their technologies. In this case, military and economic interests appear to predominate, with sex and race divisions in the labor force facilitating the change to a more sophisticated telecommunications technology. The corporation was able to shift a large part of its organizational uncertainty to the most disadvantaged groups in society.
6. Finally, working men are advantaged to some degree by sex stratification...they can and do use unions and the law to keep things that way, and they are directly advantaged by women's subordination in their private as well as public lives. This subordination helps maintain processes summarized in 1-5 above.

Although AT&T operates in the profit sector, its corporate structure and products are in the information sector, and its jobs are among the information occupations. The analysis of AT&T can serve as a case study from which to derive relationships in other segments of the profession.

If women are not relegated to traditional work roles and if there are lessons to be learned from the AT&T experience, the impact of technology and change must be consciously addressed. Deliberate efforts must be made to encourage women to become technologically proficient so that they can become technological decision-makers, instead of technological clerks.

Hennig states that strong and positive family dynamics in childhood are critical determinants in the development of competent women executives. She cites the following family characteristics:[10]

1. Both parents valued highly for their girl child both femaleness *and* achievement, activity, and competitive success.
2. Both parents valued each other highly and reinforced each other's role choices and behavioral styles.
3. Each parent related to the other and to the child as separate persons, yet valued highly and supported each other's relationships.
4. The female child was treated by her family as a person who was a female but who had available to her all role and behavior options available to either sex.
5. The family constellation provided a security base and a source of personal reward, satisfaction, and reinforcement that allowed the young girl child to overlook or retreat from potential gender-related role conflicts.
6. Overall, the parents created a positive, supportive climate in which the girl child could explore, without limitation of gender-related constraints, numerous roles and behavioral styles that allowed the girl child to experience direct instrumental life at a very early age.

The results of such family support were twofold. First, as the girl child was allowed to experience active, self-directed instrumental life and achievement motivation, she developed feelings of mastery and success at increasing levels of difficulty in a variety of settings that did not exclude direct competition with young male children. These feelings of mastery and success provided a base of self-confidence from which to view the prospect of change as a challenge rather than as a threat. This interior sense of being in control produced a personal environment in which technology or any other development which was new and different could be regarded as a positive challenge rather than a negative crisis, and the woman's response was more likely to be correspondingly positive.

Second, although many women get caught in the double bind of achievement *v.* femininity, these girl children spent their earliest years developing tremendous amounts of self-esteem, supported by parental reinforcement and their own experiences of mastery and success. High self-esteem aided their decision-making as executives under pressure, allowing both achievement and femininity to be nurtured and brought to bear upon technological development. For women raised in such an environment, fear of change and new developments dissolved quickly because their basic psychological orientation was one which focused on mastery and success. Rather than feeling overwhelmed by change, such women were more likely to feel challenged by the situation.

For women raised in less fortuitous circumstances, the prognosis is less positive. The Carnegie Commission's report on *Opportunities for Women in Higher Education* made special note that "a substantial proportion of the intellectual talent of women has been and is being lost to society as a result of cultural circumstances. Men are given comparatively more opportunities to use their mental capacities." The report further asserted that "women and men have equal intellectual abilities. This is demonstrated by their performances on test scores and in class grades." Finally, the report proclaimed: "The supply of superior intelligence is limited, and the demand for it in society is ever greater. The largest unused supply is found among women."[11]

These statements articulate a challenge to society, specifically to women. The technological present and future offer the potential to overcome old barriers and to take advantage of new opportunities. In particular, women who chart their course in the information professions face the opportunity for personal advancement coupled with the corollary ability to bring their well-developed nurturing and caring skills to settings which are becoming increasingly mechanized. The challenge will be to diversify women's energies, to continue to nurture

humanistic ideals, but also to take on the challenge of the visible and increasingly technological workplace. There are more barriers to be breached, however, than the cultural and traditional. Women are the product of both home and school; it is to this latter environment that attention must also be drawn.

*The Educational Gap*

No career advancement into the technological/information age can take place without adequate educational preparation. More than curriculum is involved, however. Solomon's study of professional women concluded:[12]

> For all, the encouragement or discouragement of an influential person made an essential difference in their development. They affirm what is striking in history: that women's expectations have grown because some people and some institutions have believed in them. Whether during childhood, school days, college, graduate, or professional years, these women have had special encouragement from one or more people: father, mother, teacher, friend, or professional colleague.

Institutional support also is vital. While discussing the impact of education, Ampola suggested:[13]

> Colleges can help by enabling women to resolve their women-work conflicts with more support. The active interest of a faculty member, particularly a female, can be of particular help. The college must help the student to come to grips with the reality that, as demanding as the present and near future appear, there will be another future of approximately 35 years when her children will be grown.

Institutional support has not always been forthcoming. For example, Bunting charges:[14]

> When it comes to the production of professionally successful women, perhaps the best, and the worst, thing that can be said about American education is that it hasn't tried....Not only has American education failed to conceive of women as an important source of professional talent, but its structure and processes have actively discouraged their aspirations.

Some of the negative elements identified include emphasis on grades and daily performance rather than on the solving of social and intellectual problems, the scarcity of female role models, scarcity of supportive male teachers, and predominance of schedules.

These comments do more than indict present educational systems; they offer direction, and they can provide focus for future educational efforts. Application of adult education principles to both undergraduate and graduate education can stimulate current students and aid in the

recruitment of both single and married women. There is definitely a resource pool of able and talented women who can be encouraged to demonstrate their knowledge during preprofessional studies and then move into significant careers. More flexibility in class scheduling, broadened financial aid, child care availability, acknowledgment of prior experience, curricula with a problem-solving approach, opportunity for self-direction, and active mentoring can put both preservice and continuing education into a new perspective—for both men and women.

Using adult education principles and relating to women students in a holistic way may result in higher levels of achievement among women professionals. The decisions facing women in the information professions can be facilitated by educational preparation which is flexible and supportive. A rigid and impersonal approach does little to encourage present learning and future practice that values flexibility and coping in a changing environment. However, education that fosters individualized learning and active reinforcement of self-confidence and achievement can be a catalyst for change for information professionals.

*The Role of Continuing Education*

Technology presents crisis decisions to women in the information professions. Crisis, however, is more than the negative connotation commonly ascribed to it; it is a catalyst for decision-making and therefore becomes an opportunity. For the individual woman, being bombarded by more and more information presents a continuous crisis situation. For the woman who wants to advance in the information professions, the rate of technological development can be overwhelming. It becomes increasingly difficult to keep professionally current and, without continuing education, it is virtually an impossible task.

Continuing education is a process in which the self-assessment of individual needs and goals is primary. This assessment can be aided and encouraged by a knowledgeable and supportive professional colleague or career counselor. If this assistance is not available, the self-assessment should still be done, for the analysis of strengths and liabilities is a prerequisite to effective career planning. In marketing terms, this process is defined as a marketing audit. The audit includes the personal assessment as well as analysis of the professional environment and its trends. If done in a thorough and comprehensive manner, this personal assessment becomes a coherent personal plan for present and future career development and continuing education. Updated on an annual basis, or more often if environmental factors on either the micro or macro levels alter significantly, the personal plan becomes a valuable career blueprint.[15]

This blueprint, however, requires a corollary responsibility on the part of the educational provider. Peterson states that:[16]

> Perhaps the most drastic changes in thinking and planning will be in the field of education, for women's foremost claim on society will be for educational opportunities geared to their multiple roles in modern society. The times demand a concept of education as a continuing thing, for men certainly, but for women especially. They require a revision of the conventional structure of education so that adults may resume education at whatever point they broke off their formal schooling.

A second responsibility of the provider is the ability to listen and respond. Educators and practitioners have a real—and understandable—difference in perspective. Daniel suggests that in order to improve communication, a shift in attention from a concentration on inputs (courses and faculty) to outputs (desired outcomes) can be a useful strategy.[17] This would result in position descriptions which are defined in terms of required competencies—an exercise enhancing practitioners' own understanding of the role they play and providing valuable data to both educators and persons engaged in personal career planning.

If curriculum is both appropriate and flexible, another key issue still remains: Who shall pay? Of course, all education incurs costs but by whom shall these costs be borne? Employer? Student? Scholarship or grant? Tax support? In the first case, proactive and innovative organizations are continually seeking out new ideas and are eager for their employees to be in tune with the state-of-the-art. Staff development and tuition reimbursement are viewed as necessary to the health of the organization. Other employers authorize time release plans which offer partial administrative support to employee advancement.

The bottom line is student self-financing with the entire responsibility and cost burden resting on the employee. This option has social and professional ramifications, as the capacity to pay varies widely. Tuition assisted by scholarship or grant may equalize educational access to a degree, but a fundamental problem is present in student-financed continuing education.

Finally, there is the possibility of tax support assistance. By far the most equitable—particularly in the light of the tax dollars expended at the K through 12 level and at the undergraduate level—is the channeling of public monies across the spectrum of lifelong education. Such public expenditures can be the key to coping with the need for new learning caused by technological development and change. Society can ill afford to "prepare" its citizens for a static world which no longer exists and ignore the realities which continuing education addresses.[18]

Financial aid is an integral component of educational opportunity, but it can be particularly critical for those persons for whom the additional economic burden would add intolerable stress to their lives. All too frequently women are in life situations where economics is a major determinant. If the technological revolution is not to pass women by, all necessary opportunities must be available to them in order to facilitate their entry and advancement in the information professions.

For women's continuing education in the information professions, the following recommendations are put forward regarding self-assessment, competencies, and financing.

1. The woman who aspires to the professional role and seeks to find the appropriate education to achieve her goal needs to search for an educational pattern and structure that will approximate her life needs as closely as possible. She needs to look for the flexibility in scheduling and coursework; foster relationships with supportive faculty and peers; and needs to continually work at making her learning environment as positive and rewarding as she can. She needs to maintain a holistic perspective in terms of personal and professional endeavors, life and work tasks.
2. For the woman who is a working professional, all of the previous statements regarding preservice education apply to continuing education as well. Rather than approaching continuing education in a scatter-shot way, the professional woman should do an annual self-assessment of her needs, her work and life situation, and her working environment. A self-assessment works to identify the gaps in a person's knowledge, education, skills, and training with respect to present and future needs. Educational opportunities should blend well with the adult's individual requirements and education may take the form of academic courses, short-term seminars or workshops, conferences, or self-directed study. The professional woman can learn and advance under the tutelage of a mentor who can guide her as she climbs the professional ladder.
3. Many women may feel nervous about machinery, change in the workplace, job security, or any of the many variables present in today's work environment. Taking action rather than reacting can help to put misgivings in perspective. Seeking out education and experiences that help confront the fears head-on, and learning about changes that worry the professional woman can help her be assertive in dealing with change.

These recommendations concerning continuing education are both specifically directed to women in information professions and to

women who have been affected by technological change on the job. The skills and knowledge gained through continuing education can provide women with opportunities to overcome traditional cultural, psychological, and economic impediments.

## Recap: Tomorrow Can Be Shaped

Erikson claims that the hope of men and women collides with dominant trends in our technological civilization, and with deep inner resistances as well. He asserts:[19]

> Woman, in many ways, has kept her place within the typologies and cosmologies which men have had the exclusive opportunity to cultivate and to idolize. In other words, even where equality is closer to realization it has not led to equivalence, and equal rights have by no means secured equal representation in the sense that the deepest concerns of women find expression in their public influence or, indeed, their actual role in the game of power.

Erikson's concern is that there is a "gigantic one-sidedness" threatening to make man the slave of his triumphant technology and that the female elements in human nature are being overlooked.

In addition, the innate tendency of organizations is to replicate themselves because this is the comfortable thing to do. Barriers are created to defend the power base against the different. Yet it is heterogeneity, not homogeneity, that promotes creativity. The diversity of male and female attributes is positive, not negative, in learning to cope with a changing world.

The desirability of goals demanding full participation of both males and females in the human experience and in the effort to direct human destiny cannot be denied. Yet current inequities between women and men in the world of work are present. The potential for society to become a slave to the machine does exist. The possibility of the dehumanized workplace is real. However, the potential exists for women in the information professions to be decision-makers regarding information technology and thus to have an impact in the direction of the technological future.

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