1-1-1995

Expressed attitudes of university administrators and faculty members toward women teaching in bachelor degree granting industrial technology programs.

Karen Coale Tracey
University of Massachusetts Amherst

EXPRESSED ATTITUDES OF UNIVERSITY ADMINISTRATORS AND FACULTY MEMBERS TOWARD WOMEN TEACHING IN BACHELOR DEGREE GRANTING INDUSTRIAL TECHNOLOGY PROGRAMS

A Dissertation Presented

by

KAREN COALE TRACEY

Submitted to the Graduate School of the
University of Massachusetts Amherst in partial fulfillment
of the requirements for the degree of

DOCTOR OF EDUCATION

May 1995

School of Education

EXPRESSED ATTITUDES OF UNIVERSITY ADMINISTRATORS AND FACULTY MEMBERS TOWARD WOMEN TEACHING IN BACHELOR DEGREE GRANTING INDUSTRIAL TECHNOLOGY PROGRAMS

A Dissertation Presented

By

KAREN COALE TRACEY

Approved as to style and content by:

William L. Thuemmel, Chair

Kenneth A. Parker, Member

Frank P. Lattuca, Jr., Member

Nancy Bottone Hellman, Consultant

Bailey W. Jackson, Dean
School of Education

ACKNOWLEDGEMENTS

There are many individuals I would like to thank for the help, guidance, support, and friendship they provided during my doctoral studies over the past six years. First, I want to thank Dr. William L. Thuemmel, chairperson of my committee, for never giving up on me and always being available to me whenever I needed his assistance. I commend his dedication to the doctoral program in Occupational Education at the University of Massachusetts. I would also like to thank the other members of my committee, Dr. Kenneth A. Parker and Dr. Frank P. Lattuca. A special thanks to Dr. Nancy Bottone Hellman for joining the committee and serving as a consultant.

The friendship and support from my colleagues at Central Connecticut State University was greatly appreciated. They encouraged me and took valuable time to read draft copies and discuss my research. I would like to extend my thanks to Dr. Karen C. Beyard, Vice President, Academic Affairs; Dr. John R. Wright, Dean, School of Technology; Dr. William Davison, Chairperson, Industrial Technology; Dr. Michael J. Williams; Prof. Sanford E. Rich; and Prof. Deborah Zanella. Without the friendship, encouragement, assistance, and caring from my friend Dr. Russell Jones of Boston College, this final project would have seemed to take forever. From Paxton High School, Paxton, Illinois, I would like to thank Mr. Donald Wolf who first introduced me to Industrial Technology and the field of teaching, and to Mr. George Young for his love of teaching, encouragement, and support to his students.

Many thanks to the National Association of Industrial Technology and its Executive Director, Dr. Alvin E. Rudisill, for their endorsement and support of this research project.

Lastly, many thanks to my wonderful family for their love and blessing throughout my educational experience. My love and respect to my husband, William E. Tracey, Jr., best friend and professional colleague. To my youngest best friends, my children, Patrick Mikal Tracey and Mikka Helen Tracey, both born during my doctoral studies, I now have only two hats to wear, so let's have some fun! My mother-in-law, Doris Tracey deserves a thank you for her encouragement and some much needed child care. Lastly, to my parents Bill and Jean Coale for never giving up. I guess I finally made it!

ABSTRACT

EXPRESSED ATTITUDES OF UNIVERSITY ADMINISTRATORS AND
FACULTY MEMBERS TOWARD WOMEN TEACHING
IN BACHELOR DEGREE GRANTING
INDUSTRIAL TECHNOLOGY PROGRAMS

May 1995

KAREN COALE TRACEY

B.S., ED., EASTERN ILLINOIS UNIVERSITY

M.L.S. - TECHNOLOGY, EASTERN MICHIGAN UNIVERSITY

Ed.D., UNIVERSITY OF MASSACHUSETTS AMHERST

Directed by: Associate Professor William L. Thuemmel

Many studies of academic women have concentrated on women who have been deflected from their academic careers either by personal considerations or institutional procedures, such as becoming a mother or being denied promotion and tenure. Little research has been done with present-day professional women who have chosen a nontraditional sector of higher education. A fundamental problem, supported by the literature, are the perceptions and attitudes toward women's roles in the workplace. The literature describes today's society as one that has a set of assumptions that still supports traditional roles for men and women. The traditional value system in the United States views women who achieve in nontraditional ways as extraordinary performers; as exceptions to the rule. The current system supports structures and systems that prevent society from discovering and implementing changes that could solidify new roles for women and men.

The purpose of this study was to assess the differences in attitudes of administrators and faculty toward faculty women teaching in the field of Industrial Technology (IT). More specifically, this study investigated attitudes toward the employment and advancement of Industrial Technology faculty women in higher education. The substantive findings after administering an opinionnaire were: (a) women in administrative and faculty positions in Industrial Technology programs recognized that employment opportunities were not the same for men and women in the institutions, and the opportunities favored men; (b) male administrators and male faculty felt that IT faculty women contributed as equals in the department and were not viewed as being subordinate, on the other hand, the female administrators and female faculty recognized the importance that the personality of the women affects the work environment; and (c) female administrators and female faculty and male administrators and male faculty varied when looking at the teaching effectiveness and related classroom climate. The women were more in consensus with the literature that described how women and men are perceived in the classroom by students and the differences between the genders when interacting with students. Lastly, recommendations were made to modify the study and suggestions were made for further research.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

THE PROBLEM

Introduction

Aburdene and Naisbitt (1992), in their book Megatrends for Women, describe how women are changing the world through their decisions concerning education, career choices, marriage, recreation, business ventures, investments, and politics. Women bring to many of these activities a perspective that differs from the traditional point of view. Social institutions are adjusting their practices and attitudes in response to increased female involvement and a new social order is evolving. This new order is significantly different from the old world order that was male defined. Many men and women are enthusiastic about the fresh and novel approaches that this new order will bring.

One institution that has been dramatically impacted by women over the last several decades is higher education. In 1975, the Chronicle of Higher Education reported female students made up 43% of the total student population within U.S. institutions of higher education. The enrollment of female students in higher education has increased steadily during the past 20 years. Today, women make up more than half (approximately 54%) of undergraduate students in American colleges and universities (National Center for Educational Statistics, 1990; Ryan, 1993).

Along with the increased enrollment of female students in higher education, there has been a moderate growth in the percentage of female professors. McCarthy (1988) reported that female faculty accounted for 2% of all higher education professors in 1972,

and 12% in 1986. McCarthy also characterized 29% of all female professors as "new hires," because they had five or fewer years in the professorate. More recent data reported in the Chronicle of Higher Education (1993), indicate that full-time female faculty positions have increased to 27.3% of the total faculty positions within institutions of higher education. Although colleges and universities have made steady progress in expanding the number of female faculty, efforts must be sustained if women are to achieve parity with men in higher education.

Tack and Patitu (1992) have projected that, by the year 2000, there will be a serious shortage of qualified persons to fill vacant faculty positions. Women will continue to be underrepresented in a variety of disciplines in academe and the inequity will persist for several decades. Hensel (1991) agrees with Tack and Patitu's projections and states, "The well-being of the university depends on its ability to recruit and retain a talented professorate. Our national well-being depends on our ability to develop a happy, emotionally healthy, and productive next generation" (p. 79).

The incentive for colleges and universities to increase the number of female faculty is not simply to comply with equal opportunity employment requirements. The primary incentive is to add diversity to the college and university environment--female faculty would be role models and serve as mentors for female students (Eaker, 1990). Universities are to serve the overall population and they are better prepared to do so when their makeup reflects the demographics and diversity in society.

Rationale

The U.S. government is responsible for constructing and implementing anti-discrimination laws, backing women to receive equal pay for equal work, and fair treatment on the job. These laws have the potential to enable long-term social change. The impact of the Federal laws is enormous and has had a dramatic impact on institutions of higher education.

The Equal Pay Act of 1963 requires equal pay for equal work. Title VII under the Civil Rights Act of 1964 prohibits discrimination in the areas of hiring, firing, promotion, and benefits (Berch, 1982). The Higher Education Act of 1972, under Title IX, states that "No person in the United States shall, on the basis of sex, be excluded from participation in, benefits of, or be subjected to discrimination under any educational program or activity" (Astin & Hirsch, 1978, pp. 129-130).

Affirmative action programs are presently one of the most effective vehicles for the advancement of women in higher education. Affirmative action programs come under the charge of the U.S. Department of Health and Human Services and apply to institutions of higher education receiving federal assistance (Crim, 1979).

According to Nevels (1980), changes in institutional practices have been motivated by (a) the women's movement; (b) the intervention of the federal government and the courts; (c) the results of previous findings; (d) new research findings; and (e) the economic interests of all faculty and staff in academe. In spite of institutional changes and anti-discrimination laws, data indicate that the percentage of female faculty is below the U.S. national average of women employed in the United States. There are currently 192 million individuals in the American work force, 100 million (52%) of the total work force

are women (U.S. Department of Labor Statistics, 1993). The participation of women in the work force has increased since 1947, when women accounted for 31% of the total labor force (Berch, 1982, pg. 179).

Formal recruiting and promotion policies have been changed to eliminate barriers for women. The explanation for low representation of women on university faculty must be sought elsewhere. A fundamental problem supported by the literature are the perceptions and attitudes toward women's roles in the workplace. Shavlik, Touchton, and Pearson (1988) describe our society as one that has a set of assumptions that still support traditional roles for men and women. The traditional value system in the United States views women who achieve in nontraditional ways as extraordinary performers; as exceptions to the rule. The current system supports structures and systems that prevent society from discovering and implementing changes that could solidify new roles for women and men.

One way for women to gain a strong foothold is for them to become trained and educated in technological fields that would prepare them to compete in the present and future work force. There are many educational opportunities for women ranging from vocational programs to various engineering fields of study. An educational option that many individuals are not familiar with is Industrial Technology. According to the National Association of Industrial Accreditation Handbook (1994), "Industrial Technology is a field of study designed to prepare technical and/or technical management-oriented professionals for employment in business, industry, education, and government" (National Association of Industrial Technology, p. 1, 1994). Industrial Technology programs can be found in colleges and universities across the United States. Unfortunately, these technological

fields of study lack female students and also lack female faculty to serve as mentors and role models. As stated earlier, women now make up over 54% of the undergraduate population in institutions of higher education and hold 52% of the jobs in the United States. The growth among women in the ranks of the professorate has not kept pace with the increased enrollment of female students in higher education and women in the overall work force. According to the National Association of Industrial Technology (1994), there are approximately 1,700 faculty teaching in the United States within the discipline of Industrial Technology. Women hold only 85 of the total 1,700 academic positions within the various concentrations of Industrial Technology. According to data reported by the Chronicle for Higher Education (1993), female faculty held 27.3% of the full-time positions in all higher education institutions. Women represented only 5% of the total academic positions in Industrial Technology. These data indicate that the discipline of Industrial Technology has 22.3% fewer women faculty than the average of all disciplines in higher education. Industrial Technology educators must recognize the strategic potential of female faculty and identify strategies to recruit and retain a more diverse professorate. The needs and concerns of the "other half" of the undergraduate population and future work force must be addressed.

Significance of the Study

Many studies of academic women (Aisenberg & Harrington, 1988; Amey, 1992) have concentrated on women who have been deflected from their academic careers either by personal considerations or institutional procedures, such as being denied promotion and tenure. Little research has been done with present-day professional women who have

chosen a nontraditional sector of higher education. Previous studies have pointed out that if women are to achieve parity with men, there needs to be basic changes in men's attitudes (Petit, 1972; Crim, 1979; Nevels, 1980; Lee, 1985). This study serves to inform university administrators and faculty members in the field of Industrial Technology regarding the current attitudes held toward women who have chosen a nontraditional sector of academe; namely, Industrial Technology. A search of Dissertations Abstracts and Educational Research Information Center (ERIC) was conducted to determine the focus of research conducted within the discipline of Industrial Technology. No matches were found on the ERIC database for the descriptors "industrial" and "technology." Dissertation abstracts revealed 40 dissertations written between the years 1988 and 1995. These dissertations focused on curriculum development, educational preparation for future leaders, and cooperatives between NAIT accredited programs and industry.

The dissertation abstract and ERIC databases were searched for the descriptors "attitudes" and "higher education" to determine if there was any current literature or dissertations between 1986 and 1994. The dissertations abstract search uncovered only one dissertation published on attitudes in higher education regarding women. The descriptors of "women," "nontraditional," and "higher education" were searched and three dissertations were revealed. The dissertations centered on attitudes and higher education regarding the father-daughter relationship on traditional versus nontraditional career choice of adult women, women, and mentoring.

Purpose of the Study

The purpose of the study was to assess the differences in attitudes among administrators and faculty toward faculty women teaching in the field of Industrial Technology (IT). Industrial Technology is traditionally a male-dominated field of study with the majority of its female population in the concentration of graphic arts/design. More specifically, this study investigated attitudes toward the employment and advancement of Industrial Technology faculty women in higher education. The four major objectives of the study were to (a) survey the opinions and attitudes of selected IT faculty toward IT faculty women; (b) survey the opinions and attitudes of administrators toward IT faculty women; (c) gather demographic information on the respondents; and (d) identify factors that might influence the general attitude towards faculty women teaching in Industrial Technology programs.

The Research Questions

This study answered the following research questions: Is there a difference in the opinions and attitudes of IT administrators and IT faculty regarding the:

Research Question 1. Employment of IT faculty women in higher education?

Research Question 2. Advancement of IT faculty women in higher education?

Research Question 3. Personality characteristics of IT faculty women?

Research Question 4. Job mobility of IT faculty women?

Research Question 5. Teaching effectiveness of IT faculty women?

Research Question 6. Research and other scholarly writing of IT faculty women?

Research Question 7. Professional contributions from IT faculty women?

Research Question 8. Acceptance by associates of IT faculty women?

Research Question 9. Full potential of IT faculty women?

Definition of Terms

The following definitions are presented to enable the reader to better understand the information included in the study:

Industrial Technology: Industrial Technology (IT) is a field of study designed to prepare technical and/or technical management-oriented professionals for employment in business, industry, education, and government.

Industrial Technology degree programs and professionals in Industrial Technology careers typically will be involved with the:

1. application of theories, concepts and principles found in the humanities, and the social and behavioral sciences, including a thorough grounding in communication skills.

2. understanding of the theories and the ability to apply the principles and concepts of mathematics and science and the application of computer fundamentals.

3. application of concepts derived from, and current skills developed in, a variety of technical and related disciplines which may include, but not [sic] limited to, materials, and production processes, industrial management and human relations, marketing, communications, electronics and graphics.

4. completion of a field of specialization, for example, electronic data processing, computer aided design, computer integrated manufacturing, construction, energy, polymers, printing, safety or transportation. (National Association of Industrial Technology, p. 1, 1994)

IT Baccalaureate Degree Programs: Four-year programs accredited in colleges and universities shall lead to the baccalaureate degree and shall be designed to prepare management-oriented technical professionals. Programs will include at least the junior and senior years of a baccalaureate program, with appropriate lower division course work from the four-year institution or from associated community colleges and technical institutes. Industrial Technology curricula which combine liberal education with professional-level technical management may be evaluated for accreditation at the baccalaureate degree level. Programs considered must prepare students for technical

management positions in areas such as industrial planning, production, supply, product market research, and technical sales. (National Association of Industrial Technology, p. 2, 1994)

Full-time: A teaching and/or research load equivalent to 12 semester hours each term. (Crim, p. 4, 1979)

IT Faculty Women and Men: Full-time teachers and/or researchers in an institution of higher education teaching within an Industrial Technology program.

IT Administrator: An individual whose principal role within a university system is to manage a College/School within an institution of higher education (as in the case of a dean or department chairperson) as defined for this study.

Institution of Higher Education: A public or privately supported college or university granting at least a four-year or bachelor's degree. (Crim, 1979)

CHAPTER II

REVIEW OF LITERATURE

Introduction

Recently, an increased emphasis has been given to conducting research to determine the process by which women are selecting careers. Popular topics of contemporary research include minorities, career aspirations, motivation, and positions most often occupied by women (Idress, 1989).

Researchers have accumulated data charting the relationship of individual variables leading to traditional or nontraditional career orientation in women. Investigators have attempted to discover the relationship of scholastic ability, actual achievement, personality, self concept, and values to traditional and nontraditional career orientation (Goldin, 1990). Although the data are primarily descriptive, more research needs to be conducted to identify variables that predict career orientation and define methods to measure the above-stated individual characteristics (Gallein, 1992).

Research has been conducted to learn why more women and minorities are not pursuing nontraditional careers in the sciences or engineering. Lack of high school preparation in math and/or science prior to college prevents many women from pursuing a degree in science or engineering. Betz (1990) pointed out that:

> Although women get better grades than men in both high school and college, they more often lack the math prerequisites for getting started in a science major in college. Math has been called the critical filter in career development; it filters out options in dramatic fashion. (p. 3)

Betz (1989) argued that the null environmental hypothesis has a distinct impact on women's career choices. The basic tenet of the null environment "is an environment that neither encourages nor discourages individuals--it simply ignores them. Its effect is to leave the individual at the mercy of whatever environmental or personal resources to which he or she has access" (Betz, 1989, p. 137). Betz further contends that psychologists, counselors, and educators should assist young women regarding career choices. "Failure to support her may, in effect, be a vote against her because it abandons her to fight sex stereotypes alone. Failure to support her may not be an error of commission, like overt discrimination or sexual harassment, but it is an error of omission because its ultimate effects are the same, that is, limitations in her ability to fully develop and utilize her abilities and talents in educational and career pursuits" (Betz, 1989, pp. 141-142).

Through an extensive review of literature, Gallein (1992) developed three sets of life conditions that affect career development for women. They are:

1. Enabling conditions such as family or demographic characteristics which provide the context for career movement. These are the personal factors of an individual's life such as age, race, marital status, and number and ages of children.

2. Precipitating conditions or internal motivating factors also serve to direct career decisions and formulate career behavior. Individual personality traits, special talents, and physical characteristics affect career choice.

3. Facilitating conditions or career strategies, those actions taken by individuals which may enhance opportunities. These reflect a woman's response to both her internal and external environments. (pp. 2-3)

Findings indicate that females have usually taken fewer mathematics, science, and computing courses in high school than males; have entered less technically oriented

vocational programs; and have been less likely to complete college-level programs in scientific and technical fields (National Research Council, 1987).

This study presents a review of literature pertinent to the research questions mentioned previously and addresses the following dependent areas related to the study: (a) entry of women in higher education, (b) factors that influence women to choose nontraditional careers, and (c) increasing female participation in nontraditional careers through mentoring and role modeling.

Entry of Women in Higher Education

Education over the last 200 years has profoundly changed women's lives in America. During the early years of the United States, educating women was one of many propositions receiving attention and, despite some resistance, the idea, took hold with surprising speed and success. Between the years 1790 and 1850, there was a remarkable growth in the education of females. A result was that the notion of collegiate study for women moved from the realm of fantasy to that of real experimentation. It was not the education of selected and privileged individuals, but the institutionalizing of education at many levels that unexpectedly produced opportunities for women.

New England produced the first generation of great women educational innovators--Sarah Pierce, Emma Hart Willard, Catharine Beecher, Zilpah Grant, Sophia Smith, and Mary Lyon. Each of these women struggled to acquire an advanced education. Like many ambitious men who went to college and gained professional status, these women were socially mobile and self-made achievers within their communities. Each of these women appeared to accept the social constraints placed on women and yet drew on

a religious sentiment to expand the scope of women's higher education. Women, pioneering in these new roles, founded schools where the female student became the focus of academic purpose (Scott, 1984).

Factors That Influence Women to Choose Nontraditional Careers

Today, over 50% of women are employed in the United States. National sample data indicate that more women than ever expect to work and more choose to have full-time careers than did in the past (National Center for Educational Statistics, 1990; U.S. Department of Labor, 1993). Consequently, there is now more interest in studying the process of career selection by women (Osipow, 1983).

In their extensive review of literature, Greenhaus and Parasuraman (1986) summarized the factors that influence women's career choices. These factors can be categorized in three main groups: (a) stable characteristics, (b) attitudes and social factors, and (c) information about courses and job opportunities provided by the social system.

Astin (1984) designed a career development model targeted for women, but claims it is also applicable to men. This model is a needs-based, socio-psychological one, and incorporates four important components or constructs: (a) motivation, (b) expectation, (c) sex-role socialization, and (d) the structure of opportunity. Her model assumes that work motivations are the same for women as they are for men. Her contention is that different behaviors are not the reflection of different capabilities, but the outcome of similar potentials that have been skewed and shaped by environmental factors; in other words, sex-role socialization and the structure of opportunity.

Farmer's (1985) career development model provides another multidimensional view of facts relevant to young women's career development. Farmer distinguishes her model from Astin's (1984) in that background variables and social learning shape gender roles that affect career choice and work motivation for young people. Three interacting influences are postulated: (a) background variables consisting of sex, race, social status, school location, and age; (b) personal psychological variables of academic self-esteem, success attributions, intrinsic values, and homemaking commitment; and (c) environmental variables of support from teachers and parents and support for working women.

The term "career contingencies" suggests that the individual's occupational choice is not influenced by any single isolated variable (Angrist & Almquist, 1975). Rather, occupational choice is associated with a variety of factors ranging from intelligence, parental socioeconomic status, to environmental structures. For women, the occupational choice is an even more complex process (Ironside, 1981).

In efforts to understand more clearly the ways women make career decisions, several recent women theorists and researchers (Gilligan, 1982; Astin, 1984; Stonewater, 1987) have investigated and analyzed female patterns of development. These authors have presented models outlining the various contingencies that affect the career choices of contemporary women. Not only have these theorists added new language and concepts with which to make sense out of the course of development in women, they have attempted to dispel some ill-founded assumptions about the career choices of women (Stonewater, 1987).

Fassinger (1985) argued that, despite the large quantity of research on factors related to women's career choice, there is no unifying theory to describe the relationships among the various variables, and was unable to determine the relative strength of the variables in their influence on women's career choices. She found that nontraditional choices are determined by the influence of women's orientation towards family and career, which are, in turn, determined by a combination of ability, achievement orientation, and feminist orientation. Early socialization is probably not the only cause of the absence of women in nontraditional careers, although it is one of the most recognized and cited reasons in the research literature of women and careers. Factors external and internal to women are operating to create this situation (Idress, 1989).

There are many theories regarding the career choices of women. The common characteristics of each are: (a) stable characteristics, such as ability and personality traits, which are less likely to be changed; and (b) factors dominated by social forces, such as attitudes and intentions. Changes in social forces are expected to cause changes in attitudes and intentions. The next section of the review of literature will focus on the stable characteristics, attitudes and career orientation, social factors, and, lastly, information and opportunities for women in nontraditional careers.

Stable Characteristics

Vocational and educational stability, satisfaction, and achievement depend on the congruence between one's personality and the environment in which one works or studies. People are more likely to feel reinforced and to perform well in an environment in which they "fit" psychologically (Holland, 1973). The individual characteristics most often

examined in relation to gender role differences are ability, self-concept, needs, and attitudes and career orientation.

Ability. The vast majority of studies conclude, on the average, that there are no significant differences in abilities between males and females (Maccoby, 1970). However, in some of the abilities, such as spatial ability and mathematics, differences increase from pre-school to high school and adulthood. According to Driscoll (The Boston Globe, February 16, 1992), girls achieve on par with boys in elementary school, but by the time they reach middle and high school, their test scores in science and math drop off markedly.

The research conducted by Sharps, Welton, and Price (1993) found the gender of the individual does not limit the possible range of cognitive abilities. Their study indicated that the gender of an individual may not be an indicator in the ability to view objects spatially. Gender difference may result from the placement of individuals in an environment in which they do not have the opportunity to try various tasks.

Driscoll (1992) stated:

> These are trends with foreboding consequences from the future career choices of girls, who are expected to continue to become increasingly visible in the workplace. In 1988, of the 5.3 million scientists and engineers in the United States, only 16.2 percent were women. Although, there is no single definitive reason as to why gender inequities exist, many researchers believe there is a subtle but pervasive bias extant within schools and society that encourages boys to such pursuits, but undermines the self-confidence of girls and serves to discourage them from pursuing math and science courses. (The Boston Globe, February 16)

The time effect on gender differences in ability suggests differential socialization for males and females. Differential socialization in respect to abilities may also be suggested for women in traditional and nontraditional occupations. One can argue that ability interacts with other personality characteristics, such as the need for achievement and self-concept, to affect vocational choice (Astin, 1968; Rezler, 1967).

Self-concept. The importance of a person's self-concept in the vocational choice process has been well formulated by Super (1951, 1990). Super found that people described themselves by using occupational terminology and sought to implement a concept of themselves when entering an occupation. This argument is strongly supported by research findings indicating that women aspiring toward male-dominated fields perceive themselves as less feminine than women in traditional fields (Moore & Sawhill, 1978; Tangri, 1972).

In line with this argument, Nash (1979) concluded that individuals will perform better on cognitive tasks when the masculinity and femininity in their self-concept is consistent with the gender stereotyping of the tasks. Spatial, mechanical, and mathematical skills were found to be stereotyped as masculine whereas verbal skills are stereotyped as feminine (Huston, 1983; Ruble, 1983; Signorella & Vegega, 1984). Betz and Hachett (1983), as well as Post-Krammer and Smith (1985), found that male students developed higher self-efficacy in mathematics than female students. A meta-analysis conducted by Signorella and Jamison (1986) showed consistent and significant association between gender self-concept and cognitive performance. Drake (1991), citing a University of Maryland study, found that when comparing male and female engineering students by Math SAT and College GPA scores, there were no distinguishing factors by gender. According to Drake (1991):

> ... research indicated that most women do have the prerequisite math courses required to enter a technology program, what they lack is the self-confidence to perform on an equal footing with men. These women may be wasting time and money in remedial courses when all they need is encouragement and minimal tutoring to address the real issue, which is how they perceive their ability to learn science and math. (p. 17)

Gallein (1992) stated, "High achieving women and women in nontraditional careers report a high number of instrumental characteristics. Found to be high on masculinity scales were women psychologists, women managers, college women in engineering majors, and women in nontraditional careers" (p. 29).

Needs. Women in both traditional and nontraditional careers were found to have the same two basic needs--the need for achievement and the need for affiliation. Fassinger (1985) found women who choose nontraditional careers to be more achievement-oriented and less socially oriented than women who choose traditional careers. Similarly, women in nontraditional occupations showed higher preferences for opportunities for self-growth and for high income level, and lower preferences for relationships with others at work than those in traditional occupations (Almquist & Angrist, 1970).

Research on work and family-related decision making implies that many women will encounter constraints that force choices between career and family (Gerson, 1985; Tangri & Jenkins, 1986). The literature indicates that career women in science and engineering were less likely than non-career women to marry and less likely to have children. If these career women had children, they usually had fewer and delayed childbearing more than non-careerists (Aneshensel & Rosen, 1980; McBroom, 1985). Consequently, occupying positions in male-dominated fields may produce larger differences between women in traditional and nontraditional fields in actual work and family-related behavior. Women in nontraditional fields may experience less career interruption because (a) their occupations are more rewarding, (b) the absence of part-time positions might push them into full-time work, (c) they are less likely to marry and less likely to have children, and (d) they may have greater discretionary income to hire

services. Differences between women pursuing traditional and nontraditional fields may continue to widen as their careers unfold.

Attitudes and Career Orientation

Traditional ideas on women's roles have been altered in recent years. People have come to believe that women can succeed while exhibiting characteristics that are different from those of men (Stokes, 1984; Ironside, 1981). Some people have also suggested that female attributes (person-oriented, caring, empathetic) will strengthen and grow if women foster rather than hide these special qualities (Gilligan, 1982; Young, 1985; Moore, 1984)

Attitudes towards women's roles differentiate between career-oriented as opposed to home-oriented women. Generally speaking, women in nontraditional occupations are less conservative with respect to marital relationships and obligations than those in traditional occupations (Houser & Garvey, 1985; Klemmack & Edwards, 1973; Stringer & Duncan, 1985).

Angrist and Almquist (1975) have examined the characteristics of women who enter male dominated fields and suggest these women are a product of enriched experiences that lead to a broader conception of the female role. Women in male-dominated occupations generally come from intact families with high parental education and a high rate of maternal employment (Angrist & Almquist, 1975; Lemkau, 1983; Standley & Soule, 1974). Furthermore, these women view their parents as supportive of their career aspirations (Hennig, 1974; Trigg & Perlman, 1976) and tend to place more importance on career-related success (Greenfeld, Greiner, & Wood, 1980) and less importance on marriage and family (Trigg & Perlman, 1976) than do women in female-

dominated fields. However, as a result of their small numbers in the field, women in male-dominated careers often suffer from feelings of isolation, lack of support from male colleagues, and sex discrimination (Kanter, 1977; Mathews, Collins, & Cobb, 1974).

Kingdon and Sedlacek (1982) conducted a study to determine the differences between female students choosing traditional careers and those choosing nontraditional careers. The results indicated that those women who chose nontraditional careers had a high achievement orientation, appeared not to participate in sex-role stereotyping, developed better study skills, and were encouraged to explore nontraditional interests. Another factor the study identified was the positive influence role models had on women in their pursuit of nontraditional careers.

Gutek and Nieva (1979) concluded:

> The woman who chooses a nontraditional career, in contrast to the traditional women, tends to be intellectual and receives high grades. She views a career as an important part of her life and is highly motivated. She expresses interests in both feminine and masculine activities and she receives support from both teachers and male friends. Further, she is aided in her career choice by the presence of one or more female role models. (p. 113)

A popular research study often cited, and which received much attention, was conducted by Hennig and Jardim (1977). In their book, The Managerial Woman, they describe 25 women who had reached high executive levels in major corporations. The researchers found similarities in successful women's experiences. All the women in the sample were firstborn children; most had close relationships with their fathers, who had encouraged them to be independent, self-reliant and risk-taking; and most found team games important to them as children. Based on these findings, the authors advocate that women who aspire to leadership positions need to develop skills they may have missed in earlier years. However, this may still be based on a "male" definition of leadership.

Social Factors. Many societies in the past explicitly defined the proper gender roles of family and professional life. From infancy, individuals are faced with how they are to conduct themselves in terms of what is proper for family and professional involvement in a social setting. Therefore, society's culture maintains a set of boundaries that one is expected to recognize, and a set of norms to follow (Gallein, 1992). This conditioning process is a key factor for individuals in choosing their vocations.

Hennig and Jardim (1977) stated:

> From a very early age men expect to work to support themselves. Only a fraction of white women come face to face with this issue as little girls... The difference in mindset that develops from this crossroads of children's expectations and ambitious is enormous. (p. 15)

MacKay and Miller (1982) agreed and believed that the socialization of children to accept stereotypic work roles has been shown to be strong especially in the early years of school. Nelson (1978) suggested that the career choices of elementary grade girls are restricted to a smaller number of female occupations, with nursing and teaching predominating; whereas boys list as many as 20 different occupational choices. Kriedberg, Butcher, and White (1978) agree with other researchers and emphasize girls' choices are narrowed even further as they progress in school . Schlossberg and Goodman (1972) described this phenomenon:

> As a direct result of their early socialization, women are restricted in their career dreams and are later confined to lower-level jobs at universities; clerks and secretaries rather than presidents and other top administrators. Women are socialized to be secretary to, wife of, mother of--in short, their personal and vocational status derives from the status of a male. (p. 23)

Astin (1984) supported Schlossberg and Goodman and maintained that girls played with dolls or played make-believe school, activities that involve nurturing and caring for others. In contrast, boys played with building blocks or things and solved puzzles. From

this early experience of children's play, Astin (1984) added that girls learn to satisfy both their pleasure needs and their contribution needs by direct service to others, while boys' contribution needs are satisfied through the direct production of tangible objects. Astin concluded that the distribution of household tasks in childhood reinforces the traditionally defined gender roles; for example, early paid work activities tend to differ by gender. Boys deliver papers, and girls baby-sit. As adolescents, boys work in service stations or car washes; girls work in retail stores.

When an individual grows older, gender roles continue to develop in the educational setting. Females are directed to the areas of home economics, arts, and music. Males are encouraged to study science and mathematics (Tsuchigane & Dodge, 1975; Tarvis & Offir, 1977). Current data provided by the Oregon State System of Higher Education (1992) stress that the consequences of gender differences in preparation in math and science fields are far reaching. Providing the support necessary to encourage women to take advantage of the full range of academic choices available will require broad-based discussion at all levels of education.

The social and cultural conditioning of gender roles in United States society has greatly influenced the employment of women (Tsuchigane & Dodge, 1975). A number of studies and surveys dating back to the 1940s indicate the pervasive influence that gender role conditioning has had in employment preferences (Noland & Bakke, 1949; National Manpower Council, 1957; Ginder, 1961; Simon & Rosenthal, 1967; Epstein, 1970; U.S. Department of Labor, 1970; Schwartz, 1971; Basil, 1972).

According to Gosman (1993), young women whose parents have a high level of education and a good salary, are entering male-dominated fields--such as engineering.

Kvande (1986) found that the educational system in Norway is greatly overrepresented in both secondary and higher education by these young women. Education is seen as an end in itself in the higher social classes and also as a way of achieving the desired status. This has a positive effect on the recruitment of women to higher education. Standley and Soule (1974) looked at the social background of women in a number of jobs dominated by men and found that an overwhelming majority of the parents of these women were from high status groups with high incomes and education. Standley and Soule concluded that the social factors most relevant to vocational choice are family background, significant others, and information provided by the school system.

The Mother. Mothers as a role model have significant influence on their daughters' attitudes towards gender role stereotypes. Daughters of employed mothers perceive women to be more competent than do daughters of homemaker mothers (Vogel, I.K. Broverman, D.M. Broverman, Klarkson, & Rosenkrantz, 1970), and they are more likely to pursue a career and to combine it with marriage (Ireson, 1978). Career-salient women students more frequently have working mothers than non-career oriented students (Gutek & Nieva, 1979; Almquist & Angrist, 1970). Kvande (1986) cited a study which states that the mothers' education is more important for the daughters than the father's education is for the sons. She said:

> ... 'mothers' levels of education are closely associated with those of their children, especially their daughters: Women whose mothers have gone far in school are more likely to obtain advanced education than men whose fathers have been highly educated. (p. 229)

Women who aspire to have a career outside the home and in particularly male-dominant fields are more likely to have college-educated mothers as role models.

The Father. Women in male-dominant occupations are somewhat more likely to perceive similarities between themselves and their fathers (Ireson, 1978), and they are more likely to have favorable attitudes towards career women (Ridgeway, 1978). Daughters of highly educated fathers are more prone to choose nontraditional occupations. According to Kvande (1986), female scientists are more oriented towards their fathers as role models than other women even though the mothers give a good deal of support, it is the fathers who provide the role model. Both male and female students feel that their father had more influence than their mother regarding career choice, with slightly more female students feeling this. This is seen in connection with the fact that many of the daughters are engineers or have similar occupations as their fathers. Farmer (1985) indicated that support from parents affects aspirations to high status occupations. Significant relationships are also reported between family's socioeconomic status and daughter's occupational aspirations (Burlin, 1976; Ireson, 1978; Klemmack & Edwards, 1973).

Peers. Research evidence strongly supports the argument that women's choices of nontraditional fields are influenced by their peers and in particular by husbands' and boyfriends' attitudes. Very often women lower their aspirations merely on the assumption that men will disapprove of their choice (Gallein, 1992).

Women depicted as successful in nontraditional occupations deviate from societal norms and can suffer negative consequences for such success (Condry & Dyer, 1976). One negative consequence of deviance that women fear is not being chosen as a desirable other, particularly as a romantic partner (Condry & Dryer, 1976). The literature on mixed-sex competition (Hagen & Kahn, 1975; Morgan & Mausner, 1973) and evidence of

men's negative imagery in response to depictions of successful women in astereotypic occupations (Alper, 1974) indirectly support this contention. However, research evaluating the interpersonal attractiveness of successful women in nontraditional occupations with more objective self-report measures has yielded mixed results (Korabik, 1981).

Women in traditionally feminine occupations tended to think that men view behavior as appropriately masculine or feminine, whereas women in nontraditional occupations are less likely to attribute to men gender role stereotypes (Argote, Fisher, McDonald & O'Neal, 1976; Hawley, 1972; Mishler, 1975). Thus, the social surroundings of women act to encourage or inhibit their educational and occupational aspirations and implementation.

Information

Information about nontraditional fields of study and career opportunities is necessary for making a vocational choice. Information can be gathered in different ways: by providing subjects with written material, advising them about career opportunities, providing opportunities to experience activities in nontraditional occupations, and introducing role models.

There are some indications that women in nontraditional fields, as compared to those in traditional fields, had more extensive exposure to information about male-dominated occupations (Almquist, 1974; Bridges & Bower, 1985). It is believed that experience accumulated in a person's past history conveys a source of information on occupational choice.

Basic individual and social factors generally discourage women from participation in nontraditional occupations. Most of these blocks are rooted in attitudinal biases and, consequently, are resistant to change. Controlling variables, which include role conflict, role overload, and direct and indirect discrimination, similarly impede women's career development. The stress factor, fear of success, and ecological limitation of time and space also add to the negative forces women encounter when pursuing nontraditional careers (Osipow, 1983). Roles and occupations that have been traditionally gender-typed need not be restricted to one or the other gender. In the long run, a different socialization process is needed that will provide expanded career options for both genders. Osipow (1975) stressed that attitudinal and institutional changes cannot be accomplished by women alone. Males play an influential role in the career development of women and they are generally more credible. They, therefore, have more impact upon established institutions. It is essential that men, also, become significantly involved in the facilitation of women's career development.

Today, greater numbers of women are pursuing careers that are considered nontraditional than has occurred in the past. A 1983 statistic indicated that "45 percent of those receiving accounting degrees, 36 percent of new lawyers, 36 percent of computer science majors, and 42 percent of business majors were women" (Johnston & Packer, 1990, p. 86). The National Science Foundation reported in 1990 that women comprised 30% of all scientists, but only 14% of the engineers in the United States.

Increasing Female Participation Through Role Modeling and Mentoring

The problem of attracting women to nontraditional careers is deeply rooted in society's attitudes towards men and women. These attitudes will not change overnight. America needs a highly skilled technical work force to compete in the world economy. It can go no longer afford the luxury of limiting these opportunities to the male population.

In order for more women to learn about nontraditional careers, role models and mentors are needed by females at an early age on to encourage women to pursue nontraditional careers. Relationships that support career development enable an individual to address the challenges encountered while moving towards a professional career. According to Kram (1985), "the prototype of a relationship that enhances career development is the mentor relationship" (p. 2). Individuals who participate in mentoring relationships also benefit from enhanced opportunities for professional advancement (Zey, 1984; Fagenson, 1989; Bahniuk, Dobos, & Hill, 1990).

Role Modeling

One factor that has clearly emerged as important to the career choice of women is the influence of role models (Almquist & Angrist, 1972; Burlin, 1976; Ridgeway, 1978; Tangri, 1972). This issue has assumed particular importance in explanations of females' career choices because finding appropriate role models is considered more difficult for women. For women, there is potential confusion and/or conflict between their homemaking role and other professional roles. Women who have successfully integrated these roles are still in the minority, and they are most often found in traditionally female

occupations. Men, in contrast, find role models in a wider range of careers and, for them, home and professional roles have never been seen as mutually exclusive.

Anderson and Ramey (1990) defined role model as:

> A role model's influence is basically a passive influence. A person identifies a role model who possesses the skills or qualities that she or he lacks and yet admires and wishes to emulate. By observing the role model's performance and its consequence, the person develops an image and then mimics the behavior that evokes desired outcomes or accomplishments. (p. 183)

While the significance of role models for women has been widely discussed, their specific influence in women's vocational decision-making remains unclear (Ridgeway, 1978; Tangri, 1972). Models typically perform two functions: (a) they demonstrate behaviors that are to be imitated, and (b) they provide information regarding the likely consequences of those behaviors. Typically, women lack models who integrate gender role and vocational role and, therefore, they have had to draw from disparate models.

The contributions of modeling and reinforcement to career decision-making in general have been discussed by Krumboltz, Mitchell, and Jones (1976). Their paradigm included learning experiences as one of the four major factors contributing to career decision making. The other factors related to career decision-making are: (a) special abilities, (b) environmental conditions, and (c) task approach skills. All four facts interact with learning to determine the eventual choice.

In support of this paradigm, early evidence by Krumboltz and Schroeder (1965) found that reinforcement plus role modeling was more effective than reinforcement alone in facilitating information during initial career exploration. The paradigm predicts that an individual will be more likely to express a preference for a particular choice if he or she has been positively reinforced for behaviors associated with that choice or has observed a

valued model being positively reinforced for engaging in behaviors associated with that choice.

The Mentor Concept

Descriptions and definitions of mentors vary from person to person. Margaret Hennig and her colleague, Anne Jardim, directors of the Simmons College Management Program for women and authors of The Managerial Woman (1977), believed a mentor to be a very specific and well-defined "classic" mentor. On the other hand, a more diverse, "mentor-like" individual has been described by men who have observed the effects of special attention and encouragement of a less direct, yet an influential person in an individual's career development.

According to D.L. Levinson, Darrow, Klein, M.H. Levinson, and McKee (1978), a mentor is one who "takes a younger man under his wing, invites him into a new occupational world, shows him around, imparts his wisdom, cares, sponsors, criticizes, and bestows his blessings" (p. 23). Burton (1977) described the mentor as a person with an extraordinary presence, because their influence is never merely the sum of his or her biology and psychology. Burton suggested that the mentor is not only older, more experienced, more powerful, and more creatively productive than the protégé, but also more intuitive and charismatic. McNeer (1983) restricted her concept of mentoring as a form of adult socialization used to develop organizational leaders. Kanter (1977) used the term "sponsor" to describe those people who act as "teachers or coaches and whose functions are primarily to make introductions or to train a young person to move effectively through the system" (p. 181). Good mentoring, then, is one of the special

contributions that persons in middle adulthood can make to society. But mentors also do something for themselves. They make productive use of their knowledge and skills and they learn from their protégés in ways not otherwise possible, further, they engage in self-rejuvenation by maintaining a connection with the forces of youthful energy (Levinson et al., 1978).

According to Zuckerman (1977), one of the most important things that mentors can teach their proteges is a sense for the important problems and an appreciation of elegant solutions. Mentors frequently review and criticize their protégés' work and show faith and confidence in their protégés' accomplishments. Hunt and Michael (1983) indicated that the mentor's age, gender, organizational position, power, and self-confidence are the most commonly cited characteristics in discussing the nature of the relationship. Levinson et al. (1978) noted that the mentor who "serves the traditional function" is usually older than the protégé by 8-15 years.

Weber (1980) noted that the mentor-protégé interaction synthesizes characteristics of the parent-child relation and peer friendship without being either. He suggested that the mentor accept the protégé as an equal and a friend, yet their differences in age and experience means they are not peers.

According to Kram (1985), in addition to age and role, gender is also an important trait that influences the mentor-protégé relationship. Male-female mentoring relationships have special complexities. Female protégés often experience overprotectiveness, greater social distance, and general discomfort in male-mentored relationships. Hunt and Michael (1983) indicated that in male-female relationships, both participants must deal with sexual tensions, fear scrutiny from the public, and break the stereotypical male-female

professional role. Erkut and Mokros (1984) indicated that a basic tenet of psychological theories of identification is that people emulate models who are perceived to be similar to themselves in terms of personality characteristics, background, race, and gender. However, findings by Alleman, Cochran, Doverspike, and Newman (1984) and Zey (1984) challenge this idea. Their findings indicate that mentors and protégés are not necessarily similar and that strong interpersonal relationships do not always characterize the mentor relationship. According to Kellerman (1983), mentors are from outside the protégé's family, thus interest in the protégé is derived from qualities in the protégé's personality. The nonfamilial relationship enables the mentor to confirm the protégé in a way that a parent, because of a vested interest, cannot. Hanson (1983) indicated that mentors demonstrate more association and provide more constructive input into the protégé's positive self-concept than does either parent. The mentor also has more in common with the protégé than do either the mother or father.

Lack of Mentors for Women

Jeruchim and Shapiro (1992), in their book Women, Mentors, and Success, stated "Women mentoring women is very different from men mentoring women. The nature of female bonding is different--there is more role modeling and less power inherent within the role" (p. 52). For women to have lunch and cocktails with other women is seen much more favorably than a man and a woman out for a lunch or dinner meeting. The latter could be misconstrued as a sexual innuendo and could ruin their reputations as professionals. This brings up the most important distinction between female-female mentoring relationships and male mentor and a female protégé. It is generally believed

that there is no sexual undercurrent in the female mentor and female protégé relationship, nor is sexism present. According to Jeruchim and Shapiro (1992), if an individual is going to be the mentor, the mentor and protégé need to have feelings of mutual respect toward each other. And, if a male mentor feels that the female protégé is inferior because of sexism, then he could not be a very good mentor to her.

Gail Sheehy (1974), in her popular book Passages: Predictable Crises of Adult Life, stated "Fewer mentors are available for women. Indeed, when I brought up the question of mentors with women, most of them didn't know what I was talking about" (p. 132). According to Levinson et al. (1978), the importance of mentors in the adult development of women is just beginning to be recognized. He pointed out that the lack of mentors has been a major obstacle in the professional development of women. Gordon and Strober (1975) also pointed to the fact that "Denial of access to the structure [the protégé system] in which competence is created has perpetuated the exclusion of women from top posts..." (p. 15).

One reason given for the small numbers of female mentor--female protégé pairs is the lack of potential female mentors for potential women protégés. In the past, fewer women than men entered and advanced in the higher echelons of the business and academic worlds. Obviously, fewer numbers of women meant fewer potential mentors for younger women. Loring and Wells (1972) stated "This sets up an insidious cycle: women do not advance rapidly, in part because they lack the insights and contacts women managers could give them, resulting in few women managers to serve as mentors for younger aspiring women" (p.56). Research by Idress (1989) parallels the findings of Loring and Wells. Idress concluded that career success depended on such matters as

organizational conditions and access to challenges to increase skills and rewards. Moreover, she noted that sponsors, or mentors, are important in advancing the careers of women managers and administrators by introducing them to key personnel. They are also in a position to guide and train their protégés to be more effective in their careers.

The Down Side to Mentoring

While the literature supports the need for mentoring relationships, researchers have found that such relationships present problems for women. Zey (1984) noted that merely two percent of the senior managers in his study were women; as a result, women were unlikely to find a female mentor. Thus, the reality is that females are forced to seek male mentors. Unfortunately, such relationships oftentimes result in a discomfort factor for both parties, with "sexual innuendo" traveling through the office grapevine. With the male mentors in the clear majority, however, Zey advises women to be pragmatic and recognize the power and status that both men and women in society at large are having on the politics of academia and business.

It has been assumed that mentoring is a totally positive experience. Unfortunately, all mentor/protégé relationships do not last forever and many times do not meet the mentors' or protégés' expectations. Only a very few studies have noted any negative aspects of the mentoring relationship (Missirian, 1982; Halcomb, 1980; Bowers 1985). After reviewing the work of numerous researchers, Merriam (1983) delineated the personal shortcomings that both the mentor and the protégé may bring to such a relationship when she said:

> Mentors may be unfulfilled individuals who try to live through an alter-ego in an attempt to gain some sort of immortality. Protégés, on the other hand, may be

> compensating for an unhappy childhood. Neither motivation is likely to lead to a healthy relationship. (p. 163)

Donald Auster (1984) suggested a conceptualization of the mentor-protégé relationship as "a power-dependent, dyadic role set with a strong potential for role strain" (p. 142). In addition to the possible problems between mentors and their protégés, both persons have constellations of other role relations that may conflict with the mentor-protégé relationship. Epstein (1970) noted that, especially in the case of a woman protégé and male mentor, significant others in each of the respective persons' role sets (colleagues, spouses, or peers) may be suspicious of the relationship.

Brooks and Haring-Hidore (1987) found that protégés sometimes perceived inadequacies in their mentor's behavior, personalities, or attitudes. In some cases, protégés felt that the mentor made inappropriate sexual advances; in other instances, protégés developed personal feelings that compromised what should have been a business-like relationship. In Brooks and Haring-Hidore's study, it is interesting to note that a higher proportion of women than men experienced problems. Farren, Gray, and Kay (1984) agreed that mentoring can foster personal problems, relational problems, and organizational problems, and they added that one of the most substantial pitfalls of such programs comes from "the myth that a mentor is required in order to succeed" (p. 20).

LaCroix (1992) suggests that all women should share information. By sharing, women empower other women to gain expertise and knowledge in their own rights. Shakeshaft's (1987) study of women in education affirmed that most women who have been successful in acquiring administrative positions have, indeed, had a sponsor or mentor to help pave the way. Such women should now consider their obligation to serve as a mentor to help bring other women along.

Summary

Women have made significant gains as students and faculty members in the institutions of higher education. Women now account for over 50% of the student population and hold 27% of the full-time faculty positions in higher education institutions within the United States. Researchers (Eaker, 1990; Gallein, 1992; Lee, 1985) have indicated that in order to further increase the number of women in the professorate, more research needs to be conducted to find out why women choose various career paths.

Several studies indicated that career development needs to begin at an early age (Betz, 1989; MacKay & Miller, 1982) and continue throughout adulthood. This literature revealed many theories regarding the career choices of women. The common characteristics were the ability and personality of an individual; and factors dominated by social forces, such as attitudes and intentions. Astin (1984) theorized that environmental factors, such as sex-role socialization and the structure of opportunity causes individuals to choose a particular career path.

Betz (1989) stated that counselors and educators should assist young women regarding career choices. There are two types of relationships that support career development of an individual, one is career guidance through mentoring and another is introducing young women to appropriate vocational role models from an early age (Almquist & Angrist, 1972). A mentor can be described in many ways: Kanter (1977) used the term sponsor to describe people who act as teachers or coaches, and take upon themselves the training of a young person to move effectively through the system.

Most of the societal factors that discourage female participation in nontraditional careers are rooted in attitudinal biases and, consequently, are resistant to change

(Gallein, 1992). Osipow (1975) stressed that changing the attitudes of people cannot be accomplished by women alone. Men also played an influential role in the career development of women (Kvande, 1986). Several studies indicated that women look to other women as positive influences for career choices. In addition, women looked to men and considered male attitudes in making a career choice (Eaker, 1990).

In order for more women to enter nontraditional careers, one must begin in the educational process and the social surrounding of young people. Pressures from peers, teachers, siblings, and parents all interact to create a network of influences that affects the direction of a young woman's career orientation. Female role models must be sought out and introduced to our young women from elementary through the high school years. The best and brightest minds are needed to attend to the future. Women constitute one-half of the human resources available. Society must adjust and encourage women to enter into careers that have been socially unacceptable in the past. They have the potential of providing at least one-half of the answers.

The literature identified the need for more research to be undertaken that studies how attitudes of women and men differ when selecting careers. Crim's (1979) study focused on expressed attitudes toward women faculty in higher education. He recommended further research be conducted on attitudes and opinions of administrators toward faculty women. Nevels (1980) recommended that research, development, and educational activities should be implemented to advance professional equity. He also recommended that further research should be conducted on women in higher education, and more specifically, research related to traditionally male-dominated fields of higher education.

This study examines the attitudes of university administrators and faculty toward women who teach in a nontraditional sector of higher education. Descriptions of both methods used and the population to be studied are the focus in chapter three.

CHAPTER III

METHODOLOGY

Introduction

Information concerning the general methodology, the population involved in the study, the survey instrument used, data collection techniques, and the methods of analysis to be used in treating the data are presented in this section.

The purpose of the study was to assess the differences in attitudes of university administrators and faculty toward faculty women teaching in the field of Industrial Technology (IT). Also, faculty women were surveyed regarding their opinions and attitudes of how they perceived themselves and other women teaching in Industrial Technology programs. Furthermore, this study identified whether there are any perceptual differences between female and male administrators, and female and male faculty regarding employment and advancement opportunities, job mobility, personality characteristics, teaching effectiveness, production of research and other scholarly writing, contributions to the profession, acceptance by associates, and use of full potential of women faculty members in higher education.

The researcher utilized a quantitative methodology employing a survey approach. Respondents completed a two-part questionnaire consisting of statements with reactions recorded on a Likert-type scale. Quantitative measurement provided a standardized structure for "instruments which are designed to limit data collection to a certain

predetermined response or analysis" (Patton, 1982, p. 22). A survey is considered a method of systematic data collection to obtain standardized information (Borg & Gall, 1990).

Instrumentation

At present, research on university administrators and faculty attitudes toward faculty women teaching in the field of Industrial Technology is handicapped by the scarcity of attitudinal studies related to this academic area. No empirical study is available. However, the researcher has reviewed the related literature for all areas of higher education.

Because the study was concerned with attitudes toward faculty women teaching in Industrial Technology (IT) programs, it was important to compare the attitudes of female and male administrators, and female and male faculty toward faculty women teaching in Industrial Technology. Since no absolute scale existed to measure the status and opportunities of women, it was necessary to compare the status and opportunity of IT faculty women with those afforded IT faculty men. A survey instrument developed by Petit (1972, pp. 130-135) and used in Crim's (1978, pp. 97-100) study was chosen as the data-gathering instrument for the present study. The instrument has been validated by Petit and Crim. It was selected because the areas of interests in the Petit and Crim studies were relevant to the present study plan. Petit's study focused on the attitudes of higher education administrators and female faculty toward females teaching in higher education in the Pacific Northwest. Crim's study focused on male and female attitudes toward females teaching in higher education in New Hampshire.

The opinionnaire for this study was composed of two parts. Part I was used to obtain demographic data that were used in reporting the profile of the respondents. Part II was comprised of 32 items, highlighting issues of the questions under study (a four-point Likert scale was provided for responses).

The content and criterion-related validity of the instrument was ensured by the item development process, the pilot studies conducted, and a post-hoc criterion check. Petit (1972), in developing the instrument, reviewed the related literature concerned with the employment and advancement of faculty women, the differences between men and women faculty members, and the use of the full potential of faculty women to formulate a list of items to be used to obtain information on opinions and attitudes toward faculty women in academe. Petit found these items of timely significance to women as faculty members in higher education. Many items were based on untested opinions and assumptions found in her review of literature.

Pilot studies were conducted by Petit (1974) and Crim (1979) to further validate the instrument. Through this process the content validity of the various items was checked, along with the suitability of the directions and the format. To corroborate the data obtained by her instrument, and to disclose apparent contradictions/discrepancies, Petit (1972) conducted semi-structured personal interviews with selected faculty women. These interviews acted as a criterion-related validity and reliability check of the data gathered.

The five-point Likert-type scale used in the Petit instrument was changed by Crim (1979) to a four-point forced-choice scale. The forced-choice scale was used to maximize usable response data (increase variance); in other words to eliminate large

percentages/frequencies selecting the "no opinion" choice that Petit (1972) incurred during her study. Bausell (1986) recommended "using a control response set to (a) reduce any tendency to try to please the researcher by giving desirable answers; and (b) force the respondent to put more thought and effort into the task, hence reducing any tendency to mark all 5s, say, on a 5-point scale" (p. 165).

Population

The population for this study consisted of administrators and faculty who are involved with Industrial Technology programs in the capacities of administration or instruction/research. There are approximately 150 colleges and universities in the United States that have bachelor degree granting programs in Industrial Technology. Approximately 1,700 faculty men and faculty women are teaching within these programs, nationwide. The total number of administrators varies slightly within each institution. Each institution has one dean and one or more department chairs, depending on how each school is structured. Therefore, there was a total population of approximately 310 administrators (National Association of Industrial Technology Directory, 1993).

The sample consisted of 35 accredited and 35 nonaccredited institutions with Industrial Technology programs in the United States. The survey was sent to five, randomly selected, male faculty members from each accredited and nonaccredited Industrial Program listed in the National Association of Industrial Technology Directory; administrators (dean and department chairs) within the same institution; and all women faculty members teaching in Industrial Technology programs. The list of administrators and faculty members was provided by the National Association of Industrial Technology,

located in Ann Arbor, Michigan. A sample of 124 administrators, 306 male faculty, and 85 female faculty was used for this study.

Data Collection

A two-part questionnaire, a cover letter, and a pre-addressed, stamped return envelope was mailed to each prospective respondent.

The cover letter explained the purpose of this project and the importance of responding to every statement; additionally, the prospective respondent were asked to check his/her responses carefully before returning the opinionnaire. To enhance the response rate, the National Association of Industrial Technology (NAIT) agreed to endorse the study and the cover letter was co-signed by the researcher and the executive director of NAIT. NAIT letterhead envelopes and stationery printed on high quality, white bond paper was used; also, the envelopes and return envelopes were addressed and hand-stamped with first class postage as Erdos (1970) recommended. See Appendix A for the cover letter.

The three-page questionnaire, consisting of two parts, was designed to be brief and easy to score. It was printed on light blue paper in accordance with the recommendations of Warwick and Lininger (1975) and to complement the blue color of the stationery letterhead and envelopes.

A follow-up, or second mailing, to nonrespondents was made three weeks after the first mailing. The primary purpose of a follow-up mailing was to reduce the percentage of nonrespondents by encouraging additional returns, so, the data would be more representative (Borg & Gall, 1990; Erdos, 1970). In addition, obtaining data from

nonrespondents is critical for the validity of a study (Miller & Smith, 1983). The follow-up mailing consisted of a second request cover letter, an opinionnaire, and a pre-addressed, stamped return envelope.

Data Analysis

The purpose of the study was to assess the differences in attitudes between administrators and faculty toward faculty women teaching in the field of Industrial Technology (IT). This was accomplished by administering a two-part survey instrument. Demographic data were collected in Part I. Participants in the study were asked to indicate, by checking the provided box, items regarding the number of years on the faculty at their institution; NAIT region in which their institution is located; administration or teaching/research; present rank; highest degree attained; area(s) of expertise; age; gender; number of faculty members in IT department (male/female); and lastly, the respondents were asked whether or not they would consent to an in-depth interview as a follow-up study.

In Part II, data were obtained by asking respondents to express their attitudes, and the opinions or attitudes of others if they could not present evidence to substantiate their own views on each of the statements. A four-point Likert-type scale ranging from "SD" for strongly disagree, "D" for disagree, "A" for agree, and "SA" for strongly agree was employed. Responses to each item on the attitude opinionnaire were assigned a value: 1 (strongly disagree), 2 (disagree), 3 (agree), and 4 (strongly agree). A .05 probability for making Type I error was used in testing each of the opinionnaire items and research questions. The computer program used in the data analysis was SPSS/Windows -

Statistical Package for Social Sciences, Version 6.0 (Chicago, SPSS Inc., June 17, 1992). Each of the 32 opinionnaire items in Part II were grouped under each of the research questions to be answered. The grouping was based on the issues and problems based on previous studies of the same nature. The following is a list of opinionnaire items related to each of the research questions.

Research Question 1. Is there a difference in the opinions and attitudes of IT administrators and IT faculty regarding the employment of IT faculty women in higher education?

1. Employment opportunities are equal for men and women in Industrial Technology at your institution.

3. Women and men deserve equal pay for equal work in higher education.

5. Employing agents favor employing better qualified women than men, as members of the Industrial Technology faculty.

7. Employing agents tend to think automatically in terms of men when filling a new position on the Industrial Technology faculty.

15. Higher education institutions should have a greater proportion of men than women on their faculties.

Research Question 2. Is there a difference in the opinions and attitudes of IT administrators and IT faculty regarding the advancement of IT faculty women in higher education?

2. Few IT faculty women meet the preparation requirements for promotion to upper ranks.

6. Few IT faculty women stay in their positions long enough to earn promotions to upper ranks.

8. IT faculty women are not as competitive in seeking advancements as faculty men.

11. In higher education there should be a merit system of appointment and promotion regardless of gender.

12. In general, advancement for women in higher education is a slow process.

18. Few IT faculty women produce the research required for promotion to upper ranks.

21. IT faculty women are often bypassed for promotion.

24. Few IT faculty women are sufficiently interested to put forth the effort to earn advancement to upper ranks.

Research Question 3. Is there a difference in the opinions and attitudes of IT administrators and IT faculty regarding the personality characteristics of IT faculty women?

8. IT faculty women are not as competitive in seeking advancements as faculty men.

9. IT faculty women have less of a professional commitment than do faculty men.

13. IT faculty women do not assume responsibility in decision-making as readily as faculty men.

17. IT faculty women accept subordination more readily than do IT faculty men.

22. IT faculty women do want full equality, even if it does mean equal responsibility.

24. Few IT faculty women are sufficiently interested to put forth the effort to earn advancement to upper ranks.

27. IT faculty women should learn to broaden their career interests more persistently than they have to date.

28. IT faculty women are more fearful than IT faculty men of conflict that might endanger their professional status.

Research Question 4. Is there a difference in the opinions and attitudes of IT administrators and IT faculty regarding the job mobility of IT faculty women?

6. Few IT faculty women stay in their positions long enough to earn promotions to upper ranks.

16. The turnover rate of IT faculty women is higher than that of IT faculty men.

19. IT faculty women are less mobile geographically than IT faculty men.

Research Question 5. Is there a difference in the opinions and attitudes of IT administrators and IT faculty regarding the teaching effectiveness of IT faculty women?

4. IT faculty women are more dedicated to teaching than faculty men.

25. IT faculty women are more responsive to students than IT faculty men.

32. Cultural attitudes of male colleagues and of students prevent a woman in higher education from being an effective teacher.

Research Question 6. Is there a difference in the opinions and attitudes of IT administrators and IT faculty regarding the research and other scholarly writing of IT faculty women?

18. Few IT faculty women produce the research required for promotion to upper ranks.

26. IT faculty women publish less than IT faculty men.

Research Question 7. Is there a difference in the opinions and attitudes of IT administrators and IT faculty regarding the professional contributions from IT faculty women?

9. IT faculty women have less of a professional commitment than do faculty men.

13. IT faculty women do not assume responsibility in decision-making as readily as faculty men.

30. IT Faculty women have higher rates of sick leave than IT faculty men.

Research Question 8. Is there a difference in the opinions and attitudes of IT administrators and IT faculty regarding the acceptance by associates of IT faculty women?

14. IT faculty women are taken less seriously than faculty men when sent out to represent the institution.

23. IT faculty women are regarded favorably by their colleagues.

31. IT faculty women are less responsive to their colleagues than IT faculty men.

Research Question 9. Is there a difference in the opinions and attitudes of IT administrators and IT faculty regarding the full potential of IT faculty women?

10. IT faculty women who wish to develop their potential have adequate opportunities to do so.

20. Exploration of the potential of women teaching in Industrial Technology programs has been neglected.

The frequency of given responses of the administrators and faculty for the 32 opinionnaire items was computed, and then grouped to answer each of the nine research questions. The responses were analyzed to compare the differences among the administrators and faculty as to their attitudes toward women faculty teaching in Industrial Technology programs.

The data collected from NAIT accredited and nonaccredited programs are presented in both written and tabular form. Responses by the two groups were tabulated for each of the 32 opinionnaire items and each of the nine research questions and subjected to the Mann-Whitney U-test. Borg and Gall (1990) suggest the application of the Mann-

Whitney U-test "to determine whether the distributions of scores of the two independent samples different significantly from each other" (p. 561).

The data collected from the administrators (female and male) and faculty (female and male) are presented in both written and tabular form. Responses by the groups were tabulated for each of the 32 opinionnaire items and each of the nine research questions. The 32 opinionnaire items were grouped to answer each of the nine research questions. The 32 opinionnaire and nine research questions were subjected to the analysis of variance (ANOVA) inferential technique. The ANOVA is an appropriate statistical analysis for this study because obtained frequencies are compared with expected or hypothesized frequencies. According to Minium and Clarke (1982), "an ANOVA is an acronym derived from ANalysis Of Variance." Hinkle, Wiersma, and Jurs (1979) further describe an ANOVA as "the analysis of one independent variable with two or more levels (p. 244)."

Limitations

Due to the nature of the study, direct control and manipulation of the variables was not possible. The researcher could not be certain that all relevant factors were included in the study. Nor was the researcher able to determine causal relationships.

Because the study relied on the response from only a percentage of the population, it is possible that they may not totally represent the Industrial Technology profession. It was expected that a high return rate of opinionnaires would partly address this issue.

Delimitations

The research is based on responses solicited from opinionnaires of administrators (deans and chairpersons), faculty men, and faculty women in Industrial Technology programs within four-year institutions. In order to maximize opinions from the small proportion of women faculty, opinionnaires were sent to all women teaching in Industrial Technology programs, whether the institution was accredited or nonaccredited by NAIT. The study was limited to administrators and faculty who were currently at institutions having Industrial Technology programs during the 1993-1994 academic year.

CHAPTER IV

RESULTS OF THE STUDY

Introduction

The purpose of the study was to assess the differences in attitudes of administrators and faculty toward faculty women teaching in the field of Industrial Technology (IT) in the United States. More specifically, this study investigated attitudes toward the employment and advancement of Industrial Technology faculty women in higher education. The four major objectives of the study were to: (a) survey the opinions and attitudes of administrators toward IT faculty women; (b) survey the opinions and attitudes of selected Industrial Technology faculty toward IT faculty women; (c) gather demographic information on the respondents; and (d) identify factors that might influence the general attitude towards faculty women teaching in Industrial Technology programs.

To obtain data, an opinionnaire was sent to all women teaching in the field of Industrial Technology; the administrators and five randomly selected male faculty from 35 NAIT accredited programs; and the administrators and five randomly selected male faculty from 35 non-accredited Industrial Technology programs, during the 1993-1994 academic year.

The results of the study are reported herein. Chapter four is divided into six sections: (a) the response rate of administrators and faculty, (b) the data describing the demographic characteristics of the respondents, (c) the comparison of the opinionnaire items and research questions of NAIT accredited and non-accredited programs using

Mann-Whitney U-tests, (d) the comparison of the opinionnaire items and research questions of IT administrators (female/male) using ANOVA tests, (e) and the comparison of opinionnaire items and research questions of the faculty (female/male) in Industrial Technology programs using ANOVA tests; and (f) a summary of the chapter.

Responses to each item on Part II of the attitude opinionnaire were assigned a value: 1 (strongly disagree), 2 (disagree), 3 (agree), and 4 (strongly agree). A .05 probability for making Type I error was used in testing each of the opinionnaire items and research questions.

Opinionnaire Response Rate

The sample was composed of 92 administrators (7 female and 85 male) of Industrial Technology Programs, 50 women teaching in Industrial Technology programs, and 187 men teaching in Industrial Technology programs. The response rate for each group surveyed was: (a) administrators, 75%; (b) female faculty, 59%; and (c) male faculty, 53%. The total response rate for the study was 62.3%.

Demographic Characteristics of Respondents

Before presenting an analysis of the data, it is important to give some information on the respondents and the institutions included in the study in order to provide a better understanding of attitudes toward faculty women teaching in Industrial Technology programs within institutions of higher education. Part I of the opinionnaire provided additional information on the respondents. The characteristics of the respondents that were used are as follows: (a) years in service, (b) academic rank, (c) degree, (d) age, and

(e) teaching responsibilities. Subject responses to demographic questions contained within the opinionnaire are reported in Tables 1 through 5.

Years in Service

The number of years in service of Industrial Technology administrators and faculty are reported in Table 1. As can be seen from Table 1, female faculty had fewer years of service than had male faculty within Industrial Technology programs.

Table 1

Years in Service of Industrial Technology Administrators and Faculty

	Female Admin.		Male Admin.		Female Faculty		Male Faculty		Total	
Years	N	%	N	%	N	%	N	%	N	%
1 - 5	2	28.6	17	20.1	34	68.0	40	21.3	93	28.3
6 - 10	3	42.9	21	24.8	9	18.0	39	20.8	72	21.9
11 - 15	0	0.0	7	8.3	4	8.0	23	12.3	34	10.3
16 - 20	0	0.0	12	14.1	3	6.0	24	12.9	39	11.9
21 - 25	2	28.6	18	21.2	0	0.0	33	17.6	53	16.1
26 - 30	0	0.0	9	10.7	0	0.0	18	9.6	27	8.2
31 +	0	0.0	1	1.2	0	0.0	10	5.3	11	3.3
Total	7	100	85	100	50	100	187	100	329	100

Sixty-eight percent (N=34) of female faculty and 21.3% (N=40) of the male faculty had less than six years of service at their present institution. The administrators had been employed in their positions for approximately the same amount of years, 28.6%

(N=2) of the female administrators and 20.1% (N=17) of the male administrators had less than six years in service. Only 6% (N=3) of the female faculty had greater than 15 years of service compared to 45.4% (N=85) of the male faculty. There also was an imbalance among administrators regarding extended years of service. Twenty-nine percent (N=2) of the female administrators, and 47.2% (N=40) of the male administrators had over 15 years of service to the college/university.

Academic Rank

The data shown in Table 2 indicate 45.9% (N=151) of the respondents held the rank of full professor. A larger percentage of male administrators (80%) and male faculty (38%) than female administrators (57%) and female faculty (16%) held the rank of full professor.

Table 2

Academic Rank of Industrial Technology Administrators and Faculty

	Female Admin.		Male Admin.		Female Faculty		Male Faculty		Total	
Rank	N	%	N	%	N	%	N	%	N	%
Lecturer	0	0.0	0	0.0	4	8.0	2	1.1	6	4.0
Instructor	1	14.3	1	1.2	5	10.0	8	3.7	15	4.6
Assistant Professor	1	14.3	1	1.2	27	54.0	46	24.6	75	22.8
Associate Professor	1	14.3	15	17.5	6	12.0	60	32.1	82	24.9
Full Professor	4	57.0	68	80.0	8	16.0	71	38.0	151	45.9
Total	7	100	85	100	50	100	187	100	329	100

Seventy-two percent (N=36) of female faculty and 29.4% (N=56) of the male faculty held the rank of assistant professor, instructor, or lecturer. Female administrators held 28.6% (N=2) of these junior ranks, compared to 2.4% (N=2) of the male administrators. Ninety-eight (N=83) percent of the male administrators and 71.3% (N=5) of the female administrators held the rank of associate or full professor, and 70.1% (N=131) of the male faculty and 28% (N=14) of the female faculty held the rank of associate or full professor.

Degree

The highest academic degrees held by respondents are presented in Table 3. Seventy-one percent of the respondents held the doctoral degrees.

Table 3

Highest Degree Held by Industrial Technology Administrators and Faculty

	Female Admin.		Male Admin.		Female Faculty		Male Faculty		Total	
Degree	N	%	N	%	N	%	N	%	N	%
Bachelor	0	0.0	0	0.0	2	4.0	3	1.6	5	1.5
Master	1	14.3	7	8.2	28	56.0	55	29.4	91	27.7
Doctorate	6	85.7	78	91.8	20	40.0	129	69.0	233	70.8
Total	7	100	85	100	50	100	187	100	329	100

Of the female faculty, 40% (N=20) held doctoral degrees compared to 69% (N=129) of the male faculty. Eight-six percent (N=6) of the female administrators and

91.8% (N=78) of the male administrators held the doctoral degree. Fifty-six percent (N=28) of the female faculty held a master's degree compared to 29.4% (N=55) of the male faculty. Only 14.3% (N=1) of the female administrators and 8.2% (N=7) of the male administrators held a master's degree as their terminal degree. Four percent (N=2) of the female faculty and 1.6% (N=3) of the male faculty held a bachelor's degree as their highest earned academic degree.

Age

The data reported in Table 4 indicate that 18% (N=59) of the respondents were under the age of 40. A marked difference in age existed among faculty by gender. Fifty percent (N=25) of the female faculty were under 40 years of age compared to 16.8% (N=31) of the male faculty. A slight difference in age existed among the administrators with 14.3% (N=1) of the female administrators and 2.4% (N=2) of the male administrators being under 40 years of age. A greater percentage of male faculty and male administrators were 50 years of age or older. Fifty percent (N=93) of the male faculty were over 50 years of age, while only 20% (N=10) of the female faculty members were 50 years of age or older. Sixty-five percent (N=56) of the male administrators and 42.9% (N=3) of the female administrators were 50 years of age or older.

Table 4

Age of Industrial Technology Administrators and Faculty

	Female Admin.		Male Admin.		Female Faculty		Male Faculty		Total	
Age	N	%	N	%	N	%	N	%	N	%
20 - 24	0	0.0	0	0.0	1	2.0	0	0.0	1	0.3
25 - 29	0	0.0	1	1.2	2	4.0	2	1.0	5	1.5
30 - 34	1	14.3	0	0.0	7	14.0	7	3.7	15	4.6
35 - 39	0	0.0	1	1.2	15	30.0	22	11.7	38	11.6
40 - 44	1	14.3	10	11.8	11	22.0	34	18.2	56	17.0
45 - 49	2	28.6	17	20.0	4	8.0	29	15.5	52	15.8
50 - 54	2	28.6	29	34.1	6	12.0	39	20.9	76	23.1
55 - 59	1	14.3	12	14.1	2	4.0	25	13.3	40	12.2
60 - 64	0	0.0	13	15.3	2	4.0	24	12.8	39	11.9
65 - 79	0	0.0	2	2.4	0	0.0	4	2.1	6	1.8
80 +	0	0.0	0	0.0	0	0.0	1	0.5	1	0.3
Total	7	100	85	100	50	100	187	100	329	100

Teaching Responsibilities

The most widely taught subjects in Industrial Technology programs are reported in Table 5. Manufacturing was the most popular subject taught by male administrators and male faculty.

Table 5

Teaching Responsibilities of Industrial Technology Administrators and Faculty

	Female Admin.		Male Admin.		Female Faculty		Male Faculty		Total
Teaching	N	%	N	%	N	%	N	%	N
Manufacturing	0	0.0	28	32.9	8	16.0	80	42.8	116
Construction	0	0.0	6	7.1	5	10.0	20	10.7	31
Graphic Design	3	42.9	5	5.9	17	34.0	22	11.8	47
Safety	1	14.3	9	10.6	4	8.0	18	9.6	32
CAD	0	0.0	7	8.2	10	20.0	41	21.9	58
CAM	0	0.0	3	3.5	3	6.0	33	17.6	39
Robotics	0	0.0	4	4.7	4	8.0	25	13.4	33
Professional	0	0.0	30	35.3	10	20.0	42	22.5	82
Electronics	0	0.0	12	14.1	4	8.0	46	24.6	62
Drafting	1	14.3	13	15.3	13	26.0	45	24.1	72
Management	0	0.0	26	30.6	14	28.0	43	23.0	83
Aviation	0	0.0	0	0.0	4	8.0	3	1.6	7

Forty-two percent (N=80) of the male faculty and 16% (N=8) of the female faculty taught manufacturing related courses. Thirty-tthree percent (N=28) of the male administrators reported teaching manufacturing related courses and none of the female administrators taught manufacturing. The primary teaching responsibilities of female administrators were graphic arts/design (42.9%, N=3), safety (14.3%, N=1), and drafting (14.3%, N=1). The primary teaching responsibilities of female faculty were graphic arts/design (32.9, N=17); management (28%, N=14), and drafting (26%, N=13). The primary teaching responsibilities of male administrators were professional (35.3%, N=30),

manufacturing (32.9%, N=28), and management (30.6%, N=26). The primary teaching responsibilities of male faculty were manufacturing (42.8%, N=80), electronics (24.6%, N=46), and drafting (24.1%, N=45).

Comparison of Responses Between NAIT Accredited and Non-Accredited Programs

To determine whether or not there are significant differences in attitudes and opinions between accredited and nonaccredited institutions, 32 nonparametric tests were executed on each of the opinionnaire items, and nine nonparametric tests were conducted on the research questions. Each opinionnaire item was grouped under one or more of the research questions. Responses to each item on the attitude opinionnaire were assigned a value: 1 (strongly disagree), 2 (disagree), 3 (agree), and 4 (strongly agree). The frequency of responses of the NAIT accredited and non-accredited IT programs were analyzed for the 32 items of Part II of the opinionnaire. The responses were analyzed to compare the differences between the two groups as to the attitudes toward faculty women teaching in Industrial Technology programs within institutions of higher education. This comparison was made using the Mann-Whitney U-test for nonparametric data.

Opinionnaire Items

To determine if a significant difference existed for the opinionnaire items between respondents from NAIT accredited and non-accredited institutions, a series of 32 Mann-Whitney U-tests were performed. The results of these tests are reported in Table 6.

Table 6

Responses to Opinionnaire Items by
NAIT Accredited and Non-Accredited Programs

Source of Variation	U Value	Z Score	Probability
1. Employment opportunities are equal.	12766.0	-0.4167	0.6769
2. Requirements for promotion to upper ranks.	10974.0	-2.5987	0.0094*
3. Equal pay for equal work in higher education.	11853.0	-2.6421	0.0082*
4. IT faculty women are more dedicated to teaching.	12791.0	-0.3953	0.6926
5. Employing agents favor employing better qualified women	13035.0	-0.0738	0.9412
6. Few IT faculty women stay in their positions long enough.	11798.0	-1.6952	0.0900
7. Employing agents tend to think automatically in terms of men.	12520.0	-0.7126	0.4761
8. IT faculty women are not as competitive.	11716.5	-1.8053	0.0710
9. IT faculty women have less of a professional commitment.	12585.0	-0.6742	0.5002
10. IT faculty women who wish to develop their potential have adequate opportunities to do so.	12355.0	-0.9642	0.3349
11. Merit system of appointment and promotion regardless of gender.	12314.0	-1.0698	0.2847
12. Advancement for women in higher education is a slow process.	11584.5	-1.8917	0.0585
13. IT faculty women do not assume responsibility in decision-making as readily as faculty men.	12827.5	-0.3526	0.7244
14. IT faculty women are taken less seriously.	12940.0	-0.1963	0.8444

*P<=.05

Continued on next page.

Table 6--continued.

Source of Variation	U Value	Z Score	Probability
15. Higher education institutions should have a greater proportion of men.	12696.0	-0.5185	0.6041
16. The turnover rate of IT faculty women is higher than that of IT faculty men.	12954.5	-0.1843	0.8538
17. IT faculty women accept subordination more readily than do IT faculty men.	12184.5	-1.172	0.2412
18. Few IT faculty women produce the research required for promotion to upper ranks.	12205.0	-1.1823	0.2371
19. IT faculty women are less mobile geographically than IT faculty men.	12493.0	-0.7691	0.4418
20. Exploration of the potential of women teaching in Industrial Technology programs has been neglected.	12596.5	-0.6295	0.5291
21. IT faculty women are often bypassed for promotion.	12521.0	-0.7517	0.4522
22. IT faculty women do want full equality, even if it does mean equal responsibility.	12294.0	-1.0256	0.3051
23. IT faculty women are regarded favorably by their colleagues.	12267.0	-1.1255	0.2604
24. Few IT faculty women are sufficiently interested to put forth the effort to earn advancement to upper ranks.	12646.5	-0.5724	0.5671
25. IT faculty women are more responsive to students than IT faculty men.	12359.0	-0.9618	0.3361
26. IT faculty women publish less than IT faculty men.	12356.0	-1.0018	0.3165
27. IT faculty women should learn to broaden their career interests.	12339.5	-0.947	0.3437

*P<=.05

Continued on next page.

Table 6--continued.

Source of Variation	U Value	Z Score	Probability
28. IT faculty women are more fearful of conflict that might endanger their professional status.	11856.5	-1.5875	0.1124
29. Part-time IT faculty members do not give sufficient thought and time to their profession.	12708.0	-0.4872	0.6261
30. IT Faculty women have higher rates of sick leave than IT faculty men.	11874.5	-1.6401	0.1010
31. IT faculty women are less responsive to their colleagues than IT faculty men.	12616.5	-0.6857	0.4929
32. Cultural attitudes of male colleagues and of students.	11300.0	-2.3365	0.0195*

*P<=.05

As can be seen from Table 6, there was little difference in the responses to the opinionnaire items between responses from accredited institutions and non-accredited institutions for 29 of the 32 questions. The opinionnaire items that were statistically significant were items 2, 3, and 32.

Research Questions

To determine if a significant difference existed for the research questions between respondents from accredited and non-accredited institutions a series of nine Mann-Whitney U-tests were performed. The results of these tests are reported in Table 7.

Table 7

Responses to Research Questions by
NAIT Accredited and Non-Accredited Programs

Source of Variation	U Value	Z Score	Probability
Employment	12461.0	-0.7611	0.4466
Advancement	11123.5	-2.3351	0.0195*
Personality Characteristics	11876.0	-1.4419	0.1493
Job Mobility	12384.0	0.8551	0.3925
Teaching Effectiveness	11965.5	-1.3626	0.1730
Research/Scholarly Writing	11963.5	-1.4214	0.1552
Professional Contributions	11866.0	-1.484	0.1378
Acceptance by Associates	12674.0	-0.5291	0.5967
Full Potential	12082.0	-1.2567	0.2089

*P<=.05

As presented in Table 7, there was no significant difference in the responses to the research questions between responses from accredited institutions and non-accredited institutions for eight of the nine research questions. Research Question 2 (advancement) was statistically significant. A comparison of the responses of accredited and non-accredited institutions are presented in the summary of this chapter.

Comparison of Responses Between Female and Male Administrators

Opinionnaire Items

To completely investigate the response of female and male administrators to the 32 opinionnaire items, a series of analyses of variance (ANOVA) were performed. The results of the analyses are reported in Table 8.

Table 8

Responses to Opinionnaire Items by
Female and Male Administrators in Industrial Technology Programs

Source of Variation	Sum of Squares	df	Mean Square	F Value	Probability
1. Employment opportunities are equal.	1.150	3	0.383	7.412	0.000***
2. Requirements for promotion to upper ranks.	0.184	3	0.061	0.830	0.481
3. Equal pay for equal work in higher education.	0.012	1	0.012	0.171	0.681
4. IT faculty women are more dedicated to teaching.	0.159	2	0.080	1.467	0.236
5. Employing agents favor employing better qualified women.	0.279	3	0.093	1.582	0.201
6. Few IT faculty women stay in their positions long enough.	0.051	3	0.017	0.234	0.873
7. Employing agents tend to think automatically in terms of men.	3.609	3	1.203	36.346	0.000***
8. IT faculty women are not as competitive.	0.028	2	0.014	0.211	0.810
9. IT faculty women have less of a professional commitment.	0.004	1	0.004	0.054	0.816
10. IT faculty women who wish to develop their potential have adequate opportunities to do so.	0.073	3	0.024	0.330	0.804
11. Merit system of appointment and promotion regardless of gender.	0.182	3	0.061	0.832	0.480
12. Advancement for women in higher education is a slow process.	0.262	3	0.087	1.215	0.309
13. IT faculty women do not assume responsibility in decision-making as readily as faculty men.	0.461	2	0.231	3.903	0.024*

*P<=.05 **P<=.01 ***P<=.001

Continued on next page.

Table 8--continued.

	Source of Variation	Sum of Squares	df	Mean Square	F Value	Probability
14.	IT faculty women are taken less seriously.	0.493	3	0.164	2.676	0.052
15.	Higher education institutions should have a greater proportion of men.	0.049	3	0.016	0.210	0.889
16.	The turnover rate of IT faculty women is higher than that of IT faculty men	0.090	2	0.045	0.612	0.545
17.	IT faculty women accept subordination more readily than do IT faculty men.	1.392	2	0.696	13.938	0.000***
18.	Few IT faculty women produce the research required for promotion to upper ranks.	0.230	3	0.077	1.012	0.392
19.	IT faculty women are less mobile geographically than IT faculty men	0.634	3	0.211	3.057	0.033*
20.	Exploration of the potential of women teaching in Industrial Technology programs has been neglected.	0.109	3	0.036	0.483	0.695
21.	IT faculty women are often bypassed for promotion.	0.312	2	0.156	2.453	0.092
22.	IT faculty women do want full equality, even if it does mean equal responsibility.	0.238	3	0.079	1.087	0.359
23.	IT faculty women are regarded favorably by their colleagues.	0.203	3	0.068	0.922	0.434
24.	Few IT faculty women are sufficiently interested to put forth the effort to earn advancement to upper ranks.	0.044	3	0.015	0.190	0.903
25.	IT faculty women are more responsive to students than IT faculty men.	1.271	3	0.424	7.970	0.000***

*P<=.05 **P<=.01 ***P<=.001

Continued on next page.

Table 8--continued.

	Source of Variation	Sum of Squares	df	Mean Square	F Value	Probability
26.	IT faculty women publish less than IT faculty men.	1.351	2	0.675	11.156	0.000***
27.	IT faculty women should learn to broaden their career interests.	0.979	3	0.326	4.691	0.005**
28.	IT faculty women are more fearful of conflict that might endanger their professional status.	0.877	2	0.438	6.340	0.003**
29.	Part-time IT faculty members do not give sufficient thought and time to their profession.	0.143	3	0.048	0.631	0.597
30.	IT Faculty women have higher rates of sick leave than IT faculty men.	0.116	2	0.058	0.723	0.489
31.	IT faculty women are less responsive to their colleagues than IT faculty men.	0.860	2	0.430	6.687	0.002**
32.	Cultural attitudes of male colleagues and of students.	0.070	2	0.035	0.531	0.590

*P<=.05 **P<=.01 ***P<=.001

The data presented in Table 8 show there was no significant difference in the responses to the opinionnaire questions between responses from male and female administrators for 22 of the 32 questions. However, significant differences were found for opinionnaire items 1, 7, 13, 17, 19, 25-28, and 31. The significant opinionnaire items will be discussed along with the research questions later in this chapter.

Research Questions

To completely investigate the response of female and male administrators to the nine research questions a series of ANOVA tests was performed. The results of the analyses are described in Table 9.

Table 9

Responses to Research Questions by
Female and Male Administrators in Industrial Technology Programs

Source of Variation	Sum of Squares	df	Mean Square	F Value	Probability
Employment	2.284	9	0.254	4.975	0.000***
Advancement	1.300	14	0.093	1.383	0.182
Personality Characteristics	2.110	15	0.141	2.454	0.006**
Job Mobility	0.816	7	0.117	1.658	0.131
Teaching Effectiveness	0.953	6	0.159	2.836	0.015*
Research/Scholarly	0.730	4	0.182	2.680	0.037*
Professional Contributions	0.127	5	0.025	0.340	0.887
Acceptance by Associates	0.914	7	0.131	1.976	0.068
Full Potential	0.073	4	0.018	0.238	0.916

*P<=.05 **P<=.01 ***P<=.001

As summarized in Table 9, there was no significant difference in the responses to the research questions between responses female and male administrators for five of the nine research questions. The data indicated significant differences in opinions and attitudes between female and male administrators on 10 of the 32 opinionnaire items, and four of the nine research questions. Female and male administrators expressed no differences in opinions and attitudes regarding advancement opportunities, job mobility, professional contributions, acceptance by associates, and full potential of IT faculty

women. However, significant differences were found for the following Research Questions: 1. Employment of IT faculty women in higher education; 3. Personality characteristics of IT faculty women; 5. Teaching effectiveness of IT faculty women; and 6. Research and scholarly writing of IT faculty women.

Summary of Opinionnaire Items as Related to Significant Research Questions

Research Question 1. Is there a difference of expressed opinions and attitudes between IT administrators, IT faculty men, and IT faculty women regarding the employment of IT faculty women in higher education?

Statistically Insignificant Difference. Female and male administrators both recognized that women and men deserve equal pay for equal work, and employing agents do not favor employing better qualified women than men as members of the Industrial Technology faculty.

Statistically Significantly Difference. Despite this apparent similarity of opinions and attitudes, the data also indicated that female administrators felt stronger than male administrators that employment opportunities are not equal at their institutions for IT faculty women. Female administrators agreed that employing agents at their institution are inclined to think automatically in terms of men when filling a new position on the Industrial Technology faculty. In contrast, male administrators disagree to the fact men are automatically thought of when filling an open position. Both female and male administrators strongly disagreed, to different levels of significance, that institutions of higher education should have a greater proportion of men than women. Lastly, male

administrators were more in favor of employing more men than women faculty. These findings are reported in Table 10.

Table 10

Comparison of the Means Between Female and Male Administrators for Research Question 1 and Related Opinionnaire Items

		Female Admin.	Male Admin.
Employment		9.000	10.950
1.	Employment opportunities are equal.*	2.330	3.528
3.	Equal pay for equal work in higher education.	3.667	3.906
5.	Employing agents favor employing better qualified women.	2.000	2.283
7.	Employing agents tend to think automatically in terms of men.*	3.333	2.094
15.	Higher education institutions should have a greater proportion of men.*	1.333	1.679

*Significant between Administrators
1 - Strongly Disagree 2 - Disagree 3 - Agree 4 - Strongly Agree

Research Question 3. Is there a difference of expressed opinions and attitudes between IT administrators, IT faculty men, and IT faculty women regarding the personality characteristics of IT faculty women?

Statistically Insignificant Differences. The opinions and attitudes of the male administrators strongly favored the fact that women were as competitive as their male colleagues when seeking advancements. Female administrators differed slightly in their response, and did not think that IT women were as competitive as the male faculty. Both female and male administrators agreed that IT faculty women have a professional commitment to their field of study. Male administrators disagreed with the statement that

IT women do not want full equality, even if it means equal responsibility. The data indicated that female administrators were more hesitant in their response and agreed that women may not really want full equality with equal responsibilities. Both female and male administrators strongly agreed that faculty women were interested in putting forth the effort to earn advancement to upper ranks.

Statistically Significant Differences. Male administrators strongly disagreed that women do not assume responsibility in decision-making as readily as the male faculty, and that they accept subordination more readily than the male faculty. On the other hand, the responses from female administrators were slightly more in agreement that women do not assume responsibility in decision-making as readily as their male colleagues, and that the faculty women are more subordinate than the faculty men. The responses from the female administrators indicate that IT faculty women should learn to broaden their career interests. In contrast, the male administrators disagree that the faculty women need to broaden their career interests. Female administrators felt IT faculty women are more fearful than faculty men of conflict that might endanger their professional status. The male administrators strongly disagreed to the aforementioned statements, where female administrators only disagreed. The means for Research Question 3 and related opinionnaire items are illustrated in Table 11.

Table 11

Comparison of the Means Between Female and Male Administrators for Research Question 3 and Related Opinionnaire Items

		Female Admin.	Male Admin.
Personality		18.333	14.300
8.	IT faculty women are not as competitive.	2.000	1.642
9.	IT faculty women have less of a professional commitment.	1.333	1.434
13.	IT faculty women do not assume responsibility in decision-making as readily as faculty men.*	2.000	1.623
17.	IT faculty women accept subordination more readily than do IT faculty men.*	2.667	1.868
22.	IT faculty women do want full equality, even if it does mean equal responsibility.	2.333	3.264
24.	Few IT faculty women are sufficiently interested to put forth the effort to earn advancement to upper ranks.	1.667	1.755
27.	IT faculty women should learn to broaden their career interests.*	3.333	2.321
28.	IT faculty women are more fearful of conflict that might endanger their professional status.*	2.333	1.962

*Significant between Administrators
1 - Strongly Disagree 2 - Disagree 3 - Agree 4 - Strongly Agree

Research Question 5. Is there a difference of expressed opinions and attitudes between IT administrators, IT faculty men, and IT faculty women regarding the teaching effectiveness of IT faculty women?

Statistically Insignificant Differences. The responses between female and male administrators varied slightly to the statement that women were more dedicated to teaching than the male faculty. Male administrators felt strongly that IT faculty women

were more dedicated to teaching, while the female administrators only disagreed. Both female and male administrators strongly disagreed that the cultural attitudes of male colleagues and of students prevent a women in higher education from being an effective teacher.

Statistically Significant Differences. Female administrators agreed and male administrators disagreed that female faculty were more responsive to students than the male faculty. The means for Research Question 5 and related opinionnaire items are reported in Table 12.

Table 12

Comparison of the Means Between Female and Male Administrators for Research Question 5 and Related Opinionnaire Items

		Female Admin.	Male Admin.
Teaching Effectiveness		6.500	5.188
4.	IT faculty women are more dedicated to teaching.	2.000	1.830
25.	IT faculty women are more responsive to students than IT faculty men.*	3.333	2.000
32.	Cultural attitudes of male colleagues and of students.	1.333	1.585

*Significant between Administrators
1 - Strongly Disagree 2 - Disagree 3 - Agree 4 - Strongly Agree

Research Question 6. Is there a difference of expressed opinions and attitudes between IT administrators, IT faculty men, and IT faculty women regarding the research and other scholarly writing of IT faculty women?

Statistically Insignificant Differences. Female and male administrators strongly disagreed that few Industrial Technology faculty women produce the research required for promotion to the upper ranks of the professorate.

Statistically Significant Differences. Male administrators strongly disagreed that IT faculty women publish less than IT faculty men. Female administrators agreed slightly more to the statement that IT faculty women publish less than the male faculty. The means for Research Question 6 and related opinionnaire items are displayed in Table 13.

Table 13

Comparison of the Means Between Female and Male Administrators for Research Question 6 and Related Opinionnaire Items

		Female Admin.	Male Admin.
Research/ Scholarly Writing *		4.333	3.750
18.	Few IT faculty women produce the research required for promotion to upper ranks.	1.667	1.925
26.	IT faculty women publish less than IT faculty men.*	2.333	1.887

*Significant between Administrators
1 - Strongly Disagree 2 - Disagree 3 - Agree 4 - Strongly Agree

Comparison of Responses Between Female and Male Faculty

Opinionnaire Items

To completely investigate the responses of female and male faculty to the 32 opinionnaire items, a series of ANOVA tests were performed. The results of the analyses are reported in Table 14.

Table 14

Responses to Opinionnaire Items by
Female and Male Faculty in Industrial Technology Programs

	Source of Variation	Sum of Squares	df	Mean Square	F Value	Probability
1.	Employment opportunities are equal.	4.120	3	1.373	8.973	0.000***
2.	Requirements for promotion to upper ranks.	1.188	3	0.396	2.446	0.065
3.	Equal pay for equal work in higher education	0.682	2	0.341	2.059	0.130
4.	IT faculty women are more dedicated to teaching.	5.364	3	1.788	13.212	0.000***
5.	Employing agents favor employing better qualified women.	0.696	3	0.232	1.493	0.218
6.	Few IT faculty women stay in their positions long enough.	0.077	3	0.026	0.149	0.930
7.	Employing agents tend to think automatically in terms of men.	5.188	3	1.729	11.638	0.000***
8.	IT faculty women are not as competitive.	1.548	3	0.516	3.138	0.026*
9.	IT faculty women have less of a professional commitment.	2.288	3	0.763	4.736	0.003**
10.	IT faculty women who wish to develop their potential have adequate opportunities to do so.	6.456	3	2.152	15.241	0.000***
11.	Merit system of appointment and promotion regardless of gender.	0.900	3	0.300	1.818	0.145
12.	Advancement for women in higher education is a slow process.	7.679	3	2.560	18.919	0.000***

*P<=.05 **P<=.01 ***P<=.001

Continued on next page.

Table 14--continued.

	Source of Variation	Sum of Squares	df	Mean Square	F Value	Probability
13.	IT faculty women do not assume responsibility in decision-making as readily as faculty men.	1.147	3	0.382	2.301	0.078
14.	IT faculty women are taken less seriously.	6.829	3	2.276	16.601	0.000***
15.	Higher education institutions should have a greater proportion of men.	3.818	3	1.273	8.125	0.000***
16.	The turnover rate of IT faculty women is higher than that of IT faculty men.	0.158	3	0.053	0.315	0.814
17.	IT faculty women accept subordination more readily than do IT faculty men.	4.444	3	1.481	9.517	0.000***
18.	Few IT faculty women produce the research required for promotion to upper ranks.	0.390	3	0.130	0.734	0.533
19.	IT faculty women are less mobile geographically than IT faculty men.	0.891	3	0.297	1.746	0.159
20.	Exploration of the potential of women teaching in Industrial Technology programs has been neglected.	0.882	3	0.294	1.795	0.149
21.	IT faculty women are often bypassed for promotion.	4.216	3	1.405	8.997	0.000***
22.	IT faculty women do want full equality, even if it does mean equal responsibility.	2.605	3	0.868	5.423	0.001***
23.	IT faculty women are regarded favorably by their colleagues.	5.847	3	1.949	13.539	0.000***

*P<=.05 **P<=.01 ***P<=.001

Continued on next page.

Table 14--continued.

	Source of Variation	Sum of Squares	df	Mean Square	F Value	Probability
24.	Few IT faculty women are sufficiently interested to put forth the effort to earn advancement to upper ranks.	2.156	3	0.719	4.376	0.005**
25.	IT faculty women are more responsive to students than IT faculty men.	9.481	3	3.160	24.339	0.000***
26.	IT faculty women publish less than IT faculty men.	1.965	3	0.655	3.933	0.009**
27.	IT faculty women should learn to broaden their career interests.	2.136	3	0.712	4.310	0.006**
28.	IT faculty women are more fearful of conflict that might endanger their professional status.	4.316	3	1.439	9.086	0.000***
29.	Part-time IT faculty members do not give sufficient thought and time to their profession.	2.069	3	0.690	4.416	0.005**
30.	IT Faculty women have higher rates of sick leave than IT faculty men.	4.506	3	1.502	9.361	0.000***
31.	IT faculty women are less responsive to their colleagues than IT faculty men.	4.425	3	1.475	9.494	0.000***
32.	Cultural attitudes of male colleagues and of students.	1.375	3	0.458	2.847	0.038*

*P<=.05 **P<=.01 ***P<=.001

As exhibited in Table 14, there was no significant difference in the responses to the opinionnaire items between female and male faculty for ten of the thirty-two opinionnaire items. However, significant differences were found for items 1, 4, 7-10, 12, 14, 15, 17,

and 21-31. The significant opinionnaire items will be discussed along with the research questions later in this chapter.

Research Questions

To completely investigate the response of female and male faculty to the nine research questions, a series of ANOVA tests was performed. The results of the analyses are reported in Table 15.

Table 15

Responses to Research Questions by
Female and Male Faculty in Industrial Technology Programs

Source of Variation	Sum of Squares	df	Mean Square	F Value	Probability
Employment	5.913	12	0.493	3.291	0.000***
Advancement	4.059	22	0.184	1.115	0.332
Personality Characteristics	5.845	21	0.278	1.745	0.026*
Job Mobility	2.835	9	0.315	1.889	0.055
Teaching Effectiveness	8.410	9	0.934	6.860	0.000***
Research/Scholarly	0.968	6	0.161	0.926	0.477
Professional Contributions	1.732	7	0.247	1.464	0.181
Acceptance by Associates	0.881	9	0.098	0.568	0.822
Full Potential	1.383	4	0.346	2.146	0.076

*P<=.05 **P<=.01 ***P<=.001

The data presented in Table 15 indicate that there was no significant difference in the responses to the research questions between the responses of female and male faculty for six of the nine research questions. The findings of this survey revealed significant

differences in opinions and attitudes between female and male faculty on 22 of the 32 opinionnaire items and three of the nine research questions. Female and male faculty expressed no differences in opinions and attitudes regarding advancement opportunities, job mobility, research/scholarly writing, professional contributions, acceptance by associates, and full potential of IT faculty women. However, significant differences were found for the following Research Questions: 1. Employment of IT faculty women in higher education; 3. Personality characteristics of IT faculty women; and 5. Teaching effectiveness of IT faculty women.

Summary of the Opinionnaire Items as Related to Significant Research Questions

Research Question 1. Is there a difference of expressed opinions and attitudes between IT administrators, IT faculty men, and IT faculty women regarding the employment of IT faculty women in higher education?

Statistically Insignificant Differences. Female faculty felt stronger that women and men deserve equal pay for equal work, than the male faculty. Both female and male faculty disagreed that employing agents favor employing better qualified women than men as members of the Industrial Technology faculty.

Statistically Significant Differences. Despite these apparent similarities of opinions and attitudes, the data indicate that female faculty agreed and the male faculty disagreed that employment opportunities are not equal at their institutions for IT faculty women. Female faculty agreed that employing agents tend to think automatically in terms of men when filling a new position on the Industrial Technology faculty. In contrast, male faculty disagreed that men were considered first when filling a new position. Female and male

faculty both strongly disagreed that there should be a greater proportion of men than women on their IT faculties. The responses of the male faculty were more in favor of a greater proportion of male faculty within their departments. The means for Research Question 1 and related opinionnaire items are shown in Table 16.

Table 16

Comparison of the Means Between Female and Male Faculty for Research Question 1 and Related Opinionnaire Items

		Female Faculty	Male Faculty
Employment		9.792	11.048
1.	Employment opportunities are equal.**	2.414	3.185
3.	Equal pay for equal work in higher education.	4.000	3.808
5.	Employing agents favor employing better qualified women	2.172	2.308
7.	Employing agents tend to think automatically in terms of men.**	3.000	2.285
15.	Higher education institutions should have a greater proportion of men.**	1.621	1.977

**Significant between Faculty
1 - Strongly Disagree 2 - Disagree 3 - Agree 4 - Strongly Agree

Research Question 3. Is there a difference of expressed opinions and attitudes between IT administrators, IT faculty men, and IT faculty women regarding the personality characteristics of IT faculty women?

Statistically Insignificant Differences. The two groups disagree on 7 of the 8 items relating to personality. The only item they agreed on was that IT faculty women assumed responsibility in decision-making as readily as the IT faculty men.

Statistically Significant Differences. Female faculty disagreed that IT faculty women are not as competitive in seeking advancements as faculty men. The data indicated that the male faculty strongly disagreed that women are as competitive when seeking promotion to upper ranks of the professorate. Both the groups strongly disagreed that IT faculty women have less of a professional commitment than do faculty men. Although both groups strongly disagreed, the level of disagreement was significant to the study with female faculty disagreeing less. Male faculty strongly disagreed that IT faculty women accept subordination more readily than do IT faculty men. In contrast, the female faculty felt that women were more subordinate. The level of agreement among the female and male faculty was significant and the female faculty were more supportive of IT faculty women wanting full equality in the workplace. The data show that female faculty disagreed more than male faculty that few IT faculty women are sufficiently interested to put forth the effort to earn advancement to upper ranks. Both groups disagreed that IT faculty women should learn to broaden their career interests more persistently than they have to date. The responses of the male faculty leaned more toward women broadening their career interests. Female and male faculty both disagreed to a different level that IT faculty women were more fearful than IT faculty men of conflict that might endanger their professional status. Faculty women were more fearful of conflict and how it might impact their professional status. The means for Research Question 3 and related opinionnaire items are illustrated in Table 17.

Table 17

Comparison of the Means Between Female and Male Faculty for Research Question 3 and Related Opinionnaire Items

		Female Faculty	Male Faculty
Personality		16.021	15.563
8.	IT faculty women are not as competitive.**	2.103	1.823
9.	IT faculty women have less of a professional commitment.**	1.276	1.669
13.	IT faculty women do not assume responsibility in decision-making as readily as faculty men.	1.828	1.709
17.	IT faculty women accept subordination more readily than do IT faculty men.**	2.517	1.946
22.	IT faculty women do want full equality, even if it does mean equal responsibility.**	3.483	3.285
24.	Few IT faculty women are sufficiently interested to put forth the effort to earn advancement to upper ranks.**	1.552	1.900
27.	IT faculty women should learn to broaden their career interests.**	2.276	2.369
28.	IT faculty women are more fearful of conflict that might endanger their professional status.**	2.690	2.146

**Significant between Faculty
1 - Strongly Disagree 2 - Disagree 3 - Agree 4 - Strongly Agree

Research Question 5. Is there a difference of expressed opinions and attitudes between IT administrators, IT faculty men, and IT faculty women regarding the teaching effectiveness of IT faculty women?

Statistically Significant Differences. Both female and male faculty disagreed to a different degree that IT faculty women are more dedicated to teaching and that the IT faculty women are more responsive to students than IT faculty men. In both cases, the

data show the responses of the female faculty felt women were more dedicated to teaching and more responsive to students. The male faculty strongly disagreed that cultural attitudes of male colleagues and students prevent a women in higher education from being an effective teacher. In contrast, the female faculty were more concerned with cultural attitudes of their male colleagues and students regarding how effective they were in the classroom. The means for Research Question 5 and related opinionnaire items are reported in Table 18.

Table 18

Comparison of the Means Between Female and Male Faculty for Research Question 5 and Related Opinionnaire Items

		Female Faculty	Male Faculty
Teaching Effectiveness		6.708	5.335
4.	IT faculty women are more dedicated to teaching.**	2.448	2.031
25.	IT faculty women are more responsive to students than IT faculty men.**	2.690	2.008
32.	Cultural attitudes of male colleagues and of students.**	2.103	1.738

**Significant between Faculty
1 - Strongly Disagree 2 - Disagree 3 - Agree 4 - Strongly Agree

Summary

The purpose of this chapter was to report the results of this study. The chapter was divided into six sections. The first section reported the responses from administrators and faculty. The results of demographic characteristics of the respondents were presented in Section 2. The comparison of the opinionnaire items and research questions of NAIT

accredited and non-accredited programs using the Mann-Whitney U-tests were presented in Section 3. The comparison of female and male administrators using the ANOVA tests was presented in Section 4, and the comparison of female and male faculty in Industrial Technology programs using the ANOVA tests was shown in Section 5. Nine research questions were addressed and 32 opinionnaire items were asked to test each of the research questions. Responses to each item on the attitude opinionnaire were assigned a value: 1 (strongly disagree), 2 (disagree), 3 (agree), and 4 (strongly agree). A .05 probability for making Type I error was used in testing each of the opinionnaire items and research questions. Section 6 will provide a summary of this chapter.

The Mann-Whitney U-test was to determine whether the distributions of scores of the accredited and nonaccredited institutions were significantly different from each other. Analyses were conducted on accredited and nonaccredited institutions to determine whether or not the process of accreditation would change the attitudes of the respondents within the college/university. The results of the Mann-Whitney U-tests found only two opinionnaire items and only one of the nine research questions between NAIT accredited and nonaccredited programs being of significance. Significance was found for Research Question 2. Is there a difference of expressed opinions and attitudes between IT administrators, IT faculty men, and IT faculty women regarding the advancement of IT faculty women in higher education?

The results of the ANOVA tests revealed there was no significant difference in the responses between the female and male administrators for 22 of the 32 opinionnaire items. However, statistically significant differences were found for the opinionnaire items listed below:

1. Employment opportunities are equal for men and women in Industrial Technology at your institution.

7. Employing agents tend to think automatically in terms of men when filling a new position on the Industrial Technology faculty.

13. IT faculty women do not assume responsibility in decision-making as readily as faculty men.

17. IT faculty women accept subordination more readily than do IT faculty men.

18. Few IT faculty women produce the research required for promotion to upper ranks.

19. IT faculty women are less mobile geographically than IT faculty men.

25. IT faculty women are more responsive to students than IT faculty men.

26. IT faculty women publish less than IT faculty men.

27. IT faculty women should learn to broaden their career interests more persistently than they have to date.

28. IT faculty women are more fearful than IT faculty men of conflict that might endanger their professional status.

31. IT faculty women are less responsive to their colleagues than IT faculty men.

The results of the ANOVA test indicated there was no significant difference in the responses to the research questions between the female and male administrators for five of the nine research questions. Statistically significant differences were found for the following Research Questions:

Research Question 1. Is there a difference of expressed opinions and attitudes between IT administrators, IT faculty men, and IT faculty women regarding the employment of IT faculty women in higher education?

Research Question 3. Is there a difference of expressed opinions and attitudes between IT administrators, IT faculty men, and IT faculty women regarding the personality characteristics of IT faculty women?

Research Question 5. Is there a difference of expressed opinions and attitudes between IT administrators, IT faculty men, and IT faculty women regarding the teaching effectiveness of IT faculty women?

Research Question 6. Is there a difference of expressed opinions and attitudes between IT administrators, IT faculty men, and IT faculty women regarding the research and other scholarly writing of IT faculty women?

The results of the ANOVA tests revealed there was no significant difference in the responses to the opinionnaire items between the male and female faculty for 10 of the 32 opinionnaire items. However, statistically significant differences were found for the following opinionnaire items:

1. Employment opportunities are equal for men and women in Industrial Technology at your institution.

4. IT faculty women are more dedicated to teaching than faculty men.

7. Employing agents tend to think automatically in terms of men when filling a new position on the Industrial Technology faculty.

8. IT faculty women are not as competitive in seeking advancements as faculty men.

9. IT faculty women have less of a professional commitment than do faculty men.

10. IT faculty women who wish to develop their potential have adequate opportunities to do so.

12. In general, advancement for women in higher education is a slow process.

14. IT faculty women are taken less seriously than faculty men when sent out to represent the institution.

15. Higher education institutions should have a greater proportion of men than women on their faculties.

17. IT faculty women accept subordination more readily than do IT faculty men.

21. IT faculty women are often bypassed for promotion.

22. IT faculty women do want full equality, even if it does mean equal responsibility.

23. IT faculty women are regarded favorably by their colleagues.

24. Few IT faculty women are sufficiently interested to put forth the effort to earn advancement to upper ranks.

25. IT faculty women are more responsive to students than IT faculty men.

26. IT faculty women publish less than IT faculty men.

27. IT faculty women should learn to broaden their career interests more persistently than they have to date.

28. IT faculty women are more fearful than IT faculty men of conflict that might endanger their professional status.

29. Part-time IT faculty members do not give sufficient thought and time to their profession.

30. IT faculty women have higher rates of sick leave than IT faculty men.

31. IT faculty women are less responsive to their colleagues than IT faculty men.

The ANOVA test revealed there was no significant difference in the responses to the research questions between the female and male faculty for six of the nine research questions. Statistically significant differences were found for the following Research Questions:

Research Question 1. Is there a difference of expressed opinions and attitudes between IT administrators, IT faculty men, and IT faculty women regarding the employment of IT faculty women in higher education?

Research Question 3. Is there a difference of expressed opinions and attitudes between IT administrators, IT faculty men, and IT faculty women regarding the personality characteristics of IT faculty women?

Research Question 5. Is there a difference of expressed opinions and attitudes between IT administrators, IT faculty men, and IT faculty women regarding the teaching effectiveness of IT faculty women?

The results of the ANOVA tests found there was a significant difference in the responses to the opinionnaire questions between the female and male

administrators and female and male faculty for 8 of the 32 opinionnaire items. Significant differences were found for items 1, 7, 17, 25, 26, 27, 28, and 32.

The results of the ANOVA test found there was a statistically significant difference in the response to the research questions between female and male administrators and female and male faculty members. Significant differences were found for Research Question 1. Employment of IT faculty women in higher education; Research Question 3. Personality characteristics of IT faculty women; and Research Question 5. Teaching effectiveness of IT faculty women.

The summary of findings, conclusions, recommendations, and suggestions for further research are presented in chapter five.

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS, RECOMMENDATIONS, AND SUGGESTIONS FOR FURTHER RESEARCH

Introduction

The purpose of the study was to assess the differences in attitudes of administrators and faculty toward faculty women teaching in the field of Industrial Technology (IT).

The population for this study consisted of administrators and faculty who were involved with Industrial Technology programs in the capacities of administration or instruction/research. The sample consisted of 35 accredited and 35 nonaccredited Industrial Technology programs from institutions of higher education in the United States. The survey was sent to five randomly selected male faculty members from each accredited, and five randomly selected male faculty members from each nonaccredited, Industrial Technology Programs listed in the National Association of Industrial Technology Directory; administrators (dean and department chairs) within the same institution; and all women faculty members teaching in Industrial Technology programs. The list of administrators and faculty members was provided by the National Association of Industrial Technology, located in Ann Arbor, Michigan. A sample of 124 administrators, 306 male faculty, and 85 female faculty was used for this study.

The purpose of this chapter is to present a summary of the findings, conclusions, recommendations, and suggestions for further research.

The results of the study were used to answer the nine research questions presented in Chapter I. The following were the research questions that were asked. Is there a difference in the opinions and attitudes of IT administrators and IT faculty regarding the:

Research Question 1. Employment of IT faculty women in higher education?

Research Question 2. Advancement of IT faculty women in higher education?

Research Question 3. Personality characteristics of IT faculty women?

Research Question 4. Job mobility of IT faculty women?

Research Question 5. Teaching effectiveness of IT faculty women?

Research Question 6. Research and other scholarly writing of IT faculty women?

Research Question 7. Professional contributions from IT faculty women?

Research Question 8. Acceptance by associates of IT faculty women?

Research Question 9. Full potential of IT faculty women?

Summary of the Findings

This study found that progress has been made over the past two decades, at least since when Petit (1972) first initiated a similar attitudinal study. Discriminatory attitudes and opinions held by administrators and faculty may no longer be one of the major hurdles for equality of women in academia.

The data from this study indicated that attitudes and opinions seem to have mellowed a great deal when compared to previous attitudinal studies. There were significant differences in opinions reported between female and male administrators on four of the nine research questions. Three of the nine research questions were significant between female and male faculty. Female and male administrators expressed no differences in

opinions and attitudes regarding the research questions that addressed advancement opportunities, job mobility, professional contributions, acceptance by associates, and full potential of IT faculty women. However, significant differences in attitudes were found between female and male administrators regarding the research questions that pertained to the employment, personality, teaching effectiveness, and research/scholarly writing of IT faculty women. Female and male faculty expressed no differences in opinions and attitudes on the research questions regarding the advancement opportunities, job mobility, research/scholarly writing, professional contributions, acceptance by associates, and full potential of IT faculty women. However, significant differences in attitudes were found between female and male faculty on the research questions concerning the employment, personality, and teaching effectiveness of IT faculty women. The statistically significant Research Questions are discussed in the following sections and how this study correlates to previous attitudinal studies.

Research Question 1. Employment

In sharp contrast to the male administrators and male faculty, female administrators and female faculty did not believe that employment opportunities were equal for women in their Industrial Technology departments/programs. For example, the female population agreed that when a new position is open at their institutions, the employing agents automatically think of men to fill the position. The male population did not agree and felt the employment opportunities were equal at their institutions, specifically within their IT departments/programs.

When compared to previous studies of this nature, little has changed from the early 1960s. Berwald's study (1962), found attitudes and practices of hiring officials strongly favor the selection of males over females. Berwald suggested that more training for women is needed if they are to be accepted as college and university teachers, and more encouragement by high school and college faculty and administrators is also needed. Howard's (1992) review of literature on women and employment reflected the sample ideals and solutions for young women, as was recommended earlier by Berwald (1962). Nevels's attitudinal study conducted in 1980, found that most faculty women, as opposed to most faculty men, believed that, when faced with a choice between hiring a women and a man for a faculty position, most employing agents would opt for the man, even if less qualified than the woman candidate.

Research Question 3. Personality

Both female administrators and female faculty felt that the personality of the women in IT programs affected the work environment. The female population believed that IT faculty women accepted subordination and that they should broaden their career interests. They also felt that faculty women had to be more careful on the job because they were afraid that conflict would endanger their professional status. On the other hand, the male population strongly opposed the thought of the faculty women as being subordinate. They also felt that faculty women need not broaden their career interests. Female administrators felt that IT faculty women do not assume responsibility in decision-making situations as quickly as their male colleagues. Whereas the male administrators, female, and male

faculty responses indicate that faculty women participated equally with their male colleagues.

Women's personality characteristics are often cited as reasons for discrimination against them. Berwald (1962) found that women college teachers were considered "harder to get along with" than men--cranky, rigid, uncompromising, uncooperative, emotionally unstable, and lacking humor. Petit (1972) found that the respondents in her study believed that for women, the family held top priority, and occupied more of their psychic and physical energy than for the men. Crim (1978) discovered that women's opinions of themselves had changed since Petit had conducted her study. Even though both men and women in his study agreed that women have as much professional commitment as their male counterparts, women expressed stronger agreement that faculty women have professional commitment and do want full equality and responsibility. A large majority of men, however, still believed faculty women accept subordination more readily than their male colleagues. Nevels's (1980) study revealed that women still have the traditional view of themselves and that female faculty members are not as competitive in seeking advancement as faculty men, and they accept subordination more readily than faculty men. He also found that faculty women are more fearful than faculty men of conflicts that might endanger their professional status, and lastly, faculty women should learn to broaden their interests.

Research Question 5. Teaching Effectiveness

Female administrators and female faculty were convinced that IT faculty women were more dedicated to teaching and more responsive to students than IT faculty men. Faculty

women also felt that cultural attitudes of male colleagues and of students prevented a woman from being an effective teacher in higher education.

Lee's (1985) review of the literature found that women spent more time in undergraduate teaching and less time in graduate teaching and research than men who held similar rank. Hornig (1972) found that the usual justification for not hiring a woman is that women want only to teach, not to do research, and a good faculty member must do both. She found that women do comparatively more teaching and less research than men, that it was not possible to establish they do so from choice or inclination, or out of necessity. One of the main criteria for promotion is teaching effectiveness as well as research. These studies indicated that women carry heavier teaching loads than men and that teaching is considered less prestigious than research.

Research Question 6. Research/Scholarly Writing

Female and male administrators did not agree on the amount of research being conducted by IT faculty women. The female administrators were concerned with the amount of research being conducted by IT faculty women, whereas the male faculty did not feel that the women produced any less research than the men within their departments.

Productivity is a primary consideration for promotion. Some studies examined cases where women were not as productive as men and to justify the women's situation. Several reasons might account for women's lesser productivity. Lee (1985) found various studies suggesting academic women may be less productive than their male counterparts. Some explanations given for this lower productivity were the proven bias against the writings and authority of women, the difficulties women experience in getting their work

published, the probable bias in the awarding of research funds, and the general, cultural, and academic context in which research and writing are done. Kirshstein (1976) found that the publication rates of women faculty are lower than for male faculty; and she stated that rank, tenure status, and discipline all affect the work an individual does. It was found in one study that, when college women were given sets of articles in various professional fields authored by three males and three females and when the author's names were switched, the college women rated those articles bearing the names of male authors higher than when the same articles bore the names of women authors. Weidman and Weidman (1975) found that women scholars are not as productive as men.

Conclusions

Previous attitudinal studies found faculty women were not advancing through academic ranks, lacking career development, not as geographical mobile, and dissatisfied with their present position. Contrary to findings of previous attitudinal studies, the data in this study found the respondents in agreement that faculty women teaching in Industrial Technology were not being denied advancement opportunities. It was also determined that faculty women were staying in their present positions and moving up through the academic ranks. The faculty women were found to be committed to the profession of Industrial Technology, although the attitudes of the different groups varied slightly regarding the items related to acceptance by associates. The faculty women thought that the opportunities to develop in their career was somewhat limited. Likewise, the need to explore new opportunites for faculty women was identified by the female administrators and faculty as an area for potential growth.

This study found the women in administrative and faculty positions in Industrial Technology programs feeling that employment opportunities were not the same for men and women in the institutions, and the opportunites favored men. Women have always been the minority in higher education, although the number of female faculty has increased to nearly 28% of all full-time positions. Still, women are outsiders and therefore at a disadvantage within institutions of higher education in particular male dominated fields. Gosman (1993) predicted, as the proportion of women increased, gender bias would have decreased. On the contrary, women in small numbers are not seen as a direct threat to the majority of the male population for positions within an institution, but as the proportion of women increase their presence is seen as a true threat. Especially among those women who compete for and receive appointments and promotions that would normally have gone to men. Given the already mentioned conditions, many stereotypes and sexist behavioral patterns are reactivated by male managers as an internal means of coping with both the fear and frustration. Another point to be made is that some men lack confidence or trust in women or have some level of anxiety about women in the professional workplace. When men are uncomfortable and/or when they are threatened by women's achievements, their informal behaviors are likely to communicate their discomfort and, in turn, make women uncomfortable (Sadler, 1992).

Shavlik, Touchton, and Pearson (1988) describe our society as one that has a set of assumptions that still support traditional roles for men and women. The traditional value system in the United States views women who achieve in nontraditional ways as extraordinary performers; as exceptions to the rule. The current system supports structures and systems that prevent society from discovering and implementing changes

that could solidify new roles for women and men. This would explain in part why the male administrators and male faculty felt that IT faculty women held their own within the department and were not viewed as being subordinate. The female administrators and female faculty, on the other hand, recognized the importance that the personality of the women affects the work environment. The literature supports the attitudes and opinions of the IT women regarding the importance of being accepted and treated as an equal.

In the U.S. society, men and women have been socialized to believe that men should take the leadership role over women, and this translates into innumerable social barriers for women. Men and women may expect women to be passive thus creating self-fulfilling prophecies. Stereotypes have lead to inaccurate perceptions and expectations concerning women (Tannen, 1990). The gender of a person affects the way in which they are perceived, particularly in terms of competence and ability. Because women's behavior is often devalued, by faculty members, their behavior may be viewed differently. Thus, a strong female faculty member may be seen as rigid and controlling rather than intellectually rigorous and challenging.

The opinions of the female administrators/faculty and male administrators/faculty varied when looking at the teaching effectiveness and related classroom climate. The women were more in consensus with the literature regarding the female interaction with students. Female/male administrators and male faculty felt that cultural attitudes did not prevent a woman from being a effective teacher. On the other hand, female faculty were concerned about the cultural attitudes of the students and how well they can teach.

Male and female students have gender-related expectations of their professors. They may expect the female professor to be more caring and motherly than their male

professors. The students may put more pressure on women faculty members for special treatment, and they may be angrier at the female faculty member who refuses to assist them than they would be at a male faculty member (Sadler, 1992). At the same time that students may expect supportive behavior from the female faculty members, they many nevertheless interpret such behavior as weakness, perhaps seeing it as "too feminine." But if a women professor acts more assertive, she may be viewed as "too masculine." Expectations and attitudes of students and how they perceive the female professors is not unlike the opinions of society as a whole. In order to change the current attitude, issues such as how students view women in authority must be raised and discussed.

Apparently women who teach in Industrial Technology programs are satisfied with their position and are respected by their colleagues and administrators. Perhaps one advantage these women have is that they are categorized in a nontraditional professional career. The literature has indicated that women who chose nontraditional professional careers are not ordinary. The literature suggests that these professional women have a high achievement orientation, appear not to participate in sex-role stereotyping, develop better study skills, and were encouraged to explore nontraditional interests (Kingdon & Sedlacek, 1982). These women are a product of enriched experiences that lead to a broader conception of the female role.

Recommendations

On the basis of the findings of this study, the following recommendations are made:

1. The National Association of Industrial Technology should provide a roster of the faculty women teaching in Industrial Technology programs, listing their area of

expertise and special interests. This list would be helpful to interested persons who want to conduct research on women in Industrial Technology; and to identify individuals for faculty positions and/or consulting, and for appointments and/or elections to advisory positions.

2. Research, development, and educational activities should continue to be implemented to advance professional equity. This should be a goal of departments in universities and of the National Association of Industrial Technology.

3. In-service workshops should be conducted to inform administrators and faculty about how leadership, learning styles, and communication are different between the genders.

4. Efforts should be made to mentor women to enter higher education and appoint qualified women to administrative positions and to university governing boards.

5. Environments should be created that are as conducive to the aspirations of women as it is to men.

Suggestions for Further Study

On the basis of this study, the following suggestions for further study are made:

1. This study was concerned with differences of attitudes and opinions between female and male administrators, and female and male faculty toward faculty women teaching in Industrial Technology programs. It would be beneficial to survey all departments within the same university to determine whether or not there are differences among disciplines.

2. Little research has been conducted on the faculty in Industrial Technology, more studies should be conducted on the teaching population.

3. There has been a decline in research on women in academia since the late 1980s. It would be beneficial to have ongoing research in order to track the trends in higher education, and the status of women.

4. Similar studies should be conducted on nontraditional occupations for men, such as elementary education and nursing.

5. The student population should be included in a study regarding the attitudes and opinions between female and male students who major in traditional and nontraditional fields of study.

APPENDIX A

LETTERS TO PROSPECTIVE RESPONDENTS

Dear Colleague:

Although there are numerous demands on your time, please take a few minutes for a task that will contribute to the understanding of the status of and opportunities for women teaching in baccalaureate degree granting Industrial Technology programs. This study has been endorsed by the National Association of Industrial Technology and should develop a better understanding of the professional development of women teaching in nontraditional fields.

The enclosed opinionnaire surveys opinions and attitudes of administrators and Industrial Technology faculty men toward Industrial Technology faculty women and the opinions and altitudes of faculty women. The survey group consists of deans of colleges/schools with Industrial Technology programs; department chairpersons of NAIT programs; five randomly selected male faculty members from each institutions; and all females teaching in Industrial Technology programs. Your name will not be associated with your responses. However, the opinionnaire is numbered for follow-up purposes. The investigator is the only person who will have access to the data, and no analyses will be made that will point to any individual or institution.

Your view points are considered important as you are the best source of information for the topic of this study. Your cooperation in this study will be greatly appreciated. Please complete the enclosed opinionnaire and return it before December 15, 1994 in the postage paid envelope provided.

Thank you in advance for your assistance in this project.

Professionally yours,

Ms. Karen C. Tracey, Asst. Professor
Central Connecticut State Univ.

Dr.Alvin E. Rudisill, Executive Director
National Assoc. of Industrial Technology

Dear Colleague:

As the end of the academic year approaches I realize there are many demands for your valuable time. A while ago you were sent an opinionnaire regarding your attitudes towards women teaching in Industrial Technology programs. As yet, your response has not been received. I would like you to take a moment and please compete the enclosed opinionnaire.

As a faculty member and/or administrator in Industrial Technology, your participation is very important to the success of the study. For your convenience, a second opinionnaire and self-addressed envelop has been enclosed. This opinionnaire **has not** been coded in any way. The first opinionnaire was numbered to keep track of the responses for first and second mailing of the survey.

Upon completion, please return the opinionnaire for this Attitudinal Study of Faculty Women Teaching in Industrial Technology Programs in the enclosed postage-paid envelop as soon as possible. If your response has been mailed previously, kindly disregard this request.

Your cooperation and assistance is most sincerely appreciated.

Professionally,

Karen Coale Tracey, Asst. Professor
Industrial Technology

Enclosures (2)

APPENDIX B

OPINIONNAIRE

Opinionnaire for Attitudinal Study of Faculty Women
Teaching in Industrial Technology
at NAIT Accredited Institutions

This opinionnaire has been designed to learn the opinions and attitudes toward the employment and advancement of faculty women teaching in Industrial Technology programs in the United States. In addition, it seeks general information about certain differences which exist between men and women faculty members. Please feel free to express candidly your attitudes, and your opinion of the attitudes of others even if you cannot present evidence to substantiate your views.

Part I. Please answer every item.

1. Number of years on faculty at your institution: _____

2. What NAIT region is your institution located? _____

3. What is your primary responsibility?

   _____ Administration or _____ Teaching/Research

4. Present rank:

   _____ Lecturer _____ Instructor _____ Assistant Professor

   _____ Associate Professor _____ Professor

5. Highest degree attained:

   _____ Bachelor _____ Masters _____ Doctorate

6. Primary area (s) of teaching (check all that apply)

   _____ Manufacturing _____ Construction _____ Graphic Design _____ Safety

   _____ CAD _____ CAM _____ Robotics ____Professional

   _____ Electronics _____ Drafting/design _____ Management _____ Aviation

7. Your age:

   _____ 20 - 24 _____ 40 - 44 _____ 60 - 64

   _____ 25 - 29 _____ 45 - 49 _____ 65 - 79

   _____ 30 - 34 _____ 50 - 54 _____ 80 +

   _____ 35 - 39 _____ 55 - 59

8. Gender: _____ Female _____ Male

9. How many faculty members are there within your IT department:

   _____ Female _____ Male

10. Would you consent to an indepth interview as part of a follow up study?

    _____ Yes _____ No

Part II. Each of the following statements refer to Industrial Technology faculty men and faculty women. Please respond to all statements by circling, at the right of each statement, the letter which best describes your opinion according to the following scale:

Scale

SD - Strongly disagree D - Disagree

A - Agree SA - Strongly agree

1.	Employment opportunities are equal for men and women in Industrial Technology at your institution.	SD D A SA
2.	Few IT faculty women meet the preparation requirements for promotion to upper ranks.	SD D A SA
3.	Women and men deserve equal pay for equal work in higher education.	SD D A SA
4.	IT faculty women are more dedicated to teaching than faculty men.	SD D A SA
5.	Employing agents favor employing better qualified women than men, as members of the Industrial Technology faculty.	SD D A SA
6.	Few IT faculty women stay in their positions long enough to earn promotions to upper ranks.	SD D A SA
7.	Employing agents tend to think automatically in terms of men when filling a new position on the Industrial Technology faculty.	SD D A SA
8.	IT faculty women are not as competitive in seeking advancements as faculty men.	SD D A SA
9.	IT faculty women have less of a professional commitment than do faculty men.	SD D A SA
10.	IT faculty women who wish to develop their potential have adequate opportunities to do so.	SD D A SA
11.	In higher education there should be a merit system of appointment and promotion regardless of gender.	SD D A SA
12.	In general, advancement for women in higher education is a slow process.	SD D A SA
13.	IT faculty women do not assume responsibility in decision-making as readily as faculty men.	SD D A SA

14.	IT faculty women are taken less seriously than faculty men when sent out to represent the institution.	SD D A SA
15.	Higher education institutions should have a greater proportion of men than women on their faculties.	SD D A SA
16.	The turnover rate of IT faculty women is higher than that of IT faculty men.	SD D A SA
17.	IT faculty women accept subordination more readily than do IT faculty men.	SD D A SA
18.	Few IT faculty women produce the research required for promotion to upper ranks.	SD D A SA
19.	IT faculty women are less mobile geographically than IT faculty men.	SD D A SA
20.	Exploration of the potential of women teaching in Industrial Technology programs has been neglected.	SD D A SA
21.	IT faculty women are often bypassed for promotion.	SD D A SA
22.	IT faculty women do want full equality, even if it does mean equal responsibility.	SD D A SA
23.	IT faculty women are regarded favorably by their colleagues.	SD D A SA
24.	Few IT faculty women are sufficiently interested to put forth the effort to earn advancement to upper ranks.	SD D A SA
25.	IT faculty women are more responsive to students than IT faculty men.	SD D A SA
26.	IT faculty women publish less than IT faculty men.	SD D A SA
27.	IT faculty women should learn to broaden their career interests more persistently than they have to date.	SD D A SA
28.	IT faculty women are more fearful than IT faculty men of conflict that might endanger their professional status.	SD D A SA
29.	Part-time IT faculty members do not give sufficient thought and time to their profession.	SD D A SA
30.	IT Faculty women have higher rates of sick leave than IT faculty men.	SD D A SA
31.	IT faculty women are less responsive to their colleagues than IT faculty men.	SD D A SA
32.	Cultural attitudes of male colleagues and of students prevent a woman in higher education from being an effective teacher.	SD D A SA

Please add any additional comments that have not been covered in this opinionnaire that you feel should be brought to the attention of the researcher.

APPENDIX C

REPORTED FREQUENCIES OF THE ADMINISTRATORS TO THE OPINIONNAIRE

Response of Female Administrators to Part I of Opinionnaire

Number of years on faculty at your institution:

(2) 1 - 5	(2) 21 - 25
(3) 6 - 10	(0) 26 - 30
(0) 11 - 15	(0) 31 +
(0) 16 - 20	

Present rank:

(0) Lecturer	(1) Assoc. Professor
(1) Instructor	(4) Professor
(1) Assist.Professor	

Highest degree attained:

(0) Bachelor	(1) Masters	(6) Doctorate

Age:

(0) 20 - 24	(2) 50 - 54
(0) 25 - 29	(1) 55 - 59
(1) 30 - 34	(0) 60 - 64
(0) 35 - 39	(0) 65 - 79
(1) 40 - 44	(0) 80 +
(2) 45 - 49	

Primary area (s) of teaching (check all that apply):

(0) Manufacturing	(0) Robotics
(0) Construction	(0) Professional
(3) Graphic Design	(0) Electronics
(1) Safety	(1) Drafting/Design
(0) CAD	(0) Management
(0) CAM	(0) Aviation

Response of Female Administrators to Part II of Opinionnaire

Opinionnaire Item	Strongly Disagree	Disagree	Agree	Strongly Agree	N	Mean
1	0	2	3	0	5	2.600
2	2	2	3	0	7	2.143
3	0	0	1	6	7	3.857
4	0	5	0	0	5	2.000
5	0	5	0	0	5	2.000
6	1	5	0	0	6	1.833
7	0	2	1	4	7	3.286
8	2	4	0	0	6	1.667
9	4	3	0	0	7	1.429
10	0	1	5	1	7	3.000
11	0	0	4	3	7	3.429
12	0	3	4	0	7	2.571
13	2	2	2	0	6	2.000
14	0	3	2	1	6	2.667
15	3	4	0	0	7	1.571
16	0	4	2	0	6	2.333
17	0	1	5	0	6	2.833
18	2	3	2	0	7	2.000
19	0	1	5	1	7	3.000
20	0	2	3	2	7	3.000
21	0	4	2	0	6	2.333
22	1	1	1	4	7	3.143
23	0	0	7	0	7	3.000
24	3	3	1	0	7	1.714
25	0	2	2	2	6	3.000
26	0	3	4	0	7	2.571
27	0	1	4	2	7	3.143
28	0	2	5	0	7	2.714
29	0	3	3	1	7	2.714
30	0	6	1	0	7	2.143
31	2	4	1	0	7	1.857
32	2	3	2	0	7	2.000

Response of Male Administrators to Part I of Opinionnaire

Number of years on faculty at your institution:

(17) 1 - 5	(18) 21 - 25
(21) 6 - 10	(9) 26 - 30
(7) 11 - 15	(1) 31 +
(12) 16 - 20	

Present rank:

(0) Lecturer	(15) Assoc. Professor
(1) Instructor	(68) Professor
(1) Assist.Professor	

Highest degree attained:

(0) Bachelor	(7) Masters	(78) Doctorate

Age:

(0) 20 - 24	(29) 50 - 54
(1) 25 - 29	(12) 55 - 59
(0) 30 - 34	(13) 60 - 64
(1) 35 - 39	(2) 65 - 79
(10) 40 - 44	(0) 80 +
(17) 45 - 49	

Primary area (s) of teaching (check all that apply):

(28) Manufacturing	(4) Robotics
(6) Construction	(30) Professional
(5) Graphic Design	(12) Electronics
(9) Safety	(13) Drafting/Design
(7) CAD	(26) Management
(3) CAM	(0) Aviation

Response of Male Administrators to Part II of Opinionnaire

Opinionnaire Item	Strongly Disagree	Disagree	Agree	Strongly Agree	N	Mean
1	12	4	31	47	94	3.202
2	26	32	16	8	82	2.073
3	0	0	8	77	85	3.906
4	25	51	6	0	82	1.768
5	8	37	23	6	74	2.365
6	12	54	7	1	74	1.959
7	22	31	30	0	83	2.096
8	29	48	5	0	82	1.707
9	42	38	0	0	80	1.475
10	1	8	49	26	84	3.190
11	1	3	24	55	83	3.602
12	11	44	22	6	83	2.277
13	34	46	4	0	84	1.643
14	22	49	8	2	81	1.877
15	36	38	5	1	80	1.638
16	7	51	13	0	71	2.085
17	23	49	9	0	81	1.827
18	20	49	7	3	79	1.911
19	14	40	25	2	81	2.185
20	5	24	41	11	81	2.716
21	21	52	7	0	80	1.825
22	3	8	35	36	82	3.268
23	1	2	58	21	82	3.207
24	30	40	7	3	80	1.788
25	15	51	12	1	79	1.987
26	12	63	5	0	80	1.913
27	8	40	25	2	75	2.280
28	14	49	13	0	76	1.987
29	6	47	22	5	80	2.325
30	13	53	8	0	74	1.932
31	27	56	0	0	83	1.675
32	37	39	5	0	81	1.605

APPENDIX D

REPORTED FREQUENCIES OF THE FACULTY TO THE OPINIONNAIRE

Response of Female Faculty to Part I of Opinionnaire

Number of years on faculty at your institution:

(34) 1 - 5	(0) 21 - 25
(9) 6 - 10	(0) 26 - 30
(4) 11 - 15	(0) 31 +
(3) 16 - 20	

Present rank:

(4) Lecturer	(6) Assoc. Professor
(5) Instructor	(8) Professor
(27) Assist.Professor	

Highest degree attained:

(2) Bachelor	(28) Masters	(20) Doctorate

Age:

(1) 20 - 24	(6) 50 - 54
(2) 25 - 29	(2) 55 - 59
(7) 30 - 34	(2) 60 - 64
(15) 35 - 39	(0) 65 - 79
(11) 40 - 44	(0) 80 +
(4) 45 - 49	

Primary area (s) of teaching (check all that apply):

(8) Manufacturing	(4) Robotics
(5) Construction	(10) Professional
(17) Graphic Design	(4) Electronics
(4) Safety	(13) Drafting/Design
(10) CAD	(14) Management
(3) CAM	(4) Aviation

Response of Female Faculty to Part II of Opinionnaire

Opinionnaire Item	Strongly Disagree	Disagree	Agree	Strongly Agree	N	Mean
1	6	16	24	4	50	2.520
2	8	17	13	8	46	2.457
3	0	0	2	48	50	3.960
4	3	24	13	3	43	2.372
5	4	24	10	1	39	2.205
6	8	26	11	1	46	2.109
7	2	11	24	12	49	2.939
8	10	26	10	2	48	2.083
9	35	13	1	0	49	1.306
10	5	20	21	3	49	2.449
11	0	2	21	26	49	3.490
12	1	9	25	13	48	3.042
13	17	25	7	0	49	1.796
14	4	14	19	9	46	2.717
15	27	18	2	2	49	1.571
16	4	25	11	2	42	2.262
17	8	17	20	3	48	2.375
18	12	30	8	0	50	1.920
19	7	20	19	2	48	2.333
20	1	8	24	13	46	3.065
21	3	23	17	5	48	2.500
22	3	0	14	31	48	3.521
23	2	20	24	2	48	2.542
24	26	15	6	2	49	1.673
25	2	15	25	6	48	2.729
26	13	22	11	0	46	1.957
27	10	14	13	4	41	2.268
28	6	16	20	7	49	2.571
29	11	24	8	2	45	2.022
30	19	26	3	0	48	1.667
31	23	24	2	0	49	1.571
32	15	23	9	1	48	1.917

Response of Male Faculty to Part I of Opinionnaire

Number of years on faculty at your institution:

(40) 1 - 5	(33) 21 - 25
(39) 6 - 10	(18) 26 - 30
(23) 11 - 15	(10) 31 +
(24) 16 - 20	

Present rank:

(2) Lecturer	(60) Assoc. Professor
(8) Instructor	(71) Professor
(46) Assist.Professor	

Highest degree attained:

(3) Bachelor	(55) Masters	(129) Doctorate

Age:

(0) 20 - 24	(39) 50 - 54
(2) 25 - 29	(25) 55 - 59
(7) 30 - 34	(24) 60 - 64
(22) 35 - 39	(4) 65 - 79
(34) 40 - 44	(1) 80 +
(29) 45 - 49	

Primary area (s) of teaching (check all that apply):

(80) Manufacturing	(25) Robotics
(20) Construction	(42) Professional
(22) Graphic Design	(46) Electronics
(18) Safety	(45) Drafting/Design
(41) CAD	(43) Management
(33) CAM	(3) Aviation

Response of Male Faculty to Part II of Opinionnaire

Opinionnaire Item	Strongly Disagree	Disagree	Agree	Strongly Agree	N	Mean
1	11	19	88	66	184	3.136
2	59	59	45	13	176	2.068
3	3	0	24	160	187	3.824
4	68	96	11	2	177	1.701
5	22	71	58	12	163	2.368
6	25	101	41	2	169	2.118
7	38	70	64	7	179	2.223
8	56	102	17	1	176	1.790
9	76	97	4	3	180	1.633
10	3	20	104	56	183	3.164
11	6	2	60	116	184	3.554
12	33	83	58	5	179	2.196
13	66	103	8	3	180	1.711
14	42	98	33	2	175	1.971
15	38	113	20	4	175	1.943
16	15	107	32	6	160	2.181
17	35	107	24	1	167	1.946
18	36	111	19	4	170	2.546
19	14	100	54	3	171	2.269
20	7	52	88	28	175	2.783
21	37	107	20	4	168	1.946
22	3	14	88	70	175	3.286
23	2	17	115	44	178	3.129
24	49	100	21	5	175	1.897
25	33	117	18	4	172	1.959
26	20	116	23	2	161	2.043
27	11	82	64	5	162	2.389
28	20	103	42	2	167	2.156
29	16	77	64	18	175	2.480
30	15	115	24	3	157	2.096
31	24	139	6	3	172	1.930
32	72	99	11	2	184	1.690

APPENDIX E

COMPARISON OF THE MEANS FOR THE RESEARCH QUESTIONS AND RELATED OPINIONNAIRE ITEMS

Comparison of the Means for Research Question 1 and Related Opinionnaire Items

	Female Admin.	Male Admin.	Female Faculty	Male Faculty
Employment ***	9.000	10.950	9.792	11.048
1***	2.330	3.528	2.414	3.185
3	3.667	3.906	4.000	3.808
5	2.000	2.283	2.172	2.308
7***	3.333	2.094	3.000	2.285
15**	1.333	1.679	1.621	1.977

* Significant between Administrators
** Significant between Faculty
*** Significant for Administrators and Faculty

Comparison of the Means for Research Question 2 and Related Opinionnaire Items

	Female Admin.	Male Admin.	Female Faculty	Male Faculty
Advancement	17.167	16.750	18.896	17.269
2	1.667	1.962	2.448	2.031
6	2.000	1.962	2.207	2.115
8**	2.000	1.624	2.103	1.823
11	3.333	3.623	3.448	3.492
12**	2.667	2.170	3.276	2.231
18	1.667	1.925	1.931	1.908
21**	2.667	1.868	2.586	1.969
24**	1.667	1.755	1.552	1.900

* Significant between Administrators
** Significant between Faculty
*** Significant for Administrators and Faculty

Comparison of the Means for Research Question 3 and Related Opinionnaire Items

	Female Admin.	Male Admin.	Female Faculty	Male Faculty
Personality ***	18.333	14.300	16.021	15.563
8**	2.000	1.642	2.103	1.823
9**	1.333	1.434	1.276	1.669
13*	2.000	1.623	1.828	1.709
17***	2.667	1.868	2.517	1.946
22**	2.333	3.264	3.483	3.285
24**	1.667	1.755	1.552	1.900
27***	3.333	2.321	2.276	2.369
28***	2.333	1.962	2.690	2.146

* Significant between Administrators
** Significant between Faculty
*** Significant for Administrators and Faculty

Comparison of the Means for Research Question 4 and Related Opinionnaire Items

	Female Admin.	Male Admin.	Female Faculty	Male Faculty
Job Mobility	6.667	5.888	6.292	6.371
6	2.000	1.962	2.207	2.115
16	2.333	2.075	2.379	2.185
19*	3.000	2.189	2.345	2.285

* Significant between Administrators
** Significant between Faculty
*** Significant for Administrators and Faculty

Comparison of the Means for Research Question 5 and Related Opinionnaire Items

	Female Admin.	Male Admin.	Female Faculty	Male Faculty
Teaching Effectiveness ***	6.500	5.188	6.708	5.335
4**	2.000	1.830	2.448	2.031
25***	3.333	2.000	2.690	2.008
32**	1.333	1.585	2.103	1.738

* Significant between Administrators
** Significant between Faculty
*** Significant for Administrators and Faculty

Comparison of the Means for Research Question 6 and Related Opinionnaire Items

	Female Admin.	Male Admin.	Female Faculty	Male Faculty
Research/ Scholarly Writing *	4.333	3.750	3.771	3.886
18	1.667	1.925	1.931	1.908
26***	2.333	1.887	1.862	2.038

* Significant between Administrators
** Significant between Faculty
*** Significant for Administrators and Faculty

Comparison of the Means for Research Question 7 and Related Opinionnaire Items

	Female Admin.	Male Admin.	Female Faculty	Male Faculty
Professional Contributions	5.500	4.825	4.708	5.353
9**	1.333	1.434	1.276	1.669
13*	2.000	1.623	1.828	1.709
30**	2.333	1.960	1.759	2.123

* Significant between Administrators
** Significant between Faculty
*** Significant for Administrators and Faculty

Comparison of the Means for Research Question 8 and Related Opinionnaire Items

	Female Admin.	Male Admin.	Female Faculty	Male Faculty
Acceptance by Associates	7.500	6.625	6.646	6.970
14**	3.000	1.887	2.931	2.000
23**	3.000	3.189	2.552	3.131
31***	2.000	1.642	1.552	1.962

* Significant between Administrators
** Significant between Faculty
*** Significant for Administrators and Faculty

Comparison of the Means for Research Question 9 and Related Opinionnaire Items

	Female Admin.	Male Admin.	Female Faculty	Male Faculty
Full Potential	5.833	5.800	5.375	5.862
10**	3.000	3.189	2.379	3.115
20	3.000	2.660	3.207	2.831

* Significant between Administrators
** Significant between Faculty
*** Significant for Administrators and Faculty

BIBLIOGRAPHY

Aburdene, P., & Naisbitt, J. (1992). Megatrends for women. New York: Villard Books.

Aisenberg, N. & Harrington, M. (1988). Women of academe: Outsiders in the sacred grove. Amherst MA: The University of Massachusetts Press.

Alleman, E., Cochran, J., Doverspike, J., & Newman, I. (1984). Enriching mentoring relationships. Personnel and Guidance Journal, 62, pp. 329-332.

Almquist, M. E. (1974). Sex stereotypes in occupational choice: The case of college women. Journal of Vocational Behavior, 5, pp. 13-21.

Almquist, M. E., & Angrist, S. S. (1971). Role model influences in the women's career aspiration. In A. Theodore (Ed.) The professional women: Trends and prospects. Cambridge, MA: Schenkman.

Almquist, M. E., & Angrist, S. S. (1972). Role model influences on college women's career aspirations. Merrill-Palmer Quarterly, 77, pp. 263-279.

Alper, T. G. (1974). Achievement motivation in college women. A now-you-see-it-now-you-don't phenomenon. American Psychologist, 29, pp. 194-203

Amey, M. J. (1992). Academic women: Different ways of knowing. Paper prepared for presentation at the Annual Meeting Association for the Study of Higher Education October, 1992. ERIC document 352 911.

Anderson, R., & Ramey, P. (1990). Women in higher education: Changes and challenges. Welch, Lynne B. (Ed.). New York: Praeger

Aneshensel, C., & Rosen, B. (1980). Domestic roles and sex differences in occupational expectations. Journal of Marriage and the Family, 42, pp. 121-132.

Angrist, S. S., & Almquist, M. E. (1975). Career and contingencies. New York: Dunellen.

Argote, M. E., Fisher, J. E., McDonald, P. J., & O'Neal, E. C. (1976). Competitiveness in males and females: Situational determinants of fear of success behavior. Sex Roles, 2, pp. 295-303.

Astin, H. S. (1968). Career development of girls during the high school years. Journal of Counseling Psychology, 15, pp. 536-540.

Astin, H. S. (1984). The meaning of work in women's lives: A sociopsychological model of career choice and work behavior. The Counseling Psychologist, 12, pp. 118-126.

Astin, H. S., & Hirsch, W. Z. (eds.) (1978). The higher education of women: Essays in honor of Rosemary. New York: Praeger.

Auster, D. (1984). Mentors and proteges: Power-dependent dyads. Sociological Inquiry, 54(2), pp. 142-153.

Bahniuk, M. H., Dobos, J., & Hill, S. K. (1990). The impact of mentoring, collegial support, and information adequacy on career success. Journal of Social Behavior and Personality, 5, pp. 431-452.

Basil, D. C. (1972). Women in management: Performance, prejudice, and promotion. New York: Dunellen.

Bausell, R. B. (1986). A practical guide to conducting empirical research. New York: Harper & Row Publishers, Inc.

Berch. B. (1982). The endless day: The political economy of women and work. New York: Harcourt Brace Jovanovich, Publisher.

Berwald, H. (1962). Attitudes toward women college teachers in institutions of higher education accredited by the North Central Association. Unpublished doctoral dissertation, University of Minnesota, Minneapolis.

Betz, N. E. (1989). Implications of the null environment hypothesis for women's career development and for counseling psychology. The Counseling Psychologist, 17, pp. 136-144.

Betz, N. E. (1990, June). What stops women and minorities from choosing and completing majors in science and engineering. Paper presented at the Science and Public Policy Seminar presented by the Federation of Behavioral, Psychological and Cognitive Sciences, Washington, DC.

Betz, N. E., & Hachett G. (1983). The relationship of mathematics self efficacy explanations to the selection of science-base college major. Journal of Vocational Behavior, 23, pp. 329-345.

Borg, W., & Gall, M. (1990). Educational research: An introduction. (5th ed.) New York: Longman.

Bowers, A. (1985). Mentors and proteges in male-dominated cultures: The experience of top-level women executives. Unpublished dissertation, California School of Professional Psychology, Los Angeles.

Bridges, J. S., & Bower, M. S. (1985). The effect of perceived job availability for women on college women's attitudes toward prestigious male-dominated occupations. Psychology of Women Quarterly, 2, pp. 265-277.

Brooks, L., & Haring-Hidore, M. (1987). Mentoring in academe: A comparison of protégés' and mentors' perceived problems. International Journal of Mentoring, 1, pp. 3-10.

Burlin, F. D. (1976). The relationship of parental education and maternal work and occupational status to occupational aspiration in adolescent females. Journal of Vocational Behavior, 9, pp. 99-104.

Burton, A. (1977). The mentoring dynamic in the therapeutic transformation. The American Journal of Psychoanalysis, 37, pp. 115-122.

Chronicle of Higher Education. (1975, September 2). Washington D.C.

Chronicle of Higher Education. (1993, August 25). The Chronicle of Higher Education Almanac, Washington D.C.

Condry, J., & Dyer, S. (1976). Fear of success: Attribution of cause to the victim. Journal of Social Issues, 32, pp. 63-83.

Crim. R. D. (1979). Expressed attitudes of faculty men and women toward faculty women in higher education in New Hampshire. Unpublished doctoral dissertation, University of Mississippi, University.

Davis, D., & Astin, H. S. (1987). Reputational standing in academe. Journal of Higher Education, 58, 3, pp. 261-275.

Dissertation Abstracts. [CDROM]. (1993, January - 1995, March). DAI Volumes 53/7 - 55/9. Ann Arbor, MI.

Drake, M. M. (1991). Recruiting women into technology programs. ATEA Journal, 19(1), pp. 16-19.

Driscoll, A. (1992, February 16). Opening education's doors for girls. Boston Sunday Globe. Boston, MA.

Eaker, D. J. (1990). Becoming a different kind of person, making a different kind of world: Race, class and gender in the schooling and career experiences of twelve academic women. Unpublished doctoral dissertation, The University of North Carolina, Chapel Hill.

Educational Resources Information Center. [CDROM]. (1995). United States Department of Education, Washington, D.C.

Epstein, C. F. (1970). Encountering the male establishment: Sex status limits on women's careers in the professions. American Journal of Sociology, 75(2), pp. 10-15.

Erdos, P. L. (1970). Professional mail surveys. New York: McGraw-Hill Book Company.

Erkut, S., & Mokros, J. R. (1984). Professors as models and mentors for college students. American Educational Research Journal, 21(2), pp. 399-417.

Fagenson, E. A. (1989). The mentor advantage: Perceived career/job experiences of protégés versus non-protégés. Journal of Organizational Behavior, 26, pp. 309-320.

Farmer, H. S. (1985). A causal model of college women's career choice (monograph). Journal of Counseling Psychology, 32, pp. 363-390.

Farren, C., Gray, J., & Kay, B. (1984). Mentoring: A boon to career development. Personnel, 61, pp. 20-24.

Fassinger, R. E. (1985). A causal model of college women's career choice (monograph). Journal of Vocational Behavior, 27, pp. 123-153.

Gallein, A. A. (1992). Selected factors related to career achievement of women administrators in community colleges. Unpublished doctoral dissertation, North Carolina State University, Raleigh.

Gerson, K. (1985). Hard choices. Berkley: University of California.

Gilligan, C. (1982). In a different voice. Cambridge, MA: Harvard University Press.

Ginder, C. E. (1961). Hiring practices. Office Executive, 36, pp. 11-13.

Goldin, C. (1990). Understanding the gender gap: An economic history of American women. New York: Oxford University Press.

Gordon, F. E., & Strober, M. H. (1975). Bringing women into management. New York: McGraw-Hill.

Gosman, T. (1993). The influence that marital status has on the advancement of professional women in non-traditional field. ED 360 223.

Greenfeld, S., Greiner, L., & Wood, M. M. (1980). The "feminine mystique" in male-dominated jobs: A comparison of attitudes and background factors of women in male--dominated versus female--dominated jobs. Journal of Vocational Behavior, 17, pp. 291-309.

Greenhaus, J. H., & Parasuraman, S. (1986). Vocational and organizational behavior, 1985: A review. Journal of Vocational Behavior, 29, pp. 115-176.

Gutek, B. A., & Nieva, V. F. (1979). Determinants of career choice in women. New Directions for Education, Work, and Careers. San Francisco: Jossey-Bass.

Hagen, R. L., & Kahn, A. (1975). Discrimination against competent women. Journal of Applied Social Psychology, 5, pp. 362-376.

Halcomb, R. (1980). Mentors and the successful women. Across the Board, 17, pp. 13-17.

Hanson, P. A. (1983). Protégé perception of the mentor-protégé relationship: Its complementary nature and developmental tasks. Unpublished doctoral dissertation, The University of Wisconsin-Madison.

Hawley, P. (1972). Perceptions of male models of femininity related to career choice. Journal of Counseling Psychology, 19, pp. 308-313.

Hennig, M. (1974). Family dynamics and the successful woman executive. In R.B. Kundsin (Ed.), Women and success (pp. 88-99). New York: William Morrow.

Hennig, M., & Jardim, J. (1977). The managerial women. New York: Simon & Schuster.

Hensel, N. (1991). Realizing gender equality in higher education: The need to integrate work/family issues. ASHE ERIC Higher Education Report No. 2. Washington, DC: George Washington University School of Education and Human Development. ED 338 128.

Hinkle, D. E., Wiersma, W., & Jurs, S. G. (1979). Applied statistics for the behavioral sciences. Boston, MA: Houghton Mifflin.

Holland, J. L. (1973). The psychology of vocational choice: A theory of personality types and model environments. Waltham, MA: Blaisdell Publishing Co.

Hornig, L. S. (1972). Affirmative action through affirmative attitudes. Albany: New York State Education Department.

Houser, B. B., & Garvey, C. (1985). Factors that affect nontraditional vocational enrollment among women. Psychology of Women Quarterly, 9, pp. 105-117.

Howard, K. C. (1992). Gender role attitudes: Differences among students enrolled at a private church-related university and a public state-supported university and among traditional and nontraditional female majors at both institutions. Unpublished doctoral dissertation, Memphis State University, Memphis, TN.

Hunt, D. M., & Michael, C. (1983). Mentorship: A career training and development tool. Academy of Management Review, 8(3), pp. 475-485.

Huston, A. C. (1983). Sex typing. In P.H. Mussen & E.M. Hetherington (Eds.), Handbook of child psychology (Vol 4). Socialization, personality and social behavior (pp. 387-467). New York: Wiley.

Idress, R. (1989). Women administrators' career paths in higher education: Experiences and perspectives. Unpublished doctoral dissertation, University of Massachusetts, Amherst.

Ireson, C. (1978). Girls' socialization for work. In A. H. Stromberg & S. S. Harkess (Eds.), Women working--Theories and facts interspective (pp. 176-200). Palo Alto, CA: Mayfield Publishing Co.

Ironside, E. M. (1981). Uncommon women/common themes: Career paths of upper-level women administrators in higher education institutions. Paper presented at the annual meeting of the Southern Association for Institutional Research, Charlotte, NC, October 29-30.

Jeruchim, J., & Shapiro, P. (1992). Women, mentors, and success. New York: Ballantine Books.

Johnston, W. B., & Packer, A. H. (1990). Work force 2000: Work and workers for the twenty-first century. Indianapolis, IN: Hudson Institute.

Kanter, R. M. (1977). Men and women of the corporation. New York: Basic Books.

Kellerman, B. (1978). Mentoring in political life: The case of Willie Brandt. The American Political Science Review, 72(2), pp. 422-433.

Kingdon, M. A., & Sedlacek, W. (1982). Differences between who chooses traditional and nontraditional careers. Journal of the National Association of Women Deans, Administrators, and Counselors, 42(2), pp. 34-36.

Kirshstein, R. J. (1976). Sex difference in the academic structure. Unpublished doctoral dissertation, University of Massachusetts, Amherst.

Klemmack, D. L., & Edwards, J. N. (1973). Women's acquisition of stereotyped occupational aspirations. Sociology and Social Research, 57 (4), pp. 510-525.

Korabik, K. (1981, March). Androgyny and leadership: An integration. Paper presented at a meeting of the Association for Women in Psychology, Boston, MA. (ERIC Document Reproduction Service No. ED 208'274).

Kram, K. E. (1985). Mentoring at work: Developmental relationships in organizational life. Glenview, IL: University Press of America.

Kriedberg, G., Butcher, A. L., & White, K. M. (1978). Vocational role choice in 2nd and 6th grade children. Sex Roles, 4, pp. 175-182.

Krumboltz, J. D., Mitchell, A. M., & Jones, G. B. (1976). A social learning theory of career selection. The Counseling Psychologist, 6(1), pp. 71-80.

Krumboltz, J. D., & Schroeder, W. W. (1965). Promoting career planning through reinforcement. The Personnel and Guidance Journal, 44, pp. 19-26.

Kvande, E. (1986). Factors affecting women's decision to study at the Technical University of Norway (NTH). European Journal of Engineering Education, 11 (3), pp. 295-302.

LaCroix, M. L. (1992). Relations among gender, years of experience, and preferred mentoring functions of high school assistant principals. Unpublished doctoral dissertation, University of Massachusetts, Amherst.

Lee, K. (1985). An assessment of attitudes of faculty men and women toward faculty women toward faculty women in higher education in the Republic of Korea. Unpublished doctoral dissertation, Western Michigan University, Kalamazoo.

Lemkau, J. P. (1983). Women in male-dominated professions: Distinguishing personality and background characteristics. Psychology of Women's Quarterly, 8, pp. 144-165.

Levinson, D. J., Darrow, C. N., Klein, E. B., Levinson, M. H., & McKee, B. (1978). The seasons of a man's life. New York: Alfred A. Knopf.

Loring, R. K., & Wells, T. (1972). Breakthrough: Women into management. New York: Van Nostrand Reinhold.

Maccoby, E. E. (1970). Feminine intellect and the demands of science. Impact of Science in Society, 20, pp. 13-28.

MacKay, W. R., & Miller, C. A. (1982). Relations of socio-economic status and sex variables to the complexity of worker functions in the occupational choices of elementary school children. Journal of Vocational Behavior, 20, pp. 31-37.

Mathews, J. J., Collins, W. E., & Cobb, B. B. (1974). A sex comparison of reasons for attrition in a male-dominated occupation. Personnel Psychology, 27, pp. 535-541.

McBroom, P. (1985). The third sex. New York: William Morrow.

McCarthy, M. (1988, Winter). The professorate in the educational administration: UCEA Presidential Address, 1986. UCEA Review, XXVIII, (2).

McNeer, E. J. (1983). Two opportunities for mentoring: A study of women's career development in higher education and administration. Journal of the National Association of Women Deans and Counselors, 47(1), pp. 8-14.

Merriam, S. (1983). Mentors and proteges: A critical review of the literature. Adult Education Quarterly, 33, pp. 161-173.

Miller, L. E., & Smith, K. L. (1983, September/October). Handling non-response issues. Journal of Extension. Volume XXI.

Minium, E. W., & Clarke, R. B. (1982). Elements of statistical reasoning. New York: John Wiley & Sons, Inc.

Mishler, S. A. (1975). Barriers to the career development of women. In H.S. Osipow (Ed.), Emerging woman: Career analysis and outlooks (pp. 117-146). Columbus, OH: Charles E. Merrill Publishing Co.

Missirian, A. (1982). The corporate connection: Why executive women need mentors to reach the top. Englewood Cliffs, NJ: Prentice Hall.

Moore, K. M. (1984). Careers in college and university administration: How are women affected? New Directions for Higher Education, 45, pp. 5-15.

Moore, K. A., & Sawhill, I. V. (1978). Implications of women's employment for home and family life. In A.H. Stromberg & S. Harkess (Eds.), Women working (pp. 201-225). Palo Alto, CA: Mayfield Publishing Co.

Morgan, S. W., & Mausner, B. (1973). Behavioral and fantasied indicators of avoidance of success in men and women. Journal of Personality, 41, pp. 457-470.

Nash, S. C. (1979). Sex role as a mediator of intellectual functioning. In M. A. Wittig & A. C. Petersen (Eds.) Sex-related differences in cognitive functioning (pp. 263-302). New York: Academic Press.

National Association of Industrial Technology. (1993). Industrial technology directory. Ann Arbor, MI.

National Association of Industrial Technology. (1994). Industrial technology accreditation handbook. Ann Arbor, MI.

National Center for Educational Statistics. (1991). Digest of education statistics. (ED 340 141). Washington, DC: U.S. Government Printing Office.

National Manpower Council. (1957). Women power. New York: Columbia University.

National Research Council. (1987). Computer chips and paper clips: Technology and women's employment. Washington, D.C.: National Academy Press.

National Science Foundation. (1990). Women and minorities in science and engineering. Washington, DC: Author.

Nelson, J. A. (1978). Age and sex differences in the development of children's occupational reasoning. Journal of Vocational Behavior, 13, pp. 287-297.

Nevels, J. N. (1980). An assessment of attitudes of faculty women and faculty men toward faculty women in selected departments at Michigan State University. Unpublished doctoral dissertation, Michigan State University, East Lansing.

Noland, E. W., & Bakke, E. W. (1949). Workers wanted: A study of employers hiring policies, preferences, and practices in New Haven and Charlotte. New York: Harper.

Oregon State System of Higher Education. (1992). Promoting women's participation in Higher Education: The status of women in OSSHE. Eugene, OR. ED 353 866.

Osipow, S. H. (Ed.) (1975). Emerging women. Columbus, Ohio: Charles E. Merrill Publishing Company.

Osipow, S. H. (1983). Theories of career development (3rd. ed.). Englewood Cliffs, NJ: Prentice Hall.

Patton, M. Q. (1982). Qualitative evaluation methods. Beverly Hills, CA: Sage.

Petit, R. M. (1972). Attitudinal study of faculty women in higher education in the Northwest United States. Unpublished doctoral dissertation, University of Montana, Missoula.

Post-Krammer, P., & Smith, P. L. (1985). Sex differences in career self-efficacy consideration, and interests of eighth and ninth graders. Journal of Counseling Psychology, 32, pp. 551-559.

Rezler, A. G. (1967). Characteristics of high school girls choosing traditional or pioneer vocations. Personnel and Guidance Journal, 45, pp. 659-665.

Ridgeway, C. (1978). Parental identification and patterns of career orientation in college women. Journal of Vocational Behavior, 12, pp. 1-11.

Ruble, T. L. (1983). Sex stereotypes: Issues of change in the 1970's. Sex Roles, 9, pp. 397-402.

Ryan, M. (1993, May/June). Women's challenge to higher education. Academe, pp. 22-27.

Sadler, B. R. (1992). Success and survival strategies for women faculty members. Association of American Colleges, Washington, D.C. ED 350 906.

Schlossberg, N. K., & Goodman, J. (1972). A women's place: Children's sex stereotyping of occupations. Vocational Guidance Quarterly, 20, pp. 266-270.

Schwartz, E. (1971). The sex barrier in business. Atlanta: Georgia State University.

Scott, A. F. (1984). Making the invisible woman visible. Urbana, IL: University of Illinois Press.

Shakeshaft, C. (1987). Women in educational administration. Beverly Hills, CA: Sage.

Sharps, M. J., Welton, A. L., & Price, J. L. (1993). Gender and task in the determination of spatial cognitive performance. Psychology of Women Quarterly, 17, pp. 71-83.

Shavlik, D. L., Touchton, J. G., & Pearson, C. R. (1988). The new agenda of women for higher education: A report of the ACD commission on women in higher education. Washington DC: American Council of Education.

Sheehy, G. (1974). Passages: Predictable crisis of adult life. New York: E.P. Dutton.

Signorella, M. L., & Jamison, W. (1986). Masculinity, femininity, androgyny, and cognitive performance: A meta-analysis. Psychological Bulletin, 100, pp. 207-228.

Signorella, M. L., & Vegega, M. E. (1984). A note on gender stereotyping in research topics. Personality and Social Psychology Bulletin, 10, pp. 107-109.

Simon, R. J., & Rosenthal, E. (1967). Profile of the women Ph.D. in economics, history, and sociology. Association of American University Women Journal, 60(3), pp. 127-129.

Standley, K., & Soule, B. (1974). Women in male dominated professions: Contrasts in their personal and vocational histories. Journal of Vocational Behavior, 4, pp. 245-250.

Stokes, J. M. (1984). Organizational barriers and their impact on women in higher education: Research report. Washington, DC: National Association for Women Deans, Administrators, and Counselors.

Stonewater, B. B. (1987). Career traits, decision style, and Gilligan: Implications for counseling women. Journal of National Association for Women Deans, Administrators, and Counselors, 50, pp. 17-26.

Stringer, P. M., & Duncan, E. (1985). Nontraditional occupations: A study of women who have made the choice. Vocational Guidance Quarterly, 33, pp. 202-212.

Super, D. E. (1951). Vocational adjustment: Implementation a self concept. Occupations, 30, pp. 88-92.

Super, D. E. (1990). A life-span, life-space approach to career development. In D. Brown & L. Brooks (Eds.), Career choice and development: Applying contemporary theories to practice. (2nd ed.) (pp. 101-261). San Francisco: Jossey-Bass.

Tack, M. W., & Patitu, C. L. (1992). Faculty job satisfaction: Women and minorities in peril. ASHE ERIC Higher Education Report No. 4. Washington, DC: The George Washington University, School of Education and Human Development.

Tangri, S. S. (1972). Determinant of occupational role innovation among college women. Journal of Social Issues, 28, pp. 177-199.

Tangri, S. S., & Jenkins, S. R. (1986). Stability and change in role innovations and life plans. Sex Roles, 14, pp. 647-661.

Tannen, D. (1990). You just don't understand. New York: Ballantine Books.

Tarvis, C., & Offir, C. (1977). The longest war. Chicago: Harcourt Brace Jovanovich.

Trigg, L. J., & Perlman, D. (1976). Social influences on women's pursuit of a nontraditional career. Psychology of Women Quarterly, 1(2), pp. 138-150.

Tsuchigane, R., & Dodge, N. (1975). Economic discrimination against women in the United States. Lexington: Lexington Books.

United States Department of Education, National Center for Educational Statistics. (1990). Integrated postsecondary education data system. Washington, DC: U.S. Government Printing Office.

United States Department of Labor, Bureau of Labor Statistics. (1993). Geographic profile of employment and unemployment. Washington, DC: U.S. Government Printing Office.

United States Department of Labor, Manpower Administration. (1970). Volume 1 Dual Career. Washington, D.C.: U.S. Government Printing Office.

Vogel, R. S., Broverman, I. K., Broverman, D. M., Klarkson, E., & Rosenkrantz, P. S. (1970). Maternal employment and perception of sex rolls among college students. Development Psychology, 1, pp. 384-391.

Warwick, D. P., & Lininger, C. A. (1975). The sample survey: Theory and practice. New York: McGraw-Hill.

Weber, C. E. (1980). Mentoring. Directors and Boards, 5(1), pp. 17-24.

Weidman, C. S. & Weidman, J. C. (1975, April 1). The woman professor of education: Social and occupational characteristics. Paper presented at the annual meeting of the American Educational Research Association, Washington, D.C.

Young, V. E. (1985). A model of internal barriers to women's occupational achievement. Unpublished doctoral dissertation, University of Massachusetts, Amherst.

Zey, M. G. (1984). The mentor connection. Homewood, IL: Dow Jones-Irwin.

Zuckerman, H. (1977). Scientific elite: Nobel laureates in the United States. New York: Free Press.