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Women in non-traditional careers

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Women in Nontraditional Careers

by

Teresa Ann Roche

A thesis submitted in partial fulfillment
of the requirements for the degree of
Education Specialist Degree
Department of Adult Career and Higher Education
College of Education
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Dedication

I dedicate this thesis to my parents, Mr. and Mrs. William Roche, and family who have given me more than life. They have made me a strong, determined, persistent, dedicated woman who believes that work will always pay off. I dedicate this topic to all women, especially my mother, who was a courageous Navy WAVE during World War II. She shined along with all the other gals!

During the finishing of the revisions of my summary, my family was very saddened about the demise of two very dear family members, Mr. William Kaler in Ocala, Florida, and Mr. Thomas Lynch of Rochester, New York, who were loved by all. This work is dedicated to my parents' family, Mrs. Thomas Lynch, and Mrs. William Kaler, my godmother. I know of the love that both of their friends and families have for Mr. Lynch and Mr. Kaler; and these dear loved ones would wish for me that I carry out my mission to advance young women into any path they choose including nontraditional careers.

I also dedicate this work to a very special young lady, Christina Ortiz, who I mentor. Her dedication, and nonstop spirit in the last seven years are remarkable, despite her challenges. I hope this work challenges her to set her goals high and never give up.

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Women in Nontraditional Careers

Teresa A. Roche

ABSTRACT

In a traditional male dominated field such as construction, and automotive technology, artificial barriers and attitudes have often prevented qualified females from reaching their full potential. The late entrance of females into these fields has created very few role models for nontraditional younger females entering these professions. This study was designed to create a profile for nontraditional females working in a male dominated work force. A large percentage of females have experienced some barriers due to discrepancies in gender performance. Acceptance by peers, community and administrators, combined with the challenge of balancing family and career appears to be areas of concern for nontraditional females.

Purpose of the Study

The purpose of this research is to examine the history, philosophies, barriers, successes and future trends of females in non-traditional careers. The U. S. Department of Labor, Women's Bureau (1991) has defined nontraditional jobs as occupations in which females constitute 25 percent or less of the employees in a given occupation (Burnett, Huh, & Rolling, 1996). The study will explain and compare how the variety of different jobs for females has changed over time. The research will show the important effects history has played as a critical role in helping define people's perceptions and attitudes toward females working in non-traditional careers.

Introduction

The majority of females chose domestic service as an occupation before 1940; in many rural farming communities, families members had to hire help during harvesting season. Females would work on canning, butter making or processing grain. Men worked on more typical jobs such as planting or harvesting. Often times those who were hired were family members such as daughters, or even neighbors. “All were in equal status to their employers, and often shared bedrooms and even beds with members of the family for whom they worked” (Baxadal & Gordon, 1995, p.22).

“The best new opportunities were those most likely to become permanently available to females such as office work. These opportunities in turn created an incentive for females to complete high school and, among the most privileged, even college. (In 1920, 28,000 females attended college, or 7.6 percent of all females) (Baxadal & Gordon, 1995, p. 22). Many of these college females remained single by choice in these years, made their way into professional and managerial jobs, and especially social work, nursing and teaching. Class differences among females, once arising mainly from the position of their fathers or husbands, now emerged from women’s own positions, along with a division between career women and other females who considered themselves employed temporarily until they were married” (Baxadal & Gordon, 1995).

Throughout 1940, new jobs were created; men were hired first and eventually females. In 1941, the Volee Aircraft Company hired 25 females in California, fourteen in Massachusetts (Coleman, 1995). Although females made progress in some companies,

many employers still refused to hire females. The men's responses were that "females did not have the physical strength, mechanical ability, and emotional stability to do high-paying, skilled factory jobs. In addition, employers said the presence of females would distract them (Coleman, 1995).

One of the reasons females had problems getting a job in a nontraditional area was that laws were passed prohibiting married females from getting jobs in local government. During the 1930-1931 school years in a survey of fifteen hundred school districts 77 percent of the districts reported that they refused to hire married females and 63 percent of them fired female teachers if they married. In 1936, many Americans said that wives should not work if their husbands had a job. In 1939, 84 percent of insurance companies and 65 percent of banks put limits on married females working (Coleman, 1995).

During World War II, females were hired in increasing numbers by the Department of Labor. Several federal agencies worked together to encourage the employment and work on marketing strategies for females. A ten minute film was shown to females about "Women in Defense" written by Eleanor Roosevelt, narrated by actress Katherine Hepburn. The film highlighted careers in areas such as a scientist, a factory worker, a modern pioneer, and a Red Cross volunteer, just to name a few. Mary Anderson from the Department of Labor and head of the Women's Bureau announced that she "worked at establishing job training programs for females. Through the National Youth Administration (NYA), a program set up during the Great Depression to help unemployed youth, twenty thousand females were learning such skills as welding and radio repair" (Coleman, 1995). Many ethnic organizations became involved, such as the

Division of Negro Affairs of the NYA. The director, Mary McLeod Bethune felt it was important to show that all black females were included in any of the training programs.

This was a great achievement, especially since segregation was still legal.

America got ready for the war; black Americans “rallied together to insist they be treated on an equal basis with white people” (Coleman, 1995). The military realized that Black Americans were going to be needed in various jobs. Franklin Delano Roosevelt issued an executive order in 1941 banning discrimination against employers from not hiring minorities. The order stated in part...”It is the policy of the United States to encourage full participation in the nation defense program by all citizens of the United States, regardless of race, creed, color, or national origin” (Coleman, 1995).

World War II Brings Changes in the Workplace

World War II brought dramatic changes. According to Weatherford, (2004) “Just as the been the case with the earlier wars in Tampa’s history, the presence of the military brought a huge economic boom to a city still stagnating from the Great Depression. A WPA report from February 1941 made clear the persistence of poverty” (p. 256). There were positive aspects, for job opportunities for females, in many areas in the skilled careers and industry. But World War II would bring employment opportunities to women unlike they had ever seen before, for in addition to the many jobs created by the presence of three airbases, Tampa’s other attraction for the wartime economy was its shipyards” (Weatherford, 2004, p. 257).

A song, “Rosie, the Riveter,” soon became the catch phrase that represented all female war workers. Written by Redd Evans and John Jacob Loeb in 1942, “Rosie, the Riveter,” was first released in February 1943. The upbeat song was heard on the radio, in records and in coin-operated machines located in restaurants, bus and train stations that played three-minute versions of the songs called “soundies” (Coleman, 1995). Six million women joined the workforce during World War II. Women worked in shipyards, lumber mills and steel mills. They worked as welders, mechanics, electricians and boilermakers, operated streetcars, buses, cranes, and tractors. In addition, women worked as engineers in the drafting rooms and physicists in industrial laboratories (Coleman, 1995). Women also became role models as police officers, taxicab drivers, lawyers, statisticians, journalists, and members of symphony orchestras (Weatherford, 2004). Women served as

volunteers for the Red Cross. Millions of women worked in jobs for the Civil Defense as air-raid wardens, fire watchers, messengers, police and drivers auxiliary. Many women took on the challenging task and devoted hours of scanning the sky looking for enemy planes. Men also wanted to join the military. In 1942, Congress created a way for women to serve in the military. The Women's Army Auxiliary Corps began with the encouragement of Rep. Edith Nourse Rogers. Twenty-two women had enlisted from Tampa, and Bertha Langford Hunt was among the first to be commissioned as a WAAC officer earning her lieutenant's bars in September 1942 (Weatherford, 2004, p. 259-260).

World War II produced a record number of ammunition, warships, self-propelled guns, airplanes, tanks and warships (Coleman, 1995). *Time Magazine* called America's wartime production a miracle (Coleman, 1995). None of this would have taken place without Rosie the Riveter.

When the war ended in 1945 so did many jobs for women. Unfortunately, Rosie the Riveter disappeared as quickly as she was created. Although the patriotism and loyalty was high from women, to support the men during the war, factories and companies were still forced to lay them off. One woman remembers the day after the war ended. "We met the women at the door, and they were lined up all the way down Market Street to the old movie theater about eight blocks away, and we handed them a slip to go over to personnel and get the severance pay. We did not even allow them in the building, all these women with whom I had become so close, had worked seven days a week for years and had been commended so many times for what they were doing" (Coleman, 1995).

The United States Government officially let men know that they “no longer need females workers to fill positions in various jobs” (Coleman, 1995). However, it was very clear that women’s wartime efforts, victories, and achievements and contributions are found in a variety of “the words and writings of females and men who lived during World War II; in employment records and statistics; magazine and newspaper articles; radio programs; and thousands of posters, pamphlets and photographs (Coleman, 1995). During the Great Depression the stereotypes that people had in their minds about men and female’s careers were suddenly postponed due to the miraculous millions of females who went to war for the men by helping out in the various industries. This was a time that females surely proved that traditional barriers had been broken down and they had proven they could succeed in the once considered “nontraditional” careers for females. It was evident that females rose to the occasion.

The Culture of the Automotive Shop Floor

Through the twentieth century, society and the industry experienced the unpolished male working class culture. The mass production workers and the negative views of male culture were in tension and conflict. This background information is important because it helps to understand why females entering the workforce faced such barriers, resistance and great challenges to change for a time. During the early 1930s and 1940s many automotive workers were mad, angry, frustrated, and humiliated. For example, the uprisings at the Briggs and Murray Body Plants in 1933, a strike in the Toledo Automotive Lite Plant, as well as sit down strikes in 1936 and 1937 at the Flint and Detroit plants. There were various strikes in 1941 at Ford, when workers battled in the streets, with police and the state militia. With all of this unrest, male automotive workers mainly wanted to strive for better protection of unions to better provide for their families and live what everyone calls the “American Dream.”

The Automotive Industry

Men in the areas of automotive technology, electrical engineering, human resources, management and computer design historically dominated the automotive industry. Many years ago, in the automotive industry, as well as other industries, sitting behind a desk answering telephones and typing letters was considered a woman's place.

According to *Automotive News*, 2000:

"Men hold nearly all the highest ranking jobs. Corporate boards remain male dominated. A woman presiding over a major automaker still seems as distant as a woman in the Oval office. But social and economic changes in the past quarter century that transformed women's roles at home, and at work did not bypass the auto industry. Women have begun to make it in the executive ranks; they are excelling there and the opportunities are expected to expand" (p. 2).

Many consultants agree in the industry that the cultural shift must multiply, if opportunities and advancement for females are going to continue. According to Mary Mattis of Catalyst, a non-profit organization that works with businesses to advance women, "The business is changing. Women coming into companies really have to be more decisive about the assignments they accept. And companies, if they really want the women in key positions, have to make sure women get key operating roles" (*Automotive News* 2000, p. 2). Also, *Automotive News*, (2000) states:

“Companies—if they really wanted females in key positions, have to make sure females get key operating roles... Females not only hold key positions, they have those positions that have clout. Clout titles are those that have the most influence and policymaking power... An example of their rise in power can be seen in the statistical figures from some of the numbers in 1999. For all Fortune 500, 1999 companies, 11.9 percent of corporate officers and top earners were females, up from 8.7 percent in 1996. Additionally, females held 5.1 percent of what *Catalyst* calls clout titles, up from only 2.4 percent in 1996. There are 22 females on this *Automotive News* list that hold clout titles, defined by Catalyst chairman, CEO, Vice-Chairman, President COO, senior executive, vice-president, and executive vice president, and senior and group vice presidents and that jumps to 35 percent” (p. 3).

Regardless of their clout titles or not, the *Automotive News* 100, females have left their mark on the automotive industry. They come from diverse backgrounds, and chose various careers within the automotive industry. Those females who have the top jobs began working in the automotive industry in mid level positions. Other groups of females that are changing the automotive industry’s future are working in the area of suppliers. There are still many other females achieving in nontraditional careers such as automotive design, sales, marketing, engineering and interior design. There are females being resourceful serving the industry from the outside by working for associations sponsoring outreach programs associated with the industry, and working for associations as advocates on behalf of females (*Automotive News*, 2000). While this statement is a

reflection of the automotive industry, positive changes are being made in the management part of the industry. Women in other nontraditional careers such as agriculture, construction, engineering, and computer technology face barriers in their careers in different forms. Perhaps the strong career oriented women of the automotive industry of 2006 can help career and technical education leaders to improve the education for future younger females. In order to do this we must implement a strong curriculum in the public schools, which includes cooperative education and work experience prior to graduation from high school.

World War II Brings Changes to the Automotive Industry

For many years, the majority of American females chose to stay home and raise their children. The typical American family was portrayed on television programs during the 1950s or 1960s such as, “The Adventures of Ozzie and Harriet” and “Leave It to Beaver.” During these prime-time programs, the father worked in a business office while the mother stayed at home with the children. While this scenario by no means accurately portrayed every American household, it closely reflected the values and ideals of a majority of females in the country (Sheng, Hall & Rojewski, 1996, p. 3).

Social change during the late 1960s through the 1980’s, along with financial necessities allowed females to obtain a foundation in the business world, especially “redefining their role to include paid employment as a norm rather than an exception” (Nash, cited in Sheng, Hall & Rojewski, 1996, p. 3). Nash forecasted that these trends would persist for the remainder of this century. Thus, between 1985 and 2000, white males who only a generation ago made up the dominant segment of the labor market, will compromise only 15 percent of net additions to the U. S. workforce. The majority of new entrants will be females and non-white minorities.

Females continue to work in traditionally female occupations such as teaching, food service, and library, retail sales, nursing and clerical positions as they did during the 1960s when they had almost no choices in terms of careers. According to Sheng, Rojewski, and Hall (1996): Females represented 80 percent administrative support workers; 9 percent precision production, craft repair workers; 68 percent retail, personal

services; 40 percent executive managers and administrators, and 9 percent non-traditional careers (p. 3).

Females in Nontraditional Industries

According to Weeks (2001) in the article, entitled *Enterprising Females in Non-Traditional Industries*:

“Women are starting and growing businesses at twice the rate of their male counterparts; women-owned firms are becoming more economically substantial; and women-owned firms are just as financially strong and credit worthy as the average U. S. firms. The newest forms of business ownership were those in nontraditional industries such as construction manufacturing and transportation” (p. 1).

Citing an article by Weeks (2001) the Center for Women’s Business Research states:

“There are 6.2 million majority-owned, privately held women owned firms in the United States, representing 28 percent of all firms. Over the past five years, the numbers of women-owned firms have increased 14 percent, twice the national business average of 7 percent...The fastest growing women’s entrepreneurship surprisingly is found among businesses that are not typically thought of as female dominated industries, such as construction, agriculture, and transportation” (p. 1).

The number of all women-owned firms grew a total of 14 percent between 1997 and 2002, and the number of women-owned non-traditional businesses (agriculture, construction, manufacturing, transportation, communications, and wholesale) grew by a

total of 17.5 percent. In comparison, the traditional industries (retail career, finance, insurance and real estate) owned by women only grew by 10.4 percent. The number of female owned employer firms in non-traditional industries showed a 50.2 percent growth. The transportation/communications areas have shown a solid growth by rising 27.2 percent and 23.6 percent increases respectively, in all firms in the industry, and a total of 69.4 percent and 50.6 percent increases among employer firms (Weeks, 2001, pp. 2-3).

The fact that females are involved in all kinds of entrepreneurship, especially those included in non-traditional industries, is a positive step in the right direction for many reasons. First, it is very important for younger females considering careers in any of these areas to have mentors and role models to follow because what historically was considered to be a non-traditional career for females a decade ago, no longer exists. Secondly, females need to feel they are being given the same opportunities that males are given. What significance does this have for younger females contemplating a future career in nontraditional fields such as construction, manufacturing, automotive, agriculture, or mining? In the year 2002, “ the number of female-owned firms in non-traditional industries increased by 35.4 percent. In contrast, the number of female-owned firms in traditional industries grew by 10.4 percent during that time, but employment increased by 36.5 percent and revenues jumped 46.7 percent” (Weeks, 2001, p. 3). (See Appendix B).

Gender bias and societal influences led to the lack of female participation in the automotive industry. Female students did not have the opportunity to view females in such a positive way.

The increased participation of females in all industries helped those females who are pioneers to “break the glass ceiling.” The continuing progress of female-owned non-traditional business firms is on the rise. The terms “traditional and non-traditional careers” likely will be relics of the past, as female-owned businesses become a visible part of the fabric of every industry” (Weeks, 2001, p. 3).

Vocational Education Programs and the Carl D. Perkins Act

Federal legislation authorizing funding for vocational education programs as the Carl D. Perkins Vocational Education Act, were designed to ensure that females had equal access and opportunity in vocational education, as early as the 1970s. Originally the Perkins programs included special populations, such as displaced homemakers, single parents and students seeking non-traditional training, the majority of them were females (American Association of Women Public Policy Government Relations, 2004). There were many changes in 1988, due to Congress, as they were “looking for more ways to send block grant money to states so they could carry out the objectives of the federal program” (American Association of University Women, June 2004, p. 1).

An educator has a powerful impact on a student’s life. Often times it can be as simple as making a positive statement of interest regarding a particular career. As Burge and Culver (1996), concluded:

“The willingness of vocational educators to be innovative in recruitment and retention activities can make a difference in women’s lives.

Wrightsmann and Keau (1996) pointed out that perceptions and attitudes have been assumed to guide people to adopt different vocational and life roles. In turn, educators perceptions and attitudes may have significant effects on student behavior” (As cited by Sheng, Rojewski, and Hall, 1996, p. 6).

The American Association of University Women (1992) feels that equal access to high wage skilled jobs are important. In these fields usually dominated by men, such as plumbing, construction or automotive, females can prove their strengths and begin to close the difference in the wage gap. Statistics indicate that females who do not earn a bachelor's degree constitute an important population group earning only 68 percent of the median income earned by male workers. To shrink the wage gap for skilled workers, participation and achievement in career and technical education should not be bound to gender segregation and stereotypes, harassment or barriers that prevent females — including single mothers, displaced homemakers, and former welfare recipients—from being self-sufficient (American Association of University Women, June 2004).

The better opportunities for females in the 1990s did little to improve the economic outlook especially for households headed by females and low-income families. This outlook is because the demands are higher for a skilled labor force. The process has caused females to remain in low paying jobs and without benefits. Many females unfortunately lacked the necessary skills or training to qualify for high-wage jobs. The opportunity for females to be hired in stable positions was lost in traditionally male-dominated industries because of their lack of skills.

The Carl D. Perkins Vocational and Applied Technology Act, the Higher Education Act, the Transportation Equity Act for the 21st Century, The Personal Responsibility and Work Opportunity Reconciliation Act are programs that play a critical role in the females' workforce issues. There are several reasons for this. They include: 1) an economic slowdown, 2) a potential jobless recovery, and 3) the reauthorization of several major pieces of legislation affecting female workers.

In the last century, female workers have increased in number and greater proportion in the workforce (*Wider Opportunities for Women*, 2002).

1. The number of working females has grown from 5.3 million in 1900, to 18.4 million in 2001.
2. Women make up 18.3 percent of the labor force in 1902, 29.6 percent in 1950, and 46.6 of the labor force in 2001.
3. Ninety-nine out of 100 women in the United States will work for pay at some point in their lives.
4. Women make up 77 percent of the cashier positions, 76 percent of hotel clerks, and 82 percent of maid positions.
5. Women are the 60 percent of low-wage workers and living paycheck to paycheck (*Wider Opportunities for Women*, 2002).

Career and Technical Education

Career and technical education, formally known as vocation education, is one of the keys to solve some of today's problems in a competitive workforce. Career and technical education bridges the gap and teaches students valuable skills necessary for today's labor market. The problem, however, is that many occupations, are still gender segregated. "For several decades, females seemed to be the 'forgotten half' in vocational education because they have been either prepared for occupations in homemaking or low-pay, or dead-end jobs" (Rojewski, 1996, p. 2). "This ultimately contributes to inappropriate vocational preparation and barriers inhibiting female participation in non-traditional programs. These female participants could otherwise benefit from a wide range of high-tech skills that offer long term employment and higher wages" (Sheng, Hall & Rojewski, 1996, p. 2). Although more females are entering traditionally male occupations, they still make up a small minority in male dominated occupational training programs. Females who are considering entering non-traditional careers, face many barriers.

Females Preparing for the Workforce

Career preparation and school –to- work programs give females an opportunity to apply the skills they learned in school to the “real world” environment. However, school-to-work programs often fail to deliver what they actually promise: Helping females and minorities enter programs that are nontraditional for their race and gender” (American Association of University Women, 1998).

In 1994, the School-To-Work Act mandated an increase in the number of young females preparing for non-traditional careers. In order to increase positive role models and factors that influence females in choosing nontraditional careers, the following National School-To-Work office strategies are recommended: 1) Include females in nontraditional occupations on advisory councils; 2) hiring females instructors in non-traditional educational areas; 3) including workshops on nontraditional employment in training institutions; 4) offering grant incentives for encouraging nontraditional careers in request for proposals for local school-to-work initiatives; 5) purchasing textbooks, videotapes, posters portraying females in nontraditional occupations; 6) collecting data that link occupations and gender; and 7) designing nontraditional occupations for program development (National School-To-Work Opportunity Office, 1996).

The State Plan for the School-To-Work Opportunities Act 1994 addresses the following issues: 1) describes the goals of the state and the methods that the state will use, such as awareness and outreach; 2) to ensure opportunities for young females to participate in school-to-work opportunity programs in a manner that leads to employment

in high performance, high paying jobs, including nontraditional employment, and 3) goals to ensure an environment free from racial sexual harassment (Florida State Department of Workforce Development, 1998). This plan was included to make educational opportunities an “absolute priority” as stated by the United State Department of Education.

The Institute for Women in the Careers, and Technology and Science outlines the program for school-based learning. The following components of the program are:

1. Outreach to female students: “to let students know that females can do career, technology, and science jobs and that they will be welcomed in school and work-based learning settings.”
2. Career information and advising: “It is important that career information shows females in a wide variety of careers, technology and science occupations.”
3. Females mentors: “Females in nontraditional career tracks will greatly benefit from at least one woman mentor who can advise them on such issues as establishing credibility on an all male worksite.”
4. Training for teachers and counselors: “In-service and pre-service “for overcoming the learning patterns females and boys often fall into the classroom that impede participation and education and achievement in math and science classes.”

5. Parent involvement: “Parents can learn strategies that will support their daughters’ achievement in math and science education and their pursuit of career clusters in careers, technology and science.”
6. Math and science education: “Math and science courses in the elementary and middle school years are the critical building blocks for upper level classes, school-to-work career clusters in careers, technology, science and in postsecondary math and science education” (ITTS, 1998).

Females working in nontraditional careers presently must inspire younger females to pursue a nontraditional area. The modern day armed forces is a good example of many nontraditional careers for younger females as the articles from the Air Force and U.S. Navy (2006) describe. Secretary James G. Roche of the US Air Force stated to members of Women in Aviation International, (WAI):

"It is my great privilege this morning to join the distinguished line-up of leader and aviators, promote aviation as a career choice for women, and encourage the advancement of women in aviation fields reflects objectives that are as admirable as they are practical. This is a special community, and one that is held in high regard, whether you are serving in the private sector, or in the government. I am personally grateful for the role WAI plays in supporting the further development of this capability. By providing resources to assist women aviation, and encouraging young women to consider aviation as a career choice, you continue the work of aviation's pioneers, expanding the boundaries of flight as well as the aspirations of women who seek to slip the surly bonds and as we like to

say in the Air Force, 'cross into the blue.' It is my great personal honor to lead the 700,000 active, guard, reserve and civilian men and women of the Air Force. They are all 'Airmen.' We are one Air Force. And Our Nation remains free today as a result of their bravery, excellence and selfless service"(LookSmart, 2004).

The Navy also offers excellent careers for women. One popular media source is, *Navy Newsstand*, which keeps the country up to date regarding communications about the war in Iraq. On January 13, 2006, at a Naval base in VA. Rear Admiral Donald Bullard, NECC's first commander stated:

"I'm proud to work the with men and women who work in expeditionary logistics specialists, the naval coastal warfare groups and the master-at-arms forces. The TECC will also provide the 500 to 700 Sailors supporting the Army and Marine Corps in the Middle East with the proper training for these non-traditional jobs. It's time that to recognize the need of the young men and women at war and on the dirt," said Bullard (*Navy Newsstand*, January 2006).

Women's roles in the armed forces have greatly changed since World War II, in a positive way. Younger females will have a variety of career choices of nontraditional role models to choose from as society changes their view of nontraditional female work roles. Hopefully the term "nontraditional" will become a term of the past as we continue to educate students about choices through Career and Technical Education.

The Role of Education and Training for Females and for all Workers

Access to education and training is important for females and families to be able to support themselves. Statistics have shown that training and educational access provides people with the skills necessary to compete in today's job market. In the July 2002 report by the U.S. Census Bureau found that in 1999 the average annual earnings ranged from \$18,900 for high school dropouts to \$25,900 for high school graduates to \$45,400 for college graduates, and \$99,300 for holders of professional degrees This gives them career potential and upward mobility toward a positive future (U. S. Census Bureau, July 2002).

The comparison of earnings for that of a worker with a bachelor's degree or someone with just a high school diploma "increases by about \$1 million for non-Hispanic whites and about \$700,000 for African Americans, Asians/Pacific Islanders and Hispanics (*Wider Opportunities for Women*, 2002).

Data also indicates that households that are led by single females with a high school diploma are 60 percent more likely to have jobs than those without a high school diploma or equivalent (*Wider Opportunities for Women*, 2002). On a more positive note, single females that are heads of household with an associate's degree are 95 percent more likely to be employed (*Wider Opportunities for Women*, 2002).

In the past, there have been many reasons why the barriers regarding female participation in non-traditional programs are complicated. Career educators could prevent females' access to non-traditional programs. This may be based on their beliefs that vocational opportunities are limited by gender. Educators transmit their gender biases

in classrooms, counseling situations, and other activities; and ignore or do not implement the 1990 Carl D. Perkins Vocational and Applied Technology Education Act which benefits females; or use gender biased and stereotyped materials for assessment, guidance and education. Therefore, negative perceptions of instructors, counselors and administrators toward female participation in nontraditional programs can be a major barrier for females who wish to enroll in a nontraditional program.” (Cited in Sheng, Rojewski & Hall, 1996, p. 4.). Comments made by an educator working in the school system, such as, “You’d have to get dirty working as a technician on a daily basis,” might have a negative tone of voice which indicates to a student that her decision to enter a non-traditional field has received a disapproval rating from the educators who are supposed to be actively recruiting in a positive non-biased manner. Historically, two year vocational programs, unfortunately, do not receive the respect or credit they deserve. This is an unfortunate indication of the type of negative public relations that is being directed, in general, from school guidance counselors in promoting nontraditional career choices for females.

Females and Computer Education

Does it matter if a young female does not want to play on a computer? Should she be forced? According to research, playing with computer games helps to develop an array of learning skills, such as focusing, concentration and problem solving. Most important, perhaps, it helps children to acquire a familiarity and ease with technology of critical importance in the future job market (Brzowsky, 1998). According to a 1997 Bureau of Labor Statistics, the occupations with the fastest employment growth for the decade are computer scientists, computer engineers and systems analysts. While there are many people who feel that computers may not be of interest to females, that is simply not the case according to Roberta Furger, who wrote *Does Jane Compute? Preserving Our Daughters' Place in the Cyber Revolution*. Ms. Furger states that “given the opportunity—that is the key—females demonstrate an interest in computers time and time again (Brzowsky, 1998).

According to Brzowsky (1998) females, compared to males, play just as much on the computer. An interesting point to make is that software for males and females are available for both groups. However, as females grow up and their interests develop games are not available. Companies do not want to take the financial risk for fear games aimed toward females will not sell. As a society, we still have the mentality of different expectations for males and females. We must change these expectations. Also, we still typically see science and technology activities as more masculine than feminine.

Brzowsky (1998) studied males and females play. “The main objection of females to existing computer games,” she says, “was that they are boring. Females tend to be interested in character and story as social complexity in their play. They’re not drawn to speed and action or defending opponents, or high scores for their own sake or beating the clock” (p. 3).

The Career Selection Process

Future workers will be expected to be ready and willing to learn. There are many factors that affect movement within the labor market for groups and individuals not the least of which is how a person views the world of work and how he or she fits into this occupational identity from complex interactions of many political, family and environmental factors (Flanigan, 1995; Hacker, 1992; Harter, 1990; Steinberg, 1989). The knowledge of students' aspirations plays an important role in the education planning process regardless of the philosophical underpinnings that drive the program development process. On the other hand, the developmental perspective of Dewey yields an education system grounded in a philosophy of teaching the individual that is generally accepted as one of the keys to optimal development of all persons (Mosher, 1995; Venn, 1996). Human development is the objective of education in this system (Swortel, 1998).

The process of choosing a career or an occupation is important within each of these competing frameworks and is heavily influenced by background and attributes such as race and gender (Harter, 1992; Steinberg, 1998). However, many educators, including this author believe that human development rather than efficiency is the ultimate standard for evaluating educational productivity (Johnson, 1994).

Harter (1990) and Steinberg (1998) believe there are certain factors that influence females and teens, their overall interests and nontraditional careers. This provides useful information for future planning of career education and post secondary programs especially those that target nontraditional students.

In a study conducted by researchers Kaplan and Farrell (1994) entitled *Weavers of Webs: A Portrait of Young Women on the Net*, those questions such as why females seek electronic spaces, what they articulate as their aims, expectations and desires; how females make their electronic communication practices meaningful to themselves by investigating a small community of adolescent females.

Many studies have shown male participation outnumber females, and male participation dominates female in most electronic environments, where the participation of females is remarkable for its vigor (Selfe & Meyer, 1991; Herring, Johnson & DiBenedetto, 1992). These professional females who have actively participated in the network culture confirm the following: Females feel frequently ignored, silenced, even abused in electronic conversations (Kaplan & Farrell, 1994).

The studies tell us what keeps females from fully participating in electronic communication. One author describes a “fear of the intimate machine.” Kaplan and Farrell (1994) make several valid points about others who have conducted research in this area regarding electronic communication. Studies often disregard that many females are determined to pursue computers no matter what kind of barriers they find. The research has concentrated mainly on communication practices of professional females in schools, at the elementary and secondary level. More research needs to be conducted on females in electronic discourse when participation occurred outside of the formal education setting.

Recent Trends in Female Career Opportunities

The goal of education is to provide opportunities to gain skills, knowledge, information and attitudes that prepare students for the real adult world. In order to achieve this purpose educators should follow clear goals that communicate equality for all. By providing an environment that has a climate of equitable learning, students need to become informed about the career choices available to them, which prepare them for the changing roles at home and in the diverse work place.

Policy makers and researchers continue to maintain the importance of encouraging nontraditional career choices when seeking to raise educational standards and occupational outcomes (Burnett, Huh, & Rolling, 1996). Numerous benefits are associated with employment in nontraditional positions, including higher wages than traditional occupations, flexible work schedules, increased job security and more personal fulfillment (U. S. Department of Labor, Women's Bureau, 1991). However, traditional attitudes about "men's" and "women's" jobs often bring individuals who make nontraditional vocational choices into a hostile working environment. Numerous activities have been initiated in attempt to change this situation by working toward attracting more individuals into nontraditional occupations (Burnett, Huh, & Rolling, 1996).

Gender inequities remain despite legislation that prohibits sex discrimination. Maraskin (1998) reported that the results of years of effort regarding gender equity with too little progress have even led to cynicism and ambivalence toward these issues. The

persistent negative attitudes have kept future students from progressing into nontraditional career options. The combination of the burden of society's barriers, sex discrimination, and many years of legislation calls our attention not only to sex equity issues, but to more nontraditional vocational and technical education programs for these students. This will introduce vocational and technical education to females and help them make more informed career choices. If more females were employed as agricultural teachers, technical teachers or technology education young teachers, females and teens would have female role models as influences when they are choosing a career path. Vocational education has made the "elimination of sex bias and stereotyping a national priority in vocational education for many years" (Rojewski, 1996).

Female Choices

Females have begun to make strides toward greater economic equity after fighting for women's rights. Technology has become an increasingly important part of everyday life—business, government, and the economy. The greater use of technology implies that if females are going to continue to move toward increased economic strength, they will have to incorporate the use of technological skills as part of their power base (Brzowsky, 1998; Pazy, 1994; Spender, 1995; U. S. Bureau of Labor Statistics,). Since technology is considered a nontraditional field, it should be noted that according to Smith (2000): Females are only 16 percent of all scientists, six percent of all engineers, and four percent of all computer scientists. In addition, females hold less than 15 percent of professional jobs that require a college degree in math, science, and/or technology (Goff, 1997; Huchinson & King, 1994; McLean, 1996, U. S. Bureau of Labor Statistics (1997).

Female Gender

In the report, “Gender Gaps: Where Schools Still Fail Our Children” (1999), researchers explored what changes have been made that have affected the education of female students. The research outlines the following positive and negative outcomes:

1. Females have made great strides in education and probably receive a fairer education today than in 1992.
2. Gender gaps in areas such as math and science have narrowed; some favoring males and some favoring females have persisted or emerged.
3. For females—an equitable education is an elusive goal—out of reach. (p. 2)
4. According to research, high school females and males take similar numbers of science courses; males are more likely than females to take three core science courses—biology, chemistry, and physics by graduation (American University of Women, 1999).
5. A marked gender gap persists in physics, where females’ enrollments lag behind males’.
6. In math and science, a large portion of males rather than females receives top scores on the National Assessment of Education Progress (NAEP), a national representative test of specific subject knowledge given to students in the 4th, 8th, and 12th grades. The gender gap increases with the grade level. On the other hand, African American females, however, match or outscore African American males at every assessment point.

7. Scores on the Third International Mathematics and Science Study (1995-1996), an achievement test given to half a million fourth, eighth, and twelfth grade students in forty-one nations revealed a gender gap in math and science that increased with age. By the 12th grade, males outscored females.
8. From 1990 to 1994 female enrollment in advanced placement courses and honors calculus and chemistry classes improved relatively to males' enrollment. Physics was an exception, along with scoring as well as the males on the Advanced Placement exam (American Association of University Women, 1999, p. 3).

The Progress Made by Females in Math, Science, and Technology

In a research study conducted by Pell (1996), *Fixing the Leaky Pipeline: Women Scientists in Academia*, despite the number of females that has increased receiving their doctorates over the past twenty years, females unfortunately are under-represented on university facilities. The reasons for these inequities are: the retention of women in science, early childhood, adolescence, college, and the graduate school/job entry period. The study mentions difficulties that females face in balancing career and family responsibilities. The study also notes the importance of effective networking and mentoring at the faculty level to keep female adolescents involved in math and science.

The research has shown that, “females come to class and see math as something men do.” They don’t perform well when they already have this point of view. In the area of science, evidence shows that males are more familiar in school and out of school with the overall subject matter. “One study of science classrooms found that 79 percent of all student assisted science demonstrations were carried out by males” (American Association of University Women, 1998). When females pursue science courses, they do not receive enough guidance or encouragement to pursue scientific careers. Sixty-four percent of the males who had taken physics and calculus were planning to major in science and engineering in college, compared to only 18.6 percent of the females who had taken the same subjects. Studies report that support from teachers, and school administrators can make a big difference. In addition, a major factor in whether or not

females choose scientific or technological careers depends on whether they have teacher support.

What the Research Reveals from the Classroom

At the preschool level, educators tend to organize activities that will attract males' interests, which often allow them to excel in certain classes or presentations, and those "student-teacher interaction patterns in science classes are often particularly biased" (American Association of University Women, 1992). "Even in math classes, where biased classes are found," psychologist Jacquelynne Eccles reports that select males in each math class she studied received particular attention to the exclusion of all other students. The research suggests that females and males learn better when they take on projects and activities in a cooperative learning atmosphere, in like fashions rather than in a competitive manner, like physics. "Shortchanging Females" (2002) tell us that females do not come into the school systems with the same amount of confidence and self-esteem as males (American Association of University Women).

The 1990 American Association of University Women poll documents report that females have "a loss of self-confidence that is twice that for males as they move from childhood to adolescence." (p.6)

Technology and Gender

According to theories in the article, “The Women’s Way of Knowing” (1999), if females and men think and learn differently in the classroom as educators, then we need to address those differences. This is especially true in the areas of technology education, where there is a severe shortage of females. Zuga’s (1999) theory suggests that technology educators have not examined the philosophy and psychology of female thinking to learn how to be more inclusive of females in both technology education and creating technology.

The manner in which all educators approach technology, math and science can improve their delivery during teaching as well as positively influence females. Educators should organize their activities so they are attractive to female students along with the “value and purpose of technology and the way in which it is taught must be changed” (Zuga, 1999).

Females need a better understanding in the classroom and an explanation about career and technical education. Females are often frustrated within a technology classroom because females often state they tell their teachers they do not understand things, however, most teachers do not explain and help students learn how to do things. Some students need a more specific degree of higher explanation than others. Technology teachers need to experiment with creative ways to communicate their ideas about technology in a variety of learning activities so that teachers can continue to break down

the gender barriers for females in science and technology, which will improve the nontraditional workforce.

Gender-gaps from various subject areas in schools indicate how females are still behind in terms of performance. The AAUW 1992 report, “How Schools Shortchange Females,” calls upon various state, local, and national leaders, to take action to “provide equitable treatment for females in public schools.” There are many questions that need to be addressed when gender is researched. Two important issues that must be looked at when one examines the issue of females’ equity in education: The use of classroom technology and teacher professional development. Our society and workforce have made it clear that technology is an exclusive all-male profession, which intimidates females and therefore, creates barriers. Educators must be sensitive to this issue, as well as the issues females face from working in nontraditional careers in the automotive industry, construction, manufacturing, technology, or agriculture. Educators have to be careful about negative views or opinions, which inadvertently will influence females into not pursuing nontraditional careers. Doing this, at any school age greatly discourages them from a challenging nontraditional career. In addition, this does not help various employers fill their critical shortage areas with workers in the job market (AAUW, 1998).

The Impact of Role-Modeling on Women's Career Choices

In the article, *Evaluating Progress in Gender Equity in Careers for Women in Science and Technology: the Impact of Role Modeling on Women's Career Choices*, Norby (1997) discusses research involving unequal representation of females in science and technology. She stresses students' scientific elementary skills, but notes how their skills decline as they enter high school or college. Negative teacher behaviors, along with sex-role and stereotyping have affected young female attitudes about their future success in any careers that have been considered nontraditional or "masculine." Role modeling has been an important means to encourage young females to choose careers in technology and science. Career choice, for many individuals in our society, is a sociological issue (Brooks-Gunn & Schempp-Matthews, 1979). Many young people choose careers by that for which they believe they or their parents can afford to finance training. Some choose careers based primarily on how much time they want to have for family and leisure activities, especially young women (Richmond-Abbott, 1983). Role modeling is a sociological area of influence, which can be used to encourage young women to choose science, and technology related careers in greater numbers (Smith, 1983). Educators have an important influence on this area, both positively and negatively. Research has shown that young women must be encouraged in science and technology careers by the time they reach their middle school years, in order to acquire a sufficient science and mathematics background. Science careers require adequate mathematics and science background for the student entering an engineering or physical

science course of study. Girls, who are discouraged from taking mathematics and science courses in middle and high school, reach college with an accumulated disadvantage (Smith, 1983).

Norby (1997) collected data on issues related to women in technology careers and developed a short survey on *Role Models and Career Choices*, based on a previous questionnaire used with high school girls (Smith, 1983). The following questions and answers showed the following results:

Question 1: *What was the single most important influence on your interest and achievements in science or technology?* required a descriptive answer. The answers included individuals, male or female, such as the respondent's father, who frequently was in a technical field himself, an older sister, or a characteristic of the respondent, such as "insatiable curiosity," need for economic independence, or fun playing with technical projects. One respondent indicated that her father was a nurse, and that he had been especially helpful in encouragement to seek a goal, which might not be typical of her gender.

For Question 2: *Do you think Role Models help women pursue and achieve successful careers in technology?*, 90 percent of the individuals who did reply, responded that a role model was important in influencing them to choose and maintain an interest in a career in science or technology. The results of this survey paralleled the results of the author's doctoral dissertation, which showed that young women who choose science and technology related careers are much more likely to have identified a role model in their life (Smith, 1983). It is of special interest to note that Smith found that the gender of the role model is not as important as is the positive nature of the interaction between the role

model and the young woman. The important quality of the role model was that she or he was positive, encouraging and supportive in the relationship with the young woman.

The following is a selected, more extensive answer to Question 2, and illustrates the need to provide role modeling in technology and science career areas where young women are still a small minority of the total population:

"Most certainly. I have spent 5 semesters in engineering classes with an average of 3 women out of 30 in a class. None of my professors are female. Very few show concern for gender issues. It is difficult for me to attend classes regularly. Though I am capable of excelling, I feel apathetic about the learning process. Sometimes attending labs makes me physically sick. The only thing that keeps me going is my pre-membership in our local AAUW (American Association of University Women) chapter. Seeing these women, where they are in their lives, how strong they are, consistently inspires me to pull through."

Question 3: *How would you define "role model"*, related to the respondents' personal definition of a role model, and tended to indicate a person, of either gender, who exhibited admirable traits to the individual, or who had encouraged and supported her in her training and interests in science and technology.

For Question 4: *Is the gender of the role model important?*, 86 percent of the respondents believe that the gender of the role model is not important, although a few said that they believe that it helps to see women in roles where men have traditionally been the only examples.

In response to Question 5: *What was your age when you chose a career in science or technology?*, most of the respondents made the decision to pursue a career in science or technology when they were in their early teens. However, one remarkable respondent indicated that she made her decision when she was sixty years of age, reminding us that lifelong learning implies that we can become accomplished in new areas later in life than traditional stereotypes would suggest!

For Question 6a: *Was your mother employed in a scientific/technology career?*, only 19 percent of the respondents replied that their mothers had been employed in a scientific/technology career. This reflects a continuing practice that started at the end of World War II, in the United States, when women were sent back home to make room for the returning male work force (Historical Statistics of the U.S., Part 1, 1970). When the work force needs technical labor, then women have been encouraged into work, but when males are available, only a few exceptional women are able to maintain employment in traditionally male dominated, higher paid fields.

In response to Question 6b, *Was any other family member employed in such a career?*, 71 percent of the respondents answered that they had had another family member who had been employed in a science/technology related career. Of those who answered yes, three said that the gender of that person was female. Twelve reported a male family member in a science or technology related career.

Question 7 asked for general comments on the topic of women in scientific and technical careers. What follows is a noteworthy, verbatim quotation from one woman's answer:

"Yes. I believe that there are still a great number of men in scientific and technical careers that don't respect their female coworkers or employees. However, I find that this respect can be earned through hard work, dedication, and fighting for what you deserve - without making personal attacks. I think too many women in the workplace feel that they deserve respect just because they are present and accounted for. No woman is *owed* a career or career advancement. The men earn theirs, we must earn ours. And if there are still some men who create a hostile environment, then we file a formal complaint, talk to their supervisors, and if that doesn't work... find another job. I want equal rights, not special rights."

An issue revealed by this response is, in the author's opinion, a common theme relating to women in the workplace. First, women workers do not want special treatment, only fair treatment. Most women want an opportunity to be judged for their ability, regardless of gender, and, to obtain equal pay for equal work. And, tangentially, there is the issue of the "Queen Bee Syndrome", where some sort of underlying resentment by women already in the workplace, of other women who share that workplace, is very hard to eradicate. More than women judge men's behavior, there is an unfortunate tendency for women to judge other women's behavior, and to apply more demanding standards that require that another woman work even harder than a man to "earn her stripes" (Dr. Millie Graham, personal communication).

The final questions on the survey were intended to obtain demographic data. The average age of the respondents was 38, with the maximum being 60, and the minimum age 21. Respondents included individuals from the northeastern United States, the South,

the Midwest, two individuals at University of Wyoming who are students in the physical sciences, both graduate and undergraduate, and three from outside the United States—Canada, the United Kingdom, and Australia.

Spectrums of educational levels were represented, including the 21-year-old undergraduate, and a Ph.D. who is also a "docent". Most of the respondent's degrees were in engineering or physical and biological sciences, with one reporting a bachelor's and master's degree in business. Responses to the question on marital status included individuals who are single, one who indicated that she is planning never to marry, married, married with children, and living with significant other but not married.

As previously mentioned, the percentage of responses to this survey was small, due to the time frame for returning replies. One respondent requested that the author fax her the survey, as her computer screen "scrolled too fast" for her to respond by E-mail. Other factors include the time of year (Thanksgiving and Christmas holidays), when many individuals are not reading their E-mail and responding immediately, and, of course, the fact that this was a voluntary survey. Possibly the respondents were self-selected to some extent by feeling more confident with the technology than those who did not respond. The good news is that there is a directory of professional women where individuals in technology can be identified, and where individuals can find support, information and inspiration, hopefully even some form of validation. Communication can help resolve feelings of isolation, and provide the assurance that other women are finding careers that allow them to fulfill their potential.

Characteristics of Nontraditional Occupations

Females choose careers for many different reasons. According to a survey conducted by Schroedel (1998), a group of females in nontraditional occupations were asked “open-ended” questions about what attracted them to these occupations. The answer was “the money.” This answer was given by 72 percent of the group. This is not a surprising answer given the fact that females work for a wage almost twice the national average of other female workers at the time of the interview (Florida State Department of Education, 1998). Twenty-four percent said that the factors that influenced them in choosing this career was the idea of working with their hands, being able to work outdoors, as well as the satisfaction of creating a product. Research indicates that nontraditional jobs allow females to better support their families. Research conducted in a profile of successful females workers in nontraditional occupations included the following characteristics:

- Love of learning
- Willingness to take on new challenges
- Interest in working with one’s hands
- Interest in seeing concrete products of one’s work
- Desire to earn higher wages and benefits (*Workplace Solutions*, 1998)
- In good physical health and fitness
- Need to earn more than \$6.00 per hour for self and family
- Need access to health care and other benefits

- Willingness to explore new things, new places, new people (*Illinois Women in the Careers*, 1998).

“In 1992, females who maintained families also had lower median weekly earnings than other single earner-families.” (U.S. Department of Labor, Women’s Bureau). In addition, the Females Bureau of the Department of Labor reports the following information:

1. Family households headed by females had the lowest income in 1991-- \$16,692 compared to a married couple with \$40, 995.
2. Families earned \$28,351 (maintained by men).
3. White females had a median income of \$19,547.
4. Black families had an income of \$11,414.
5. Hispanic families had an income of \$12,132 (U.S. Department of Labor, Women’s Bureau (1993, p.11)).

Females and Minorities in Apprenticeships in Florida

The Bureau of Job Training Apprenticeship Section in the Florida Department of Labor reported on December 15, 1998 that there were 14,572 active registered apprentices in Florida. These programs had 10 percent females in traditional areas, such as child care and health, as well as the nontraditional apprenticeships; 29 percent belong to a minority including 16 percent African American and 12 percent Hispanic. (FL DOE, 1998). The individual females involved in the various apprenticeships in a program that consisted of daily training that involved, teaching structured skills, and on the job practical work experience. Florida's apprenticeship programs were graduating more than 300 individuals a month" (Jamerson, 1998).

Susan Eisenberg (1998), the author of *We'll Call You If We Need You—Women of Working Construction*, has called females in the building career "permanent pioneers." During a report on the television new program, *60 Minutes*, Lesley Stahl reported on a story entitled, *Hard and Heavy*, regarding some interesting statistics about females in various careers. These statistics include: 1) almost one-third of all lawyers and doctors in America are now females, 2) twenty percent of police officers are females, and 3) but you'd still have to look under a lot of hard hats before you'd find a woman in construction site (FL D.O.E., 1998).

In the 1970s reports regarding females working in the construction careers indicated at that time that females in this field were fewer than two percent. Two decades later it has changed by just over two percent (Hartman, 1998). Females represent 2.7

percent of journey workers in construction careers according to the U. S. Department of Labor.

There are important reasons females and minorities are underrepresented in traditionally male, skilled blue-collar jobs. First, a female in low paying jobs is a “social problem.” Low paying jobs given to females creates poverty. Integrating females into high paying jobs without college degrees; and traditionally male jobs would be a major step toward rectifying this problem.

Laws affecting workforce development and welfare reform under Florida’s Welfare Reform Act, Work and Gain Economic Self-Sufficiency (WAGES) registered apprenticeships would fulfill the “work first” requirement and combine training and education in a work program (Florida State Department of Workforce Development, 1998). The following activities may be used under Florida’s Welfare Reform Act, Work and Gain Economic Self-Sufficiency (WAGES): a) unsubsidized employment, b) subsidized private sector employment, including the public sector, grant diversion and on the job training, c) community service work experience, d) work experience, e) job search and job readiness, f) vocational education or training related to employment, g) job skills training related to employment, h) education services for participants 19 years of age or younger coordinated with school to work program, i) attendance at a high school or GED for participants 19 years of age or younger, j) the provisions of child care services by a WAGES participant for another WAGES person who is participating in community service work experience.

Many welfare recipients do not meet the prerequisites to enter a registered apprenticeship program. What would help this problem is a pre-apprenticeship to bridge

this gap in terms of education, training, and employability skills. Many females on welfare are pursuing a second career in another area of employment and education. “A second chance program would select occupations substantial enough to provide adequate incomes, fund training sufficient to prepare them, and required performance commensurate with success (Levitan & Magum, 1998, p. 230).

Conclusion

In summary, I have come to understand the significance of the studies about females and nontraditional careers. Females need a better understanding and explanation of male dominant traditional jobs. Females who obtain a bachelor's degree with the desire to achieve a higher-level position in a traditionally male career have often been frustrated. It is important that the profile of nontraditional females begin to change, we need for technology educators and policy makers to understand the role of nontraditional females in traditionally male jobs.

Educators must provide a new perception about nontraditional careers. This would help traditional males to eliminate some of the gender stereotypes as it relates to nontraditional females. One example of this would be a female working in a welder position. Encouraging women to consider nontraditional careers is the responsibility of schools, employers, and community leaders. They can help females in nontraditional roles assess their transferable skills, interests, and attitudes. It is imperative that we as educators and leaders provide resources and information about the various nontraditional careers for females. A good example is to help them prepare a resume that reflects nontraditional training. Our female teachers who teach nontraditional subjects must serve as role models along with government officials and political leaders.

If we are going to be successful in helping educators and leaders to understand nontraditional careers, then the learning process must start at the elementary level. The learning process will help schools identify the important roles of nontraditional careers.

In order to raise academic standards and to provide opportunities for nontraditional careers, then our workforce must be ready to elevate their ideas about traditional versus nontraditional occupations.

Strategies for the school system were involved in the following components, which will produce a better understanding of nontraditional careers:

- School-based learning is one activity that will enable career counselors and academic leaders to provide a movement toward vocational participation as a significant part of classroom learning.
- Work-based learning is the key for practical experiences that are learned through internship, through job-shadowing, employment, and apprenticeship programs.
- Activity connection is the main link between education and the business community, such as the automotive industry, and the armed forces.

If the professional training offered by the U.S. Navy or the Marines is going to embrace nontraditional careers for females, their training services must reflect a willingness to accept females in all nontraditional roles. In order for the U.S. Navy to meet its goals, the training must include non-gender biased training and communicate the willingness to receive females in combat duty, and nontraditional careers. Gender integration has proven to be a positive affect and has raised the professional level of standards as it relates to women in nontraditional careers.

According to Rombough (2000), military or females seeking nontraditional careers have had expectations placed on them to perform greater than their male

counterpart. One way to resolve this issue is to develop new policies that would include standards for nontraditional females.

Challenges facing nontraditional females in male related careers are: gender bias, acceptance by male peers, and the perception of their ability to be successful. Those three barriers often put pressure and make it difficult for nontraditional females to function in a nontraditional male environment.

The educational curriculum and its language need to incorporate nontraditional careers and diversity for the nontraditional female. This perception would provide the educational system with the ability to serve traditional and nontraditional careers. It will not be enough to equip men with technological skills, as more families depend on nontraditional females for their survival needs.

It is the educators' role to incorporate and encourage growth and ideas about nontraditional careers and help to change teaching practices in a traditional setting. Nontraditional educators must continue their efforts to eliminate gender stereotyping related to occupational decision-making and to emphasize the importance of nontraditional careers for females. Traditional educators must begin to rethink its position and philosophy as it relates to nontraditional careers. Technology and vocational educators cannot alone right societal ills such as the under-representation of females in nontraditional careers. We as educators must begin to teach male and female equally in technology and diversity.

Ultimately learning is a shared process, which requires cooperation from nontraditional and traditional environments. If technology along with nontraditional careers is going to work, we must see the impact it has on learning and growth. This

requires educators, administrators, and policy makers to be engaged in the process and work toward making learning a success. While progress has been made within the last decade regarding nontraditional careers and programs for females, the research suggests that further improvement in the education system is needed. Based on the research, here are some recommendations:

1. To revise technology and science by including more opportunities in nontraditional careers for females.
2. The individual measurement of interest and aptitude should be part of an ongoing process for traditional careers as well as nontraditional careers.
3. Job awareness and exploration are important for the workforce preparation process. This recommendation is extremely important to nontraditional careers for females.
4. Changes in the political structure and legislation have created more opportunities in the labor market, but the male population is still controlling it.
5. Educators have a responsibility to introduce nontraditional and traditional careers in the curriculum. We must provide nurturing to female students' dreams and allow them to think beyond their immediate surroundings.
6. Educators must be advocates for females entering nontraditional careers and develop methods to help them overcome the barriers in the workplace.
7. The business community needs to have an in depth discussion about the benefits and barriers for females working in nontraditional jobs. For example, what are the entry-level wages and career advancement opportunities?

8. Educate business and community partners in ways to encourage females to participate in school-to-work activities, which are designed for nontraditional careers.
9. Provide females seeking nontraditional career with the necessary experiences and tools to be used in a male traditional field.
10. Provide teachers, educators, and guidance counselors with appropriate experiences in career exploration in nontraditional training.

The key to our future success depends on our ability to accept nontraditional female roles in the military, business, industry, education, technology and government. We need highly motivated, skilled, and trained men and women prepared for the challenge in the workplace. It is wonderful to know that our nation's young men and women in nontraditional careers are making a significant contribution to the challenges that lie ahead.

References

- Anderson, J. (2003). Industry focus. *The Automotive Industry*. Retrieved on March 21, 2004. <http://graduatingengineering.com/industryfocus/automotive2.html>
- Brooks-Gunn, J., & Schempp-Matthews, W. (1979). *He and she - How children develop their sex-role identity*. Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Braundy, M. (Summer, 2004). Dewey's technological literacy: Past, present, and future. *Journal of Industrial Teacher Education*, Vol. 41, No. 2.
- Brzowsky, S. (1998). Are females being shortchanged? The Center for Research on Parallel Computation at Rice University. *Parade Magazine*, Feb. 8, 1998. Retrieved July 27, 2005. http://www.crpr.rice.edu/newsArchive/parade_2_8_98.html
- Delaney, L. (2002). Women entrepreneurs take on the world. *Enterprising Women*, Retrieved April 17, 2004 http://www.enterprisingfemales.com_world.htm/.
- Farmer & O'Lawrence, (2002). Differences in characteristics of post-secondary technical studies in Pennsylvania community college and two-year proprietary institutions. *Journal of Career and Technical Education*. Vol. 18, No. 2.
- Gaona, J. (Summer, 2004), The effects of no child left behind act on career and technical education: Implications for students with special needs. *Journal of Industrial Teacher Education*. Vol. 41, No. 2.
- Gender gaps where schools still fail our children. (1998). *American Association of University Women Educational Foundation*. Retrieved December 12, 2005 <http://www.aauw.org/executivesummary98/>. p. 2.
- How schools shortchange females. (1992). *American Association of University Women Educational Foundation*. Retrieved December 3, 2005 <http://www.aauw.org/research/girls/hssg.cfm>.
- Growth is key focus for all women entrepreneurs. (Aug. 2003) *Los Angeles Business Journal*, Retrieved April 14, 2004 http://www.findarticles.com/cf_dls/m5072/34_25/107255172/pl/article.jhtml

- Kaplan, N. & Farrell, E. (1994). Weavers of webs: A portrait of young on the net. *The Arachnet Electronic Journal on Virtual Cultural*, Vol. 2, No. 3. Retrieved July 29, 2005
<http://www.mirth2.umd.edu/FemalesStudies/Computing/Articles+ResearchPaper/>
- LaPlant, M. P. & Carlson, D. (1996). *Disabilities in the United States: Prevalence and causes*. 1992. Disability Statistic Report (7). Washington, D. C.: National Institute on Disability and Rehabilitation Research.
- Lanius, C. (2001) *Females interested in computers*. Retrieved July 27, 2005
<http://math.rice.edu/~lanius/club/girls.html>
- 100 leading women in the auto industry – 2000. (2004). *Automotive News*. Retrieved March 19, 2004 <http://www.autonew.com/page.cum?pageId=97>. p. 2.
- Navy expeditionary combat command stands up. (2006). *NavyNewstand* Retrieved June 15, 2006
http://www.news.navy.mil/search/print.asp?story_id21962&VIRIN=31269&imahetype=1
- Norby, R.F. (1997). *Evaluating progress in gender equity in careers for women in science and technology: The impact of role modeling on women's career choices*. Research Study, University of Wyoming, Laramie, Wyoming.
- Pell, A. N. (1996). *Fixing the leaky pipeline: Women Scientists in Academia*, Department of Animal Science, Cornell University, Ithaca, N. Y.
- Rombough, J. (2000). *Military Women and Combat*. Retrieved July 3, 2006
<http://lark.cc.ku.edu/~lance/Family/Julia/5030text.htm>
- Rough manhood: the aggressive and confrontational shop culture of U. S. automotive workers during World War II*. (2002) Retrieved April 4, 2004
http://findarticles.com/cf_dls/m2005/1_36/92587332/print.jhtml
- Schmidt, E. (Sept., 1999) Program steers females toward job as automotive mechanic. JS online. *Milwaukee Journal Sentinel*. Retrieved April 13, 2004
<http://jsonline.com/bym/news/sep99/cars22092199a.asp>
- Sheng, Rojewski & Hall (Fall, 1996). Perceptions held by vocational educators toward female participation in non-traditional programs. *Journal of Vocational and Technical Education*,_13(1), pp. 2-4.
- Smith, R.F. (1983) *The investigation of role models and women's choices of science related careers*. Doctoral Dissertation. Atlanta: Georgia State University.

- Sunkin, E. (2001). *Trends and traits of today's technicians: The 2001 professional automotive technician survey*. Retrieved April 17, 2004
<http://www.babcox.com/editorial/us/us30130.htm>
- Talent is being recognized, rewarded. (2004). *Automotive News*. Retrieved March 15, 2004. http://www.autonews.com/page.cms?page_ID=97
- Truby, M. (2000). Diversity gives Ford a new look. *The Detroit News*. Retrieved March 15, 2004
<http://www.detnews.com/specialreports/2000/nasser/diversity/diversity.htm>
- Vocational education in the United States: The early 1990s. (1996) *National Center for Educational Statistics*. Retrieved November 19, 2005.
http://rdb.readwriteact.org./adult_lit/workplace_literacy/research_reports/336
- Weatherford, D. (2004). *Real women of Tampa and Hillsborough County from prehistory to the millennium*. University of Tampa Press: Tampa, Fl., pp. 257-260, 296-297.
- Weeks, J. R. (2002). Breaking new ground: The growth of females in “non-traditional industries.” *Enterprising Females*. Retrieved April 17, 2005
<http://www.enterprisingfemales.com/new-ground.htm>. p.1-3.
- Wider opportunities for women, education and training federal policy issues for the 108th congress (2002). Retrieved on November 19, 2005 <http://www.wowonline.org/>.
- Women in the air force—An unbroken tradition of excellence (2004). *LookSmart*
Retrieved June 15, 2006
http://www.findarticles.com/p/artic;es/mi_m0PDU/is_2004_March_12/ai_n6049744/print
- Zuga, Karen F. (1999). Addressing women's ways of knowing to improve the technology education environment for all students. *Journal of Technical Education*, 10(2). p. 11. Retrieved December 3, 2005.
<http://scholar.lib.vt.edu/ejournals/JTE/v10n2/zuga.html>.

Appendices

Appendix A: Tables and Figures

Table 1. Growth in Women-Owned Firms by Industry (1997-2002)

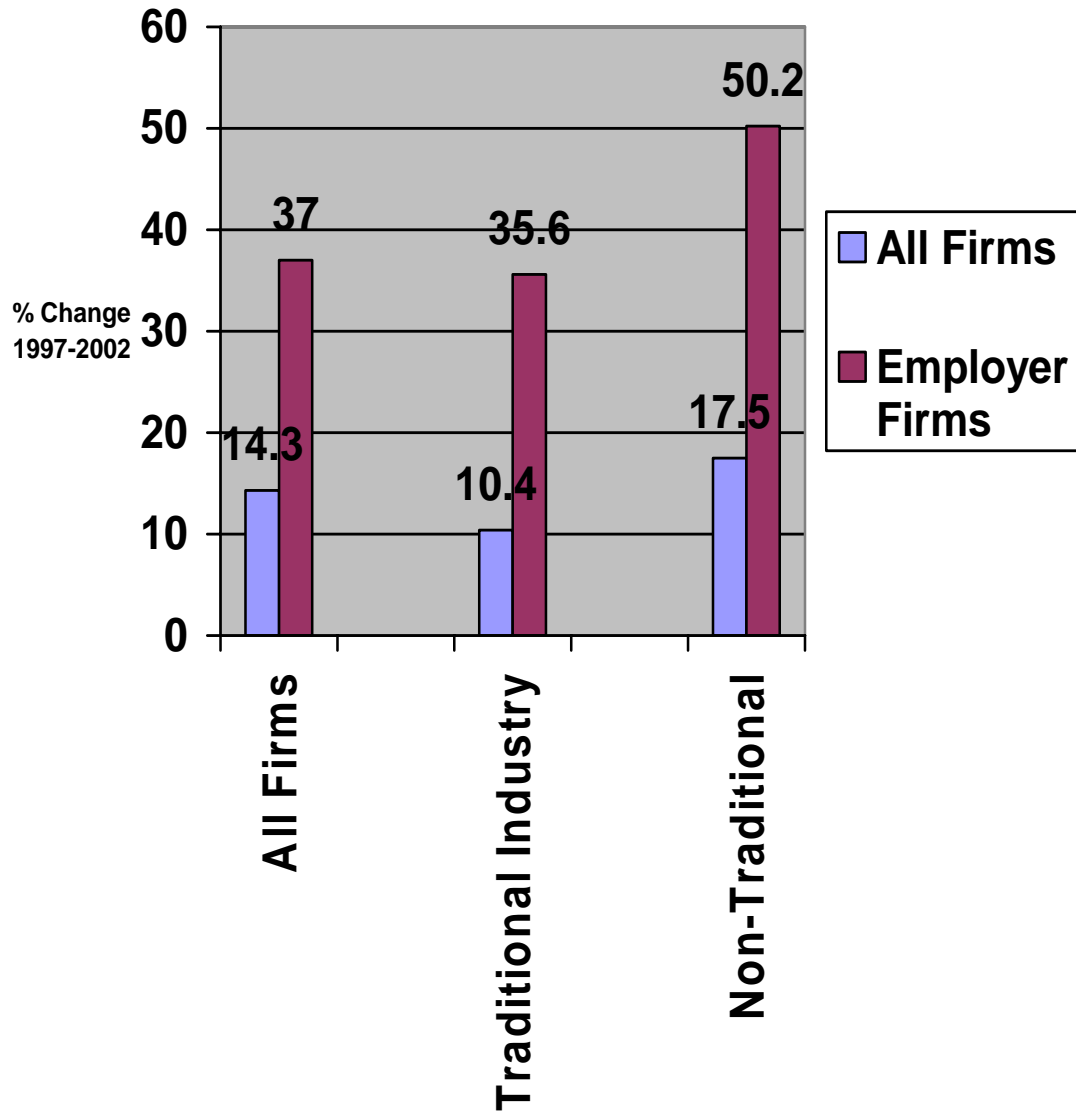
	All Firms	Employer Firm	Growth in Employment	Growth in Sales
	14.3	37.0	30.0	40.0
	17.5	50.2	22.9	35.4
Agriculture	27.2	69.4	74.8	104.3
Mining	-21.6	0.0	0.0	0.0
Construction	35.5	71.6	69.9	94.3
Manufacturing	2.8	27.1	-2.1	4.6
Transportation				
Communications	23.6	50.6	10.6	28.7
Public Utilities				
Wholesale Career	3.2	36.7	19.9	33.3
	10.4	35.6	36.5	46.7
Retail Career	7.8	26.9	31.3	39.1
Finance, Insurance	14.4	43.7	-11.5	29.4
Real Estate	10.6	39.3	43.9	58.1

Note: Numbers are percent change. 1997-2002.

Source: Center for Women's Business Research, Women-Owned Businesses in 2002: Trends in the U. S. and 50 States, based on data from the U. S. Census Bureau.

Appendix A (Continued)

Figure 1. “Non-Traditional” Women-Owned Firms Growing Faster



Source: Center for Women’s Business Research, Women-Owned Businesses in 2002: Trends in the U.S. and 50 States, based on data from the U.S. Census Bureau.