PERCEPTIONS OF TRAITS OF WOMEN IN CONSTRUCTION

By

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A THESIS PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
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To my loving and supporting family

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Major: Building Construction

Studies have shown that men and women perform differently on tasks. This difference can be attributed to a degree to their sex. Studies have also shown that women are predominately employed in 'lighter' construction trades and are not employed in significant numbers in trades consisting of more laborious tasks. What has not been studied is the relationship between the unique gender skill sets and the placement of women in construction firms. There is also a lack of information on whether construction firms are actively recruiting women. When the labor shortages of the past return, the industry should be actively looking to change its offensive identity and reach out to untapped labor sources.

The objective of this study was to determine and analyze the perceived trends of women in construction with regards to recruitment practices and placement within firms on the basis of gender. Data and literature on construction industry recruitment strategies, differences in gender, and representation of women in the trades has been studied in order to understand the perceived status of women in the construction industry as a whole.

The research used surveys to collect data from the construction industry. The construction companies targeted for this research included all types of contractors and subcontractors, from a pool of attendees of the M.E. Rinker School Career Fair. This ensured

that only companies that were actively recruiting and have some type of company recruitment program in place completed a survey. The data collected were analyzed and statistically significant relationships were noted. Recommendations were then developed according to the results of the data analysis.

Major findings of the study included correlations between the size and type of construction firms and the proportions of women employed. The analysis determined that there are greater opportunities for women in home office positions in smaller firms. It was also determined that the greater the amount of work that is subcontracted, the greater the proportion of women home office personnel and salaried employees. Other findings from the study included patterns of how the industry ranked women's performance of tasks. Construction industry professionals rated women higher in tasks involving computer literacy skills than did student respondents. Both industry professionals and student respondents thought women perform slightly better at tasks involving communication skills and sensitivity to the emotions of others, and that women performed worse than men in tasks involving physical strength. In regards to observations of personality traits, industry professionals and student respondents thought that women were slightly more tenderminded and organized as compared to men, while men were slightly more aggressive than women.

The results helped to concluded that while companies are not necessarily discriminating against women, they are also not looking to them as a potential skilled labor source. Additionally, gender differences observed in construction work, are not reflected when assigning work. In times when gender is considered, physical strength is typically the only gender difference that the industry is recognizing.

CHAPTER 1
INTRODUCTION

Introduction

Previous studies are inconclusive as to whether the construction industry has yet to actively seek out ways to successfully recruit women (Moccio 2006). This confusion may be attributed to the lack of training and hiring programs for women on the industries part, or the neglect for creating an atmosphere where new female recruits are regarded with respect amid the male veterans of the industry, since previous opposition to female workers has been well noted.

Studies have shown that men and women perform differently on tasks. This difference can be attributed to a degree to their sex. Studies have also shown that women are predominately employed in 'lighter' construction trades and are not significantly present in trades consisting of more laborious tasks. What has not been studied is the relationship between the unique gender skill sets and the placement of women in construction firms. With current labor shortages that are only expected to get worse, the industry should be actively looking to change its offensive identity and reach out to untapped labor sources.

Objective of the Study

The objective of this study was to determine and analyze the perceived trends of women in construction with regards to recruitment practices and placement within the firm on the basis of gender. Data and literature on construction industry recruitment strategies, differences in gender, and representation of women in the trades has been studied in order to understand the perceived status of women in the construction industry as a whole.

The research method involved surveys to collect data from the construction industry. The construction companies targeted for this research included all types of contractors and subcontractors, from a pool of attendees of the M.E. Rinker, Sr. School of Building Construction

Career Fair. This ensured that only companies that were actively recruiting and have some type of company recruitment program in place completed a survey. Utilizing statistical analysis, observations were concluded and recommendations were then given according to the results.

Hypothesis Statement

The hypotheses tested were as follows:

H_0: A relationship exists between the gender of an employee and their placement or position within the company.

H_0: Construction companies are not specifically targeting women for recruitment into the industry.

H_0: Employers perceive men and women to have specific gender associated skills and personality traits. These perceptions follow gender stereotypes rather than proven gender differences.

Overview

Chapter 2 presents a literature review on recent implemented construction industry recruitment strategies toward women, differences in gender skills and traits with consideration to gender stereotypes, and data analysis of the representation of women in the trades, women in similar schools within the University of Florida and women in the M.E. Rinker, Sr. School of Building Construction. The review also includes a background to women in construction; the advantages for women to enter the construction industry, both for themselves and for the companies in which they will work; and hindrances for women entering the industry including preconceptions, internal barriers, and external barriers.

Chapter 3 provides the methodology used to conduct this research. There was no specifically targeted group or type of contractor. A total of 108 surveys were conducted. The research plan consisted of two surveys; a student survey, distributed manually, and a survey for

industry professionals, distributed electronically. The basis of selection for the industry professional survey was that the company had attended an M.E. Rinker, Sr. School of Building Construction Career Fair. The contact information was gathered from the Career Fair materials so that only companies that were actively recruiting and have some type of company recruitment program in place completed surveys. The student survey was completed by graduate students of the Rinker School. The survey was designed to obtain qualitative and quantitative information needed on trends of women in construction. The beginning of the survey was designed to collect demographic information about the respondent's construction company. The second objective of the survey was to discover if the company had any specialized recruitment program or effort in place for the hiring of women or any particular recruitment practice against the hiring of women. This part of the survey questionnaire was both a quantitative trend and a qualitative descriptive answer portion. The third part of the survey was to determine the number of women employed in that company and the placement or position of those women within the construction firm. The fourth part of the survey obtains observations of women's task performance. Similarly, the fifth part of the survey deals with observations of personality traits. The final portion of the questionnaire deals with the observations of women in the construction trades.

Chapter 4 provides a discussion of the analysis performed on the results of the survey. The findings of the research are based on a total of 108 completed surveys that were received. A total of 261 surveys were dispersed, representing a response rate of 41.4%. In the student survey, 62 surveys were manually distributed and 62 surveys were received, representing a response rate of 100%. In the industry professional survey, 212 surveys were electronically distributed to personnel in management positions. Of those, 13 were returned as undeliverable, leaving a total of 199 industry professional surveys distributed. There were 46 responses to the

industry professional survey, representing a response rate of 23.1%. A discussion of the statistical analysis used to study the data collected is introduced.

Chapter 5 is the final chapter of this thesis and provides a conclusion of the research and results by summing up the study performed in this work. Each hypothesis is accepted or rejected based on the results of the statistical analysis. Finally, recommendations for future research on gender in the construction industry are made.

CHAPTER 2
LITERATURE REVIEW

Background: Recruiting Women into the Trades

Studies are inconclusive as to whether the construction industry has yet to actively seek out ways to successfully recruit women (Moccio 2006). This confusion may be attributed to the lack of training and hiring programs for women on the industries part, or the neglect for creating an atmosphere where new female recruits are regarded with respect amid the male veterans of the industry, since previous opposition to female workers has been well noted. However, with current labor shortages that are only expected to get worse, the industry should be actively looking to change its offensive identity and reach out to untapped labor sources. Hence, how can the construction industry attract new female recruits with this already tainted image? To answer this, the industry needs to look more closely at what advantages there are for women to enter the construction industry, both for themselves and for the companies in which they will work; what hindrances there are for women entering the industry including preconceptions, internal barriers, and external barriers, and lastly; what strategies are successful in recruiting and retaining women employees in the construction industry.

Advantages for Women

To some extent, all people are driven by money. Skilled blue-collar work usually involves high pay. Typical wages for the first year of apprenticeship range from $10 - $17 an hour. After the completed apprenticeship, wages may increase to as much as $45 an hour (NEW 2007). These rates are much higher than most entry-level wages. There is also a great opportunity and likelihood of promotion, and the start of a career path. Construction is one of the few businesses where you can work your way from the bottom up. Prospects to own your own business are greater in construction than any other trade. A study in 2007 proclaimed that

women-owned construction companies comprise more than 12% of the market (Fisher 2007). With the average household income around merely $36,000 a year, a career in construction looks very attractive. Numerous women have concluded that an occupation in construction will provide them better opportunities (Nesby 1999). The higher wage rates of construction are especially attractive to women with children. The higher wage rates would enable them to afford childcare. Women with children show a greater willingness to transfer to nontraditional occupations, such as construction, than women without children (Moccio 2006). This is because women with children are more likely to have economic need as their main motivating factor. Studies also show that for African-American women, the main motivating factor is economic need. Women of color may also be more inclined to consider blue collar work because of prior exposure to customarily male tasks during upbringing. Entry into higher paying blue collar work permits women of color the chance to progress in the labor market, in terms of both status and earnings. Because women of color are the most open to this nature of work, they should be specifically targeted by recruitment efforts for the construction business (Moccio 2006).

Along with the advantages of higher wages, jobs in construction usually have excellent medical benefits, pensions, and paid annuities, and provide both technical classroom training and on-the-job training (NEW 2007). A study in New York in 2006 showed that "at least 50% of construction jobs are living wage jobs with unionized benefits that could significantly increase the living standard of welfare to work mothers" (Moccio 2006). With all of the benefits to blue collar type work in construction, one would think that it would be a difficult industry to break into. However, the greatest advantage to the construction industry is just the opposite. The jobs do not entail extreme training or natural inborn talent. It is quite easy for anyone having the

physical ability to start at the bottom and work their way up the ladder. There are also advantages for the companies that will hire these women.

Advantages for the Industry

More and more construction companies are becoming conscious of the fact that diversity practices add economic worth for their clientele. Variations in ideas, talent, and skills enhance their competitive advantage in an insistent market. Developing the cultural aptitudes of all people will add to their worth in society and the companies and organizations in which they work. Companies that have previously come to this understanding are founding mentoring programs for minority and women contractors and hiring consulting firms to support them in achieving these new cultural competencies (Nesby 1999). With advantages both for women and for the companies in which they will be employed, the following question arises: Why aren't there more women in the construction industry?

Barriers to Entry

Women may be shying away from working in the construction industry because of preconceptions about the work. Customarily, women's lack of interest in male blue collar work, such as construction, has been attributed to either socially developed partialities for sex-appropriate occupations and/or the result of men's treatment of women who do enter these nontraditional professions (Moccio 2006). More recent studies indicate that there may be other reasons which explain why women do not typically pursue jobs in construction or other male dominated occupations. The results of the research state that women may prefer white-collar employment to blue collar employment because of the inherent characteristics of each type of employment. Women may also seek out only 'socially acceptable' employment. They may stay away from jobs that they think may result in negative feedback and harassment from family members, friends, male co-workers, and employers. Women may be acting on culturally formed

beliefs embedded from adolescence that construction is a “man’s job”. Additionally, some women may have formerly been subjected to sex discrimination in hiring and employment or suffered from harassment on the job. These women may no longer wish to work in blue collar employment. Industry analysts reason that years of discrimination and sexual harassment in the field is revolting prospective female candidates for the industry. Many contractors may also be under the influence that women are physically incapable to execute the tasks of the post and may be disinclined to hire them based on that erroneous idea. Along these same lines, women may believe that they are unqualified for blue collar work. They may be uninformed of job requirements and of job training programs and apprenticeships. A final reason may be due to labor conditions: trades people are exposed to extreme weather; the work is cyclical; apprenticeship wages are low; and the risk of on-the-job injury is great. The hours and work schedules of a number of blue collar jobs may thwart women, particularly women with young children, from seeking blue collar employment. “Blatant sexual harassment and the constant questioning of their abilities and qualifications, as reported by current women construction laborers, have created a tainted image and reputation of the construction industry” (Moccio 2006).

Sexual harassment is not only a preconception or a problem with the image of the construction industry; it is also a very real hindrance for women in construction professions. The executive director of the National Organization for Women’s Legal Defense and Education Fund, Helen R. Neuborne, agrees, and adds that even when women manage to attain an opening in an apprenticeship programs, their on-the-job treatment often becomes an impediment to natural job progression. “They’re sent for coffee, they’re put off by themselves, they’re sexually harassed, men urinate next to them,” she said. “There is so very little incentive to stay” (Bishop

1991). Another testimony to this awful treatment is from Linda Jofuku, a former carpenter who is now the business representative for the International Federation of Professional and Technical Engineers. She testified that she was doused with water while working with electrical wires and grabbed and fondled while carrying heavy loads up ladders. "You get really sick of it," she said (Bishop 1991). Women may also face problems or obstacles from the company at large in hiring practices. Many construction companies have hesitated in establishing women contractor development programs because these programs are often viewed as unfair practices or reverse discrimination. This has also been a problem for minority workers. Construction companies also may not see this part of the company's development as a high priority. A 1999 article about diversity in construction companies said that this may be partially attributed to profit margins. "Because profit margins are so thin, many construction companies are in survival mode, forced to reduce their workforce, subcontractors and supplier base. Other contractors' work load has increased so much it forces them to be in reactionary mode, relying on traditional methods for recruiting and hiring personnel" (Nesby 1999). Additionally, women may be hindered from entering into construction work because of lack of math skills, tool familiarity, and physical conditioning. This stems from the traditional belief that construction is "men's work". Because of this belief, women may have been pushed away from these subjects in school or told that they *couldn't* do them or *wouldn't be good* at them. To confront these negative viewpoints, there is a need for active strategies in outreach and career exploration. The hope is that these strategies can counteract the ingrained gender tendencies and allow women to be comfortable in choosing to train for a non-traditional occupation (Moccio 2006). Also, women have historically lacked access to the "old-boys network", which are so closely tied to the construction industry. Without the access, women are barred from the informal networks through which most positions are

filled. The greatest obstacle of recruitment strategies is to make sure that qualified female applicants learn of job opportunities (Andrews). This is also a hindrance at the company level. Large, mostly white male-owned construction firms have a propensity to do business with each other, and businesses with not as much capitalization are left to bid on comparatively minor jobs. This places difficulty on minority and women business enterprises, pushing them out of a vast amount of business opportunities. Several exceedingly talented women-owned construction firms lack access to capital for the purchase of equipment, labor and bonding. Recently, these minority and women-owned businesses have been constructing alliances with each other, an approach which boosts their general competitiveness (Nesby 1999). Instances such as this are small steps in evening out the playing field and starting to overcome obstacles for women in the construction industry. External barriers such as discrimination by employers in selection and hiring, or harassment by co-workers can be tackled to a certain degree by regulation and laws, however, internal barriers, which are socialized positions that lead women not to consider non-traditional occupations, must be dealt with through outreach programs targeted specifically towards women (Moccio 2006). The first step in combating these internal barriers is to educate young women.

Current Recruitment Strategies

Resoundingly, the recommendations for recruitment of women into the construction industry focused on getting into elementary and secondary schools and conversing with students about the prospects offered within the construction industry (Moore 2006). This starts by bridging the gap between educators and employers. Hawaii's Women in Technology Program studied the ways that construction corporations typically market their job openings and the correspondingly low rate of female applicants who respond (Andrews). Through this study, they were able to form conclusions about recruitment strategies. One strategy that was

successful for Women in Technology was to develop partnerships with educators and guidance counselors, so that when employers were recruiting, they had access to female students and graduates. Women in Technology developed relationships with employers that encouraged then to invest in talented women students through internships and apprenticeships that led to full-time jobs. Women in Technology served as a clearinghouse, gathering resumes, and cultivating a communication network of women students, professionals and technical workers that served as a female counterpart of the "old-boys network" (Andrews).

Another crucial area for recruitment that has been recognized is improved coordination and communication between secondary schools and post-secondary construction management degree programs (Moore 2006). Indisputably, attracting women to the construction industry begins by educating them about potential construction careers as girls. Theresa Daytner, owner of Daytner Construction Group in Maryland, says that we need to stress the economic benefits of a construction career. "It is education and letting people know about the options, but there is never discussion about money. As a young girl looking at career options, it was always about what I like, not about what I can earn" (Fisher 2007). With construction occupations still deemed non-traditional careers for women, the majority of girls are not urged to investigate their carpentry skills, or contemplate a position as a project manager. Job shadowing and 'Take Our Daughters and Sons to Work' Day are model opportunities for a hands-on approach to the industry. In fact, this style of peer support or mentor protégé relationship seems to be essential to attracting and retaining women in the construction industry. Other hands-on type recruiting range anywhere from the National Association of Women in Construction's Block Kids Competition to the Associated General Contractors of America's Build Up! Program for fifth graders. These types of programs work constantly to spread the message about construction

career opportunities through hands-on activities. Theresa Daytner agrees, “We haven’t given our daughters the best exposure yet to the construction environment. We tend to be the ‘suits’, not out in the field. We need more hands-on opportunities” (Fisher 2007). Getting girls exposed to work in the field and exploring all of the options is key. Although the experience for girls is limited, there is already a system in place to support these hands-on programs for women who are preparing to enter the industry. The federal government has recognized the importance of mentoring to attract women to the construction fields, and has established the Women in Apprenticeships and Non-Traditional Occupations (WANTO) grant. The Women in Apprenticeship and Nontraditional Occupations Act allowed the U.S. Department of Labor to give grants to community-based organizations to encourage the recruitment, training, employment, and retention of women in apprenticeship and nontraditional careers (Fisher 2007).

The next obstacle in recruiting women for construction occupations is the actual recruitment to the apprenticeships and the successful retention of women in these programs as well as in their future careers. The first way that Hawaii’s Women in Technology program tackled this was by producing a flyer with a familiar image of a female construction laborer and the title “Female Applicants Wanted for Laborer Apprenticeship!” (Andrews). The flyer also provided information about the starting and ending wages for apprentices, benefits, the application process and the dates applications would be accepted. The Women in Technology program then assembled a fax list of over 200 organizations that assist women, cultural associations, day care providers, social service providers, health service suppliers, housing agencies, welfare and unemployment offices, grocery stores, health clubs, laundromats and beauty salons. All of these are places in which women frequent, and are likely to hear about these new opportunities in construction. Women in Technology then developed a cover sheet for

the fax that included an image of a female construction worker and explained briefly that women are underrepresented in apprenticeships, that apprenticeships provide paid on-the-job training with benefits, and that the majority of customarily male apprenticeship fields offer considerably better pay than traditionally female lines of work. The cover sheet invited the recipient to copy, circulate and publicize the flyer and to inform prospective female candidates. A brochure was also put into an email and circulated to a list of over 500 people, particularly to the state and county Commissions on the Status of Women. The program drew up a press release to the local media with the title, "Female Apprenticeship Applicants Sought by Laborers' Union". To follow through with this recruiting strategy, the Hawaii Women in Technology program then offered recruitment and retention workshops and technical assistance to employers and labor unions. This began with a 2-hour workshop consisting of a 15 minute welcome followed by a 15 minute group discussion on why women choose the trades and why women avoid the trades. This was followed by a 45 minute seminar on model recruitment and retention tactics. The workshop finished with 30 minutes for the action planning development, where participants cultivated an action plan for their business to implement detailed recruitment and retention strategies. During the closing 15 minutes of the workshop, participants presented their action plans. Women in Technology built upon the training workshops by offering technical assistance to employers and labor unions throughout their recruitment of applicants. The Hawaii Women in Technology program has been able to accomplish remarkable expansion in the representation of women in apprenticeships and non-traditional employment by these methods. Overall, as a result of Women in Technology's labors, 70 women were positioned in apprenticeships between September, 2001 and December, 2002, and the total number of women in registered

apprenticeships statewide in Hawaii leaped radically, from 3.2% in 2001 to 5.1% in 2003, an increase of 59% (Andrews).

Conclusions

However, attaining sexual equality in the labor force involves more than just recruiting and training. The problem must be handled according to the shifting demands of the workplace and the requirements of women. This may necessitate a transformation of the entire system (Moccio 2006). In order for these recruitment and training programs to be successful, the industry must start changing itself. Diversifying companies requires new cultural competencies, such as ways to recruit and hire persons of color and women, learning how to find qualified minority and women-owned business enterprises, learning to use language that reinforces diversity, and making certain that conduct and operational practices are not discriminatory or exclusive. Furthermore, managers must become skilled in techniques for settling cross cultural and gender conflicts, and improve policies and practices that support diversity. Many government, state and municipal agencies are legislating diversity by requiring minority and women business participation on the development of projects (Nesby 1999). Legislation alone will not be enough. To give women these possibilities, they must be provided with support and encouragement for nontraditional choices at an early age. Women must be aggressively recruited into training programs with the aim of configuring the curriculum and skills training to assimilate them into high wage nontraditional employment (Moccio 2006). Then, once they are placed, the companies must continue to support these women, especially those with family obligations, by developing flexible work schedules, allowing part-time or shared work arrangements, and possibly arranging childcare options (Andrews). Before women can be successfully recruited and integrated into the construction industry, the industry must change to

actively seek women for job opportunities and create an atmosphere where new female recruits will be treated with respect.

Unique Skill Sets by Gender

Introduction

Studies have shown that men and women perform differently on tasks. This difference can be attributed to a degree to their sex. Studies have also shown that women are employed in some 'lighter' construction trades and are not significantly present in other trades. What has not been studied is the relationship between the unique gender skill sets and the placement of women in construction firms. The construction industry is historically male-dominated and changes at an extremely slow rate. The industry is also deeply rooted with stereotypical images of what a construction worker should look like and act like: a man. While other industries are approaching sexual equality, construction is lagging far behind. The first and foremost reason for this difference in velocity may be the lingering negative stereotypes toward women mingled with the traditional belief that construction is a 'man's job'.

Gender stereotypes are present in many realms, including personality traits and intellectual achievement (Ortner, T. & Sieverding, M. 2008). In consideration of personality traits, men are regularly seen as more autonomous, assertive, and competitive, whereas women are perceived as more sensitive, communicative, and tender-minded. These gender-based personality traits reflect and replicate the archetypal social positions as the 'male breadwinner' and the 'female caregiver'. In consideration of intellectual abilities, from most viewpoints, the male stereotype has the advantage. Men are generally seen as more intelligent, and generally estimate themselves as so. Gender based stereotypes were most likely developed in earlier times, under different social situations, as a consequence of a gender-related division of labor (Ortner, T. & Sieverding, M. 2008).

Women are also plagued a phenomenon known as *stereotype threat.* Stereotype threat is believed to happen when a person experiences the threat of substantiating a negative stereotype about their particular group (Jaušovec, N., & Jaušovec, K. 2008). Reminding women of the negative stereotype regarding women's math skills, for instance, creates a "threat in the air", which indicates the chance of the individual being considered or evaluated in terms of the stereotype. This threat, and the anxiety it brings about, may restrain individuals from performing to their fullest potential (Jaušovec, N., & Jaušovec, K. 2008). Women in construction battle with stereotype threat everyday, with the belief that others think they are incapable.

The purpose of this part of the research is to look beyond gender stereotypes and examine gender differences as they are relevant to construction. It will also address existing gender stereotypes and the effects that they cause in work situations. The study of gender differences is divided into three sets: (1) those skills typically used and related to work in-the-field (or to conduct physical work at the jobsite), (2) skills and traits typically required for supervisory, management and leadership roles within the company, and (3) mathematical and technical skills required to perform work for the project.

Physical Abilities

Musculoskeletal differences

Females inexplicably run a greater risk than males of work-related musculoskeletal disorders (Nordander et al. 2008). A study by Nordander et al. (2008) evaluated whether male and female workers, with the same repetitive job tasks, differed regarding the risk of disorders and physical or psychosocial experiences. Employees in rubber manufacturing and mechanical assembly plants were studied. These industries were chosen because in both, groups of male and female workers worked alongside each other carrying out the same repetitive job tasks

(Nordander et al. 2008). These types of industrial jobs are often compared to the construction industry. It was found that functioning postures and movements were analogous among both genders (Nordander et al. 2008). Females, however, had a higher number of reported disorders, especially involving disorders of the neck and upper extremity. It is widely held that males, in general, are stronger than females. However, the women in this study showed significantly greater muscular activity, as compared to their overall strength (Nordander et al. 2008). For females, muscle activity of the forearm extensors was higher than 39% of the maximum exertion for a period of 10% of the workday. Correspondingly, the figure for males was 27%. Females also demonstrated less muscular rest in the forearm extensors. This may mean that their muscles had less time to recover following each of the high-power applications (Nordander et al. 2008).

Females, possibly more regularly than males, are working in occupations with greater risk for injury (Nordander et al. 2008). This study showed that females were twice as likely as males to leave the industry because of complaints of pain and injury. These occupations of greater risk may also be linked to earlier studies that have revealed that low job-control and high job demands are connected with musculoskeletal disorders. Females have reported less job-control, and more job-demands, than males, suggesting that this may be a cause as to why they also report more muscular disorders. Such circumstances are common outcomes of highly constrained and controlled job tasks such as the assembly line work examined here, which are more common jobs amongst females. Gender differences effecting work tasks can also be seen in activities outside of the job. Women typically spend more time doing household work, and have less time for recovery and exercise. Deficiencies in recovery during leisure time, specifically the lack of muscular relaxation, may amplify the risk of disorders. This is an especially prevalent issue for mothers. In addition to rest and regular exercise, it is recommended

that the amount of time spent on such high-force work tasks should be lessened, by incorporating other, non-repetitive, job tasks to reduce the number of musculoskeletal disorders (Nordander et al. 2008).

Personal protection equipment and body types

Women in the construction and manufacturing industries have typically worn PPE (Personal Protection Equipment) designed for men (Naso, M. 2006). Previously, boots, gloves, harnesses and additional gear were not readily obtainable in female sizes as the demand was low. Many women at that time were not employed in blue-collar jobs. According to the Bureau of Labor Statistics, women now embody 10 percent of the construction workforce and 30 percent of the manufacturing workforce in the United States. Manufacturers are currently attacking women's sizing in two ways: creating entirely separate products for just for women or developing PPE that fits a wider range of sizes. While both men and women contend with the same risks on the job, the lack of suitable equipment frequently heightens a woman's vulnerability to injury. "Most welding gloves, for example, are made in men's large or extra large sizes. It's not commonplace to find a supplier with small or extra small welding gloves," said Terri Piasecki, owner of Charm and Hammer, an online supply store specializing in safety gear for women (Naso, M. 2006). "If a woman wears a welding glove that's too large, how is she going to handle anything? How is she going to pick up a tool properly?" Along with the decrease in dexterity, oversized gloves create real hazards to women working near equipment. “A glove that is too big easily can get caught in a conveyor belt or on a lever, pulling- a woman's hand with it,” Piasecki said. One new line of PPE for women is crafted by two female engineers and founded on a rock climber's harness. The new line is called ‘Ms. Miller’ and is distinct from a man's harness because it is adapted to hold a woman's center of gravity and the form of her

hips. “Women in construction and manufacturing traditionally have tried to blend in; they are used to wearing men's equipment,” Piasecki said. She also added that numerous women did not want companies to think they had to acquire anything different for them; the women thought it would make them unmarketable. Piasecki said, "Very little was said (about PPE not fitting). They just put up with it because they wanted the job" (Naso, M. 2006).

Manual dexterity

Folk psychology suggests that women's fingers are nimble (Peters, M. & Campagnaro, P. 1996). However, this may not necessarily lead to the conclusion that they have greater dexterity than men. Modern experimental psychology suggests that women perform well on tasks that entail fine synchronization of muscles and excel in rapidity and accuracy of repetitive reactions (Peters, M. & Campagnaro, P. 1996). A study in 1993 stated that "women do better on precision manual tasks—that is, those involving fine-motor coordination—such as placing the pegs in holes on a board". It could be possible that finger size itself has something to do with the precise dexterity of women rather than a difference in sex. In contrast, men are believed to do extremely well on tasks that entail "extensive mediation of higher processes as opposed to reflexive stimulus response connections". Men also show a greater competitiveness when performing manual dexterity tasks, especially in tasks where there is less importance placed on finesse and more on speed. Conversely, women were observed in manual dexterity tests as more cooperative in nature. Although it is said that women’s fingers are more nimble, historically men have held positions such as jewelers and goldsmiths. These occupations use tools to operate on their objects, involve immense precision and very minuscule movement trajectories. These types of tasks that make very high demands of manual dexterity. Similarly, the most challenging human ability in terms of swift and precise movement, force modulation, and sequencing are created by

the playing of musical instruments. Traditionally in Western cultures, musicians have been men. It seems that as long as the variable of finger size is removed, the occupation is linked to more to social conventions than to innate differences in fine motor abilities of the sexes (Peters, M. & Campagnaro, P. 1996). Thus, reinforcing stereotypes rather than true abilities. The only real differences that may be deciphered are the differences in response to repetitive activities.

Spatial abilities

The strongest and most distinct sex difference is seen in spatial abilities (Jaušovec, N., & Jaušovec, K. 2008). Spatial ability can be subdivided into three categories: spatial perception, mental rotation, and spatial visualization. The largest difference between the sexes in spatial abilities lies in tasks of mental rotation, in favor of males (McGlone, M. & Aronson, J. 2006). Tests of this nature typically require the taker "to visualize a static two- or three-dimensional target object from one of several different perspectives and to determine whether the "mentally rotated" target object matches the shape of one or more comparison objects". Tests developed in 1971 such as the Shepard and Metzler mental rotation paradigm and the Vandenberg Mental Rotation Test produced an outcome of approximately one full standard deviation of difference between the sexes, the greatest recognized sex difference of any cognitive ability. Of those scoring above average on the test, 75% were male and 25% were female. These statistics have empowered those who believe that the difference is due completely to 'innate abilities'. For instance, Harvard University President Lawrence Summers attributed the lack of women in the math and science professorate to differences in "innate ability." Conversely, nearly all scientists familiar with the gender gap identify that it is so vast that it most likely entails a mixture of genetic and socialization theories to explain it. Over the last 30 years, the gap between men and women's scholastic and professional contact with visual–spatial tasks has closed swiftly.

However, the gap in their achievement on tests of this type has stayed rather stable (McGlone, M. & Aronson, J. 2006). What part might the stereotype of female visual–spatial incompetence play in this spatial abilities gap?

A study performed in Germany, aimed "to analyze the effects of gender and gender stereotype priming on performance of a mental rotation task" (Ortner, T. & Sieverding, M. 2008). They concluded that the effect of gender priming on test outcome was considerable, whereas the key effect of gender was not substantial. "Within this study, women were clearly able to perform the same level of mental rotation as men with low effort" (Ortner, T. & Sieverding, M. 2008). However, another possible outcome may have come out of this: women must struggle with the likelihood that poor performance will validate a negative stereotype about their spatial abilities (McGlone, M. & Aronson, J. 2006). Women may then be battling two separate objectives, one which is the actual test and one which distracts them from the test and turns their attention to evaluative concerns. This diversion in their attention from the actual test may negatively impact their performance (McGlone, M. & Aronson, J. 2006). Alternatively, one could hypothesize that those with higher abilities, of both genders, to some degree compensate for their substandard skills by intensifying their level of attention put forth toward the task (Jaušovec, N., & Jaušovec, K. 2008). This, and other research, calls into question the naive presumption that biological differences completely rationalize the differences in performance outcomes of spatial tasks (McGlone, M. & Aronson, J. 2006).

Leadership/Management Abilities

Emotional intelligence – recognizing emotions

Emotional intelligence is "the ability to recognize emotion, reason with emotion and emotion-related information, and process emotional information as part of general problem

solving" (Jaušovec, N., & Jaušovec, K. 2008). Recent studies have found that females exceed males on tests of emotional intelligence. Again, both genders to some degree compensate for their lesser abilities by increasing their level of attention; for females with spatial rotation tasks, and for males in emotional tasks (Jaušovec, N., & Jaušovec, K. 2008).

Communication and verbal abilities

Research shows that women are typically better in areas concerning communication and verbal abilities. This is may also be a part of the stereotypical view about women talking more than men. In an ancient Sanskrit book, nine shares of talk were given to women and one to men, symbolizing what is most likely one of the first written accounts for female advantage in verbal ability (Jaušovec, N., & Jaušovec, K. 2008). Current studies propose that females exceed males in some, but not necessarily in all, sections of verbal abilities. Communication is very important in positions involving supervising other workers and all types of management and leadership positions.

Supervision

Supervision depends greatly on a woman's work-related status and position (Ortner, T. & Sieverding, M. 2008). In contrast, the supervision of male workers principally reflects their ability. The association suggests that supervision in men's occupations are considered and adapted on the foundation of performance, while women must be able to wield influence over supervisory practices by way of prestige (Ortner, T. & Sieverding, M. 2008).

Group behavior

Research shows that the gender composition, or the sexes which make up the group, have a greater affect on women's behavior than men's (Taps, J. & Martin, P. 1990). The difference in how women are perceived and responded to within the group may be attributed to whether

they give internal or external accounts. "*Internal accounts* give credit to one's own knowledge, experience, or skills as a reason or explanation for one's behavior, whereas *external accounts* give credit to others, such as teachers, experts, books, media, and so on." Reports crediting one's own experiences, or internal accounts, can show that the member of the group is knowledgeable and should be paid attention, therefore acceptable or even admirable. Conversely, such accounts may also be regarded as conceited and condescending, particularly when given by a low-status group member, in this instance, a woman. These internal accounts of women may then be seen as efforts to take over, and therefore become irrelevant and unaccepted. The way that internal and external accounts are perceived also depends to a great extent on the total composition of the group, not just the reaction of the individual. One study found that "(a) a solo woman in an otherwise male group is most influential and well liked when she gives external attributional accounts, (b) a woman in an all-female group is most influential and well liked when she gives internal accounts, and (c) a woman in gender-balanced groups is comparably influential and well liked when she gives internal or external accounts". The study also found that a solo woman in an otherwise male group, which is typical of construction, has little sway on coworkers and is not popular among the group if they give internal accounts. These groups seemingly develop a normative configuration that commends and supports women who give recognition to others in external accounts, but overlooks and rejects women that credit themselves. Again, in this instance, a woman may be seen as conceited and condescending to other group members. In the compositional group, however, men are impacted by, and like, women who present external accounts. Those accounts are perceived as legitimate. "It is not only what women do or say that influences their male co-workers *but what they do or say in the context of variously gender-composed groups"* (Taps, J. & Martin, P. 1990).

The gendered nature of occupations gives normative and legitimacy partiality to men and develops a burden for women who are forced to prove themselves (Taps, J. & Martin, P. 1990). Tailoring comments to give acknowledgment to external sources can neutralize differences between the minority and majority genders of the group and tailoring comments toward the audience can be employed as a tactic to improve effectiveness. While it may appear wrong that women must vary their choice of accounts to their audience to be accepted, this is not an unusual occurrence for low-status members in groups (Taps, J. & Martin, P. 1990).

Overall, equally composed groups are best for women, but are rare in construction work. In other industries, and hopefully in the future of construction, group administrators can take these matters into account and create task groups in ways that do not inadvertently put women at a disadvantage from the start (Taps, J. & Martin, P. 1990).

Leadership

There are both advantages and disadvantages for women as leaders (Eagly, A. & Carli, L. 2003). Most of the disadvantages come from masculine defined roles or roles that are male-dominated. The traditional female role does not fit into these masculine positions easily and is met with strong prejudice. Because of this, women are forced to perform beyond the expectations of the normal competence level while still reassuring others with their gender appropriate female behavior. This can be very difficult to accomplish and also may hinder women from achieving recognition for high ability or outstanding achievements. Given this background, women may tend more toward transformational leadership because it reflects expected gender roles for women, including supportive and considerate behavior toward others. "Transformational leadership entails establishing oneself as a role model by gaining followers' trust and confidence" (Eagly, A. & Carli, L. 2003). The case that women are more effective

leaders is not direct— that is, women, more so than men, exhibit leadership styles that have been linked with effectiveness (Eagly, A. 2007).

Previous studies have shown that there has been a shift toward women leaders (Eagly, A. & Carli, L. 2003). This may be attributed to the gradual breaking down of barriers and disadvantages for women. It may also be because of the increase in number of women in the labor force. Women themselves are changing; self-reports of assertiveness, dominance, and masculinity, and the value that women place on job attributes such as freedom, challenge, leadership, prestige, and power have all become more similar to those of men. Leadership roles have also changed. The role of 'manager' is no longer solely genderized as being male. With increasing numbers of women leaders, organizations have changed. They are now driven more "by results than 'old boy' networks, they reward talent over gender and present a more level playing field than do traditional organizations". Women succeeding in these organizations are symbols of innovation and progressive change (Eagly, A. & Carli, L. 2003).

Technological/Mathematical Abilities

Computer literacy

Computer related activities are stereotypically linked to the male gender. A study performed in 1997 found that males experience considerably more successful computer-related results than females across all organizational jobs with the exception of clerical work (Harrison,A. et al. 1997). To make matters worse, males' achievement with computers may additionally strengthen the sex orientation of computing occupations, thus discouraging females even further from successful endeavors. Excluding clerical workers, females were concluded to be more fearful of computer work, had less optimistic participation, and believed computers to be more controlling. These pessimistic feelings may hinder their use of the computer. Females also stated that they used all software applications and graphics considerably less than males.

This may also hinder their success because learning curve theories imply that repetition frequently enhances performance. Females' fears about computer usage may lead to lower beliefs of their own abilities and thus may lead them to expect less of themselves. In the 1997 study, females conveyed significantly poorer computer self-efficacy than males (Harrison,A. et al. 1997).

These conclusions have implications for both females and organizations (Harrison,A. et al. 1997). First, females must be conscious that performance of computer-related activities may establish yet one more barrier to their work-related success. Females must knowingly cope with the apparent male stereotype of computing. Second, organizations must also be sensitive to the evidence that a lack of expertise in computing may impede females in responsibility, pay, and professional advancement. Organizations should develop methods to conquer such obstructions (Harrison,A. et al. 1997).

Mathematical abilities

A widespread stereotype is that men perform better than women in mathematical abilities. It actually depends on the test itself (Eriksson, K., & Lindholm, T. 2007). Over the past years, a mounting body of research has confirmed that gender differences in math abilities may be produced, propagated, or removed by variables in the test condition itself. In particular, research has shown that the establishment of the negative stereotype of women's abilities in the field of math can lead women to underachieve on math tests. When participants were notified beforehand that either the test had been shown to generate gender differences, or that it had been shown *not* to generate such differences, men achieved higher scores than women. The results demonstrated that when notified that the test had revealed gender differences, women performed

more inadequately than men. The gender relevance manipulation altered men's performance more than women's (Eriksson, K., & Lindholm, T. 2007).

In a study conducted by Schmader, results showed that the negative stereotype threat effect on women's math test scores only influenced those women who deeply identified with their gender (Eriksson, K., & Lindholm, T. 2007). According to Schmader, the justification of this effect of high gender recognition may be that women who are exceedingly identified with their gender are further encouraged to sustain a positive image of that identity than lower identifiers. Consequently, highly gender identified women possibly will experience greater threat, and consequential impairments at the proposition that their 'in-group' is substandard to other groups. "While both groups of women thus to an equal extent may endorse the negative stereotype of women's math abilities, and recognize a threat of confirming a negative stereotype about women's math abilities, those high in gender identification can use their strong, general belief and their experience of support for this belief as a protection against these expectancies." Still, if a woman who identifies less with their gender is more doubtful of their rights in general, they do not have these means of prevailing over the pressure of the threat and their performance will decrease as a result (Eriksson, K., & Lindholm, T. 2007).

The results of the aforementioned study suggest that the gender identity relevance manipulation made these women more cautious and meticulous on any given problem, or instead, that they experienced more struggles solving each problem because their cognitive abilities were preoccupied (Eriksson, K., & Lindholm, T. 2007). As mentioned before, the phenomenon is known as *stereotype threat*. This threat, and the intimidation it brings about, may hinder individuals from performing to their capability (Eriksson, K., & Lindholm, T. 2007).

Conclusions

The greatest differences between the sexes were found in areas of muscular abilities – in favor of men, in emotional intelligence – in favor of women, in communication and verbal abilities – in favor of women, in group behavior based on gender composition – in favor of men, in leadership – in favor of women, and in computer literacy – in favor of men. Results from the other studies concluded that there was no significant difference in ability between males and females with gender based stereotypes aside. Many of the differences that were significant could have logically been hypothesized. For example, it is well known that males, in general, are stronger than females. Other main differences help to point out ways in which behavior may be modified to fit the situation; such is the case with group behavior based on gender composition. However, the more intriguing conclusions are those which provide proof toward gender equalities, thus negating wide-spread gender stereotypes. These include the equal performance of women on spatial and mental rotation tasks. With an industry-wide shortage of skilled workers, this may be a case for recruiting female equipment operators, especially since this position does not require excessive physical strength. There is no reasoning left for placing women in 'lighter' occupations on the basis of gender abilities, when they possess the same skills as men do. Some employers even report that they prefer to hire women, stating that they "drink less" and are more responsible. With equal, or at least comparable, skills, and a more dependable nature, females may actually be able to boost construction productivity even though they are physically weaker. Furthermore, women may make better construction managers because of their greater ability in emotional intelligence and communication, and their propensity toward the transformational leadership style. The reasoning for the absence of women in the industry may soon lie in women's preferences toward feminine occupations, rather than a barrier of industry stereotypes. The differences between male and female workers are not

as vast as was once thought. Once stereotypes are put aside, construction may be able to develop a more diverse and productive workforce.

Personality Traits by Gender

Background

Research on gender differences was initiated by scientists who suspected that individual distinctions of traits were biologically determined (Feingold, A. 1994). They also believed that findings of gender differences supported this assertion. Some of the first discussions of gender differences began with the conclusions from Maccoby and Jacklin's (1974) research of sex differences in cognition, temperament, and social behavior (Feingold, A. 1994). Maccoby and Jacklin applied the previously widely-used narrative method of review. This means that the studies were evaluated by area, then the significance or non-significance of each difference was recorded by study, and deductions were made subjectively from both the quantity and the uniformity of significant gender differences. Maccoby and Jacklin's study found males to be more assertive (dominant), more aggressive, and less anxious than females. No sex difference was found in their studies for self-esteem. A person’s locus of control was concluded to fluctuate by age, with a gender difference (greater male internality) coming out only during college years. Other earlier studies found that females scored higher than males on ego development but that the difference diminishes with age. This finding suggests that the sex difference may be a product of prior female maturation in ego development (Feingold, A. 1994). The causes of sex differences may be the most difficult aspect to determine.

Proximal Causes

Biological model

The biological model speculates that observed gender differences in personality test scores “reflect innate temperamental differences between the sexes” (Feingold, A. 1994).

Modern research has proposed that there is a strong biological foundation underlying individual dissimilarities in personality traits. A study by Zuckerman conducted in 1991, implied that gender differences in the traits of dominance and aggression may be produced by biological sex differences in gonadal hormones (Feingold, A. 1994). An earlier study in 1987 also hypothesized that sex differences in chromosomes may make women more prone to depression than men. "Women have two X chromosomes, in comparison with one for men, and major affective illnesses may be caused by a mutant gene on the X chromosome" (Feingold, A. 1994). In these studies, a greater female susceptibility to depression would be discernible in higher scores for women than for men on assessments of depression, anxiety, and neuroticism.

Socio-cultural model

The socio-cultural model of gender differences suggests that social and cultural factors create gender differences in personality traits in a direct manner. Studies by Eagly in 1987 and Eagly & Wood in 1991, hypothesized that sex differences in social behavior come from gender roles, which state the behaviors that are suitable for males and females (Feingold, A. 1994). One socio-cultural model is the expectancy model. This model insists that social and cultural factors propagate in gender stereotypes. This in turn, causes sex differences in personality traits; as holders of stereotypical beliefs treat others in a manner that results in others conforming into compliance with the prejudices of the perceivers. Self-concept may also influence expectancy outcomes. For example, if "assertiveness is a trait seen to be characteristic of men, then people may respond to men in a manner that causes men to first internalize assertiveness as part of their self-concept and then to behave assertively to bring their behaviors in line with their self-image" (Feingold, A. 1994).

Another example of a socio-cultural model is the artifact model. The artifact model suggests that socio-cultural factors (e.g., gender stereotyping) result in men and women holding

different values about the importance of possessing various traits (Feingold, A. 1994). “Women may view nurturance, for example, as a very positive characteristic, and social desirability-related biases may result in women reporting themselves to be more nurturant than they are. Men, by comparison, may have been inculcated with the belief that nurturant males are "wimps" or "sissies" and may underreport their level of nurturance” (Feingold, A. 1994).

Distal Causes

Current gender differences may be a consequence of socio-cultural factors that are a remnant of bygone eras. Social roles, based primarily on the distribution of work tasks, may have developed in preindustrial times as a result of physical differences of the sexes, which were far more significant then than in the present technological age (Feingold, A. 1994). These physical differences pertain to greater male size and strength as well as anatomical differences involving aspects of reproduction. Accordingly, traditional male and female work roles were assigned. The gender associations of work tasks in the preindustrial age may have produced gender differences in personality traits.

Conclusions

Overall, recent research found males to be more assertive and have slightly higher self-esteem than females, although the effect size was very small (Feingold, A. 1994). Females were rated higher than males in extraversion, anxiety, trust, and especially high in tender-mindedness (e.g., nurturance). There were no significant differences between the sexes in social anxiety, impulsiveness, activity, ideas, locus of control, and orderliness. Gender differences in personality traits were commonly steady across ages, years of data collection, educational levels, and nations (Feingold, A. 1994).

Women in the Construction Trades

Job Satisfaction

Because individuals usually perform best at jobs or occupations that satisfy them, it is important to examine women's satisfaction with construction jobs. It is a fairly safe assumption to say that women will strive to succeed as long as they are satisfied with the work. Research has revealed that pay, benefits, and job security are most essential to women in their occupations (Dabke, S. et al. 2008). Although tradeswomen appear to be satisfied with the nature of work in the construction trades, this is not the case in terms of pay, benefits, and job security. Research found that women liked the nature of work in carpentry and were proud of building a structure as a result of their efforts. They took great pride in projects on which they worked and spoke highly about those projects. Many of them mentioned helping or seeing their fathers and uncles do carpentry as a child and thus chose carpentry as a career. The opportunity to learn new things, adequacy of tools, quality of equipment and machinery for job performance, and supervisory support were found to be important, yet their satisfaction is relatively lower in these aspects of work. Women in construction trades were most content with personal protective equipment, the ability to execute work, completion of a whole and identifiable piece of work, job training, opportunities to develop skills and abilities, and opportunities for challenging work. They were least satisfied with separate and hygienic sanitary facilities, understanding of family responsibilities by management, support from management during maternity or other medical situations, job security, and work benefits. Women reported dissatisfaction with opportunities for promotion. They also expressed a desire to quit the trades and reported low levels of satisfaction with opportunities and supervision. They were attracted to trades primarily because of higher wages; some had worked at administrative jobs but joined trades because of pay and union benefits. Coworker support or treatment was not important to women, and they were satisfied

with people on the job. Overall they wanted to work in the trades and establish themselves so that the next generation of women would be better off (Dabke, S. et al. 2008).

Representation

Women in the trades increased by 13.8% from 1995 to 2001 (Dabke, S. et al. 2008). In 2004, women comprised 6.4% of the construction managers, 11.7% of the civil engineers, and an overall 2.5% of the total employment across various trades. Thus, construction remains a nontraditional occupation for women, as women comprise less than 25% of those employed in this industry (Dabke, S. et al. 2008).

The most recent statistics produced by the Bureau of Women, a division of the United States Bureau of Labor Statistics (Fig. 2-1), show the representation of women in each of the respective construction trades. These trades are considered non-traditional occupations for women, since they are comprised of less than 25% women. Overall, the Bureau of Women has noted 153 occupations as nontraditional (Menches, C. & Abraham, D. 2007). Of those, 33 are construction-related professions. Of the 33 occupations, 25 are related to the construction trades. These trades consist of many of the traditional field labor positions, such as carpenters, plumbers, electricians, and equipment operators. Over 75% of the trades employ fewer than 5% women. Almost 10% reported employing no women at all. Only paperhangers and woodworkers employ more than 10% women (Menches, C. & Abraham, D. 2007).

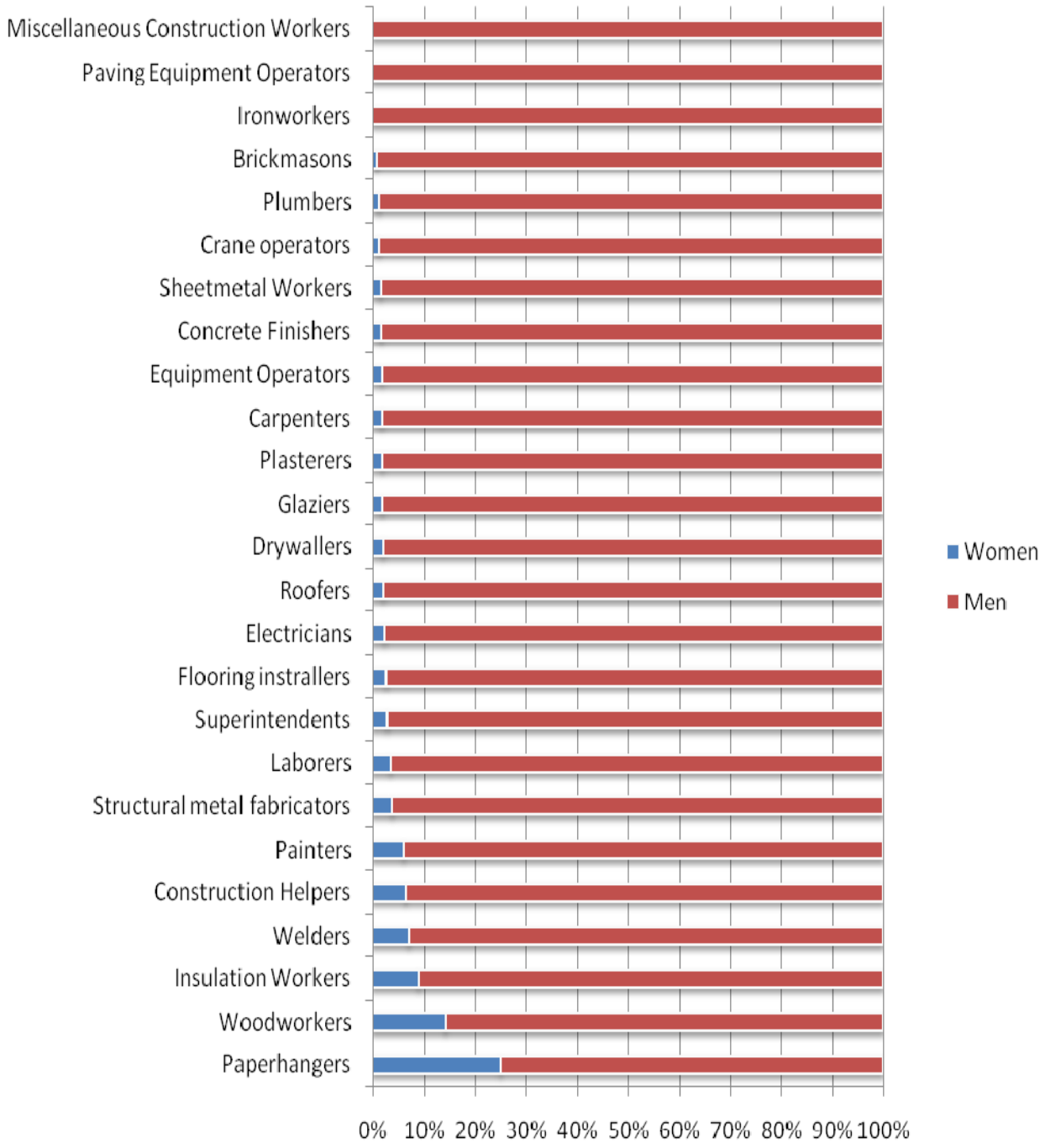


Figure 2-1. Percentage of women employed in construction trades. (Adapted from: United States Bureau of Labor Statistics. (2007). *Women in the labor force : A databook.* Washington, DC: U.S. Dept. of Labor, U.S. Bureau of Labor Statistics.)

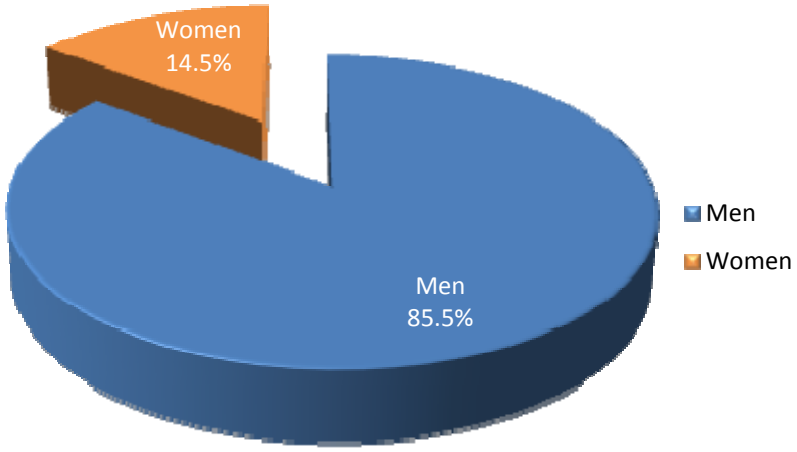
Comparison to similar occupations

In 2006, the Bureau of Labor Statistics reported that 3.1% of all employees in the construction and extraction occupations were women (Table 2-1). Similar construction-related occupations of Architecture and Engineering reported that 14.5% of all employees were women. These proportional differences can be seen graphically in Figure 2-2.

The highest concentrations of women in Architecture and Engineering Occupations were in Industrial Engineering (including Health and Safety) with 22.6% of all employed (174,000 out of 2,830,000 total employees in Architecture and Engineering Occupations), followed by Architects (except Naval) with 22.2% of all employed (221,000 out of 2,830,000 total employees in Architecture and Engineering Occupations) (Table 2-1). The highest concentrations of women in the Construction and Extraction Occupations were in Construction and Building Inspection with 8.8% of all employed (102,000 out of 9,507,000 total employees in Construction and Extraction Occupations), followed by Painters (Construction and Maintenance) with 7.7% of all employed (713,000 out of 9,507,000 total employees in the Construction and Extraction Occupations).

Table 2-1. Employed persons by detailed occupation and gender, 2006 annual averages (Numbers in thousands). (Source: United States Bureau of Labor Statistics, 2007)

Occupation	Total Employed	Percent Women
Architecture and engineering occupations	2,830	14.5
Architects, except naval	221	22.2
Aerospace engineers	110	13.1
Chemical engineers	70	17.1
Civil engineers	304	11.9
Computer hardware engineers	80	16.2
Electrical and electronics engineers	382	7.7
Industrial engineers, including health and safety	174	22.6
Mechanical engineers	322	5.8
Drafters	181	21.8
Engineering technicians, except drafters	396	20.6
Surveying and mapping technicians	96	9.9
Construction and extraction occupations	9,507	3.1
First-line supervisors/managers of construction trades and extraction workers	976	2.6
Brickmasons, blockmasons, and stonemasons	244	1.6
Carpenters	1843	2.4
Carpet, floor, and tile installers and finishers	279	2.4
Cement masons, concrete finishers, and terrazzo workers	107	0.7
Construction laborers	1693	3.7
Operating engineers and other construction equipment operators	451	1.7
Drywall installers, ceiling tile installers, and tapers	295	2.9
Electricians	882	1.9
Painters, construction and maintenance	713	7.7
Pipelayers, plumbers, pipefitters, and steamfitters	662	1.8
Roofers	242	1.1
Sheet metal workers	125	3.1
Structural iron and steel workers	59	2.2
Helpers, construction trades	132	6.2
Construction and building inspectors	102	8.8
Highway maintenance workers	103	3.8



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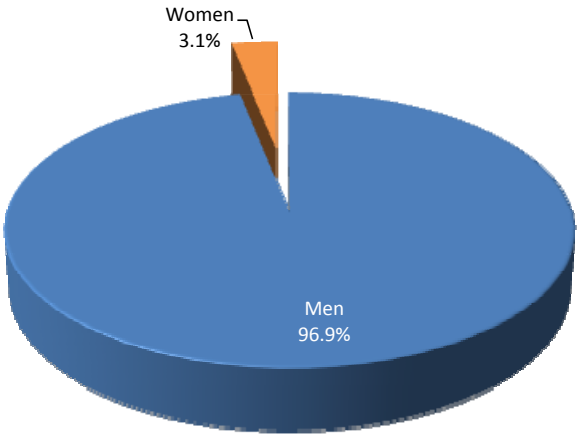


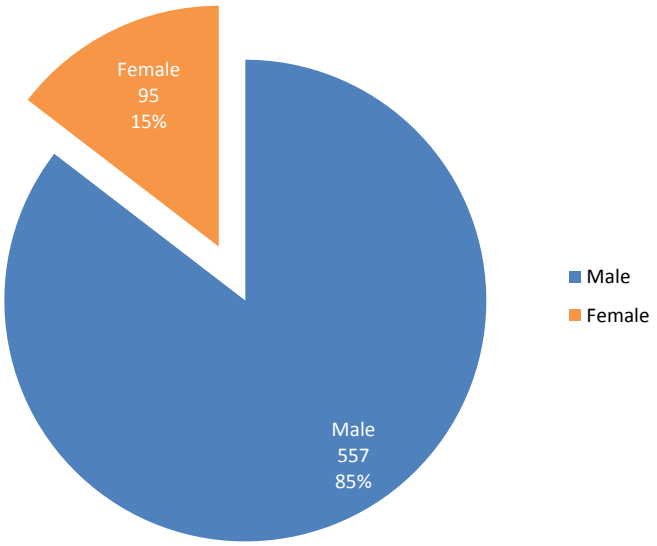
B

Figure 2-2. Comparison of representation of women in construction and extraction occupations versus women in architecture and engineering occupations. A) Proportion of women in architecture and engineering occupations (2006). B) Proportion of women in construction and extraction occupations (2006). (Adapted from: United States Bureau of Labor Statistics. (2007). *Women in the labor force : A databook.* Washington, DC: U.S. Dept. of Labor, U.S. Bureau of Labor Statistics.)

Women in the Rinker School

In the last fifteen years, the Rinker School has seen an increase in female students from 25 enrolled in 1992 to 95 enrolled in 2007, i.e., the number of women enrolled has nearly quadrupled (Fig. 2-3). The overall proportional increase was only 8%. There is also a significant difference between the gender composition of the other majors within the College of Design, Construction and Planning (DCP) when compared to the School of Building Construction. Other majors of the College of DCP are comprised of 51% women (479 enrolled) and 49% men (456 enrolled) as compared to 15% women (95 enrolled) and 85% men (557 enrolled) in the Rinker School (the majority of women in the Rinker School are enrolled in the Graduate Program). Other majors in the College of DCP also follow closely with the overall gender composition of the University of Florida (Fig. 2-3 & Fig. 2-4).

The Engineering College has a gender composition that is similar to the Rinker School. Its programs are closely related to construction occupations, non-traditional occupations for women (Fig. 2-4). The Engineering School is still closer to the gender composition of the University as a whole, with 21% female students and 79% male students, and has a higher overall enrollment of women (1,510 women and 5,606 men enrolled).



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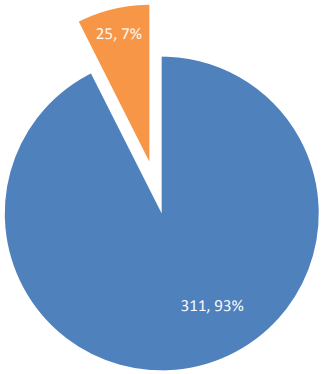
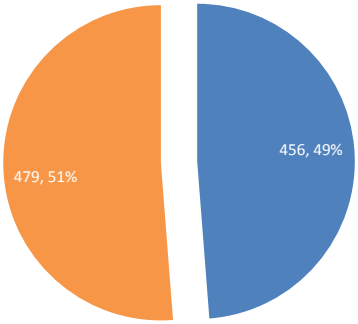
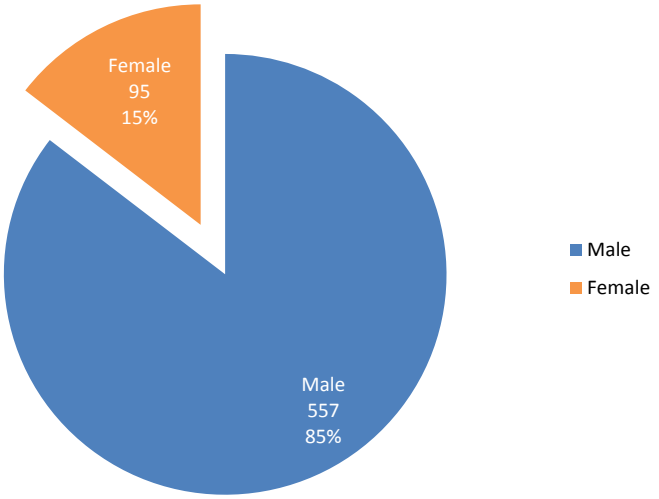




B C

Figure 2-3. Comparison of representation of women in the M.E. Rinker, Sr. School of Building Construction to enrollment 15 years prior and other majors. A) Total enrollment in Rinker School of Building Construction (2007). B) Total enrollment in Rinker School of Building Construction (1992). C) Total enrollment in other majors in the College of DCP (Adapted from: University of Florida, (2008). UF Factbook: Enrollment. Retrieved November 4, 2008, from University of Florida, Office of Institutional Planning and Research Web site: http://www.ir.ufl.edu/factbook/enroll.htm)



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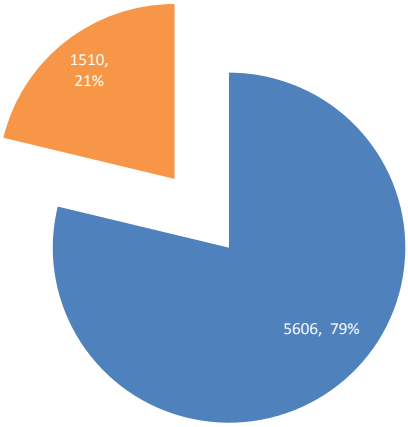

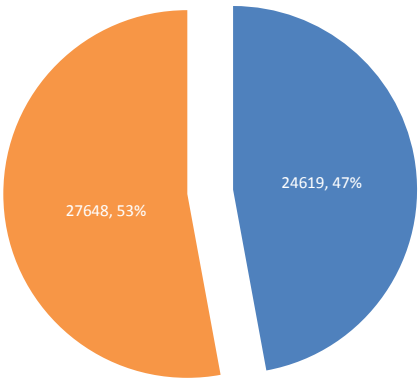

B C

Figure 2-4. Comparison of representation of women in the M.E. Rinker, Sr. School of Building Construction to enrollment of engineering majors and the University of Florida. A) Total enrollment in the Rinker School of Building Construction (2007). B) Total enrollment in Engineering at the University of Florida (2007). C) Total enrollment in the University of Florida (2007). (Adapted from: University of Florida, (2008). UF Factbook: Enrollment. Retrieved November 4, 2008, from University of Florida, Office of Institutional Planning and Research Web site: http://www.ir.ufl.edu/factbook/enroll.htm)

CHAPTER 3
METHODOLOGY

Introduction

This research was undertaken to examine the perceived trends of women in construction in the state of Florida with regards to recruitment practices, placement within firms on the basis of gender, perceived task performance abilities and gender-based personality traits. It was decided that the best way to collect the needed information was a survey of the industry. The survey was then devised using findings from the literature review. The first revision of the survey was developed by the researcher and submitted for review by Dr.Hinze, committee chair. The survey was also tested by having friends of the researcher fill it out. The survey evolved through several such iterations. Potential recipients of the survey were then considered and a list of contact information was compiled. The decision was made to send the surveys to contractors of all types, including general contractors, design-builders, construction management firms, and subcontractors.

Survey Questionnaires Designed

A survey was designed to obtain qualitative and quantitative information on trends of women in construction. The beginning of the survey sought demographic information about the construction company being surveyed, so that trends related to such aspects as volume of work subcontracted, size of the firm, type of firm, gender composition of the workplace, and position and gender of the survey respondent, could be assessed. The second section of the survey identified the specific positions within the company in which women were employed. This section was divided into office positions, field supervisory positions, and trades positions. The second part of the survey also inquired about whether gender was considered when work was assigned to new hires. The objective of the third part of the survey was to determine if the

company had any specialized recruitment program or effort in place for the hiring of women or any particular recruitment practice against the hiring of women. The fourth section of the survey questionnaire was designed to record the observations of how well women performed on work-related skills and tasks when compared to their male counterparts. The tasks and skills tested in this section were developed from the information obtained through the literature review. The tasks and skills were described in a Likert-type fashion; for example, "women perform much worse" = "-3", "women perform worse" = "-2", etc. This section was also designed to collect additional information on situations that relate to the skills and tasks studied, such as complaints of musculoskeletal injuries or pains by women, whether companies purchase and supply PPE specially made for women, observations of women's interaction in peer groups, and productivity observations. This part of the survey sought both quantitative and qualitative information. The fifth portion of the survey was designed with a similar Likert-type ranking system based on the degree to which personality traits are portrayed in employees. The personality traits used were based on those identified in the literature review. The final portion of the questionnaire dealt with the observations of women in the construction trades. This section asked the respondents to give their perceptions on the suitability of women in construction trades; if they are more suited or less suited for some trades than others.

Sample Selection

The sample selection used in this study consisted of construction management and supervisory positions, along with other upper management positions. It was decided to send the surveys to companies that had attended an M.E. Rinker, Sr. School of Building Construction Career Fair. The contact information was gathered from Career Fair materials so that only companies that were actively recruiting and have some type of company recruitment program in

place were included in the survey population. The respondents represented a variety of construction companies. A total of 212 surveys were dispersed electronically.

At this point in the study, an opportunity presented itself to survey graduate students of the M.E. Rinker, Sr. School of Building Construction. They were given the survey during class and asked to only answer the applicable questions. A total of 62 student surveys were conducted.

Surveys Conducted

The research plan for the industry survey consisted of an email message explaining the study and containing a link to direct the participant to the online survey. The student surveys were manually conducted during a graduate-level class with an enrollment of 65 students. The following procedures were used to collect the data for this study:

1. Obtained the list of attendees of the M.E. Rinker, Sr. School of Building Construction Career Fairs. The list included useful information such as a contact person and email address.
2. Survey recipients were 212 professionals in the industry who had attended an M.E. Rinker, Sr. School of Building Construction Career Fair. Surveys were distributed by email. Of the 212 emails sent out, 13 emails were returned as undeliverable. Within 48 hours, eight respondents had completed the survey.
3. A follow-up email reminding the contacts of the survey was sent 2 days after the initial distribution. Survey recipients who did not respond to the first request were asked to please respond. Those who had already responded were thanked for their assistance. Following this email, 29 more individuals responded to the survey.

4. One week after the first email message was sent, a third and final email was sent to the potential respondents. They were again encouraged to complete the survey. Nine more individuals responded to this email, resulting in a total of 46 respondents.
5. Conducted the student survey during a graduate class, of which 62 surveys were completed out of 62 distributed.
6. Obtained data from both surveys was compiled to be reviewed and analyzed.

Data Analysis

The results of the surveys were first analyzed by evaluating the frequency distributions. Statistical tests for correlations between data collected were then performed using the Statistical Package for the Social Sciences (SPSS). The results of these analytical approaches are presented in Chapter 4.

CHAPTER 4
RESULTS

Survey Response Rate

The findings of this research are based on a total of 108 completed surveys that were received. A total of 261 surveys were dispersed, representing a response rate of 41.4%.

In the student survey, 62 surveys were manually distributed and 62 surveys were received, representing a response rate of 100%. In the industry professional survey, 212 surveys were electronically distributed. Of those, 13 were returned as undeliverable, leaving a total of 199 industry professional surveys distributed. There were 46 responses to the industry professional survey, representing a response rate of 23.1%. The findings will be presented for each of the topic areas of the survey based upon the total group of respondents, the position or experience in the industry of the respondents, and by the gender of the respondents.

Respondent Demographics

The first part of each survey was designed to collect demographic information about the respondent and the company being surveyed. Many business sectors were represented by the respondents (Figure 4-1). The results show that 64 of the respondents that were surveyed did at least some work in the commercial sector. Note that respondents were asked to mark all of the industry sectors that applied, thus the sum of the total number in each sector may be greater than the number of respondents. Those sectors categorized as “other types” included government, healthcare, education, sports/event venues, site development, historical restoration, sustainable construction, institutional, and entertainment type projects.

Many business classifications were represented by the respondents (Figure 4-2). The results show that the most common type of employers surveyed were general contractors with 50 respondents, and construction management firms with 32 respondents. Again, it should be noted

that respondents were asked to mark all that applied, thus the sum of the total number in each classification may be greater than the number of respondents. Those business classifications noted as "other type" included integrated real estate services, developer, owner, architecture/engineering design services, consultants, and design firms.

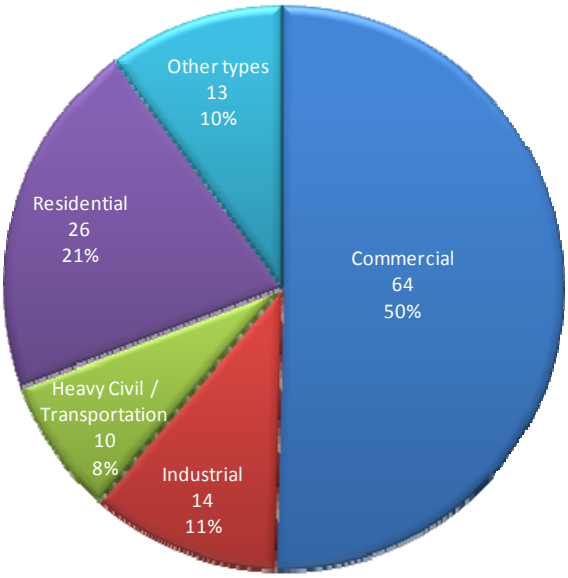

Figure 4-1. Types of projects performed by respondents.

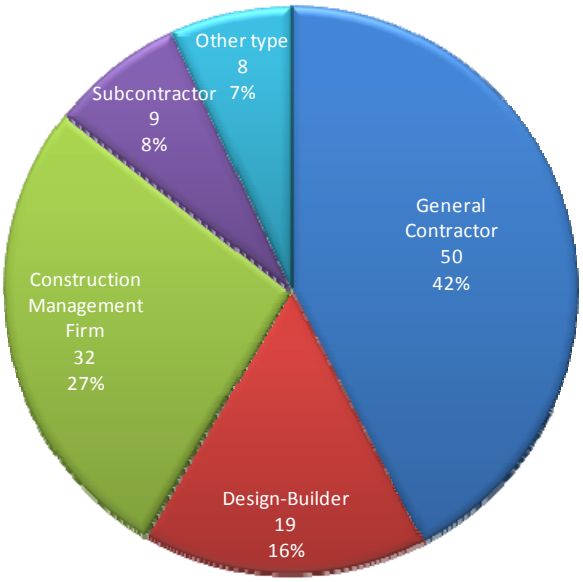

Figure 4-2. Types of employers of respondents.

Respondents were also asked about the percentage of work that the company subcontracts out to other businesses (Figure 4-3). Of the 74 responses to this question, 64.9% subcontracted over 75% of the work to be performed on a project and 8.11% responded that they self-performed all the work.

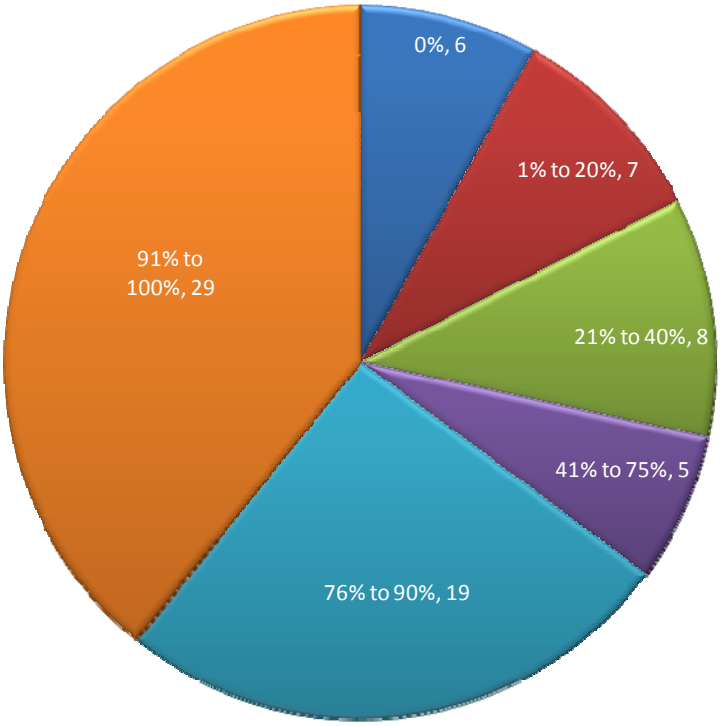

Figure 4-3. Percent of work subcontracted.

Respondents of the survey were asked to indicate their position within the company (Figure 4-4). Students represented 58% of all survey respondents and industry professionals represented 43% of all survey respondents. Of the industry professionals, 3% were presidents or CEOs, 9% were vice presidents, 10% were project managers, and 20% were in other positions. Those positions categorized as “other” included director of human resources, business development, recruiter, marketing manager, office engineer, project engineer, project coordinator, operations manager, executive assistant, and owner.

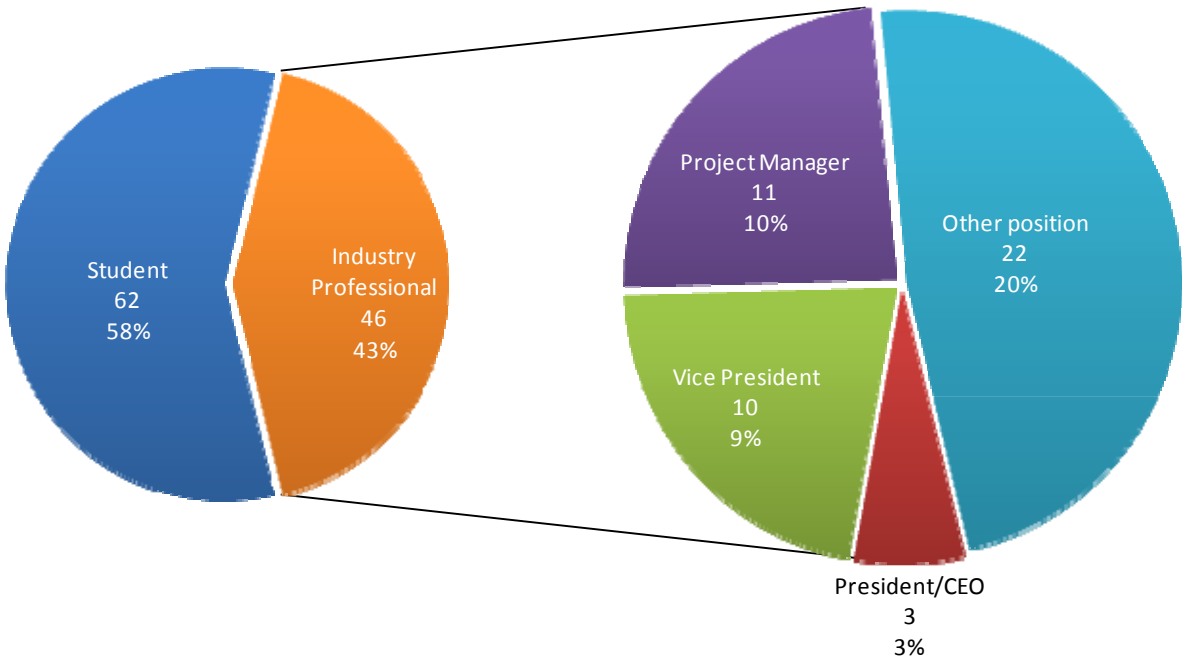

Figure 4-4. Construction industry position of respondents.

Students, instead of indicating the position within the company, were asked to indicate the amount of experience, if any, that they had obtained in the construction industry (Figure 4-5). Of the students surveyed, 33.9% responded that they did not have any past experience nor are they currently working in the construction industry. Of the remaining 66.1% that responded that they did have experience related to the construction industry, 38% had two to twelve months of construction-related experience and 6% had more than six years of construction-related experience.

Respondents completing the survey were also asked to indicate whether they were male or female. Of all the surveys conducted, 62 respondents were men and 46 respondents were women (Figure 4-6). Of the industry professional respondents, 18 were men and 28 were women (Figure 4-7). Of the student survey respondents, 44 were men and 18 were women (Figure 4-8).

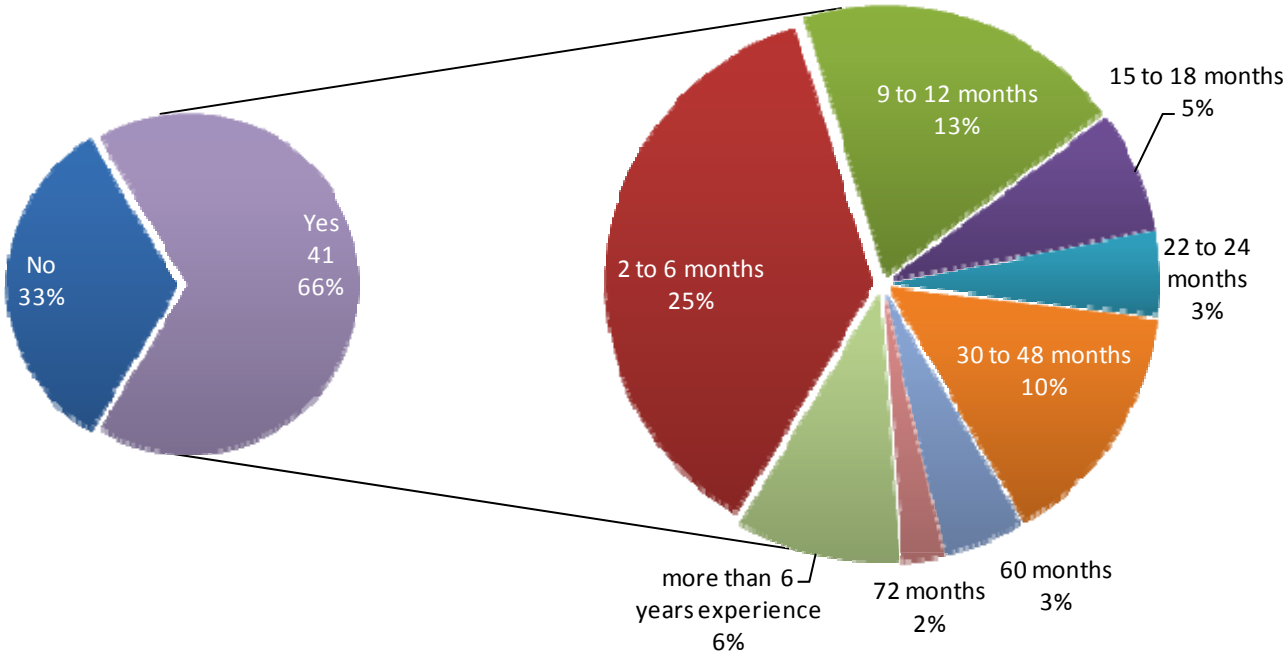

Figure 4-5. Students' amount of construction experience.

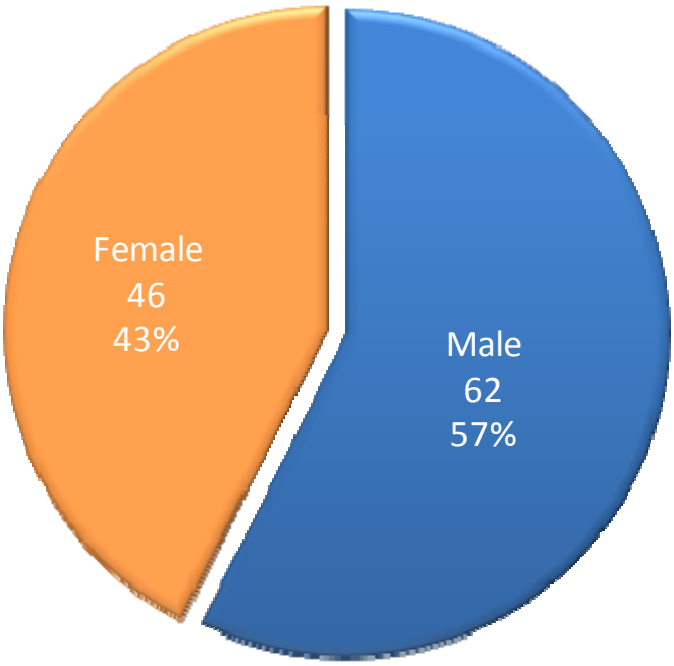

Figure 4-6. Gender composition of industry professional and student survey respondents.

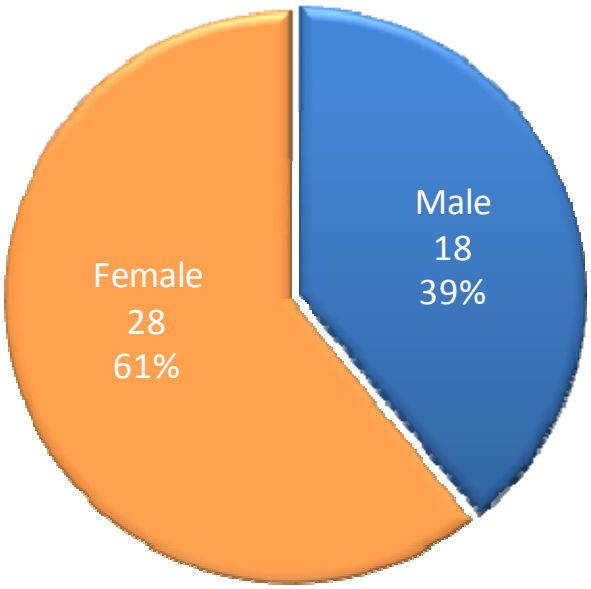

Figure 4-7. Gender composition of industry professional respondents.

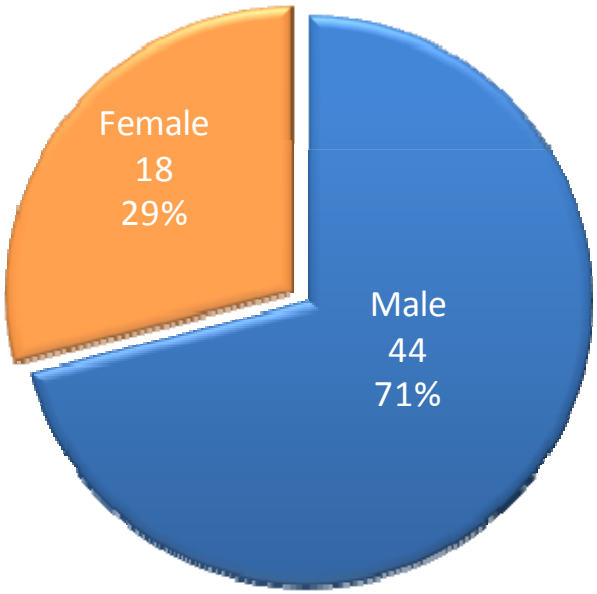

Figure 4-8. Gender composition of student respondents.

To determine the composition of each respondent's company workforce, questions were asked about the number of field employees (manual workers), the number of home office personnel and salaried employees, and how many of those employees were women. Since each

of these questions had two parts, partial responses were not included in the analysis. Reponses of zero (or no responses) total field employees or zero total home office personnel and salaried employees were also not included, because those responses do not provide any information on the proportions relative to the number of women employed. In reference to field employees, the number of total field employees ranged from one to 500, with a mean of 91.8 field employees (Figure 4-9). Nine respondents reported that they did not have any field employees. The number of women field employees ranged from zero to 200, with a mean of 9.05 women field employees. In reference to home office personnel and salaried employees, the total number of employees ranged from one to1,900, with a mean of 77.4 employees (Figure 4-10). Three respondents reported that they did not have any home office personnel and salaried employees. The number of women home office personnel and salaried employees ranged from zero to 250, with a mean of 16.5 women employees.

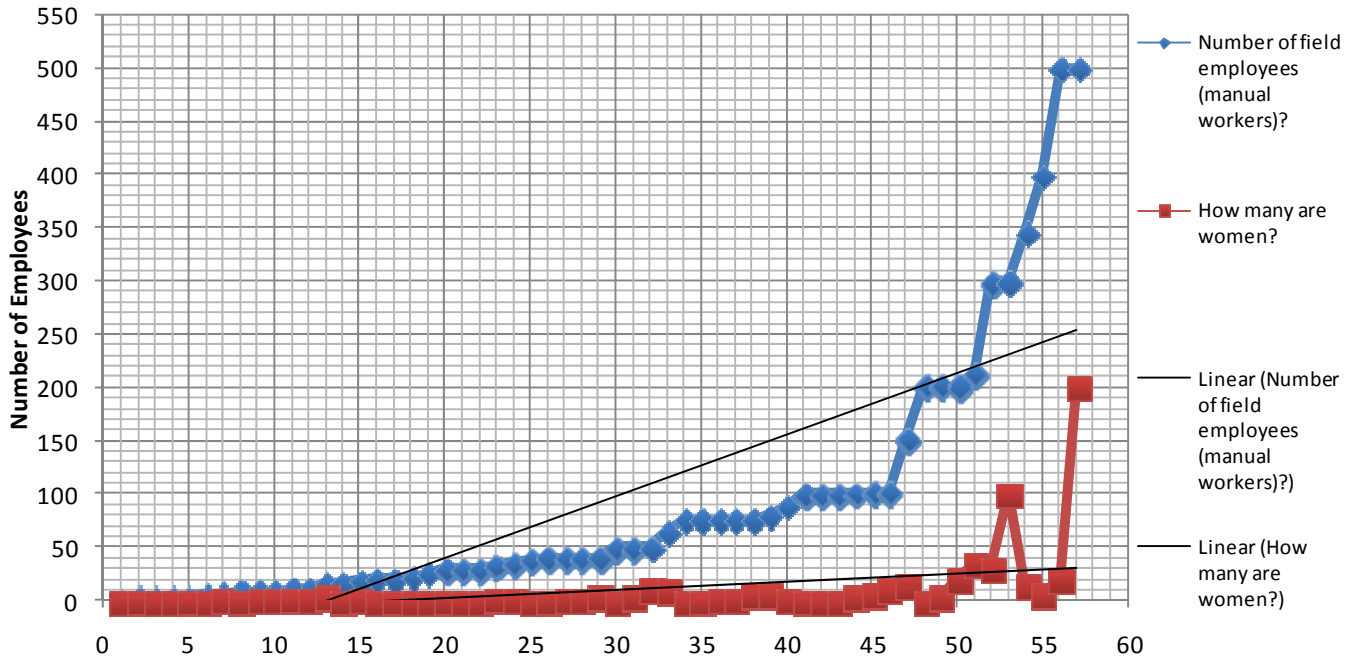

Figure 4-9. Numbers of field employees.

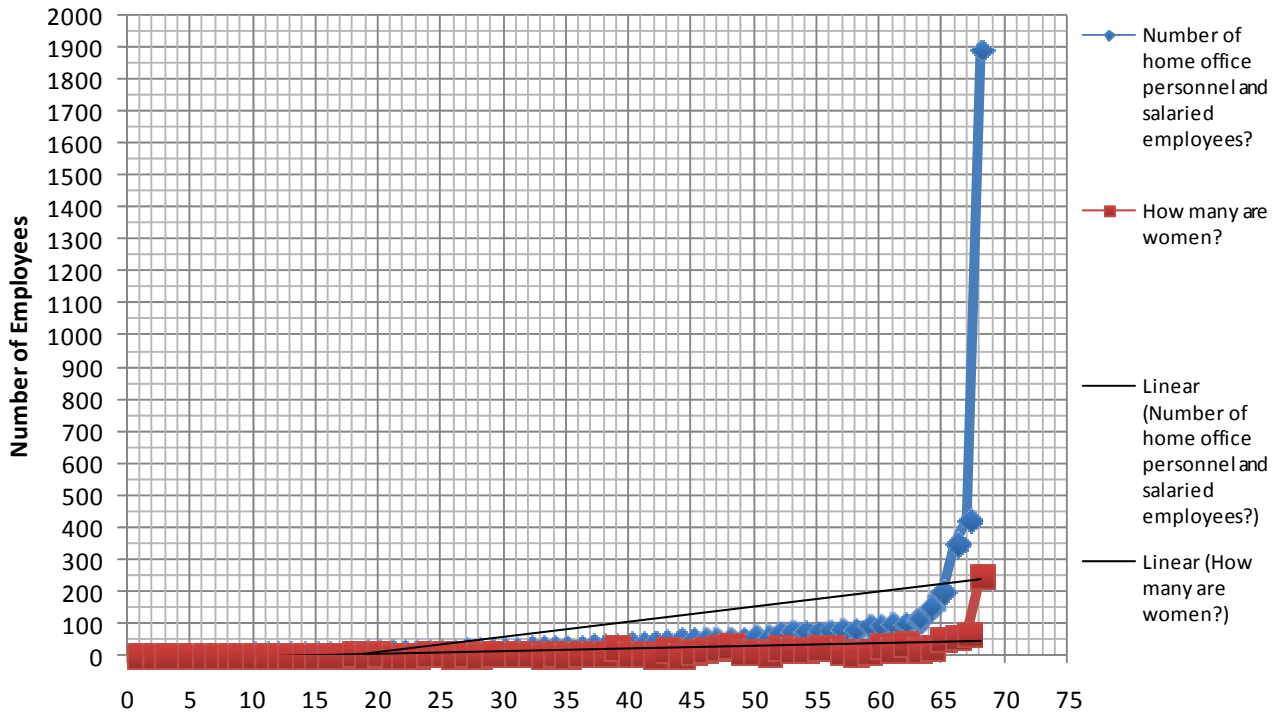

Figure 4-10. Numbers of home office personnel.

A statistical analysis was performed to evaluate if there were correlations between aspects of employer demographics. Correlation tests that were performed can be found in Table D-1. Correlations with a level of significance of 0.05 or less were considered to be statistically significant, while those with a level of significance between 0.05 and 0.10 were considered to have a tendency to being significant. The following results have a tendency toward being significant:

- Larger companies have a greater proportion of female field employees (Figure 4-11).
- As the total number of home office personnel and salaried employees increases, the proportion of women home office employees decreases (Figure 4-12).
- Subcontractors have a smaller percentage of women home office personnel and salaried employees than do general contractors.
- The greater the amount of work that is subcontracted, the greater the proportion of women home office personnel and salaried employees.

- Firms that do commercial projects have a greater proportion of women home office personnel and salaried employees than projects in other industry sectors.

- Firms that do industrial projects have lower percentages of women field employees.

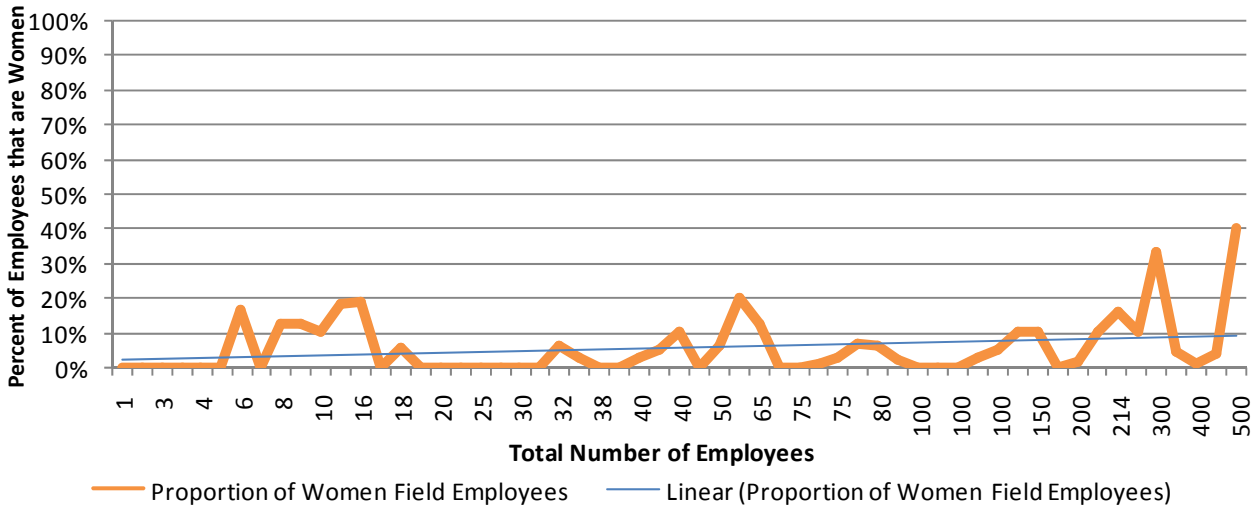

Figure 4-11. Proportion of women field employees.

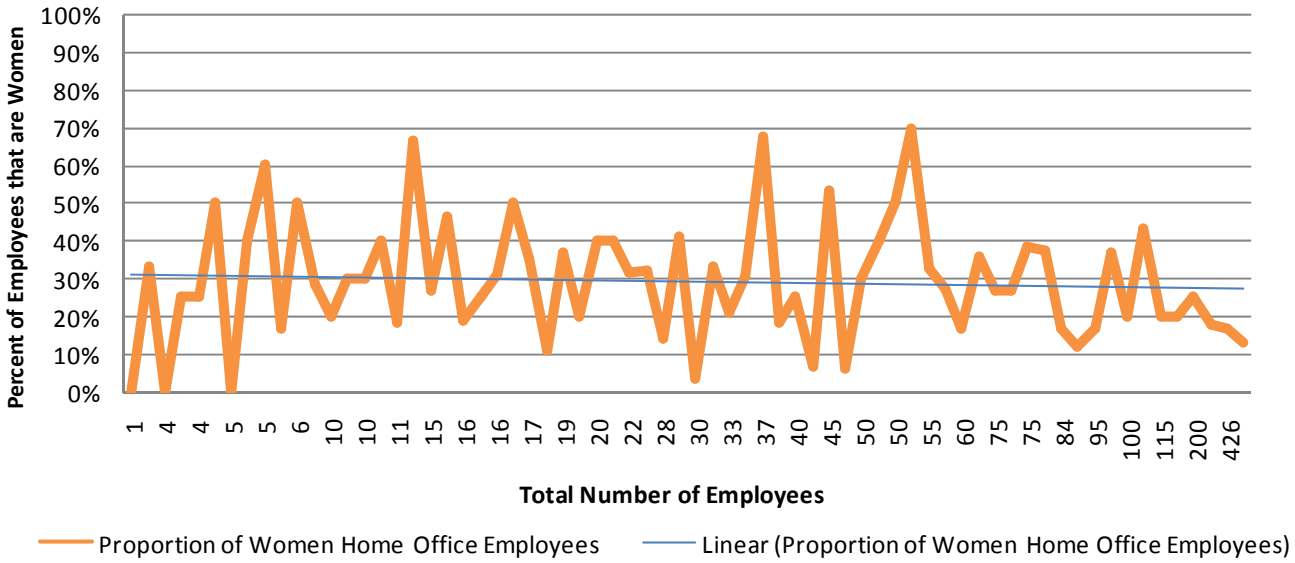

Figure 4-12. Proportion of women home office and salaried employees.

Employee Placement

The second section of the survey identified the specific positions within the company in which women were employed. This section was divided into office positions, field supervisory positions, and trades positions.

Office positions included receptionists, office managers, estimators, project engineers/assistant project managers, project managers/department managers, vice presidents, presidents or CEOs, and other office positions. The women of the companies included in the survey were proportioned as follows: 52% were receptionists and office managers and 48% were estimators, project engineers/assistant project managers, project managers/department managers, vice presidents, presidents or CEOs, and other office positions (Figure 4-13). Those positions categorized as "other" included accountants, interns, realtors, architects/engineers, chief financial officer, support personnel, human resources, I.T. personnel, marketing personnel, safety directors, construction administrator, and director of new business. A statistical analysis was performed and it was determined that there are greater opportunities (based on positions held by women) for women in home office positions in smaller firms (Kendall Correlation Test: Coef. = -0.207, $\rho = 0.009$, N = 63).

Field supervisory positions included supervisors, foremen, field engineers/assistant supervisors, and other field positions. The women of the companies included in the survey were proportioned as follows: 63% foremen, 16% other field positions, 15% field engineers/assistant supervisors, and 6% supervisors (Figure 4-14). Those positions categorized as "other" included shop department supervisor, field clerk, project manager, safety coordinator, and journeyman.

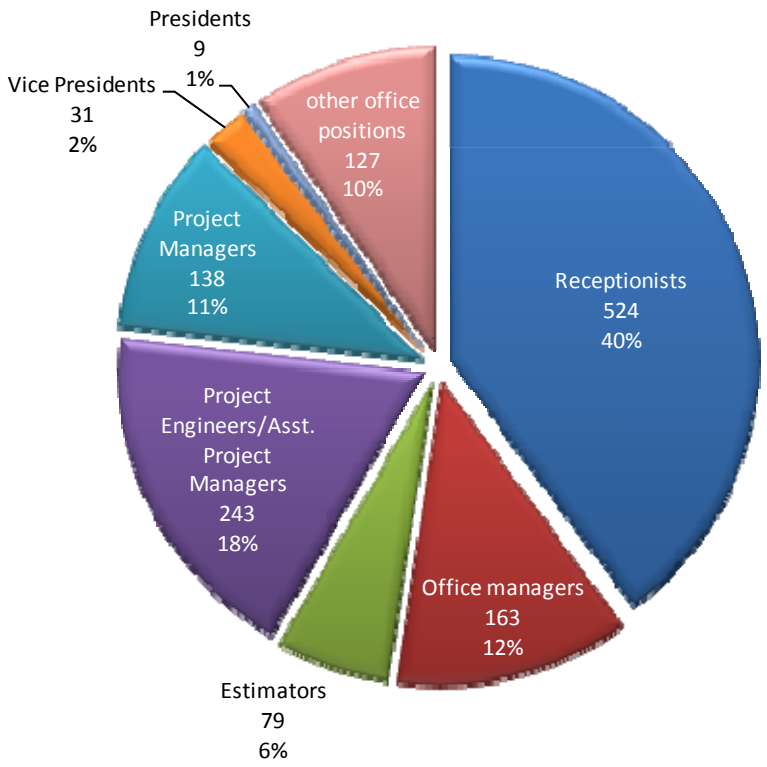

Figure 4-13. Office positions of women.

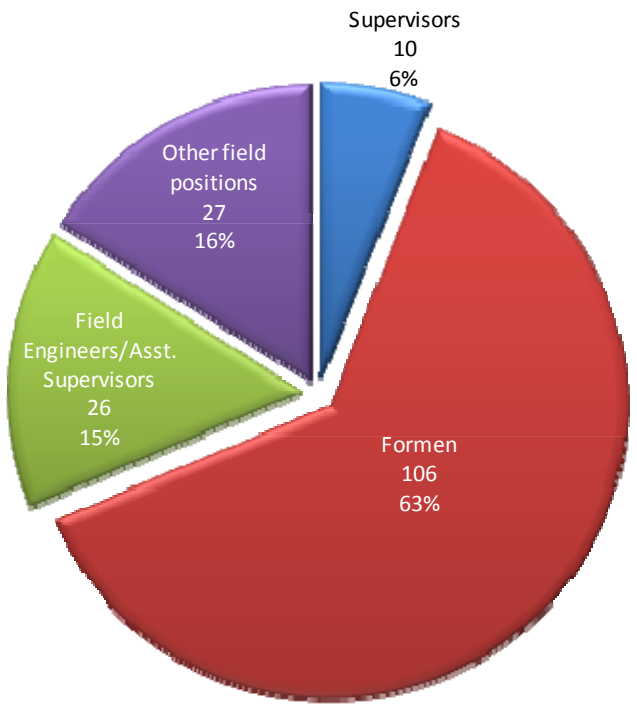

Figure 4-14. Field positions of women.

To determine the proportions of women in the trades, respondents were asked to indicate the percentage of women working in each trade on the company's projects in the previous year. It should be noted that only 51 respondents answered this section. This may be because it is not common practice to keep a record indicating gender of workers on the jobsite. Responses to question about the proportion of trades positions held by women ranged from 0% to 50%. Trades that were reported as having 0% women across the board included roofers and sheet metal workers (Figure 4-15). Trades that averaged less than 1% women included carpenters, concrete finishers, equipment operators, drywall installers and tapers, electricians, plumbers/pipelayers, structural iron and steel workers, and highway maintenance workers. Trades that averaged between 1% and 2% women included brick/block/stone masons, flooring installers and finishers, construction laborers, painters, construction helpers, construction and building inspectors, and other trades. Trades categorized as "other" included HVAC workers, landscapers, construction clean-up workers, and truck drivers. There were no trades that averaged over 2% women. The highest average percentages of women were found among construction and building inspectors with 1.90% and construction laborers with 1.80%. These numbers are below the proportions of women in the trades reported by the Bureau of Labor Statistics (Figure 2-1).

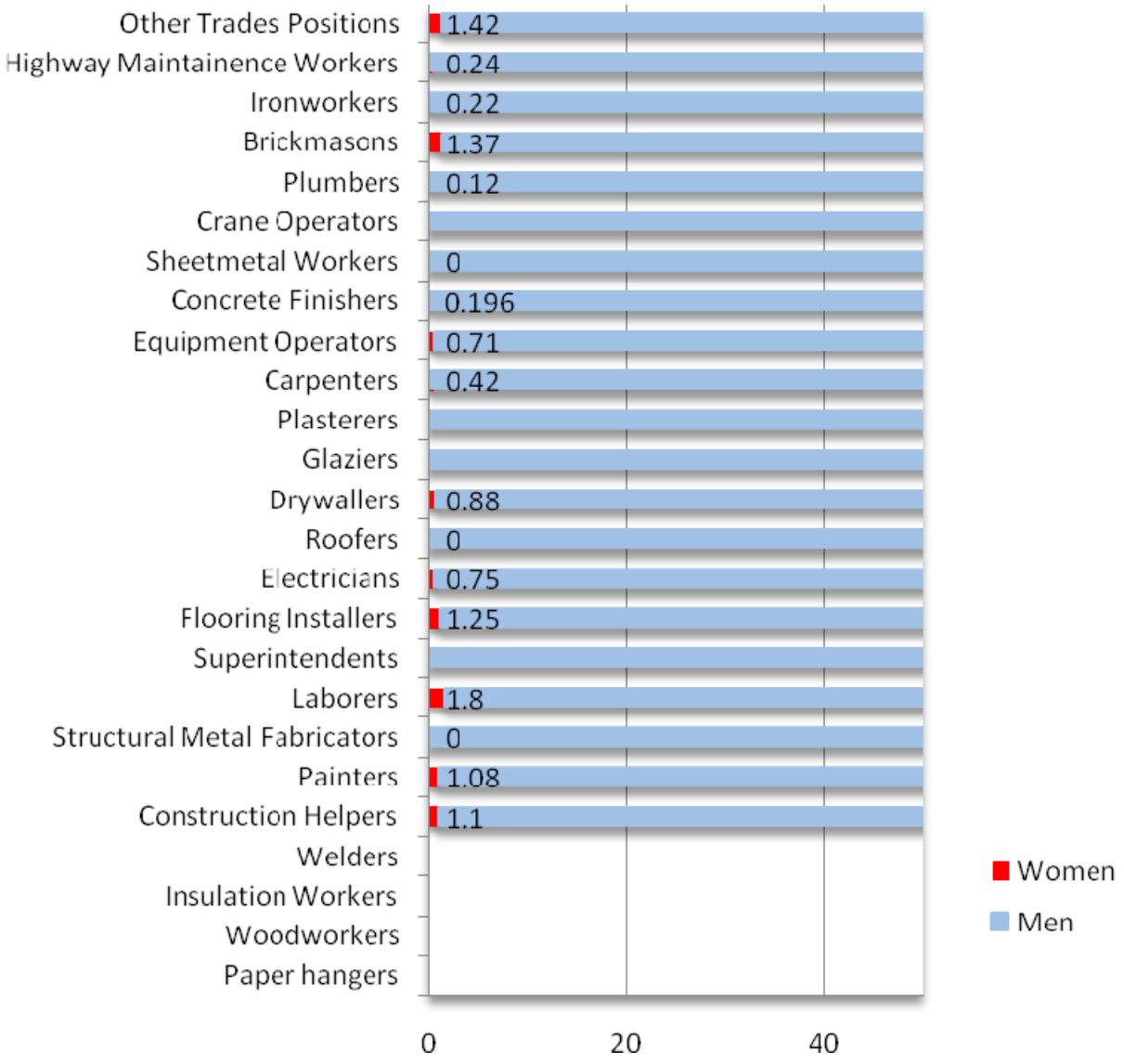

Figure 4-15. Proportions of women in trades on companies' projects.

The second part of the survey asked if and how gender is considered when assigning work to new hires. Of the respondents, 16% reported that gender was a consideration when assigning work to new hires (Figure 4-16). These respondents were then asked to describe how gender was considered in this process. Most considerations were based on physical exertion that was expected from the workers. The following were responses to this question:

- “In general, many laborer positions can require significant strength. Some women can't physically lift or haul some materials. Respectfully.”
- “If considering a trade position, it is more reasonable to hire men because the physicality of the work.”
- “Weight restraints of lifting and hoisting materials.”
- “Possibly easy-handling work would be assigned to women.”
- “Gender is considered because of the amount of physical/manual labor typically required, although, few women apply for these positions in the first place.”
- “Only ability to show up and work hard is considered. Also experience.”
- “Males are considered to be more suitable.”
- “They consider females not efficient enough for field jobs.”
- “If it is a field position, are they qualified and can they physically handle it. If it is an office or supervisory position can they handle it emotionally?”
- “We are based on meritocracy. The position has minimum qualifications. Sex, race, religion, etc is not an issue - we are an EEO company.”
- “Women are considered an advantage.”

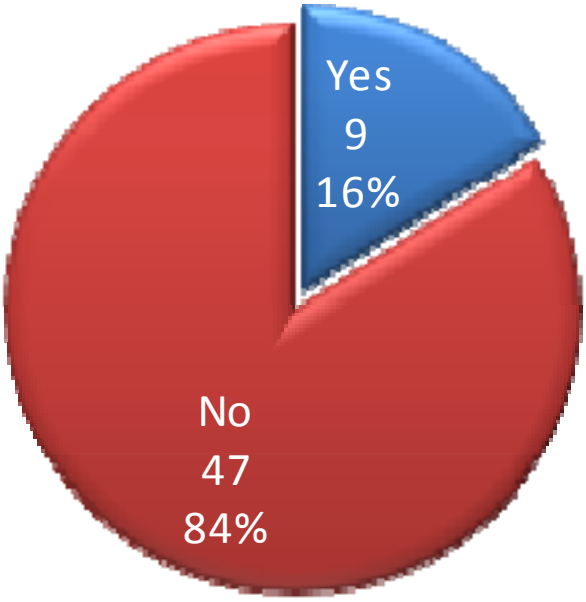

Figure 4-16. Gender is a consideration when assigning work to new hires.

Employee Recruitment

The objective of the third part of the survey was to determine if the respondents' companies had any specialized recruitment programs or efforts in place for the hiring of women or if they had any particular recruitment practices against the hiring of women. Of the respondents, 86% reported that their company did not have any policies against the hiring of women, 12% had no information on whether or not their company had such policies, and 2% reported that their companies did have policies, either written or verbal, against the hiring of women (Figure 4-17).

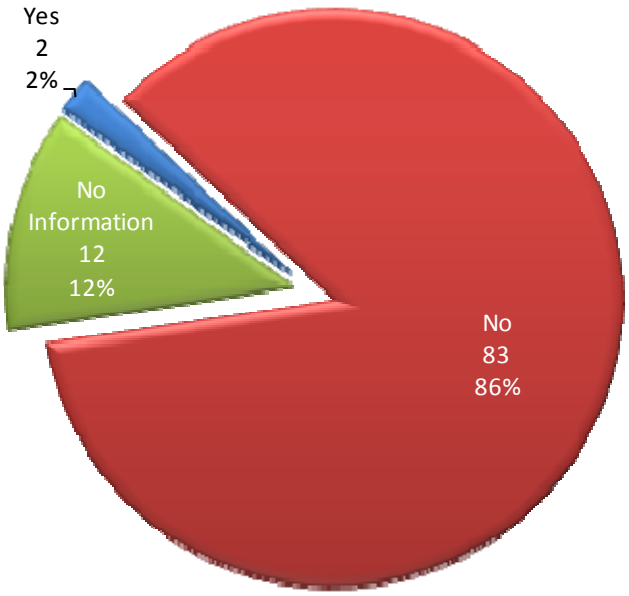

Figure 4-17. Company has policies against hiring women.

Information was also sought on whether or not the respondent's company had a program that was meant to specifically target women for employment. Of the respondents, 76% reported that they did not have a program to specifically target women, 19% responded that they did not have any information in order to answer this question, and 5% responded that they did indeed have a program to target women for employment (Figure 4-18). Respondents who stated that their firms had programs to target women were asked to elaborate on or to describe those

programs. The resultant descriptions indicated that some of these firms did not actually have specific programs that targeted women. The following list contains the responses that were received when the respondent was asked to give a short summary of the recruitment program for women:

- "MBE Requirements"
- "We have an EEO statement but we hire whoever is qualified, has the best employment references and tests the best on the equipment. We don't target any race or sex but the quality of workmanship."
- "We choose the best candidate no matter race or gender"
- "Affirmative Action Plan to identify qualified applicants through outreach and colleges."
- "Typically, a certain percentage of work on government contracts is supposed to be subbed out to minority and/or women-owned businesses. These are the only guidelines we have on this..."
- "We do most of our recruiting at UF. All applicants are interviewed and considered on a level playing field regardless of gender. For the past 3 years, our summer internships have been equally split between males and females, based on qualifications."

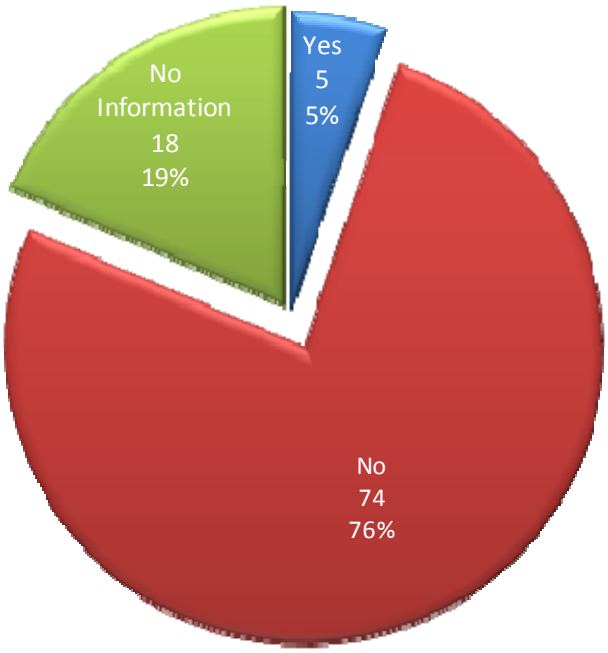

Figure 4-18. Company has a program to target women for employment.

A statistical analysis was performed to determine if there was a correlation between companies that reported having a recruitment program to specifically target women and the percentages of women field employees and home office personnel and salaried employees. Both the Pearson and Kendall Correlation Tests showed that no variables had a significant correlation. Reported recruitment efforts are not related to the percentage of women employees.

Skill Productivity Observations

The fourth section of the survey questionnaire was designed to record the observations of how well women performed on work- related skills and tasks when compared to male counterparts. The tasks and skills tested in this section were developed from the literature review. Respondents were asked to rate the level of performance of women when compared to men. To numerically quantify the data collected, responses were converted as follows: “women perform much worse” = “-3”, “women perform worse” = “-2”, “women perform slightly worse” = “-1”, “women perform equal to men” = “0”, “women perform slightly better” = “1”, “women perform better” = “2”, “women perform much better” = “3”. To analyze the data collected, respondents were grouped based upon their gender, whether a student or industry professional, and whether experienced in construction or not.

When all responses were analyzed, an initial analysis showed that respondents thought that women perform slightly better at tasks involving communication skills, with an average ranking of 0.736, and sensitivity to the emotions of others, with an average ranking of 1.241 (Figure 4-19). The initial analysis also showed that the respondents thought that women performed worse than men in tasks involving physical strength, with an average ranking of -1.595. The differences between men and women for the ratings on other skill/task performances were not appreciable.

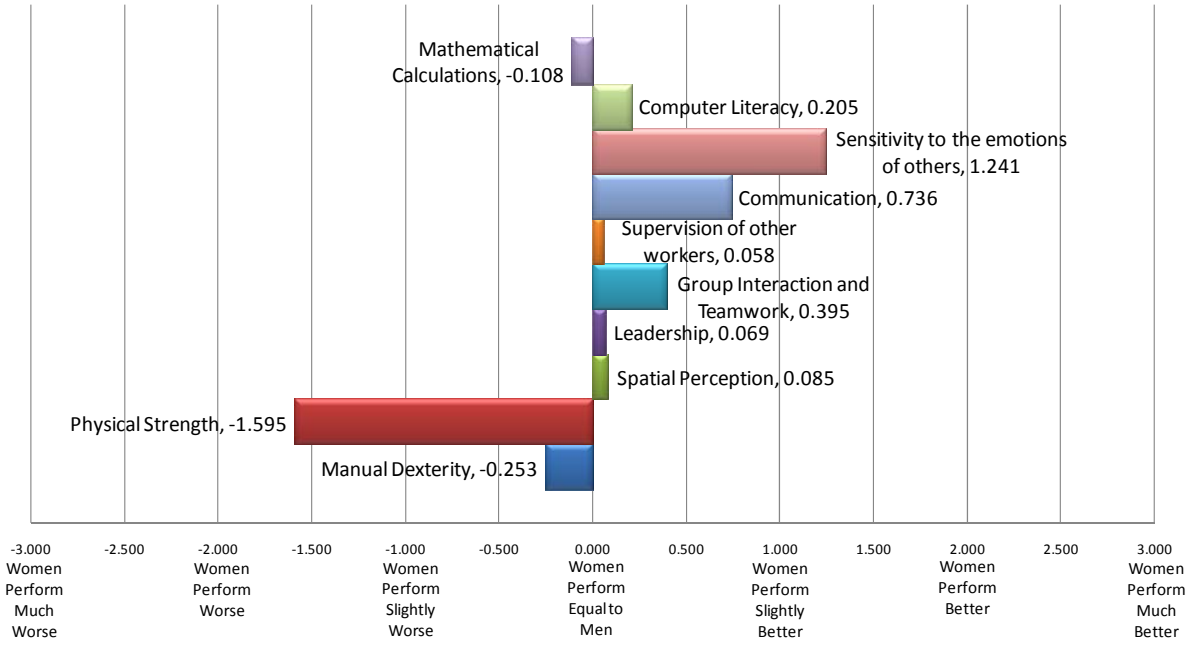

Figure 4-19. Observations from industry professionals and student respondents on skill/task performance.

When responses from industry professionals were grouped together, an initial analysis of their responses revealed that their perception was that women perform slightly better at tasks involving communication skills, with an average ranking of 0.900, and sensitivity to the emotions of others, with an average ranking of 1.172 (Figure 4-20). They also ranked women as performing “equal to men” to “slightly better” on tasks involving computer literacy skills, with an average ranking of 0.500. The initial analysis also showed that these respondents thought that women performed between “slightly worse” and “worse” than men in tasks involving physical strength, with an average ranking of -1.481.

The responses from the industry professionals that were men were grouped together for a separate analysis. An initial analysis of their responses showed that they perceive that women perform slightly better at tasks involving communication skills, with an average ranking of 1.000 and equal to men in tasks involving spatial perception and supervision of other workers (Figure

4-21). They also ranked women between performing "slightly better" and "better" on tasks involving sensitivity to the emotions of others, with an average ranking of 1.455. The initial analysis also showed that these respondents thought that women performed worse than men in tasks involving physical strength, with an average ranking of -1.833.

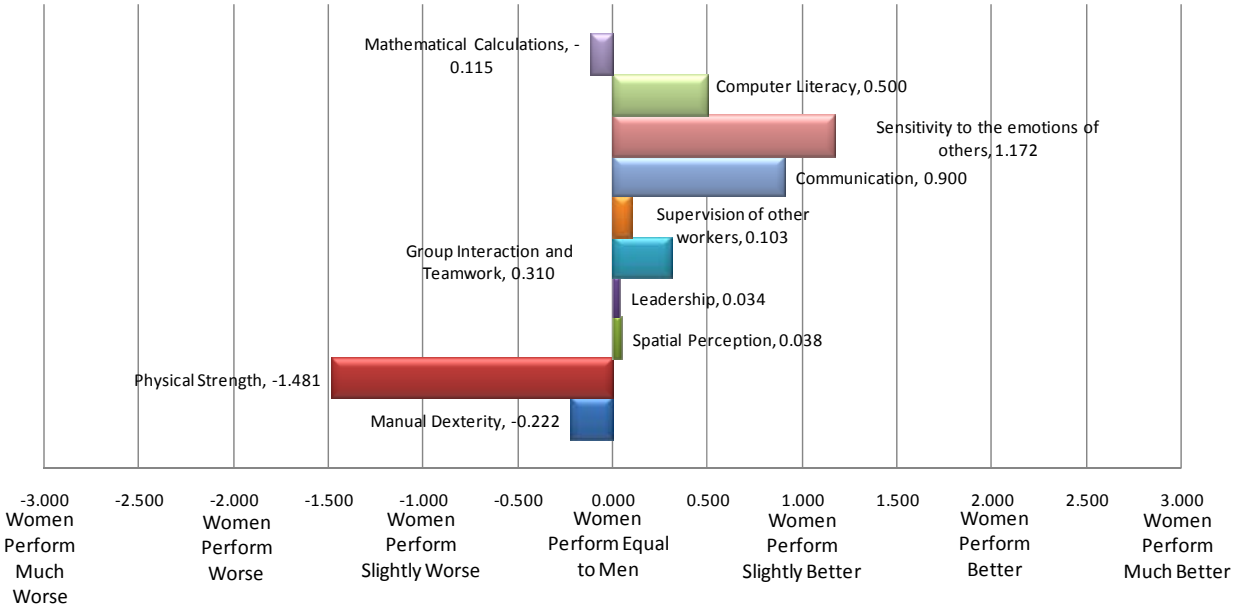

Figure 4-20. Observations from industry professional respondents on skill/task performance.

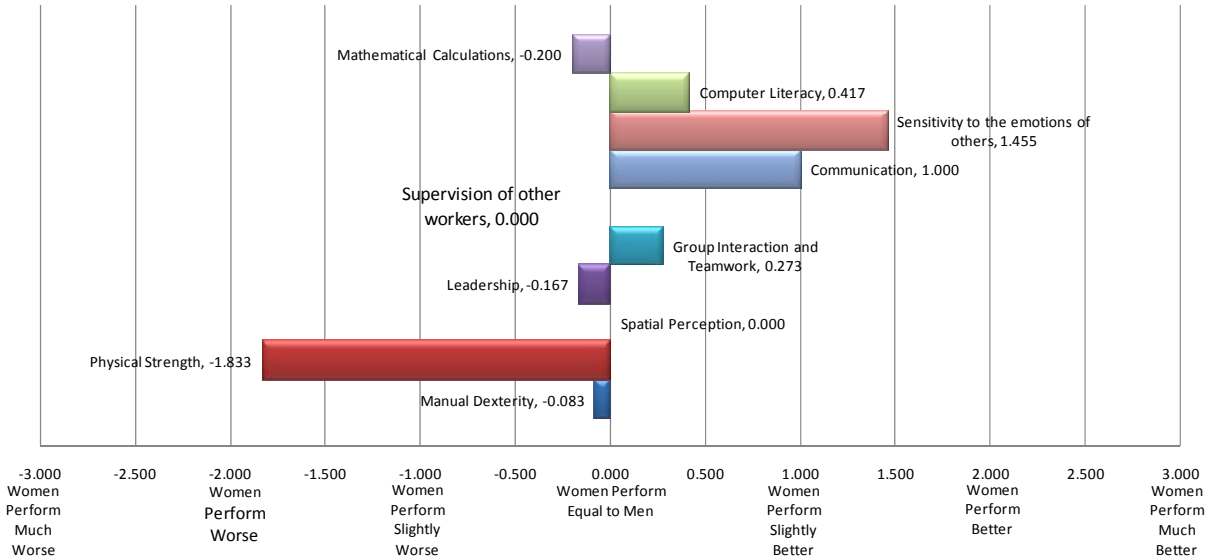

Figure 4-21. Observations from men industry professional respondents on skill/task performance.

When responses from industry professionals that were women were grouped together, the analysis of their responses showed that they perceive that women perform slightly better at tasks involving communication skills, with an average ranking of 0.833, and sensitivity to the emotions of others, with an average ranking of 1.000 (Figure 4-22). They also ranked women as performing between “equal to men” and “slightly better” on tasks involving computer literacy skills, with an average ranking of 0.556. The initial analysis also showed that these respondents thought that women performed slightly worse than men in tasks involving physical strength, with an average ranking of -1.200.

Next, student responses were grouped together and an initial analysis was performed. Responses of all students showed that they perceived that women perform slightly better at tasks involving sensitivity to the emotions of others, with an average ranking of 1.276 (Figure 4-23). They also ranked women as performing between “equal to men” and “slightly better” on tasks involving communication skills, with an average ranking of 0.649, and group interaction/teamwork, with an average of 0.439. This analysis also showed that these respondents thought that women performed between “slightly worse” and “worse” than men in tasks involving physical strength, with an average ranking of -1.649.

When responses of male students were grouped together, the analysis of their responses showed that they perceived women as performing slightly better at tasks involving sensitivity to the emotions of others, with an average ranking of 1.073 (Figure 4-24). They also ranked women as performing between “equal to men” and “slightly better” on tasks involving communication, with an average ranking of 0.450. The initial analysis also showed that these respondents thought that women performed worse than men in tasks involving physical strength,

with an average ranking of -1.700, and performing between “equal to men” and “slightly worse” on tasks involving manual dexterity, with an average ranking of -0.425.

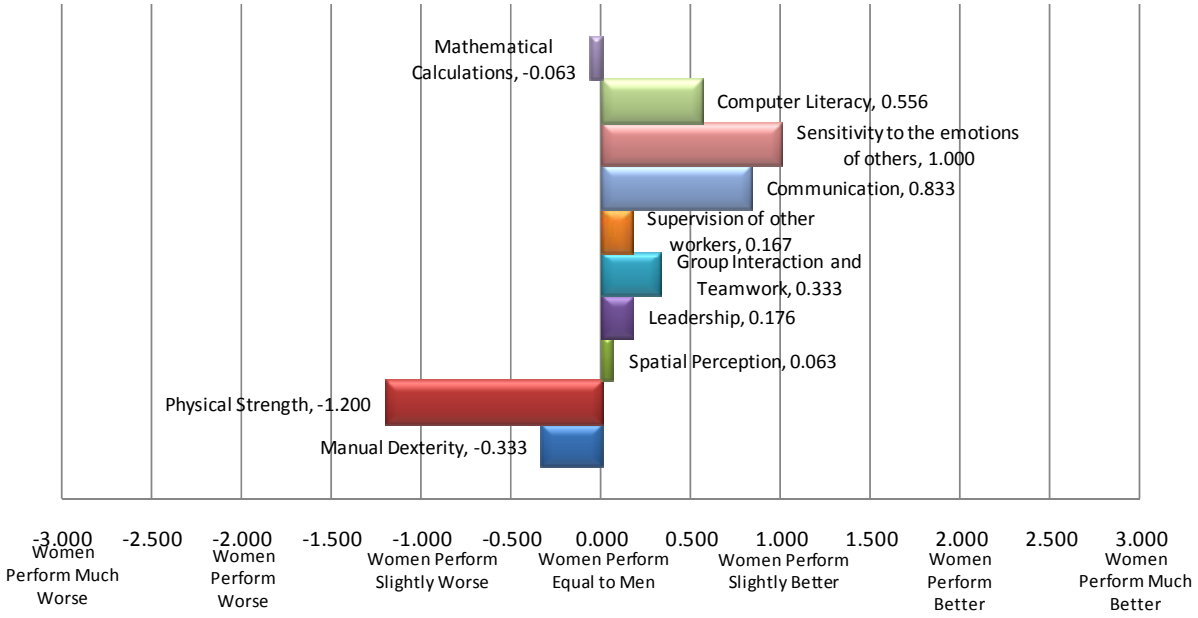

Figure 4-22. Observations from women industry professional respondents on skill/task performance.

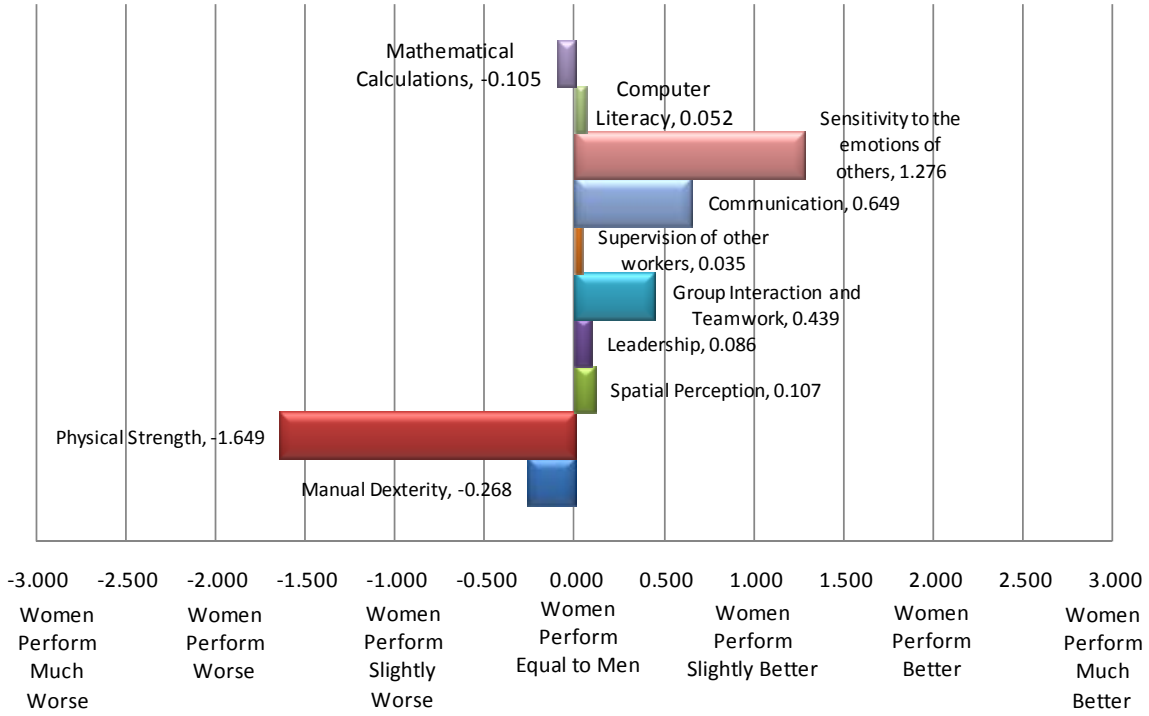

Figure 4-23. Observations from student respondents on skill/task performance.

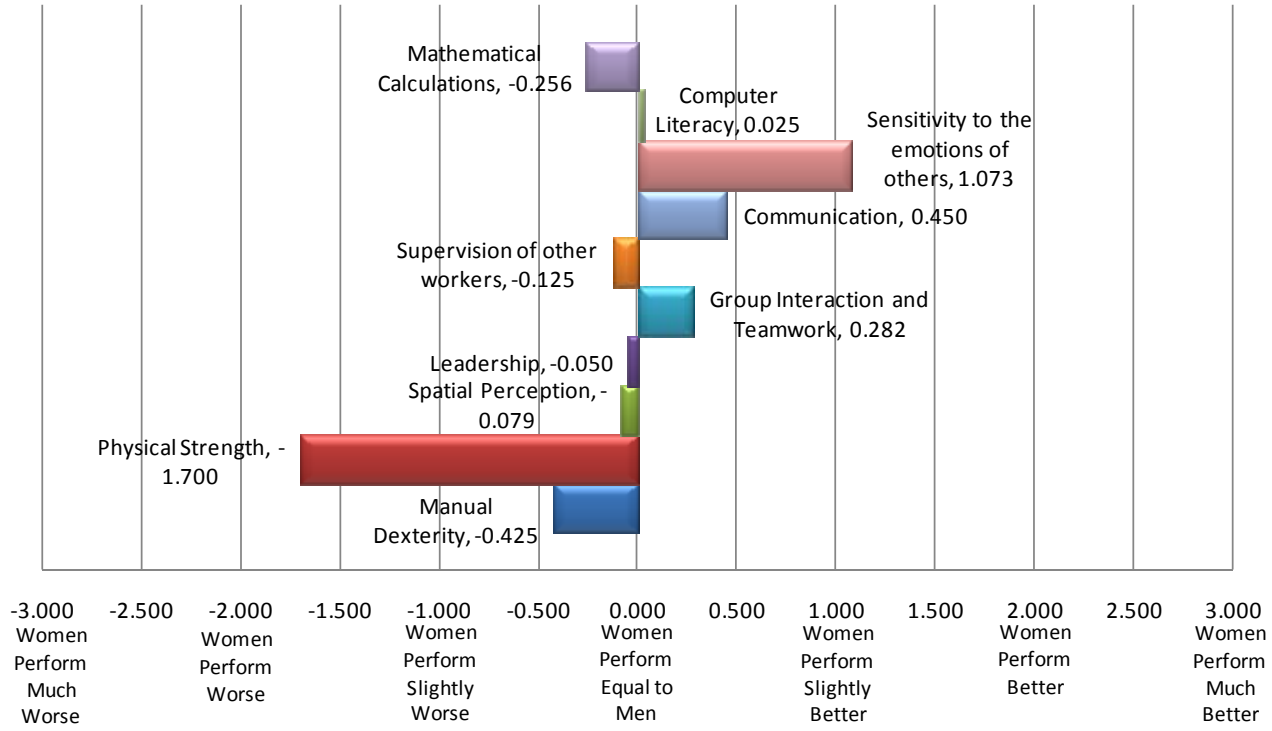

Figure 4-24. Observations from men student respondents on skill/task performance.

When responses of women students were grouped together, the analysis of their responses showed that they perceived women as performing better at tasks involving sensitivity to the emotions of others, with an average ranking of 1.756 (Figure 4-25). They also ranked women as performing "slightly better" on tasks involving communication, with an average ranking of 1.118, and tasks involving group interaction and teamwork, with an average ranking of 0.778. They also ranked women as performing between "equal to men" and "slightly better" on tasks involving spatial perception, with an average ranking of 0.500, tasks supervision of other workers, with an average ranking of 0.412, and tasks involving leadership skills, with an average ranking of 0.389. The analysis also showed that these respondents thought that women performed worse than men in tasks involving physical strength, with an average ranking of -1.529.

Respondents with construction work experience, including both industry professionals and those students which have worked in construction, observed that women performed slightly better than men on tasks involving sensitivity to the emotions of others, with an average ranking of 1.254, and tasks involving communication skills, with an average ranking of 0.745 (Figure 4-26). The analysis also showed that these respondents thought that women performed worse than men in tasks involving physical strength, with an average ranking of -1.651.

Respondents without construction work experience, which included students which had not worked in the construction industry, perceived that women performed slightly better than men on tasks involving sensitivity to the emotions of others, with an average ranking of 1.211, and tasks involving communication skills, with an average ranking of 0.757 (Figure 4-27). The analysis also showed that these respondents thought that women performed slightly worse than men in tasks involving physical strength, with an average ranking of -1.400.

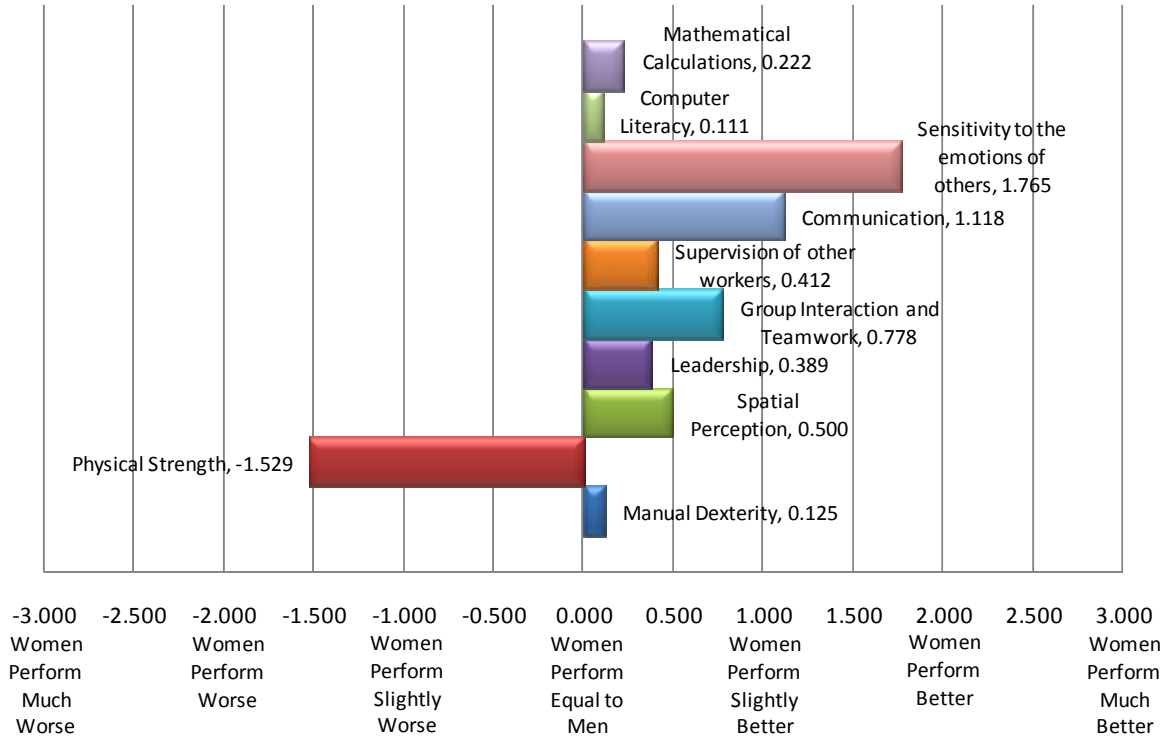

Figure 4-25. Observations from women student respondents on skill/task performance.

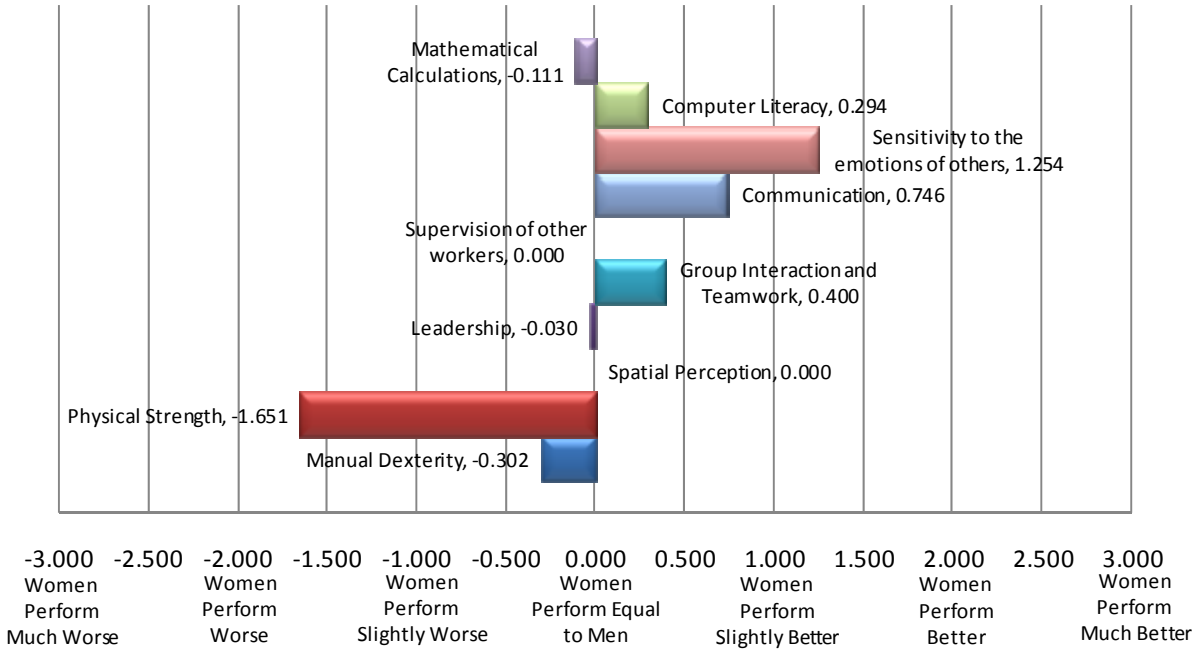

Figure 4-26. Observations from respondents with construction work experience on skill/task performance.

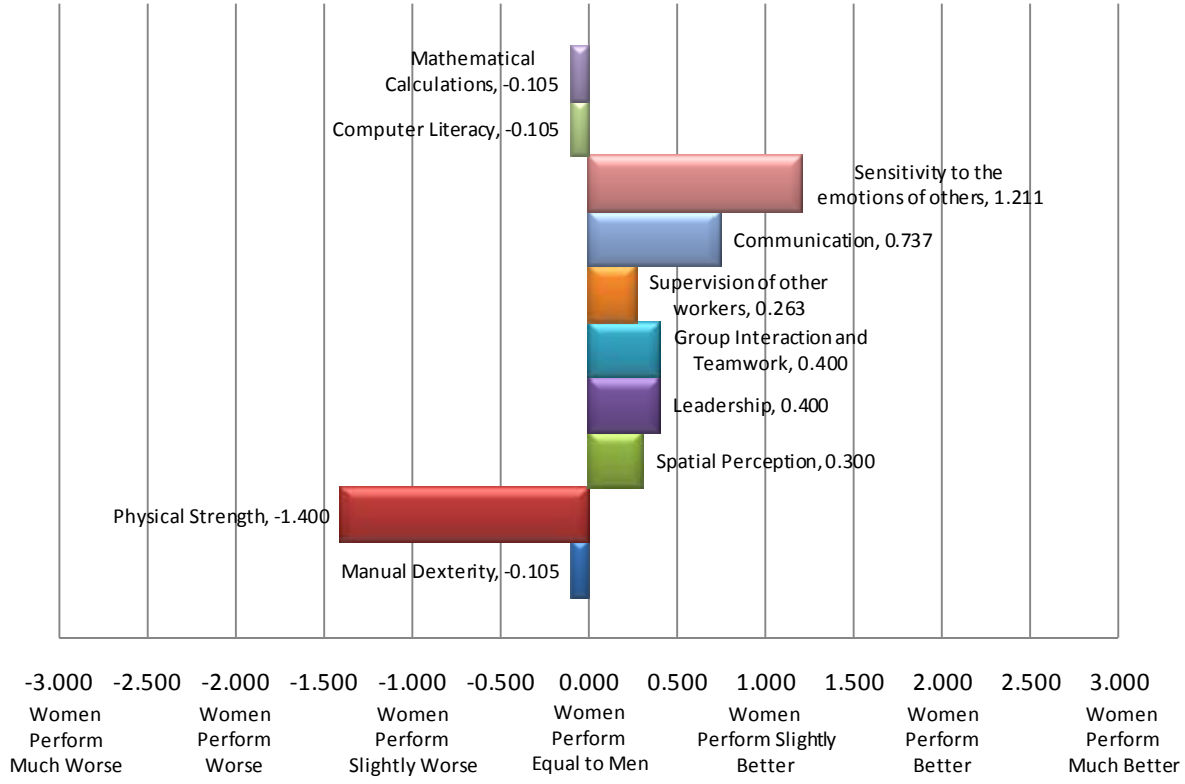

Figure 4-27. Observations from respondents with no construction work experience on skill/task performance.

When these groupings of respondents were compared to each other based on the associated tasks, there were few differences in the response patterns. In tasks involving manual dexterity, women students perceived women's performance differently from other groups, i.e., women students felt that women performed better on tasks involving manual dexterity (Figure 4-28). This also differs from the perceptions of women industry professionals.

In tasks involving physical strength, all groups appear to agree that to some extent women perform worse than men (Figure 4-29). Opinions in areas of spatial perception tasks of women are much more varied, but still fall within the range of equal performance as compared to male counterparts (Figure 4-30). Perceptions of leadership skills also vary, but still fall within the range of equal performance (Figure 4-31). In tasks involving group interaction and teamwork, all groups appear to agree that women perform equal to slightly better than men, with female students tending more toward "slightly better" (Figure 4-32). Except for the men students, all respondent groupings perceived that women performed equally to men to slightly better in tasks involving the supervision of other workers (Figure 4-33). In tasks involving communication skills, all groups appear to agree that to some extent women perform better than men (Figure 4-34). All groups also appear to agree that women perform "slightly better" to "better" than men on tasks involving sensitivity to the emotions of others (Figure 4-35). Perceptions of computer literacy skills vary, but still fall within the range of equal performance (Figure 4-36). All groups tend more toward better performance from women, with the exception of those respondents with no work experience related to construction. In tasks involving mathematical calculations, it appears that most groups perceive that to some degree women perform worse, although all averages still fall within the equal performance range (Figure 4-37). Women students however,

tend to disagree with other groups and believe that women are to some degree better at mathematical calculations.

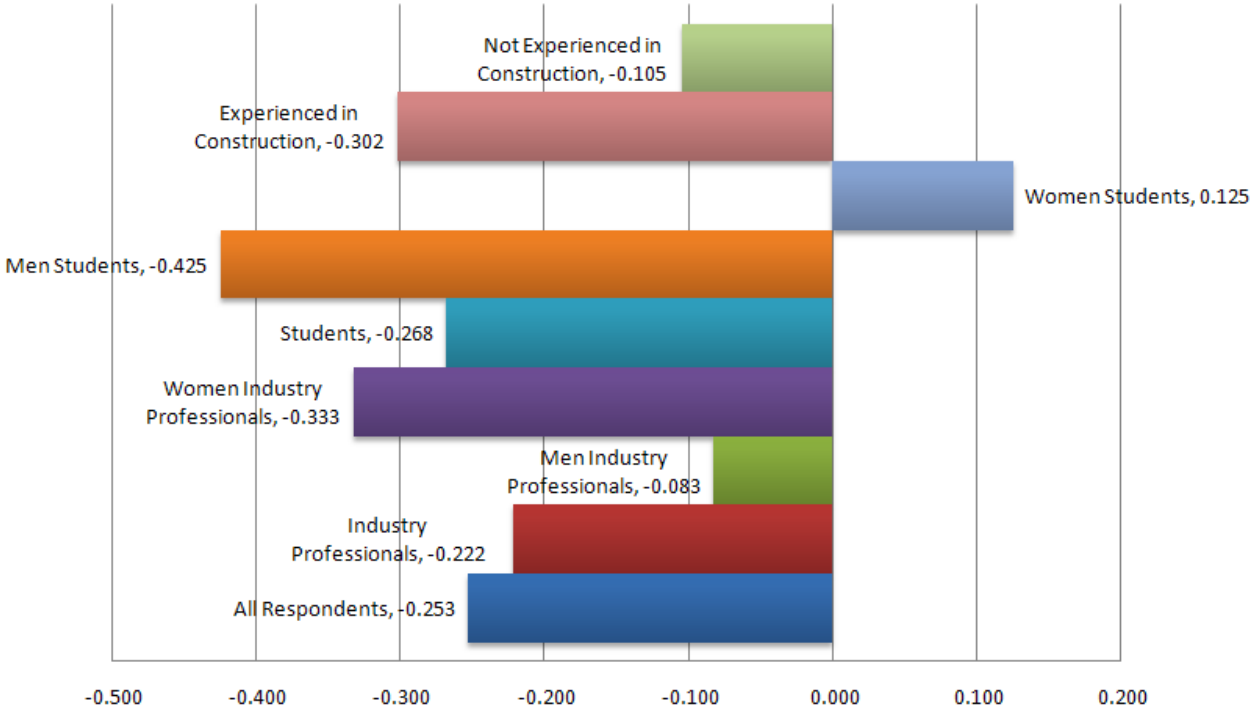

Figure 4-28. Manual dexterity, average rankings by group.

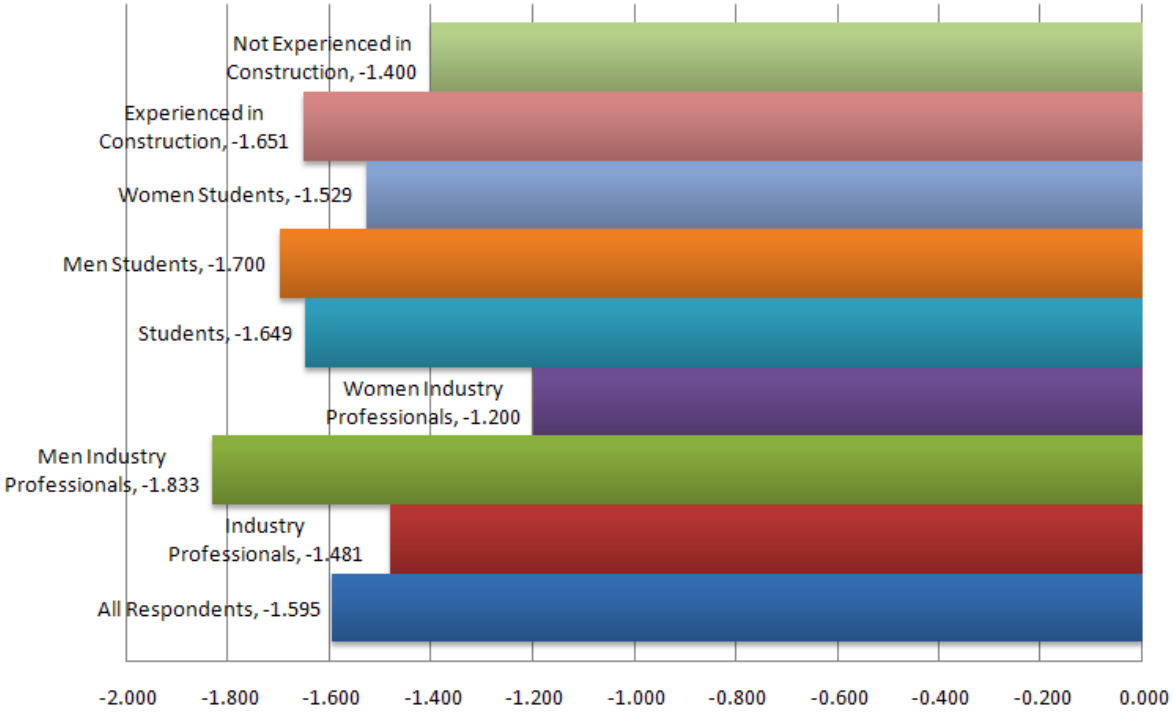

Figure 4-29. Physical strength, average rankings by group.

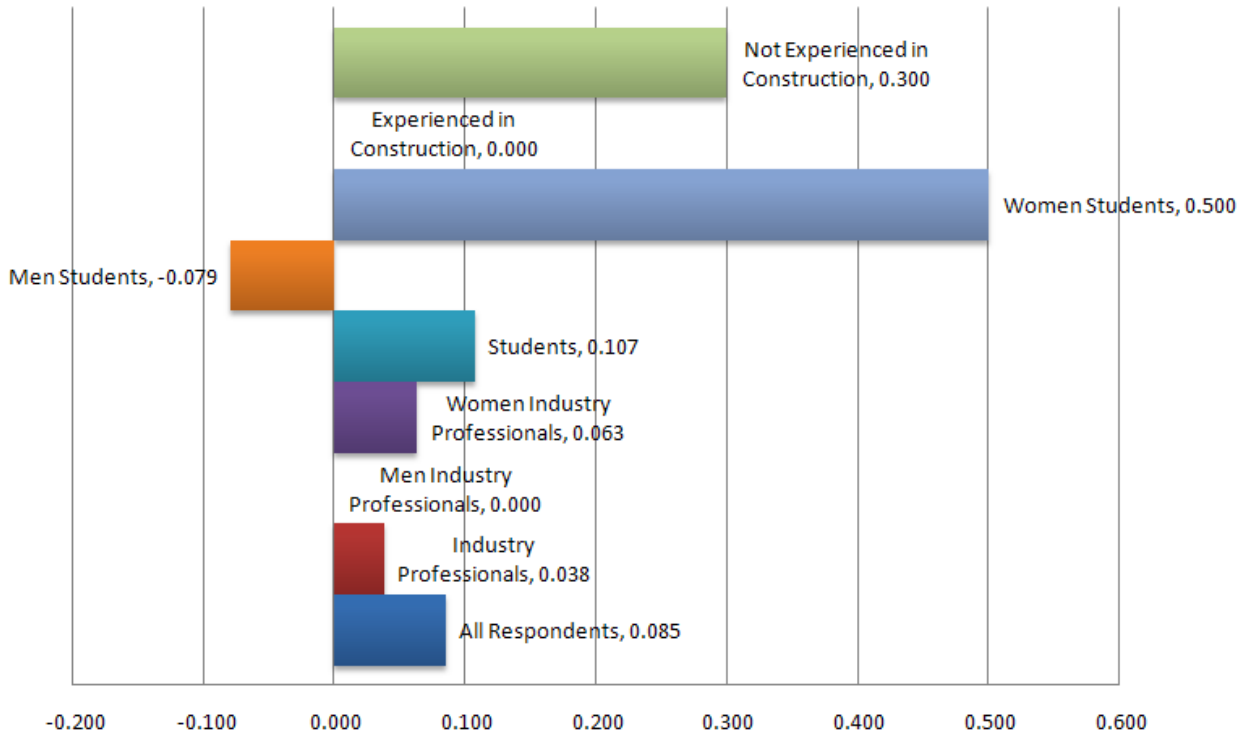

Figure 4-30. Spatial perception, average rankings by group.

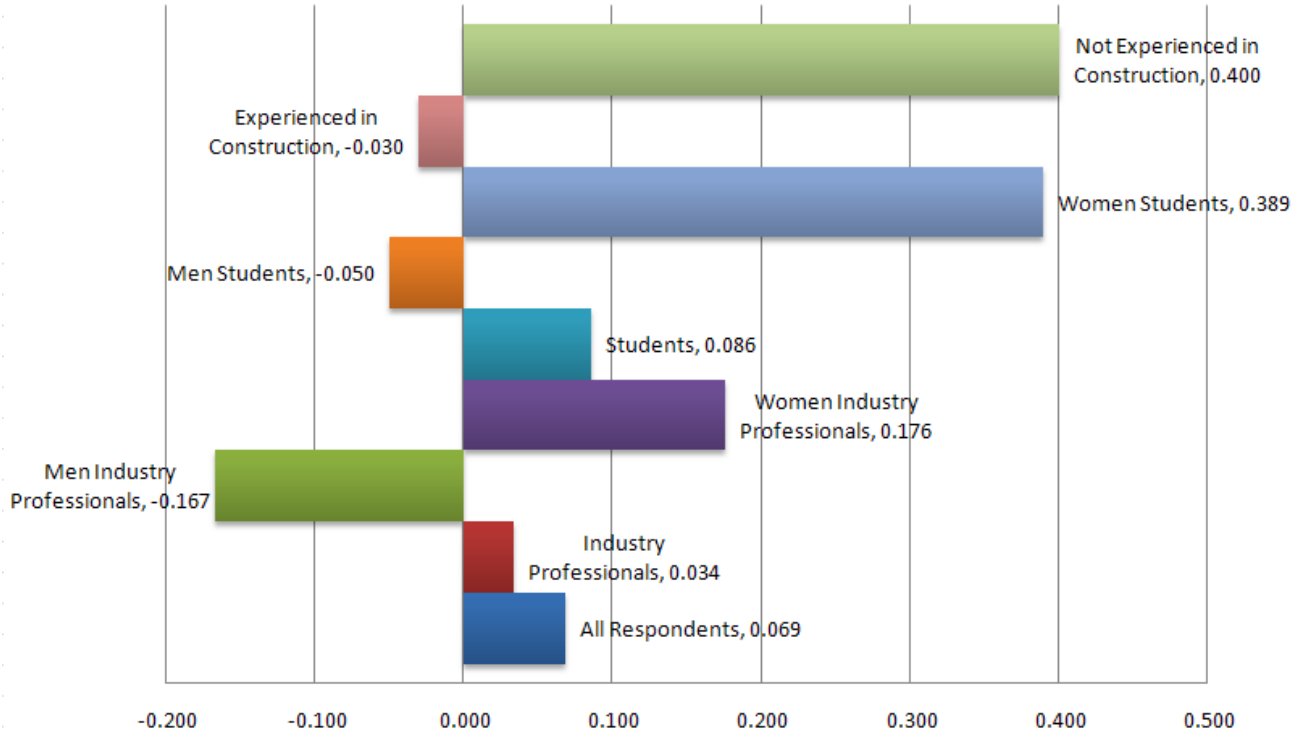

Figure 4-31. Leadership skills, average rankings by group.

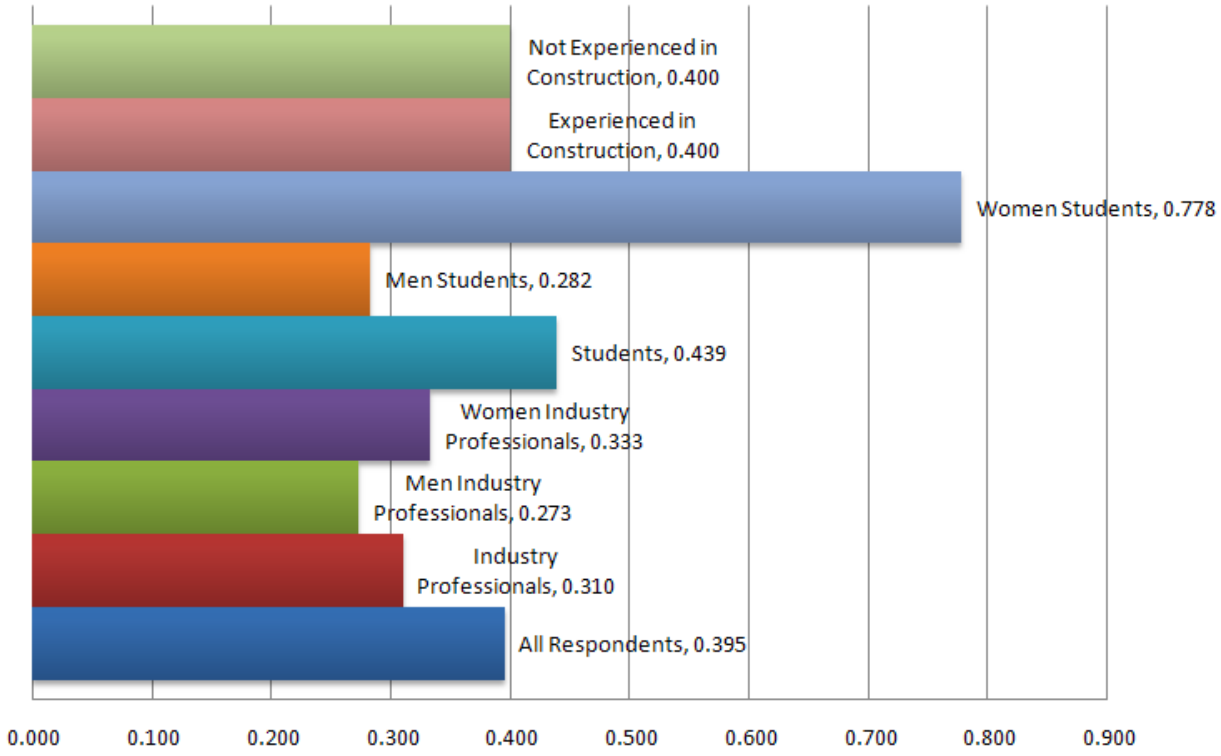

Figure 4-32. Group interaction/teamwork, average rankings by group.

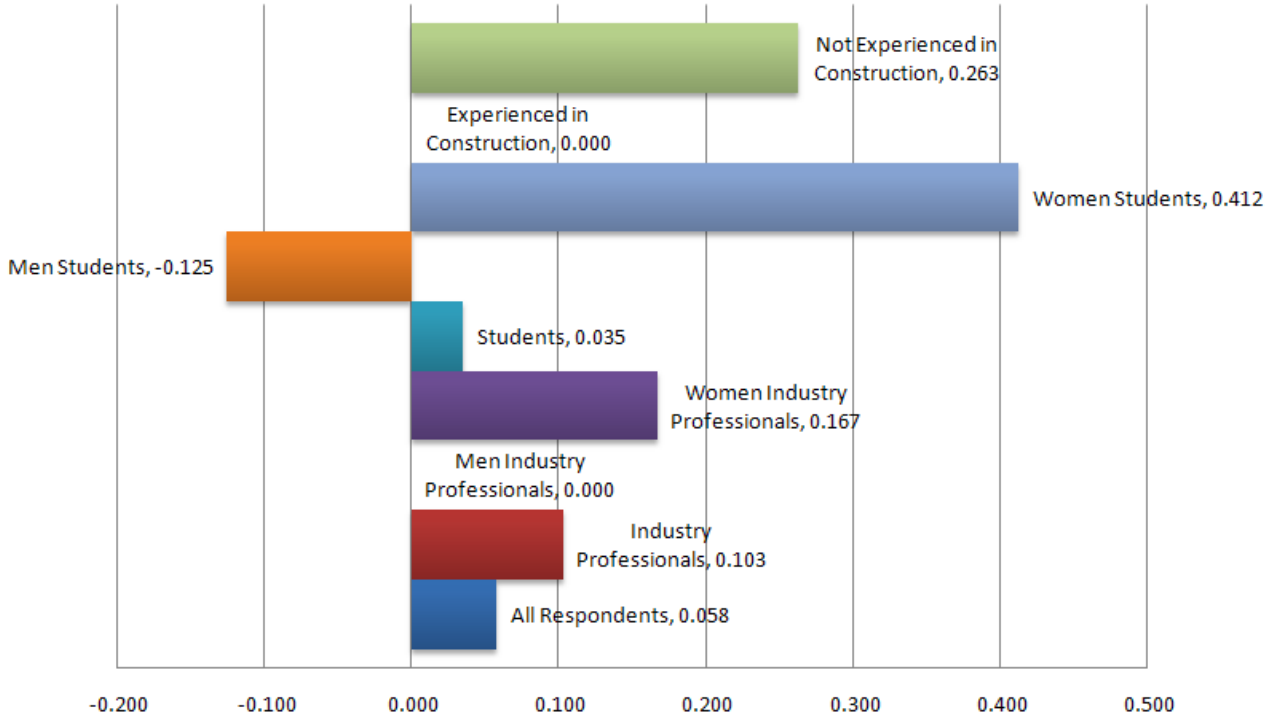

Figure 4-33. Supervision of other workers, average rankings by group.

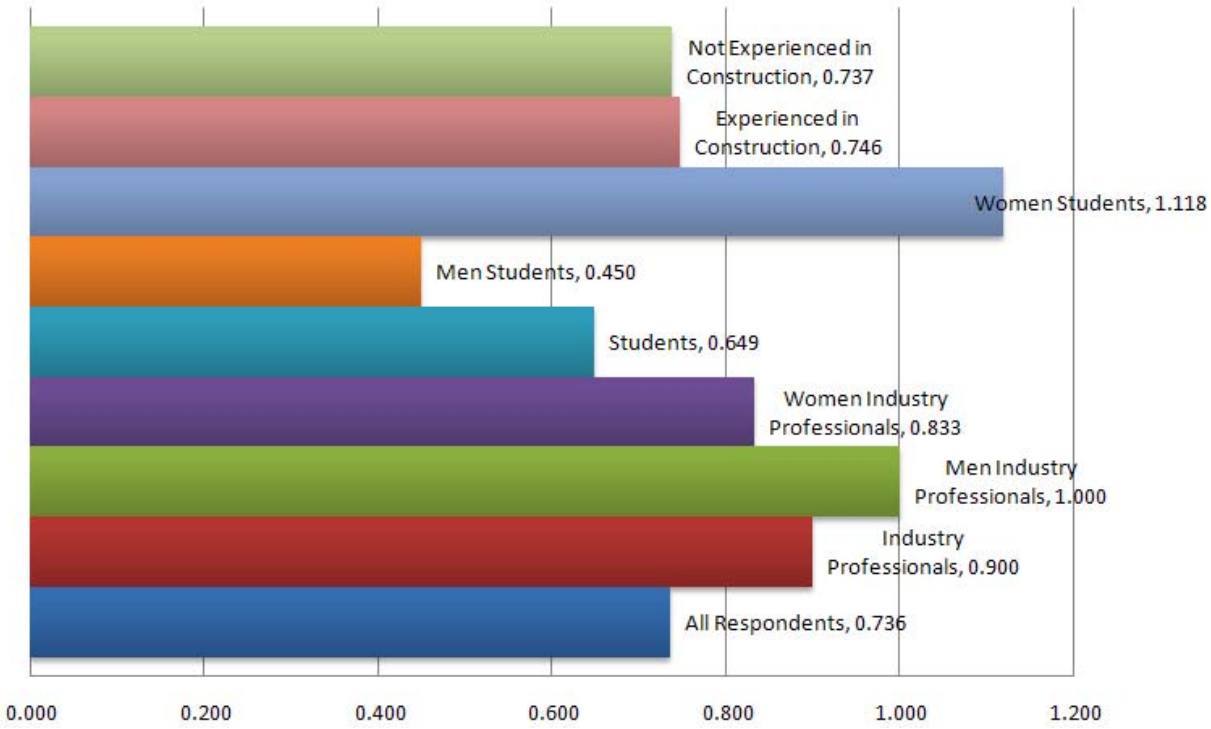

Figure 4-34. Communication, average rankings by group.

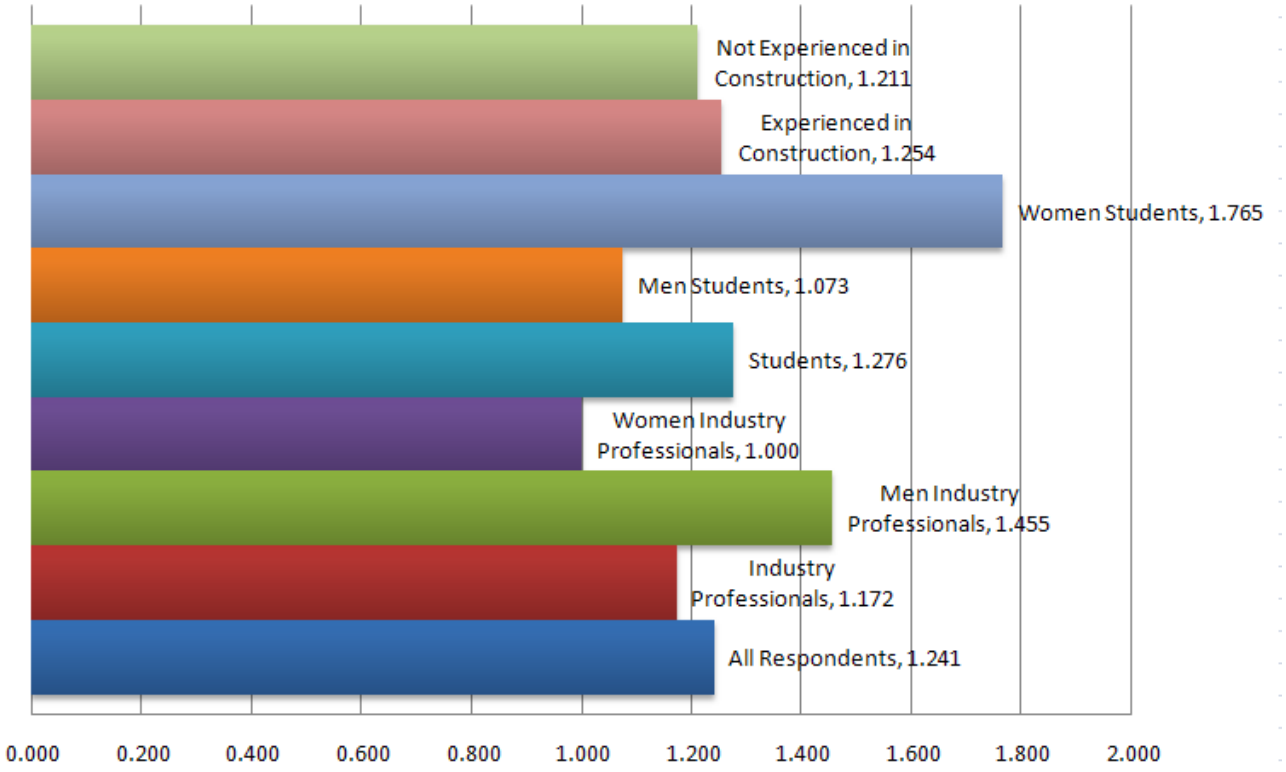

Figure 4-35. Sensitivity to the emotions of others, average rankings by group.

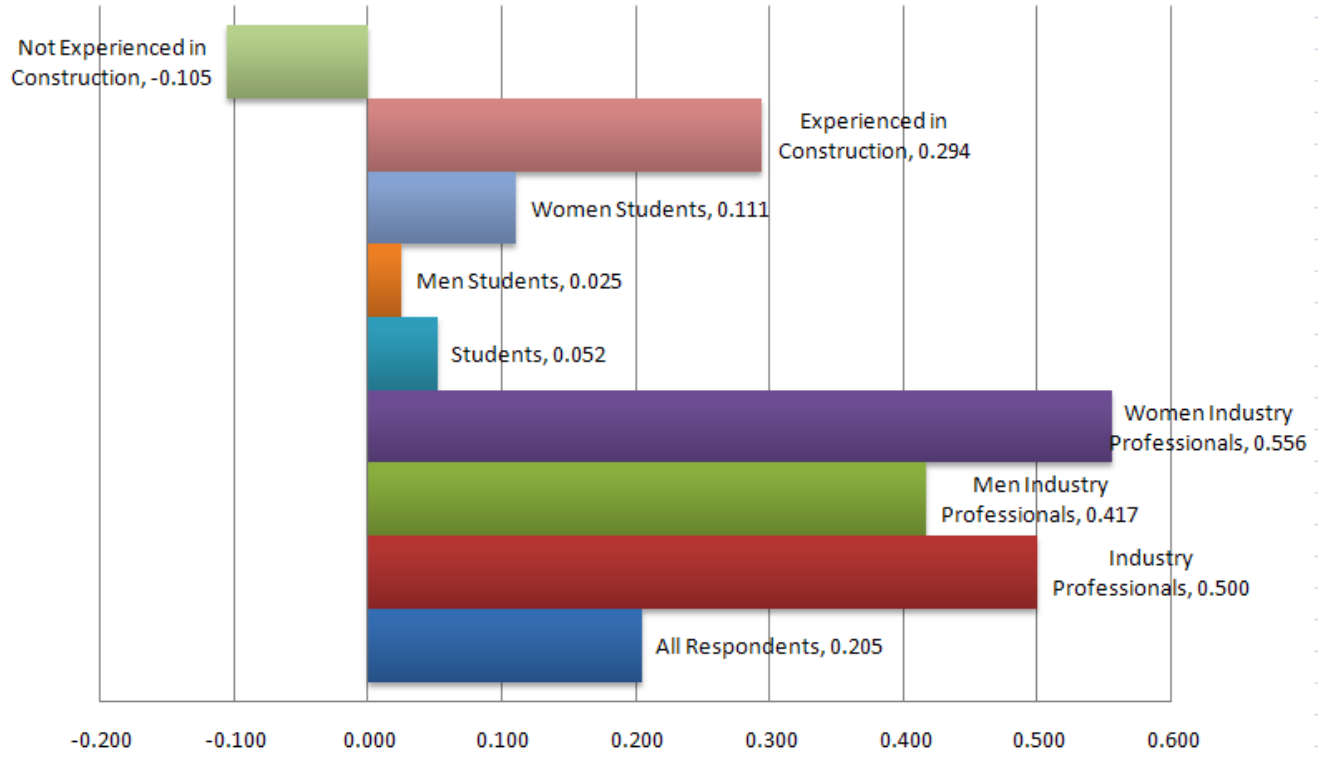

Figure 4-36. Computer literacy, average rankings by group.

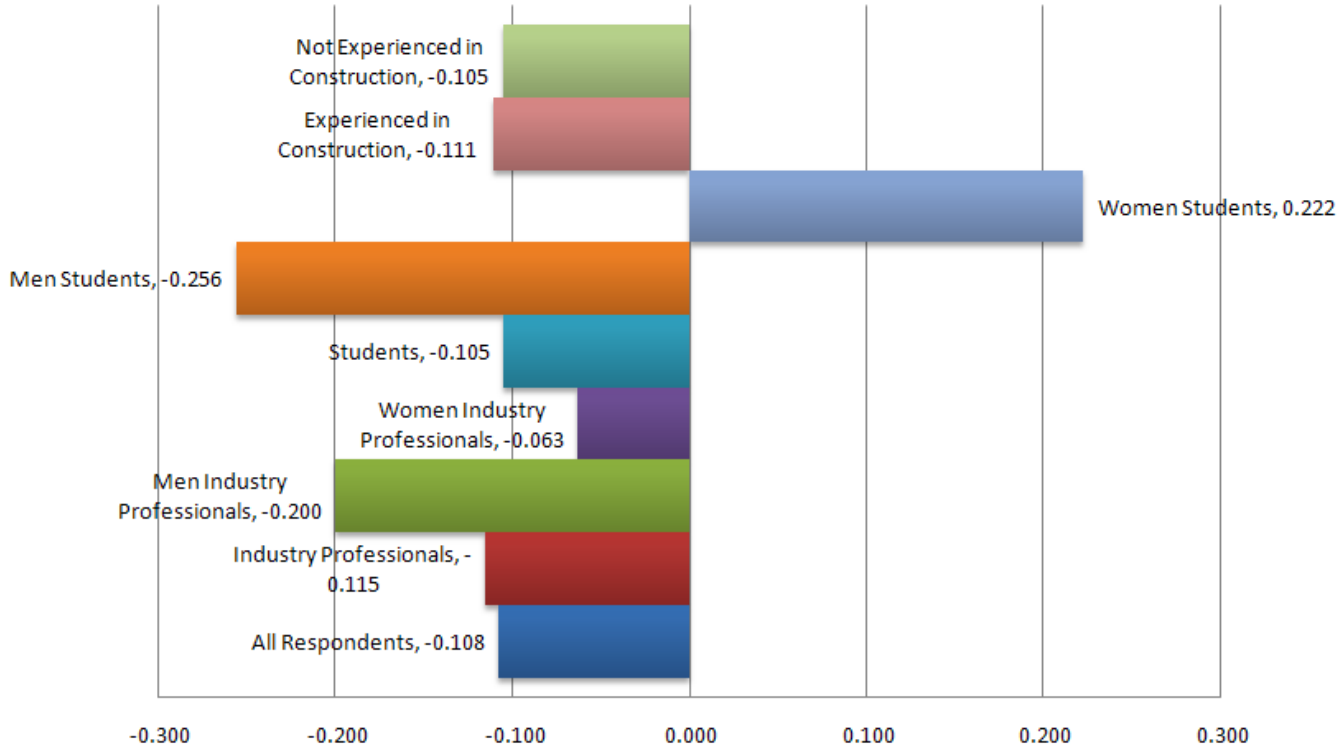

Figure 4-37. Mathematical calculations, average rankings by group.

A statistical analysis was performed, to further the understanding of trends in response to skill/task performance of women. The following results were found to be statistically significant:

- Construction industry professionals rated women higher in tasks involving computer literacy skills than student respondents (Pearson Correlation Test: Coef. = 0.241, ρ = 0.012, N = 88; Kendall Correlation Test: Coef. = 0.242, ρ = 0.008, N = 88).

- Women respondents rated women higher in areas of physical strength than the male respondents (Pearson Correlation Test: Coef. = 0.228, ρ = 0.018, N = 84; Kendall Correlation Test: Coef. = 0.197, ρ = 0.029, N = 84).

- Women respondents rated women higher in tasks involving spatial perception than the male respondents (Pearson Correlation Test: Coef. = 0.212, ρ = 0.028, N = 82; Kendall Correlation Test: Coef. = 0.185, ρ = 0.039, N = 82).

- Women respondents rated women higher in tasks involving leadership skills than the male respondents (Pearson Correlation Test: Coef. = 0.202, ρ = 0.03, N = 87; Kendall Correlation Test: Coef. = 0.169, ρ = 0.048, N = 87).

- Women respondents rated women higher in tasks involving supervision of other workers than the male respondents (Pearson Correlation Test: Coef. = 0.221, ρ = 0.021, N = 86; Kendall Correlation Test: Coef. = 0.209, ρ = 0.021, N = 86).

- Women respondents rated women higher in tasks involving mathematical calculations than the male respondents (Pearson Correlation Test: Coef. = 0.242, ρ = 0.014, N = 83; Kendall Correlation Test: Coef. = 0.241, ρ = 0.012, N = 83).

- Women respondents rated women higher in tasks involving communication skills than the male respondents (Pearson Correlation Test: Coef. = 0.176, ρ = 0.051, N =87; Kendall Correlation Test: Coef. = 0.165, ρ = 0.048, N = 87).

- Student respondents with no construction work experience rated women higher in tasks involving physical strength than the students with construction work experience (Pearson Correlation Test: Coef. = 0.248, ρ = 0.031, N = 57; Kendall Correlation Test: Coef. = 0.259, ρ = 0.021, N = 57).

- Student respondents with no construction work experience rated women higher in tasks involving leadership than the students with construction work experience (Pearson Correlation Test: Coef. = 0.239, ρ = 0.035, N = 58; Kendall Correlation Test: Coef. = 0.187, ρ = 0.066, N = 58).

The survey was designed to collect additional information on situations that relate to the skills and tasks studied, such as complaints of musculoskeletal injuries or pains by women, whether companies purchase and supply PPE specially made for women, observations of women's interaction in peer groups, and productivity observations. This part of the survey questionnaire asked for both quantitative and qualitative answers.

Respondents were asked to indicate whether or not they found that female employees expressed more concern about musculoskeletal injuries or pains than male employees. Of the respondents, 44% reported that they did not find that women expressed more concern, 37% reported that they did not have information in order to provide an informed answer to this question, and 19% reported that they did find that women expressed more concern about musculoskeletal injuries or pains than male employees (Figure 4-38).

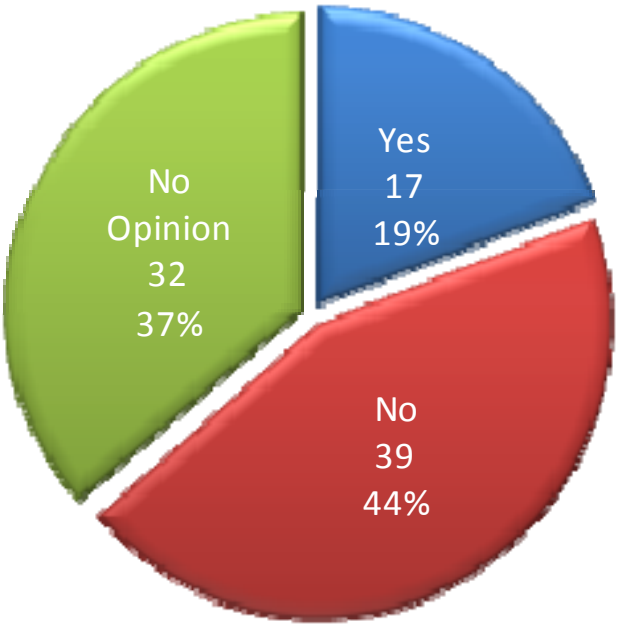

Figure 4-38. Female employees express more concern about musculoskeletal injuries.

Respondents were then asked if their company purchased and supplied Personal Protection Equipment (PPE) that was specially made to fit women. Of the respondents, 47% reported that

they did not supply PPE that was made specially for women, 37% reported that they did not have information in order to make an informed answer to this question, 9% reported that they did supply PPE that was specially made to fit women, and 7% reported that PPE specially made to fit women was not commercially available for purchase by the company (Figure 4-39).

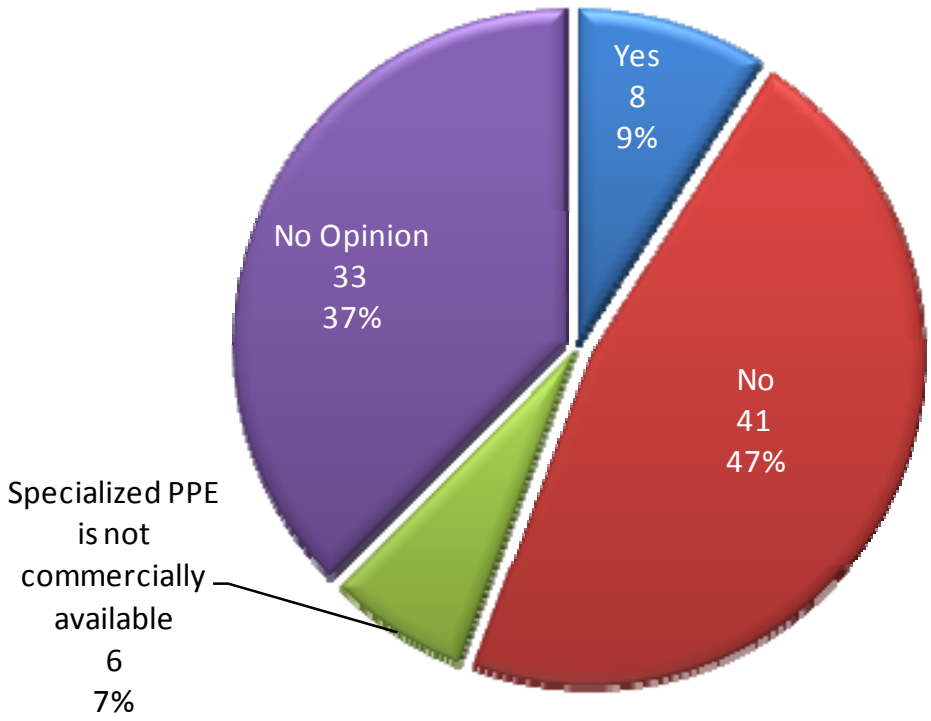

Figure 4-39. Company supplies PPE especially for women.

Information was also sought on respondent observations of how well women interact in peer groups at work. The following responses showed positive interaction differences:

- "I think women interact better than men in peer groups. Their communication skills are usually better."
- "In my observations women interacted well with peer groups. They would take charge and/or do what was asked with no bitching or failure."
- "Interaction is/was great. Very outgoing."
- "Women communicate well and express any expectations from coworkers."
- "They are more friendly and come up with better ideas."

- “Women seem to interact in peer groups rather well because a lot of the time they are good listeners and they also take actions to get the work done.”
- “They tend to have better communication skills so I think they interact better and can explain their ideas better.”
- “They interact really well. They have the required knowledge of the topic and also they can take part in all group discussions properly.”
- “They are very well concerned about others.”
- “Talkative and out-going.”
- “Women tend to listen more and engage others in dialogue versus directed actions”
- “Take leadership Interact well if knowledge is there Aggressive when needed”

The following responses displayed a negative interaction difference:

- “Women are treated like peers as long as they do not isolate themselves and demand special treatment. If they can do the work like the guys and know they're stuff, there's never a problem.”
- “Emotions play a larger role”
- “I find it difficult to work with women because few get to the point of the discussion and are not as straight forward as most men. Hard to trust women as much which can make group work difficult.”
- “Women are more defensive and less trusting of other female peers due to competition.”

Other responses included those that displayed a gender-based interaction difference, but the connotation could not be determined; those that displayed a neutral or equal observation about interaction in peer groups and thus differences could not be determined; and those that displayed that the respondent had no basis for an opinion. These responses are included in Table E-1.

Information was also sought on respondent observations of any differences in productivity between male and female employees. The following responses displayed positive feedback toward women’s productivity:

- “Female probably more productive. Men have other men to converse with (i.e. slack more often)”

- “Seem to be the same. Men might be a little less productive by letting attitudes get in the way.”

- “Women focus well even when tackling multiple tasks.”

- “Female employees are more productive and work the entire day. Males tend to play computer games and distract themselves.”

- “In the construction office, the female employees seem more task-oriented and maintain focus.”

- “Observations are in PE, APM, PM, Estimating employee groups. Females are often more productive than male counterparts.”

- “Women tend to be more organized therefore they are often more productive.”

- “Women tend to multi-task more and are successful in positions that require management of multiple deadlines at one time.”

- “A running joke in our company is that all the women who have taken the LEED exam pass the first time, all the men the second. Not sure what this is about... maybe the women just take it more seriously, maybe they catch on faster....”

- “Females tend to respond quicker with a completed task than males.”

The following responses displayed negative feedback toward women employee’s productivity:

- “I think in terms of manual labor, men may be slightly more productive than women for physical/anatomical reasons.”

- “Only some physical limitations.”

- “Women may let emotion interfere with productivity.”

- “The only main reason in difference for men vs. women is that normally men are better in the strength field so sometimes men can be faster when it involves strength to get something done fast.”

- “I think they lack physical strength and they have more family issues and family bindings than men.”

- “Men work faster with greater stamina!”

- “Female employees get more physically tired from manual labor than male employees which impacts productivity.”
- “Most of our female employees smoke, many smoke breaks during the day.”

Other responses included those that displayed that there was no difference between male and female employee’s productivity at work; those that displayed situational connotations in their answers; and those that displayed that the respondent did not have information in order to make a comparison of productivity. These responses are included in Table E-2.

Personality Trait Observations

The fifth portion of the survey was designed to obtain information on the degree to which personality traits are portrayed in employees. The personality traits used were based on those examined in the literature review. The personality traits were ranked by on a Likert-type scale as follows: “only describes men” = “-3”, “more descriptive of men” = “-2”, “slightly more descriptive of men” = “-1”, “there is no difference” = “0”, “slightly more descriptive of women” = “1”, “more descriptive of women” = “2”, “only describes women” = “3”. To analyze the data collected, respondents were grouped by gender, whether they are a student or industry professional, and whether they are experienced in construction or have no work experience related to construction.

The analysis showed that there was a general consistency from all groups that to some degree men were more assertive than women (Figure 4-40). The average response of almost every group still tended toward “there is no difference”, with the exception of male students, with an average of -0.590, and students as a whole, with an average response of -0.527. These two groups are tending more toward assertiveness being “slightly more descriptive of men”. Those respondents with no construction experience fell half way between “there is no difference” and “slightly more descriptive of men”, with an average ranking of -0.500. Women

as a whole and industry professionals appear slightly less apt to think of men as more assertive than women than other groups.

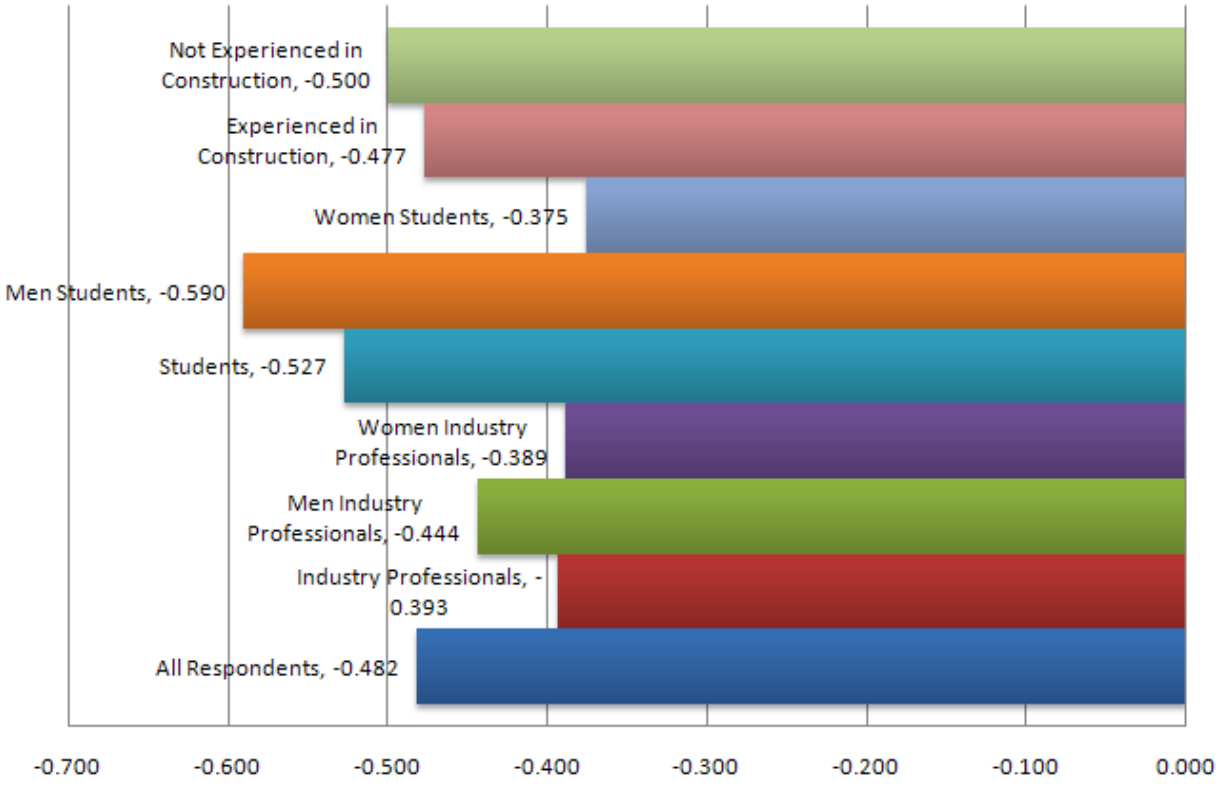

Figure 4-40. Assertiveness, average rankings by group.

All groups also appear to agree that to some extent men have higher self esteem than women (Figure 4-41). The average response of industry professionals and student respondents tended toward “there is no difference”, with an average of -0.356. Those respondents not experienced in construction work (-0.550) and women students (-0.688) appear to go against the trend and tend toward “slightly more descriptive of men”. Male industry professionals appear slightly less apt to think of men as having higher self-esteem than other groups, with an average response of -0.222.

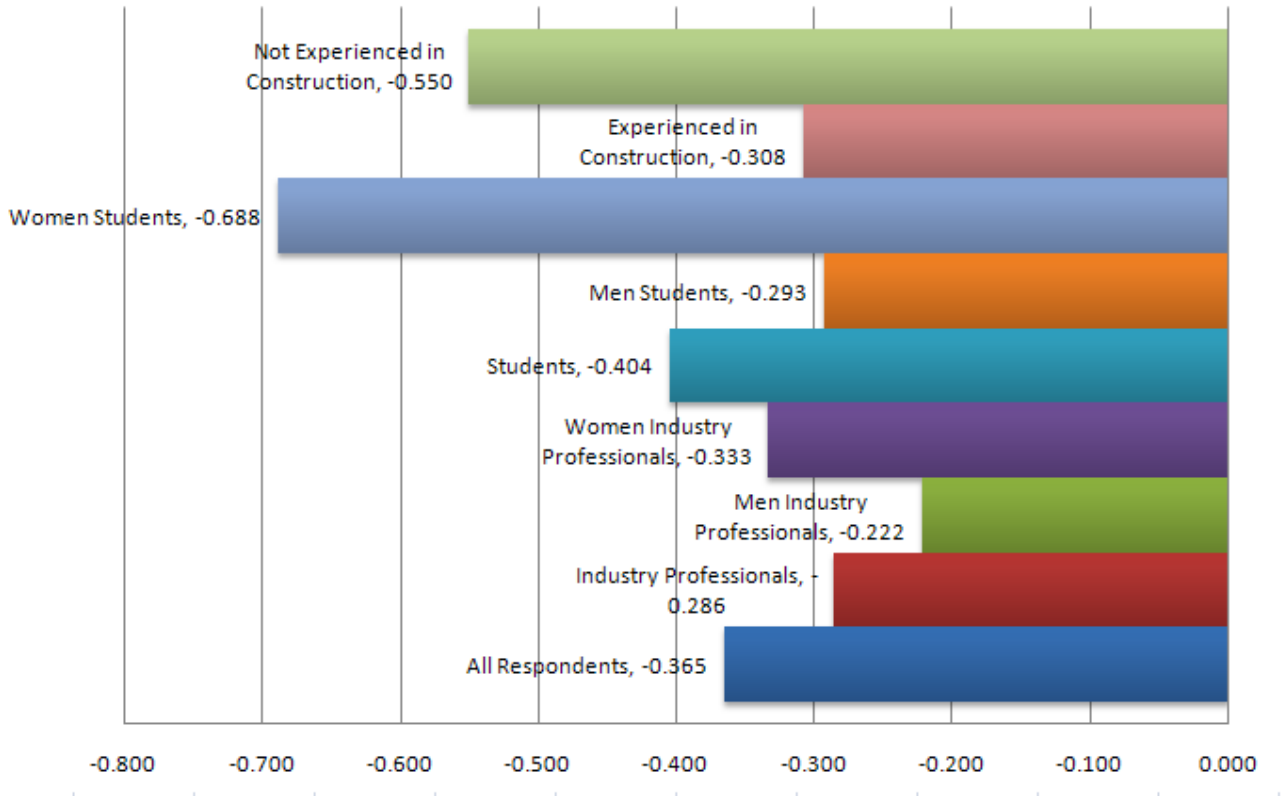

Figure 4-41. High self-esteem, average rankings by group.

There was a general consistency among all groups that to some degree women were more extroverted than men, with the exception of male students and respondents with no construction work experience (Figure 4-42). The average response of industry professionals and student respondents tended toward “there is no difference”, with very little variation in the averages of all group responses. The greatest differences are seen between average responses of women students, with an average of 0.267, and men students and respondents with no construction work experience; both groups having an average response of 0.000. Women students appear slightly more apt to think of women as more extroverted than men than other groups.

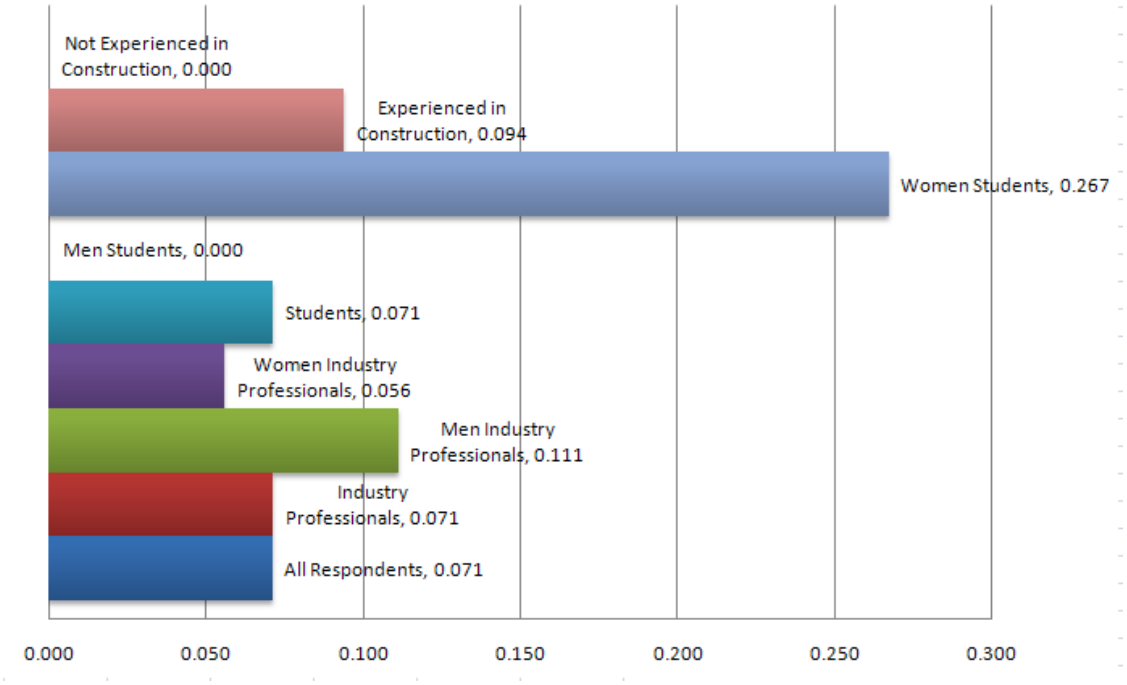

Figure 4-42. Extroversion, average rankings by group.

All groups appear to agree that to some extent women are more anxious, with the exception of men industry professionals (Figure 4-43). The greatest differences are seen between average responses of women students and men industry professionals. Men industry professionals, with an average response of 0.000, appear to state that “there is no difference”, while women students, with an average of 0.867, are tending more toward a response of “slightly more descriptive of women”. Those respondents with no construction work experience also appear more apt to think of women as more anxious (0.70) than other groups.

There was a general consistency from all groups that to some degree women were more creative than men (Figure 4-44). The average response of industry professionals and student respondents, however, still tended toward “there is no difference”. Women as a whole and industry professionals appear slightly more apt to think of women as more creative than men than other groups.

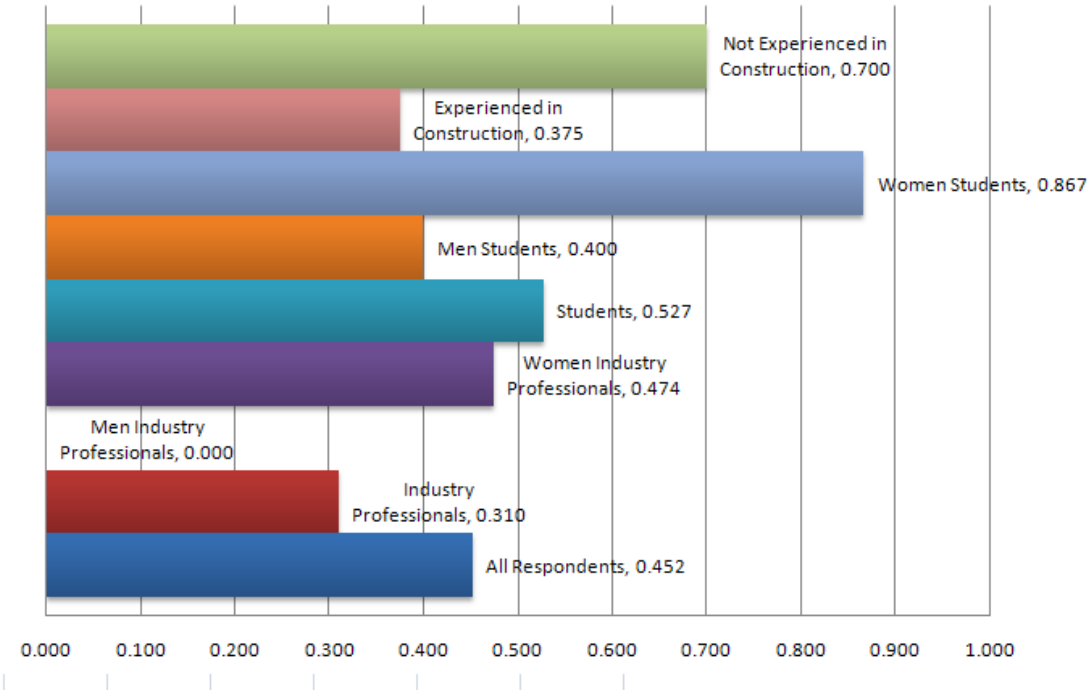

Figure 4-43. Anxiety, average rankings by group.

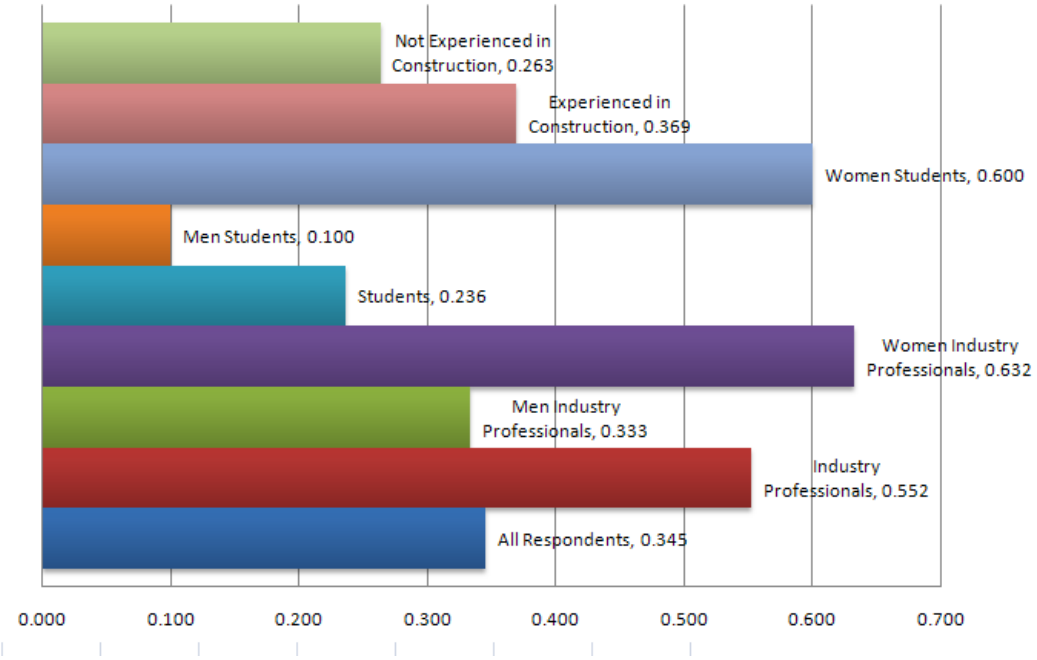

Figure 4-44. Creative/idea generating, average rankings by group.

There was also general consistency from all groups that to some degree women were more stressed than men (Figure 4-45). The average response of industry professionals and student

respondents tended toward “there is no difference”, with very little variation in the averages of all group responses. The greatest difference was seen between the average response of women students of 0.563, and all of the other groups. Women students appear slightly more apt to think of women as being more stressed than men.

All groups appear to agree that to some extent women are more trusting, with the exception of men industry professionals (Figure 4-46). The greatest differences are seen between the average responses of women as a whole, those respondents with no construction work experience (0.40), and men industry professionals (0.00). Men industry professionals, with an average response of 0.000, appear to state that “there is no difference”, while women students, with an average of 0.500, are half way between responses of “there is no difference” and “slightly more descriptive of women”.

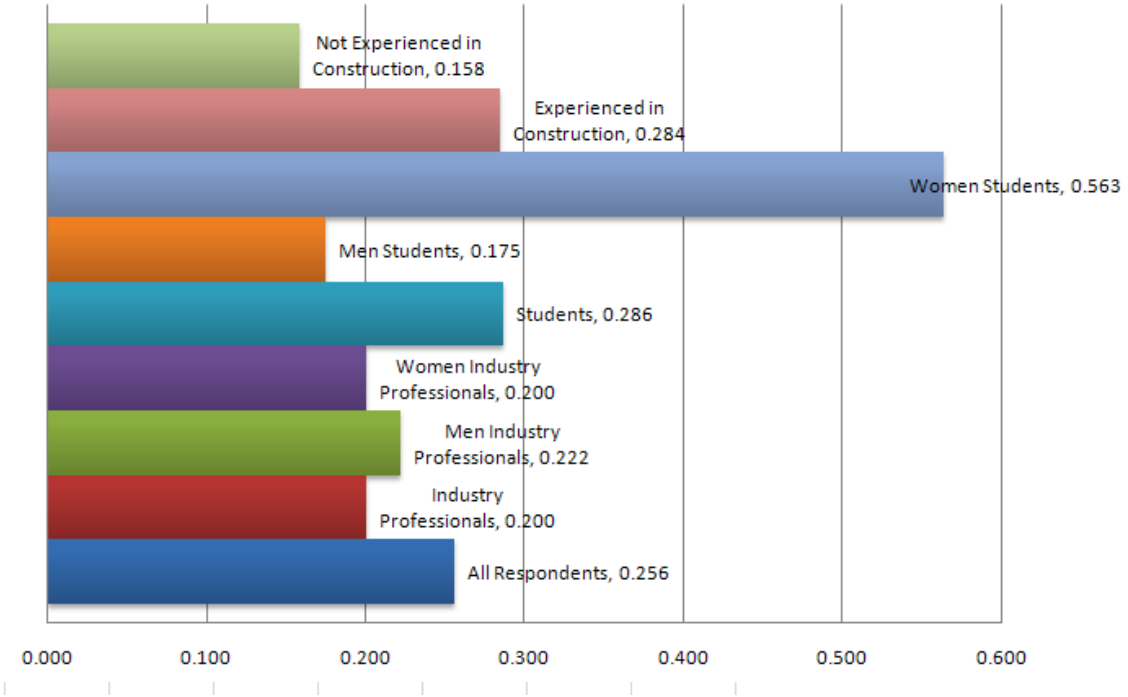

Figure 4-45. Stress, average rankings by group.

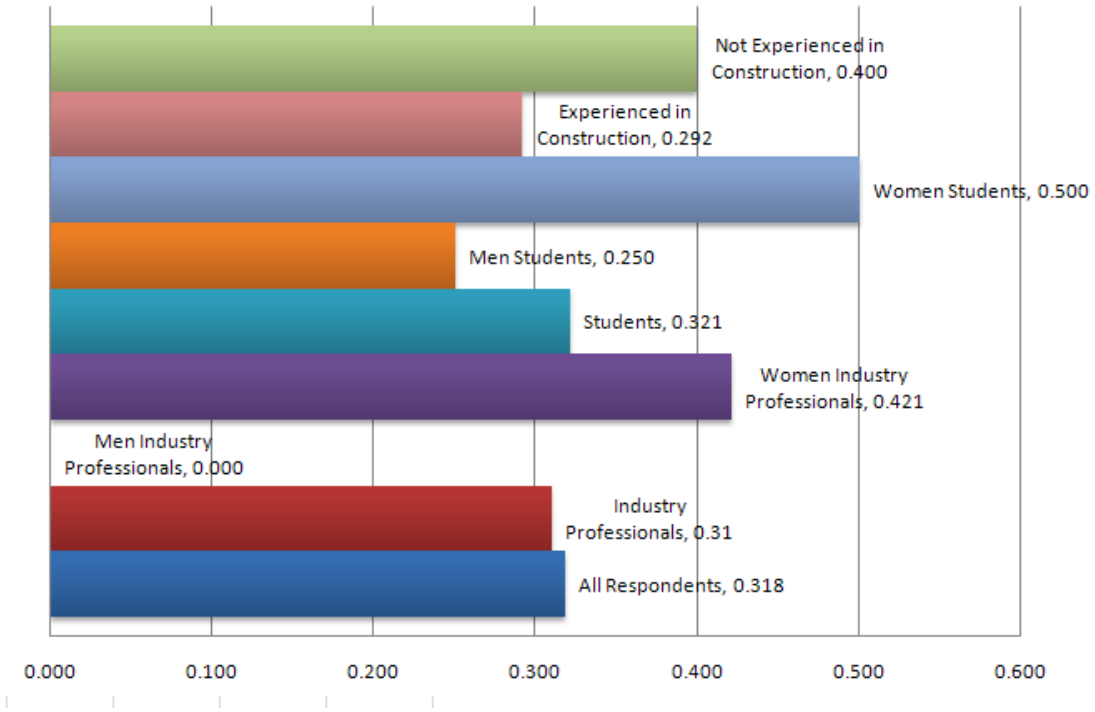

Figure 4-46. Trust, average rankings by group.

In reference to the personality trait of aggression, all groups appear to agree that to some extent men are more aggressive (Figure 4-47). The greatest differences are seen between the average responses of men students and industry professionals. Industry professionals, with an average response of -0.429, tend more toward the opinion that "there is no difference", while men students, with an average of -1.026, tend toward a response of "slightly more descriptive of men". The average of industry professionals and student respondents also tends toward men being slightly more aggressive than women.

There was general consistency from all groups that to some degree women were more tender-minded than men (Figure 4-48). The average response of industry professionals and student respondents tended toward "slightly more descriptive of women". The greatest difference was seen between the average response of women students of 1.125, and men industry professionals, with an average of 0.250. Students as a whole, women as a whole, and those

respondents experienced in construction work appear slightly more apt to think of women as more tender-minded than other groups.

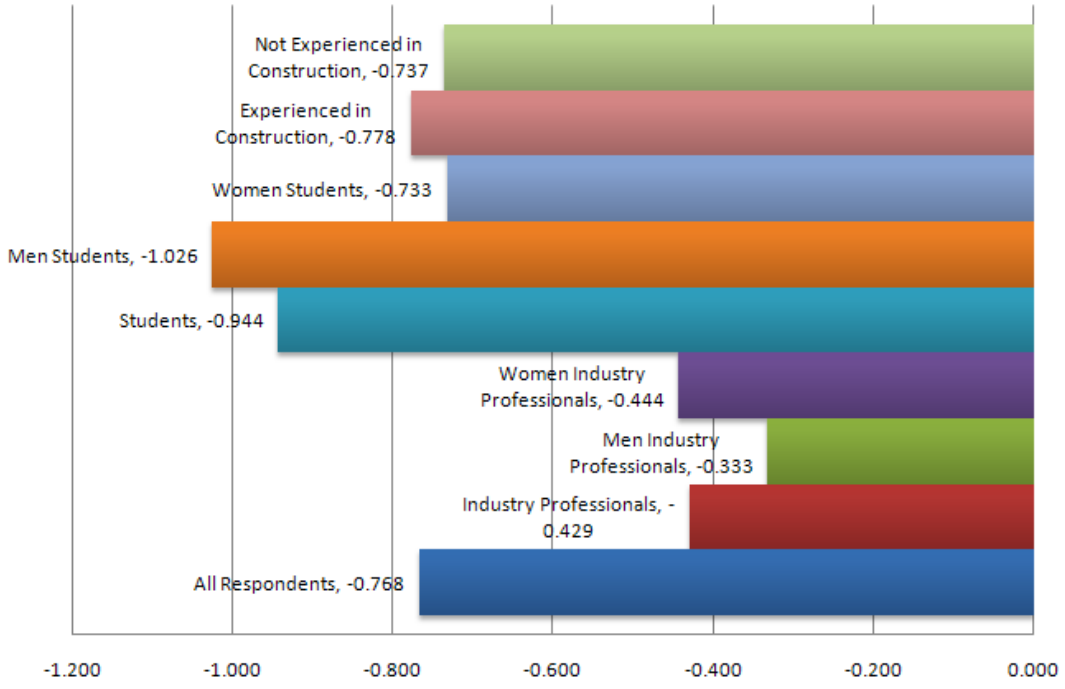

Figure 4-47. Aggression, average rankings by group.

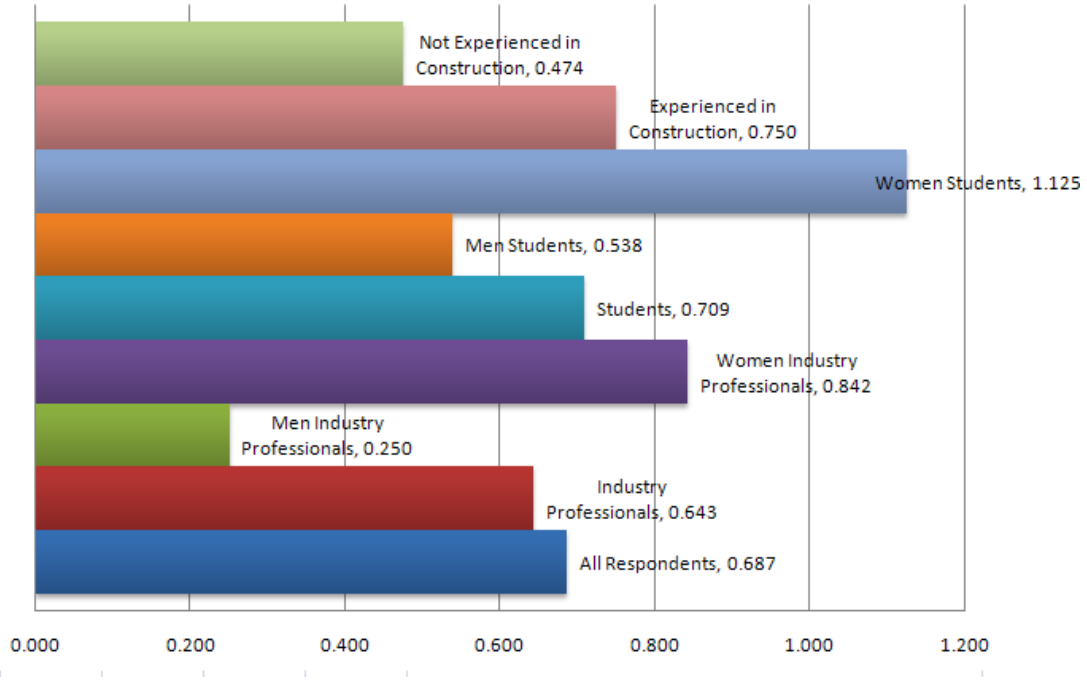

Figure 4-48. Tender-mindedness, average rankings by group.

There was also general consistency from all groups that to some degree men were more impulsive than women (Figure 4-49). The average response of industry professionals and student respondents tended toward “there is no difference”, with very little variation in the averages of all group responses. The greatest difference was seen between the average response of respondents with no construction experience of -0.500, and all of the other groups.

In reference to the personality trait of hard working, all groups appear to have slightly differing opinions, while still all tending toward no difference between men and women (Figure 4-50). The greatest differences are seen between the average responses of those who do not have construction work experience, with an average response of 0.100, and men industry professionals, with an average ranking of -0.111. Again, however, the differences in opinion are very slight.

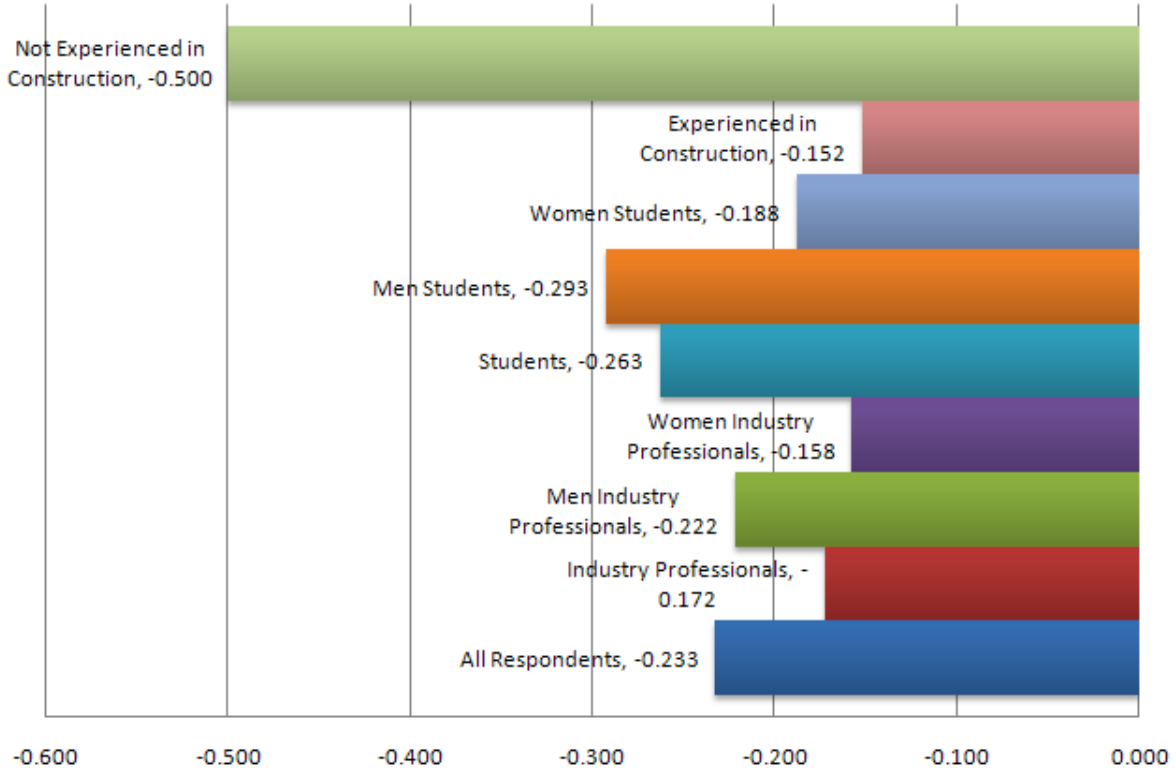

Figure 4-49. Impulsive, average rankings by group.

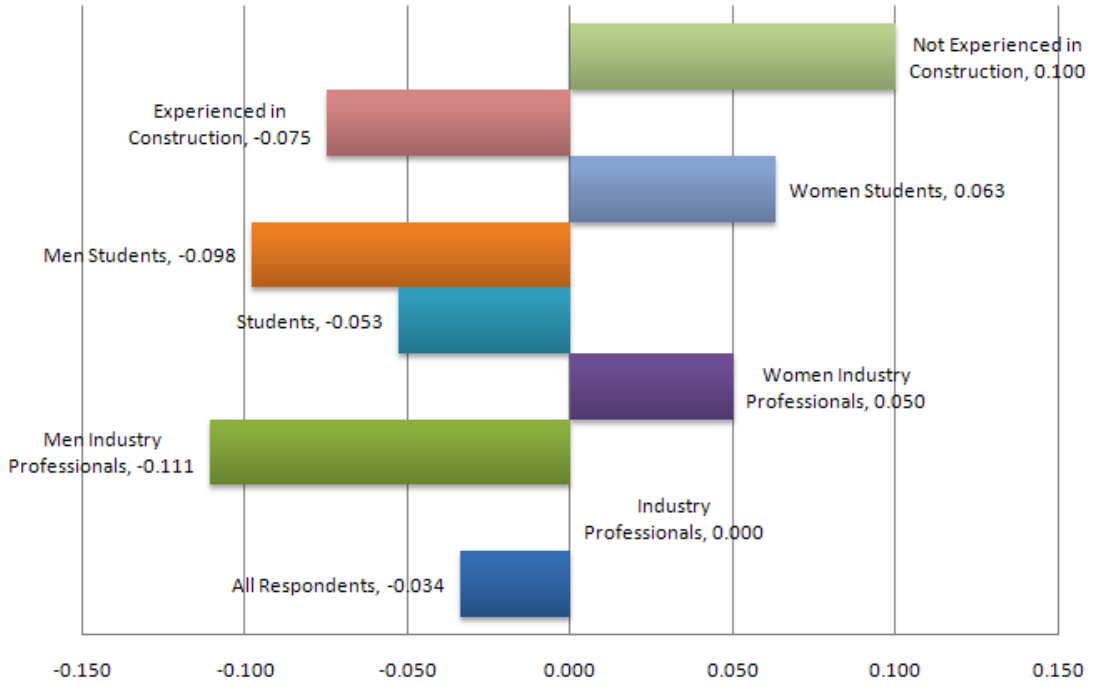

Figure 4-50. Hard-working, average rankings by group.

All groups appear to agree that to some extent women are more organized than men (Figure 4-51). All groups, with the exception of men students and men industry professionals, perceive women as "slightly" more organized than men. The greatest differences are seen between the average responses of women students, with an average response of 1.000, and men industry professionals, with an average response of 0.111. Men as a whole appear to state that "there is no difference" in the trait of organization.

In reference to the personality trait of self-control, all groups, with the exception of men students and students as a whole, appear to agree that to some extent this trait is descriptive of women (Figure 4-52). While having slightly differing opinions, however, all groups are still tending toward no difference between men and women. The greatest differences are seen between the average responses of women students, with an average response of 0.188, and men students, with an average ranking of -0.073. Again, the differences in opinion are very slight.

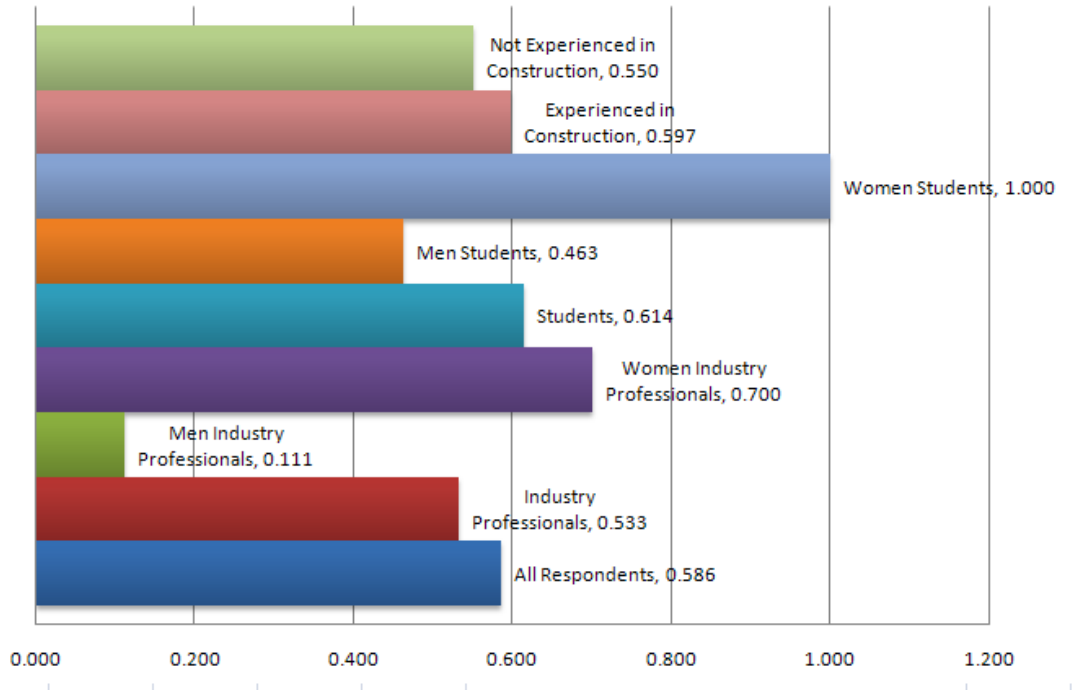

Figure 4-51. Organization, average rankings by group.

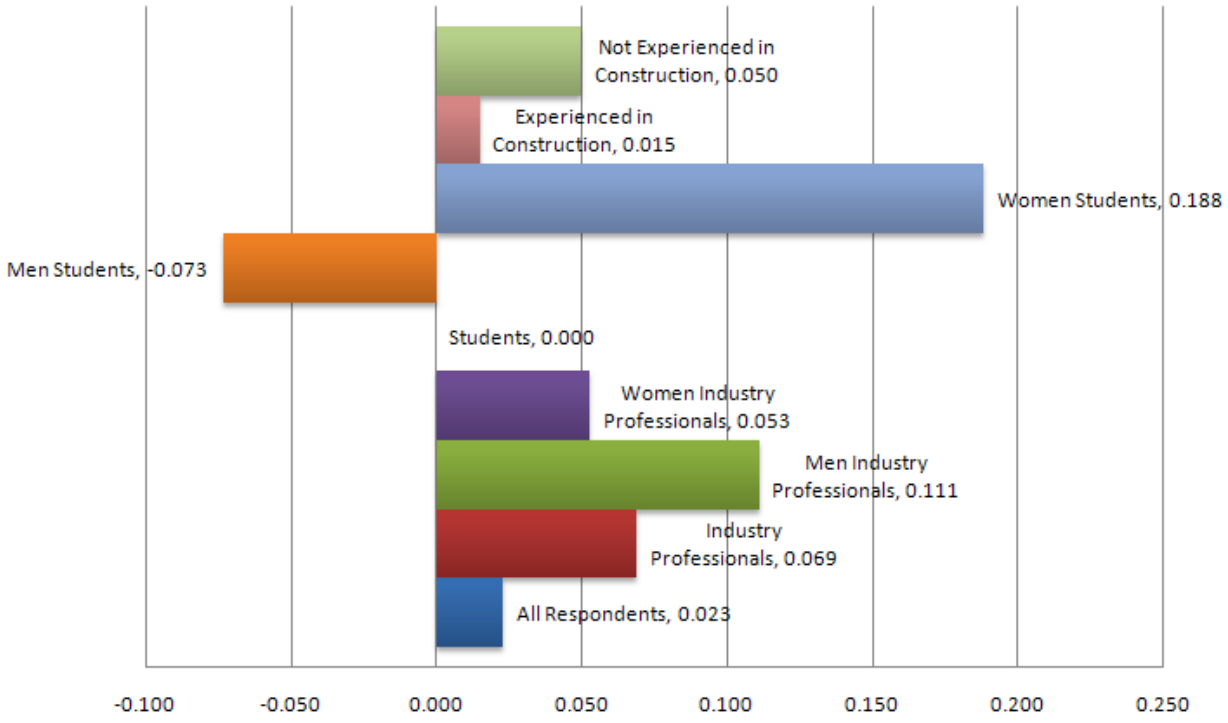

Figure 4-52. Self-control, average rankings by group.

In reference to the personality trait of dedication, all groups appear to have slightly differing opinions, while still all tending toward no difference between men and women (Figure 4-53). The greatest differences are seen between the average responses of those who do not have construction work experience, with an average response of -0.100, and women students, with an average ranking of 0.250.

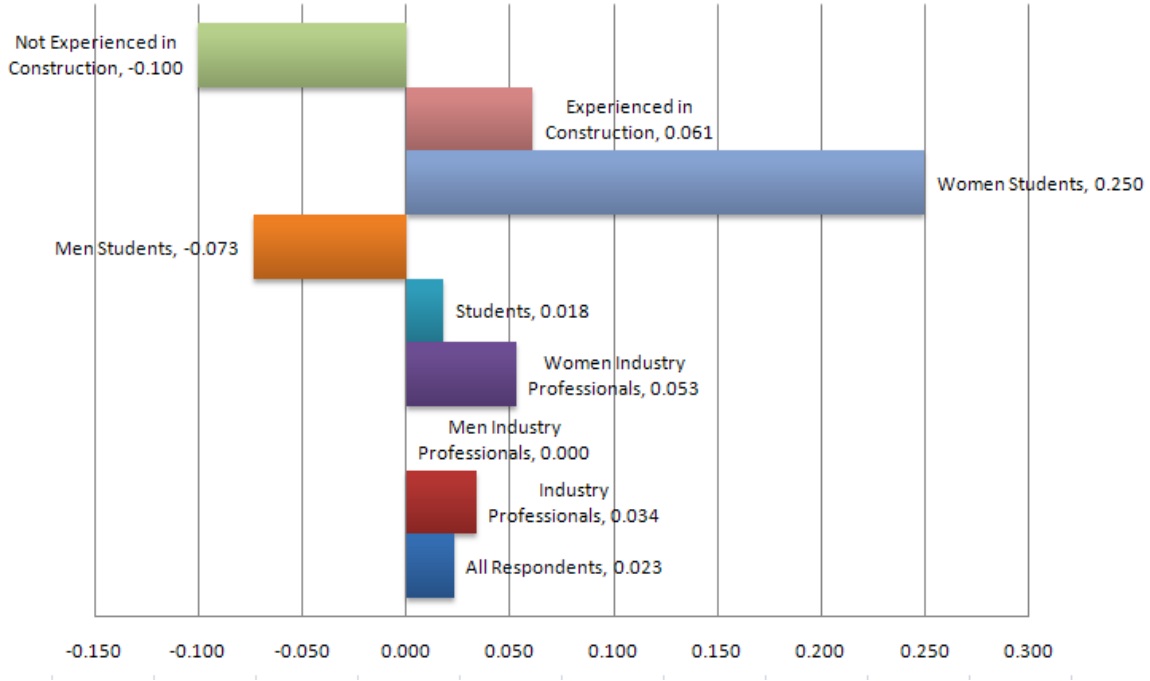

Figure 4-53. Dedication, average rankings by group.

In summary, industry professionals and student respondents thought that women were slightly more tender-minded and organized when compared to men (Figure 4-54). Respondents also thought that men were slightly more aggressive than women. There was little to no difference between men and women in personality traits of dedication, self-control, extroversion, and the trait of being hard-working. While there was very little difference perceived between the average rankings of trust, stress, creativity, and anxiety, these traits tended more toward women's personalities while impulsiveness, high self-esteem, and assertiveness tended more toward men's personalities.

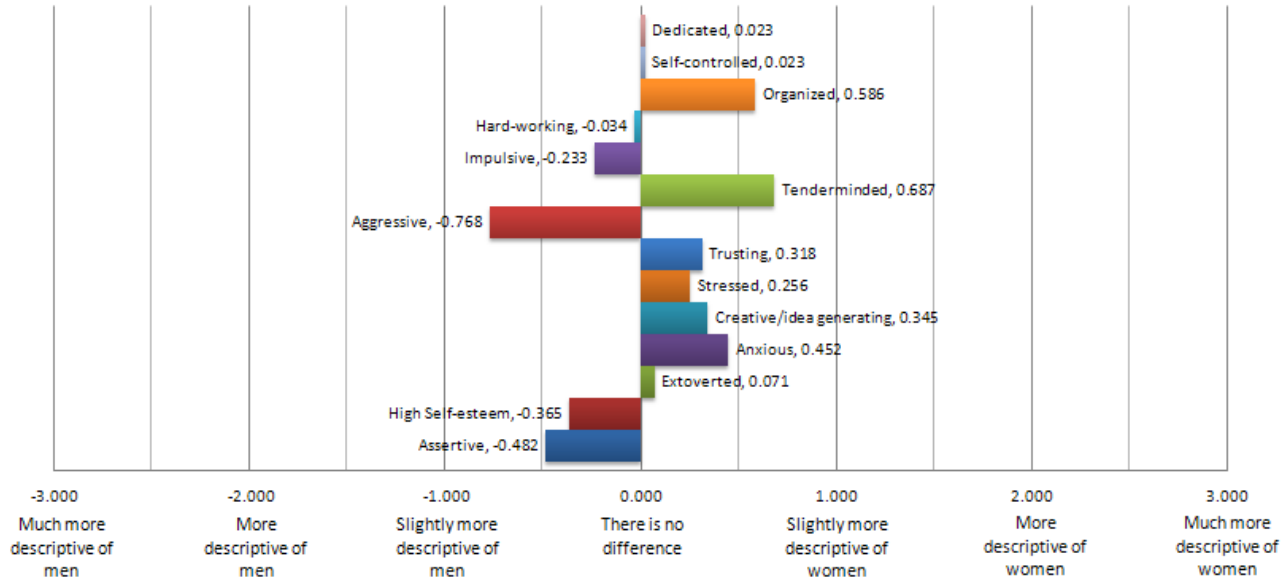

Figure 4-54. Industry professionals' and students' average rankings of personality traits.

A statistical analysis was performed to better determine if there were trends in the responses based on categorized groups, percentages of women employees, and degrees of personality traits of women. The following results were found to be statistically significant:

- As the percentage of women field employees in a company increases, the perception of women's high self-esteem increases (Pearson Correlation Test: Coef. = 0.263, ρ = 0.036, N = 48; Kendall Correlation Test: Coef. = 0.214, ρ = 0.04, N = 48).
- As the percentage of women home office personnel and salaried employees in a company increases, the perception of women's creativity/idea generation increases (Pearson Correlation Test: Coef. = 0.381, ρ = 0.002, N = 58; Kendall Correlation Test: Coef. = 0.255, ρ = 0.008, N = 58).
- Construction industry professionals rated women higher in the trait of creativity/idea generating than student respondents (Pearson Correlation Test: Coef. = 0.185, ρ = 0.046, N = 84; Kendall Correlation Test: Coef. = 0.178, ρ = 0.044, N = 84).
- Student respondents rated women higher in the trait of anxiety than construction industry professionals (Pearson Correlation Test: Coef. = -0.144, ρ = 0.095, N =84; Kendall Correlation Test: Coef. = -0.173, ρ = 0.049, N = 84).
- Construction industry professionals rated women higher in the trait of aggression than student respondents (Pearson Correlation Test: Coef. = 0.271, ρ = 0.007, N = 82; Kendall Correlation Test: Coef. = 0.242, ρ = 0.009, N = 82).

- Women respondents rated women higher in the trait of creativity/idea generating than the male respondents (Pearson Correlation Test: Coef. = 0.259, $\rho = 0.009$, N = 84; Kendall Correlation Test: Coef. = 0.187, $\rho = 0.036$, N = 84).
- Women respondents rated women higher in the trait of aggression than the male respondents (Pearson Correlation Test: Coef. = 0.266, $\rho = 0.008$, N = 82; Kendall Correlation Test: Coef. = 0.248, $\rho = 0.008$, N = 82).
- Student respondents with no construction work experience rated women higher in the trait of hard-working than the student respondents with construction work experience (Pearson Correlation Test: Coef. = 0.256, $\rho = 0.027$, N = 57; Kendall Correlation Test: Coef. = 0.289, $\rho = 0.014$, N = 57).

Statistical correlation tests were performed to determine if there were trends in answers between skill/task productivity observations of women and personality traits of women. Several correlations exhibited a tendency toward significance. Correlations between responses to skills/task productivity observations were noted in Table D-2. Correlations between responses to personality traits of women are found in Table D-3. Significant correlations between skill/task productivity observations of women and personality traits of women are noted in Table D-4.

Women in the Trades

The final portion of the questionnaire dealt with the observations of women in the construction trades. This section asked the respondents to give their perceptions on the suitability of women in construction trades; namely if they are more suited or less suited for some trades than others. Of the respondents, 47% reported that they did not find that women were more suited or less suited for some trades than others, 32% reported that they did find that women were more suited or less suited for some trades than others, and 21% reported that they had no basis on which to form an opinion on the subject (Figure 4-52). If the respondent did find a difference in their suitability, then they were asked to please explain. The following comments were made on the suitability of women in specific trades:

- “Better suited to more complicated work, electrical work, carpentry, etc. Less suited to brute force type work like demolition, concrete cutting, laying block.”

- “I think in terms of management positions, they are better suited for upper management and project management versus manual labor or a superintendent position, but their detail oriented nature makes them suitable for our industry.”

- “Women may struggle a bit more with high intensity activities, for example concrete labor.”

- “I would argue that there is no specific task unless it was a shear strength-based trade. Even then, there is equipment that can be used to assist the female employee.”

- “Interior designers.”

- “In construction women would be very hard to place in some of the trades- due to strength”

- “More suited for Interior Finish Trade type work”

- “manual labor” (assuming less-suited)

- “I feel that women are generally more organized and neat compared to some men. So, organizational tasks could be more suited for some women.”

- “Women cannot handle the highly physical positions such as block mason, drywall hangers, as well as men”

- “Less suited for some of the more physically demanding trades.”

Other comments were found to be more general statements about gender differences rather than attributed to certain trades and are listed in Table E-3.

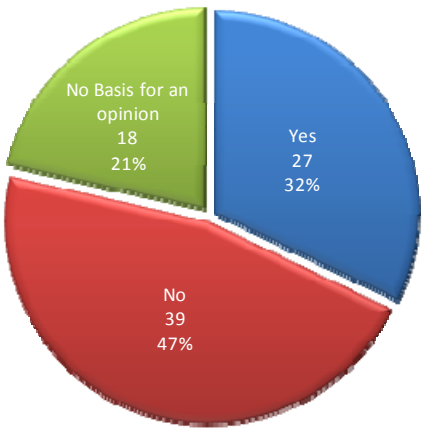

Figure 4-52. Suitability in trades.

CHAPTER 5
CONCLUSIONS

When the ideas for this research began, the construction industry was experiencing a severe skilled labor shortage and a thriving economy. Previous studies were inconclusive as to whether the construction industry was actively seeking women in order to fill the gap in the trades. From this research it can be concluded that the industry itself, with the exception of specialized apprenticeship programs outlined in the literature review, is not specifically targeting women with recruitment programs. While companies are not necessarily discriminating against women, they are also not looking to them as a potential skilled labor source. Most of the responding companies who did claim that they specifically targeted women for employment instead described their recruitment program in terms of "following the laws" of equal opportunity employment or requirements set forth for Minority Business Enterprises (MBEs). This could in part be due to the recent changes in economic status. For example, the current economy is laying-off employees rather than seeking out new sources of skilled labor. The fact still remains, however, that historically the construction industry does not invest in research and development, especially in areas of recruitment, as much as other industries. This is important because the economy will soon rebound and the construction industry finds itself with the same skilled labor shortage problem.

A statistical analysis was performed to determine if there was a correlation between companies that reported having a recruitment program to specifically target women and the percentages of women field employees and home office personnel and salaried employees. Both the Pearson and Kendall Correlation Tests showed that no variables had a significant correlation. Recruitment efforts are not related to the percentage of women employed.

In relationships between percentages of women employees and total numbers of employees, the study found that larger companies have a greater proportion of female field employees. It should be clarified that women in the field might be employed in the field or the project office. This was not ascertained. The relationship between home office personnel and salaried employees had the opposite effect; as the total number of home office personnel and salaried employees increases, the proportion of home office women employees decreases. The analysis also determined that there are greater opportunities for women in home office positions in smaller firms, based on the positions of women within the companies that were studied. It should be noted here that this conclusion may be influenced by the nature of the respondents. Of all the surveys conducted, 62 respondents were men and 46 respondents were women. Of the industry professional respondents, 18 were men and 28 were women. This high proportion of women respondents indicates that there may be a bias among the respondents. This shows that women responding to the survey are those in management positions and automatically it is known that women are employed in those companies. The gender composition of survey respondents does not reflect the composition of the industry. From the gender composition of the responses, it may also be deduced that women have a greater propensity to participate in a study about women. This may mean that companies with fewer or no women in management positions were less likely to complete the survey. This may also influence the perceptions expressed about women in the survey.

The analysis also found that subcontractors have a smaller percentage of women home office personnel and salaried employees. Also, the greater the amount of work that is subcontracted, the greater the proportion of women home office personnel and salaried employees. The relationships between the percentage of women employees and the types of

projects performed, it was found that firms that do commercial projects have a greater proportion of women home office personnel and salaried employees, and firms that do industrial projects have lower percentages of women field employees. Personal experience of the researcher and studies of labor statistics have shown similar results. Women with design backgrounds will also migrate to design-build positions. It may be the nature of the work or cultural influences of how genders should behave that influences the numbers of women working in certain fields. Cultural based gender stereotypes proclaim that appropriate work for women is "cleaner" and less physically involved. This may be why fewer women are found in firms that self-perform large quantities of work; because these employees are closer proximity to physical/manual labor. Similarly, industrial projects may be viewed by society as less feminine than commercial or other types of projects and thus have fewer women.

Of the respondents, 16% reported that gender was a consideration when assigning work to new hires. These respondents were then asked to describe how gender was considered in this process. Mostly, considerations were based on the amount of physical exertion that was expected from the worker. This lends itself to the conclusion that most companies do not think about gender differences, and in times when it is, physical strength may be the only gender difference that the industry is choosing to recognize. As mentioned previously, there was an overall sense in the responses to the survey that respondents were trying to somehow prove they were "following the law" rather than stating their perceptions of gender differences.

Studies described in the literature review found that men and women perform differently on tasks. This difference can be attributed to a degree to the genetic traits of their sex. When all responses to questions regarding women's performance on typical tasks or skills related to construction work were analyzed, the results showed that respondents thought women perform

slightly better at tasks involving communication skills and sensitivity to the emotions of others (Table 5-1). The analysis also showed that the respondents thought that women performed worse than men in tasks involving physical strength. These aspects were also found to be true in the gender studies described in the literature (Figure 5-1). Previous gender studies, however, also found that men had advantages in group behavior situations and computer literacy skills, and that women had advantages in leadership. In the current study, these skills were not perceived as tending toward a particular sex.

Table 5-1. Advantages by gender in skills and tasks used in construction.

Industry's Responses	Gender Study Findings
Men: Physical Strength Women: Communication Sensitivity to the emotions of others	Men: Physical Strength (Muscular Abilities) Group Interaction (Group Behavior) Computer literacy Women: Communication Sensitivity to the emotions of others (emotional intelligence) Leadership
No Difference: Spatial Perception Manual Dexterity Mathematical Calculations Group Interaction Supervision of Other Workers Computer Literacy Leadership	No Difference: Spatial Perception (Spatial and Mental Rotation) Manual Dexterity Mathematical Calculations Supervision of Other Workers

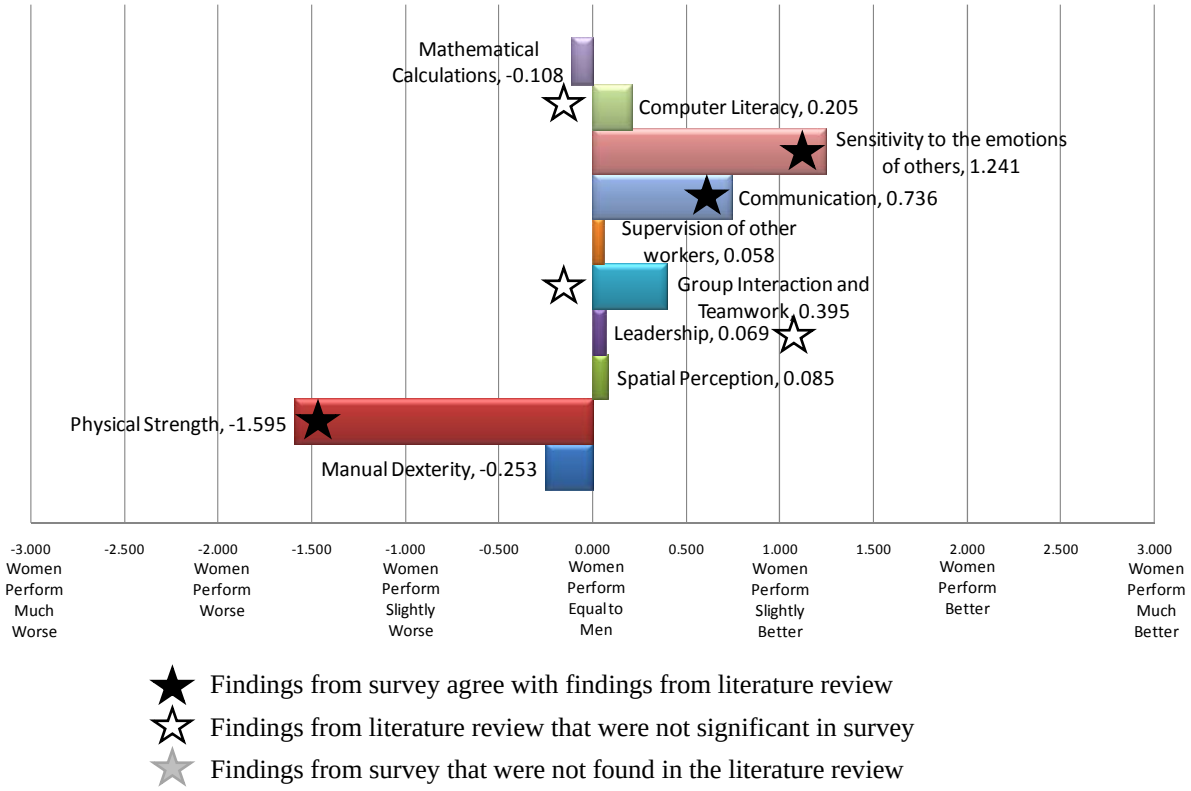

Figure 5-1. Findings of observations from industry professionals and student respondents on skill/task performance.

In regards to observations of personality traits, industry professionals and student respondents thought that women were slightly more tender-minded and organized as compared to men (Table 5-2). Respondents also thought that men were slightly more aggressive than women. There was little to no difference between men and women in personality traits of dedication, self-control, extroversion, and the trait of being hard-working. While there was very little difference seen between the average rankings of trust, stress, creativity, and anxiety, these traits still tended more toward women's personalities while impulsiveness, high self-esteem, and assertiveness still tended more toward men's personalities. Gender studies analyzed in the literature review confirmed that men were more aggressive and assertive, and that women were

more tender-minded (Figure 5-2). The gender studies analyzed, however, also found that women were higher in extraversion, anxiety, and trust, and that men were slightly higher in self-esteem.

Table 5-2. Tendencies by gender of personality traits.

Industry's Responses	Gender Study Findings
Men: Aggressive Women: Tender-minded Organization	Men: Aggressive Assertive High Self-esteem Women: Tender-minded Extroversion Anxiety Trust
No Difference: Impulsiveness Creativity/Idea Generation Dedication Self-Control Extroversion Hard-Working Trust Stress Anxiety High Self-Esteem Assertive	No Difference: Impulsiveness Creativity/Idea Generation (Ideas/Reflectiveness) Self-Control (Locus of Control) Organization (Orderliness) Not Studied: Dedication Hard-Working

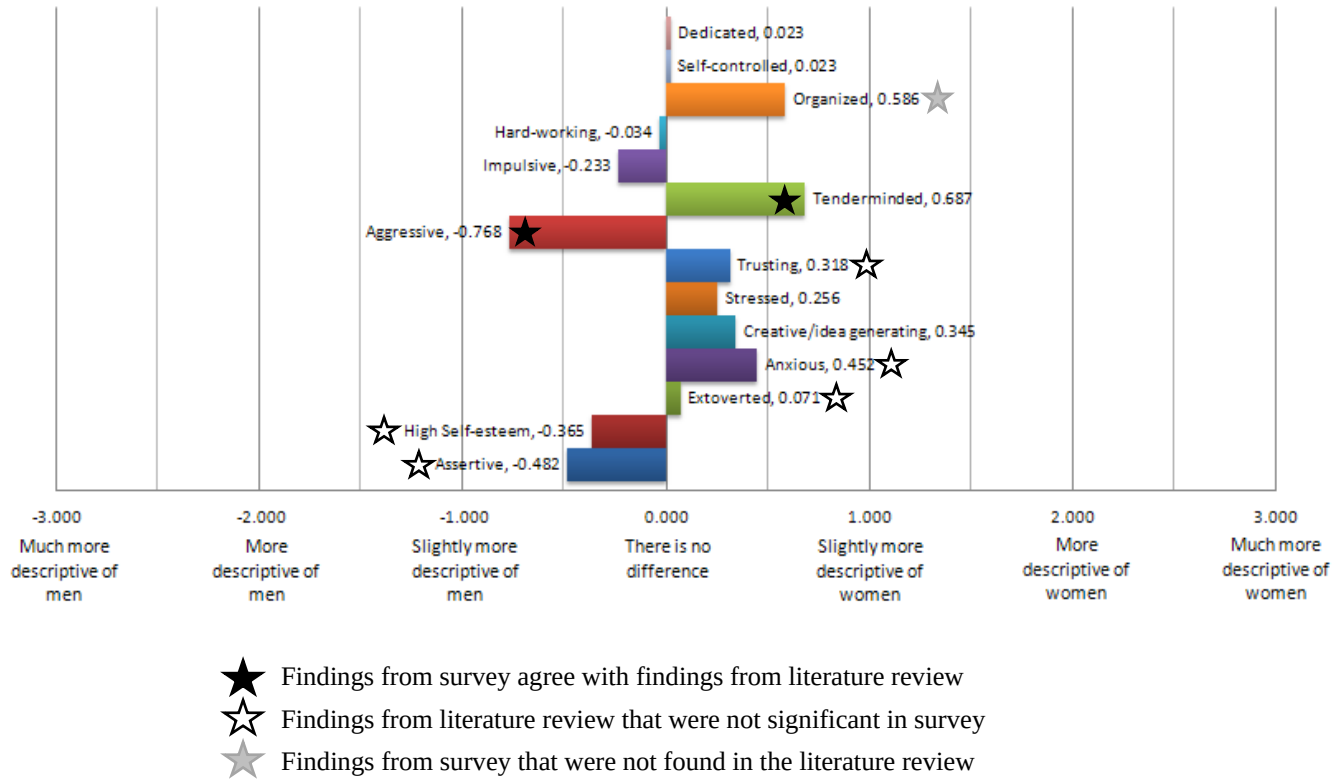

Figure 5-2. Findings of industry professionals' and students' average rankings of personality traits.

Several explanations may be offered for the differences and similarities between the past gender study conclusions and the conclusions of this research on both skill/task performance ratings and degrees of personality traits. Since the differences that were stated are similar to those found in the gender studies, it does not appear that the treatment of women in the construction industry is based on gender stereotypes. It was noted in this study that the industry respondents appeared somewhat timid to state that sexes are different; especially to state that any difference was more than slight. There is a possibility that the industry is in a state of hyper-sensitivity to sexual discrimination. In other words, instead of expressing the belief that everyone should be *treated* equal, as the law states, they may be attempting to perceive that genders are *created* equal or with identical traits. Another alternative explanation could be that the industry respondents perceive little difference between the sexes because minorities, in this

case women, involved in a group or a situation often alter their behavior to conform to their surroundings. There is also the possibility that women who choose construction as a career are of certain and distinct personality types; a different breed that cannot be summed up with generalizations of women.

Students and professionals differ in their perceptions of the traits of women. This stems from the lack of experience of students. Further studies on this topic need not be conducted with students.

Recommendations to the construction industry begin by first thinking of gender differences as a positive advantage. If the industry can view differences positively and apply this knowledge, they may discover improvements in productivity and a more efficient workforce. The greatest areas of improvement that could come from considering gender differences may be in the recruitment of skilled workers. The industry should understand the advantages of having women employees and the advantages *to* women of working in construction, to recruit skilled workers to fill job openings. Overall, the industry should invest in finding skilled labor sources.

Recommendations to researchers begin by better understanding the recruitment programs for women that are in-place and to identify those which are most successful. This may involve looking more closely at trades training programs, numbers of women in the trades, and how subcontractors and apprenticeships recruit workers. There should also be more research into why groups within the construction industry have differing opinions on women's performance of tasks and degrees of personality traits. This should also be compared against similar occupations. A further study could compare women who are in design-build firms to women in traditional design-bid-build firms in the commercial sector, to understand differences in the perceptions concerning women and also to examine reasons for the career choices that women

make. There should also be a survey conducted exclusively of project managers. This survey should include questions on the number of women supervised in the past. To make sure that there is clarity in the understanding of terms, the survey should also give definitions for the various skills and personality traits. There should also be further investigation into the industry's seemingly hypersensitive toward gender differences and gender related issues. More research should be conducted as to what impacts gender differences might have on construction work; for instance, since women are less aggressive than men, does this mean they are safer on the jobsite than men? More extensive research should be conducted to determine how gender differences might improve the construction industry.

APPENDIX A
INSTITUTIONAL REVIEW BOARD SURVEY APPROVAL

UF | Institutional Review Board
UNIVERSITY of FLORIDA

PO Box 112250
Gainesville, FL 32611-2250
352-392-0433 (Phone)
352-392-9234 (Fax)
irb2@ufl.edu

DATE: February 6, 2009

TO: Amber Wangle
1123 SW 5th Avenue
Gainesville, FL 32601

FROM: Ira S. Fischler, PhD, Chair
University of Florida
Institutional Review Board 02

SUBJECT: **Approval of Protocol #2009-U-0077**

TITLE: Women in Construction

SPONSOR: None

I am pleased to advise you that the University of Florida Institutional Review Board has recommended approval of this protocol. Based on its review, the UFIRB determined that this research presents no more than minimal risk to participants, and based on 45 CFR 46.117(c), An IRB may waive the requirement for the investigator to obtain a signed consent form for some or all subjects if it finds either: *(1) That the only record linking the subject and the research would be the consent document and the principal risk would be potential harm resulting from a breach of confidentiality. Each subject will be asked whether the subject wants documentation linking the subject with the research, and the subject's wishes will govern; or (2) That the research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context.*

The IRB authorizes you to administer the informed consent process as specified in the protocol. If you wish to make any changes to this protocol, ***including the need to increase the number of participants authorized***, you must disclose your plans before you implement them so that the Board can assess their impact on your protocol. In addition, you must report to the Board any unexpected complications that affect your participants.

If you have not completed this protocol by **January 28, 2010**, please telephone our office (392-0433), and we will discuss the renewal process with you. It is important that you keep your Department Chair informed about the status of this research protocol.

ISF:dl

Informed Consent Documentation

Protocol Title:
Women in Construction

Please read this Informed Consent Document carefully before you decide to participate in this study.

Purpose of this research study:

The purpose of this study is to determine the construction industry's perception of women and how they perform on industry specific work tasks. The study is also intended to gather information on where women are employed within the industry, if and how women are recruited into the industry, and how gender is considered in the hiring and placement of new employees.

What you will be asked to do in this study:
Answer a short survey regarding observations of women in the construction industry.

Time required:
The survey will take about 15-25 minutes, depending on the level of detail of your responses.

Risk and benefits:
There are no risks to become involved in this survey. Your completed survey can contain as little or as much information as you wish to divulge. There is no compensation to you for participating in the study. If you would like to receive a summary of the findings, please indicate your choice on the survey form or send an email to the address listed below.

Confidentiality:
Your responses will be held in complete confidentiality. Your responses will be anonymous, the researchers will have no way of linking them to your name, net address, or your company. It is completely optional to include any additional information with the survey.

Voluntary participation:
Participation in this survey is completely voluntary, and there is no penalty for not participating.

Right to withdraw from this study:
You have to right to withdraw from this study at any time with no risk.

Whom to contact with questions about this study:
Amber Wangle, Principal Investigator, M.E. Rinker School of Building Construction
Phone: 352.871.8400
Email: amberwangle@hotmail.com

Dr. Jimmie Hinze, University of Florida School of Building Construction
Email: hinze@ufl.edu

Approved by
University of Florida
Institutional Review Board 02
Protocol # 2009-U-0077
or Use Through 01/28/2010

Whom to contact about your rights as a research participant in this study:
IRB02 Office, POBox 112250, University of Florida, Gainesville, FL 32611-2250
Phone: 352.392.0433

Agreement:

I have read the Informed Consent Documentation above. I have received a copy of the research proposal, and I voluntarily agree to participate in this research.

Participant: _____ Date:_____

Principal Investigator: _____ Date:_____

Approved by
University of Florida
Institutional Review Board 02
Protocol # 2009-U-0077
or Use Through 01/28/2010

APPENDIX B
SURVEY COVER LETTER

Cover Letter for **Women in Construction Survey**

January 23, 2009

Approved by
University of Florida
Institutional Review Board 02
Protocol # 2009-U-0077
or Use Through 01/28/2010

To: Upper Management

Subject: Women in Construction Survey

We, the M. E. Rinker, Sr. School of Building Construction at the University of Florida, are conducting a study to explore the construction industry's perception of women and how they perform on industry specific work tasks. One focus of the study is to assess practices the industry is currently implementing to recruit women into construction occupations. When possible, information is sought regarding documented recruitment plans concerning women. Specific information is also sought regarding the numbers of female employees and information on where women are employed within the industry.

The survey questionnaire contains a variety of questions related to observations of women in construction. Many of the questions can be answered by simply checking the applicable answers. There are no direct benefits or risks associated with participating in this study and the survey can be completed in about 15 to 25 minutes. Naturally, you do not have to answer questions you do not wish to answer. Your participation is voluntary and you may withdraw your consent at anytime without penalty.

The results of this study will be compiled and a summary report will be prepared. As a token of our appreciation for participating in the study, we will provide a copy of the summary report to you at no charge. Should you have any questions please feel free to call me at the telephone number provided below or contact me at the email address shown below.

Responses provided by specific firms will be kept strictly confidential to the extent provided by law. Research data will be summarized so that the identity of individual participants will be concealed. You have my sincere thanks for participating in this valuable study.

Yours truly,

Amber Wangle

Amber Wangle

Graduate Student, M.E. Rinker School of Building Construction at the University of Florida

Phone: (352) 871-8400 Fax: (352) 392-9606 Email: amberwangle@hotmail.com

P.S. For information about participant rights, please contact the University of Florida Institutional Review Board at (352) 392-0433 or Email: IRB2@ufl.edu.

APPENDIX C
SURVEY

Women in Construction Survey

Curren

Part 1. Company Demographics

What is your position? _____ Sex? ◯ Male ◯ Female

Which of the following best describes the company?(Please check all that apply)

☐ General Contracting ☐ Design Build ☐ Const. Management ☐ Subcontractor ☐ Other: _____

Which of the following industry sectors best describe company projects? (please check all that apply)

☐ Commercial ☐ Industrial ☐ Heavy Civil/Transportation ☐ Residential ☐ Other: _____

Number of field employees (manual workers) _____ How many are women? _____

Number of home office personel and salaried field employees _____ How many are women? _____

Percent of work that is subcontracted to others _____ %

Part 2. Employee Placement

Indicate the number of women employed in each position within the company (Please choose the position that best fits)

Office Positions	
Position Description	Number of Women
Reception / Clerical Work	0
Office Manager	0
Estimator	0
Project Engineer / Asst. Project Manager	0
Project Manager / Dept. Manager	0
Vice President	0
President or CEO	0
Other (please specify) _____	0

Field Supervisory Positions	
Position Description	Number of Women
Supervisor	0
Foreman	0
Field Engineer / Asst. Supervisor	0
Other (please specify) _____	0

On your company's projects in the past year, what percentage of the workers in the following trades were women?

Trades Positions

Position Description	Percent Women	Position Description	Percent Women	Position Description	Percent Women
Brick/Block/Stone Mason	0 %	Electrician	0 %	Construction and Building Inspectors	0 %
Carpenter	0 %	Painter	0 %	Highway Maintainence Workers	0 %
Flooring Installers and Finishers	0 %	Plumber / Pipelayer	0 %	Other (please specify)	0 %
Concrete Finishers	0 %	Roofer	0 %		
Construction Laborer	0 %	Sheet Metal Worker	0 %		
Equipment Operator	0 %	Structural Iron and Steel Worker	0 %		
Drywall Installer and Taper	0 %	Construction Helper	0 %		

Is gender a consideration when assigning work to new hires? ◯ Yes ◯ No

If yes, how is gender considered in this process?

Part 3. Employee Recruitment

Does your company have policies (verbal or written) specifically against the hiring of women?

◯ Yes ◯ No

Does your company have a program that is meant to specifically target women for employment?

◯ Yes ◯ No

If yes, please give a short summary of the recruitment program.

Please feel free to attach pages if needed, including any program materials you would like to offer.

Part 4. Skill Productivity Observations

Based on your observations, indicate how well women perform these tasks when compared to men doing the same work.

Task / Skill	Women perform **much worse**	Women perform **worse**	Women perform **slightly worse**	Women perform **equal to men**	Women perform **slightly better**	Women perform **better**	Women perform **much better**
Manual Dexterity	◯	◯	◯	◯	◯	◯	◯
Physical Strength	◯	◯	◯	◯	◯	◯	◯
Spatial Perception	◯	◯	◯	◯	◯	◯	◯
Leadership	◯	◯	◯	◯	◯	◯	◯
Group Interaction and Teamwork	◯	◯	◯	◯	◯	◯	◯
Supervision of other workers	◯	◯	◯	◯	◯	◯	◯
Communication	◯	◯	◯	◯	◯	◯	◯
Sensitivity to the emotions of others	◯	◯	◯	◯	◯	◯	◯
Computer Literacy	◯	◯	◯	◯	◯	◯	◯
Mathematical Calculations	◯	◯	◯	◯	◯	◯	◯

Do you find that female employees express more concern about musculoskeletal injuries or pains than male employees?

◯ Yes ◯ No

Does your company purchase and supply Personal Protection Equipment (PPEs) that is specially made to fit women?

◯ Yes ◯ No ◯ Specialized PPE is not commerically available

Describe your observations of how well women interact in peer groups at work.

Describe any differences in productivity between male and female employees that you have observed.

Part 5. Personality Trait Observations

Based on your observations, indicate the degree to which the following personality traits are portrayed in employees .

Personality Trait	**Only** describes **men**	**More** descriptive of **men**	**Slightly more** descriptive of **men**	There is **no difference**	**Slightly more** descriptive of **women**	**More** descriptive of **women**	**Only** describes **women**
Assertive	◠	◠	◠	◠	◠	◠	◠
High Self-esteem	◠	◠	◠	◠	◠	◠	◠
Extroverted	◠	◠	◠	◠	◠	◠	◠
Anxious	◠	◠	◠	◠	◠	◠	◠
Creative / Idea Generating	◠	◠	◠	◠	◠	◠	◠
Stressed	◠	◠	◠	◠	◠	◠	◠
Trusting	◠	◠	◠	◠	◠	◠	◠
Aggressive	◠	◠	◠	◠	◠	◠	◠
Tenderminded	◠	◠	◠	◠	◠	◠	◠
Impulsive	◠	◠	◠	◠	◠	◠	◠
Hard-Working	◠	◠	◠	◠	◠	◠	◠
Organized	◠	◠	◠	◠	◠	◠	◠
Self-Controlled	◠	◠	◠	◠	◠	◠	◠
Dedicated	◠	◠	◠	◠	◠	◠	◠

Part 6. Women in the Trades

Do you find that women are more suited/less suited/un-suited for some trades than others?

◠ Yes ◠ No

If yes, please explain:

Thank you for taking the time to fill out this survey.

Does the company have a written recruitment plan specifically for women? If so, I would greatly appreciate the company providing copies with the survey responses for use in this study. Note that all information will remain anonymous.

Thank you,
Amber Wangle
352-871-8400

APPENDIX D
STATISTICAL CORRELATION TABLES

Table D-1. Respondent demographics correlation tests

Correlation Finding Statement	Test	Coef.	ρ	N
Larger companies have a greater proportion of female field employees.	Pearson	0.391	0.001	57
	Kendall	0.205	0.018	57
As the total number of home office personnel and salaried employees increases, the proportion of home office employee women decreases.	Pearson	-0.167	0.086	68
	Kendall	-0.088	0.149	68
Subcontractors have a smaller percentage of women home office personnel and salaried employees.	Pearson	-0.245	0.020	71
	Kendall	-0.192	0.027	71
The greater the amount of work that is subcontracted, the greater the proportion of women home office personnel and salaried employees.	Pearson	0.244	0.024	66
	Kendall	0.075	0.201	66
Firms that do commercial projects have a greater proportion of women home office personnel and salaried employees.	Pearson	0.235	0.024	71
	Kendall	0.192	0.027	71
Firms that do industrial projects have lower percentages of women field employees.	Pearson	-0.172	0.098	58
	Kendall	-0.185	0.056	58

Table D-2. Correlation coefficients of skills/tasks.

		Physical Strength		Spatial Perception		Leadership		Group Interaction		Supervision of other workers		Communication		Sensitivity to the Emotions of Others		Computer Literacy		Mathematical Calculations	
Correlation Test		Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall
Manual dexterity	Coef.	.194*	0.057	-0.035	-0.037	.270**	.194*	0.072	0.021	.207*	0.141	0.077	0.082	0.08	0.118	-0.132	-0.078	0.151	0.066
	r	0.039	0.277	0.382	0.358	0.007	0.022	0.261	0.412	0.031	0.074	0.246	0.193	0.236	0.106	0.118	0.21	0.091	0.256
	N	83	83	78	78	82	82	81	81	82	82	82	82	82	82	82	82	80	80
Physical Strength	Coef.	1	1	0.176	0.165	.378**	.337**	.183*	0.156	0.172	0.075	-0.055	-0.057	-.211*	-.211*	-0.024	-0.028	0.107	0.038
	r		.	0.06	0.051	0	0	0.05	0.055	0.062	0.223	0.312	0.277	0.029	0.014	0.415	0.387	0.17	0.354
	N	84	84	79	79	83	83	82	82	82	82	82	82	82	82	83	83	81	81
Spatial Perception	Coef.	0.176	0.165	1	1	.221*	0.112	.249*	.190*	.274**	0.159	.211*	0.136	0.129	0.113	0.09	0.065	.365**	.266**
	r	0.06	0.051		.	0.023	0.129	0.012	0.027	0.007	0.056	0.03	0.082	0.125	0.124	0.213	0.257	0	0.005
	N	79	79	82	82	82	82	81	81	81	81	80	80	81	81	81	81	79	79
Leadership	Coef.	.378**	.337**	.221*	0.112	1	1	.574**	.518**	.506**	.335**	.245*	.184*	-0.03	0	0.129	0.025	.329**	.209*
	r	0	0	0.023	0.129		.	0	0	0	0	0.012	0.025	0.394	0.498	0.119	0.399	0.001	0.019
	N	83	83	82	82	87	87	85	85	85	85	85	85	85	85	86	86	82	82
Group Interaction	Coef.	.183*	0.156	.249*	.190*	.574**	.518**	1	1	.368**	.276**	.246*	.272**	0.17	.275**	0.146	0.058	.231*	.214*
	r	0.05	0.055	0.012	0.027	0	0		.	0	0.002	0.012	0.002	0.06	0.002	0.091	0.273	0.019	0.015
	N	82	82	81	81	85	85	86	86	85	85	84	84	85	85	85	85	82	82
Supervision of other workers	Coef.	0.172	0.075	.274**	0.159	.506**	.335**	.368**	.276**	1	1	.303**	.261**	.274**	.251**	.351**	.341**	.298**	.209*
	r	0.062	0.223	0.007	0.056	0	0	0	0.002		.	0.002	0.003	0.005	0.004	0	0	0.003	0.019
	N	82	82	81	81	85	85	85	85	86	86	85	85	86	86	85	85	82	82
Communication	Coef.	-0.055	-0.057	.211*	0.136	.245*	.184*	.246*	.272**	.303**	.261**	1	1	.582**	.519**	0.161	0.117	0.153	0.12
	r	0.312	0.277	0.03	0.082	0.012	0.025	0.012	0.002	0.002	0.003		.	0	0	0.069	0.104	0.086	0.11
	N	82	82	80	80	85	85	84	84	85	85	87	87	86	86	86	86	81	81
Sensitivity to the Emotions of Others	Coef.	-.211*	-.211*	0.129	0.113	-0.03	0	0.17	.275**	.274**	.251**	.582**	.519**	1	1	0.171	0.139	0.074	0.094
	r	0.029	0.014	0.125	0.124	0.394	0.498	0.06	0.002	0.005	0.004	0	0		.	0.058	0.07	0.255	0.169
	N	82	82	81	81	85	85	85	85	86	86	86	86	87	87	86	86	82	82
Computer Literacy	Coef.	-0.024	-0.028	0.09	0.065	0.129	0.025	0.146	0.058	.351**	.341**	0.161	0.117	0.171	0.139	1	1	.352**	.245**
	r	0.415	0.387	0.213	0.257	0.119	0.399	0.091	0.273	0	0	0.069	0.104	0.058	0.07		.	0.001	0.007
	N	83	83	81	81	86	86	85	85	85	85	86	86	86	86	88	88	83	83

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

Table D-3. Correlation coefficients of personality traits.

		High Self Esteem		Extroversion		Anxiety		Creativity/Idea Generation		Stress		Trust		Aggression		Tender-mindedness		Impulsiveness		Hard Working		Organization		Self Controlling		Dedication	
		Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall
Assertiveness	Coef.	.234*	.244**	0.019	-0.073	-.193*	-.221*	-.233*	-.221*	0.169	.161*	-0.166	-0.157	.362**	.403**	-.359**	-.395**	0.006	0.024	0.042	0.07	-0.136	-.162*	-0.165	-0.161	-0.141	-0.126
	r	0.017	0.008	0.431	0.233	0.042	0.014	0.018	0.013	0.063	0.049	0.069	0.056	0	0	0.001	0	0.479	0.403	0.352	0.248	0.11	0.05	0.068	0.053	0.103	0.108
	N	83	83	82	82	81	81	82	82	83	83	82	82	80	80	80	80	83	83	83	83	83	83	83	83	83	83
High Self Esteem	Coef.	1	1	.225*	0.139	-.305**	-.322**	-.300**	-.209*	-0.077	-0.065	-.266**	-.204*	0.081	0.145	-.255*	-.289**	.205*	.167*	-.259**	-0.13	-.473**	-.429**	-.375**	-.259**	-0.162	-0.117
	r	.		0.02	0.084	0.002	0.001	0.003	0.019	0.244	0.257	0.007	0.02	0.235	0.073	0.01	0.002	0.03	0.045	0.008	0.115	0	0	0	0.005	0.069	0.126
	N	85	85	84	84	83	83	83	83	84	84	84	84	81	81	82	82	85	85	85	85	85	85	85	85	85	85
Extroversion	Coef.	.225*	0.139	1	1	.240*	.275**	-0.046	0.003	-0.032	0.041	-0.04	0.005	-0.139	-0.067	0.033	0.07	.295**	.200*	0.063	0.074	-0.049	0.002	-.430**	-.324**	-0.171	-0.02
	r	0.02	0.084	.		0.014	0.003	0.34	0.489	0.389	0.339	0.36	0.481	0.108	0.252	0.385	0.245	0.003	0.021	0.285	0.237	0.328	0.49	0	0.001	0.06	0.423
	N	84	84	84	84	83	83	83	83	83	83	83	83	81	81	81	81	84	84	84	84	84	84	84	84	84	84
Anxiety	Coef.	-.305**	-.322**	.240*	.275**	1	1	.250*	0.155	.381**	.330**	0.125	0.101	-0.044	-0.112	.443**	.422**	0.056	0.066	0.169	.179*	.287**	.306**	-0.139	-0.153	-0.031	0.043
	r	0.002	0.001	0.014	0.003	.		0.011	0.06	0	0	0.128	0.153	0.347	0.128	0	0	0.305	0.249	0.062	0.042	0.004	0.001	0.104	0.062	0.389	0.336
	N	83	83	83	83	84	84	83	83	83	83	84	84	82	82	82	82	84	84	84	84	84	84	84	84	84	84
Creativity/Idea Generation	Coef.	-.300**	-.209*	-0.046	0.003	.250*	0.155	1	1	.362**	.288**	.496**	.443**	-0.055	-0.123	.207*	0.148	-.235*	-.165*	.211*	.186*	.469**	.415**	.289**	0.153	.492**	.419**
	r	0.003	0.019	0.34	0.489	0.011	0.06	.		0	0.002	0	0	0.311	0.104	0.032	0.07	0.016	0.045	0.027	0.035	0	0	0.004	0.061	0	0
	N	83	83	83	83	83	83	84	84	84	84	83	83	82	82	81	81	84	84	84	84	84	84	84	84	84	84
Stress	Coef.	-0.077	-0.065	-0.032	0.041	.381**	.330**	.362**	.288**	1	1	0.178	.197*	0.042	0.022	0.171	0.114	-0.145	-0.023	-0.08	0.001	0.099	0.112	-0.051	-0.054	.186*	.167*
	r	0.244	0.257	0.389	0.339	0	0	0	0.002	.		0.052	0.021	0.355	0.408	0.062	0.124	0.093	0.406	0.232	0.497	0.181	0.122	0.323	0.289	0.044	0.047
	N	84	84	83	83	83	83	84	84	86	86	84	84	82	82	82	82	85	85	86	86	86	86	85	85	85	85
Trust	Coef.	-.266**	-.204*	-0.04	0.005	0.125	0.101	.496**	.443**	0.178	.197*	1	1	-0.064	-0.084	.242*	.187*	0.032	0.034	0.01	0.008	0.162	0.139	.207*	0.14	.405**	.370**
	r	0.007	0.02	0.36	0.481	0.128	0.153	0	0	0.052	0.021	.		0.285	0.193	0.014	0.028	0.384	0.36	0.463	0.47	0.07	0.075	0.029	0.075	0	0
	N	84	84	83	83	84	84	83	83	84	84	85	85	82	82	83	83	85	85	85	85	85	85	85	85	85	85
Aggression	Coef.	0.081	0.145	-0.139	-0.067	-0.044	-0.112	-0.055	-0.123	0.042	0.022	-0.064	-0.084	1	1	-0.114	-.310**	0.11	0.139	0.14	0.11	-0.169	-.225*	0.037	-0.076	0.042	0.053
	r	0.235	0.073	0.108	0.252	0.347	0.128	0.311	0.104	0.355	0.408	0.285	0.193	.		0.157	0.001	0.162	0.075	0.105	0.141	0.064	0.01	0.372	0.219	0.353	0.3
	N	81	81	81	81	82	82	82	82	82	82	82	82	82	82	80	80	82	82	82	82	82	82	82	82	82	82
Tender-mindedness	Coef.	-.255*	-.289**	0.033	0.07	.443**	.422**	.207*	0.148	0.171	0.114	.242*	.187*	-0.114	-.310**	1	1	0.032	-0.04	-0.15	-0.12	.302**	.399**	0.155	.233**	0.152	0.135
	r	0.01	0.002	0.385	0.245	0	0	0.032	0.07	0.062	0.124	0.014	0.028	0.157	0.001	.		0.387	0.339	0.088	0.119	0.003	0	0.081	0.009	0.085	0.092
	N	82	82	81	81	82	82	81	81	82	82	83	83	80	80	83	83	83	83	83	83	83	83	83	83	83	83
Impulsiveness	Coef.	.205*	.167*	.295**	.200*	0.056	0.066	-.235*	-.165*	-0.145	-0.023	0.032	0.034	0.11	0.139	0.032	-0.04	1	1	0.002	0.015	-.208*	-0.131	-.179*	-0.139	-0.058	-0.052
	r	0.03	0.045	0.003	0.021	0.305	0.249	0.016	0.045	0.093	0.406	0.384	0.36	0.162	0.075	0.387	0.339	.		0.491	0.44	0.028	0.085	0.05	0.075	0.299	0.297
	N	85	85	84	84	84	84	84	84	85	85	85	85	82	82	83	83	86	86	86	86	86	86	86	86	86	86
Hard Working	Coef.	-.259**	-0.125	0.063	0.074	0.169	.179*	.211*	.186*	-0.08	0.001	0.01	0.008	0.14	0.11	-0.15	-0.121	0.002	0.015	1	1	.246*	.170*	.292**	.185*	.280**	.337**
	r	0.008	0.115	0.285	0.237	0.062	0.042	0.027	0.035	0.232	0.497	0.463	0.47	0.105	0.141	0.088	0.119	0.491	0.44	.		0.011	0.045	0.003	0.035	0.004	0.001
	N	85	85	84	84	84	84	84	84	86	86	85	85	82	82	83	83	86	86	87	87	87	87	86	86	86	86
Organization	Coef.	-.473**	-.429**	-0.049	0.002	.287**	.306**	.469**	.415**	0.099	0.112	0.162	0.139	-0.169	-.225*	.302**	.399**	-.208*	-0.131	.246*	.170*	1	1	.352**	.239**	.277**	.177*
	r	0	0	0.328	0.49	0.004	0.001	0	0	0.181	0.122	0.07	0.075	0.064	0.01	0.003	0	0.028	0.085	0.011	0.045	.		0	0.007	0.005	0.038
	N	85	85	84	84	84	84	84	84	86	86	85	85	82	82	83	83	86	86	87	87	87	87	86	86	86	86
Self-Controlling	Coef.	-.375**	-.259**	-.430**	-.324**	-0.139	-0.153	.289**	0.153	-0.051	-0.054	.207*	0.14	0.037	-0.076	0.155	.233**	-.179*	-0.139	.292**	.185*	.352**	.239**	1	1	.427**	.270**
	r	0	0.005	0	0.001	0.104	0.062	0.004	0.061	0.323	0.289	0.029	0.075	0.372	0.219	0.081	0.009	0.05	0.075	0.003	0.035	0	0.007	.		0	0.004
	N	85	85	84	84	84	84	84	84	85	85	85	85	82	82	83	83	86	86	86	86	86	86	86	86	86	86

**. Correlation is significant at the 0.01level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

Table D-4. Correlation coefficients of skills/tasks and personality traits.

		Manual Dexterity		Physical Strength		Spatial Perception		Leadership		Group Interaction		Supervision of other workers		Communication		Sensitivity to the Emotions of Others		Computer Literacy		Mathematical Calculations	
Correlation Test		Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearso	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall	Pearson	Kendall
Assertiveness	Coef.	-0.079	-0.157	0.177	0.169	0.089	0.057	0.11	0.09	-.272**	-.245**	-0.022	-0.049	-0.074	-0.095	-.273**	-.277**	-.221*	-0.112	0.115	0.13
	r	0.251	0.062	0.063	0.051	0.227	0.293	0.17	0.188	0.008	0.007	0.426	0.315	0.261	0.169	0.008	0.003	0.025	0.132	0.162	0.107
	N	75	75	76	76	73	73	77	77	78	78	77	77	77	77	78	78	79	79	76	76
High Self	Coef.	-0.078	-0.077	-0.009	0.027	0.002	0.032	-0.115	-0.057	-0.03	-0.007	-.212*	-.181*	-0.153	-0.059	-.224*	-.188*	-0.171	-0.142	-0.063	-0.056
Esteem	r	0.251	0.226	0.468	0.397	0.493	0.381	0.155	0.29	0.406	0.473	0.03	0.04	0.089	0.277	0.023	0.03	0.065	0.083	0.292	0.299
	N	77	77	78	78	75	75	79	79	80	80	79	79	79	79	80	80	80	80	77	77
Extroversion	Coef.	0.034	0.068	-0.044	-0.109	0.11	0.098	0.078	0.061	0.165	.217*	0.088	0.128	0.084	0.134	0.025	0.086	-0.185	-0.125	-0.126	-0.106
	r	0.384	0.254	0.352	0.147	0.176	0.178	0.248	0.274	0.073	0.016	0.221	0.107	0.234	0.091	0.413	0.195	0.051	0.11	0.138	0.159
	N	76	76	77	77	74	74	78	78	79	79	78	78	78	78	79	79	79	79	76	76
Anxiety	Coef.	0.031	0.06	-0.155	-0.134	0.097	0.146	0.129	0.114	.238*	.195*	.326**	.326**	0.164	.174*	.316**	.362**	0.041	0.018	-0.097	-0.062
	r	0.395	0.278	0.091	0.099	0.206	0.083	0.13	0.132	0.017	0.026	0.002	0.001	0.076	0.041	0.002	0	0.359	0.431	0.204	0.279
	N	75	75	76	76	74	74	78	78	79	79	78	78	78	78	79	79	79	79	75	75
Creativity/Idea	Coef.	0.018	0.019	0.013	-0.021	.253*	.344**	.212*	0.164	.388**	.311**	.301**	.212*	.267**	0.151	.224*	.196*	.413**	.323**	.356**	.358**
Generation	r	0.439	0.427	0.456	0.419	0.015	0.001	0.031	0.053	0	0.001	0.004	0.019	0.009	0.064	0.024	0.023	0	0.001	0.001	0
	N	75	75	76	76	74	74	78	78	79	79	78	78	78	78	79	79	79	79	75	75
Stress	Coef.	-0.026	0.02	-0.052	-0.042	.228*	.224*	0.032	0.056	-0.04	-0.042	0.093	0.038	0.028	0.04	0.093	.163*	.184*	0.156	.238*	.251**
	r	0.412	0.42	0.325	0.337	0.025	0.015	0.39	0.286	0.364	0.334	0.208	0.354	0.404	0.339	0.206	0.046	0.05	0.057	0.019	0.008
	N	77	77	78	78	75	75	80	80	80	80	79	79	80	80	80	80	81	81	76	76
Trust	Coef.	-0.065	-0.06	-0.08	-0.059	0.123	0.084	0.108	0.03	.272**	.230**	0.185	0.125	.270**	.179*	0.179	.180*	0.083	0.029	0.018	0.106
	r	0.29	0.274	0.245	0.279	0.146	0.208	0.171	0.382	0.007	0.01	0.051	0.106	0.008	0.033	0.056	0.031	0.232	0.383	0.438	0.151
	N	76	76	77	77	75	75	79	79	80	80	79	79	79	79	80	80	80	80	76	76
Aggression	Coef.	0.066	0.049	0.064	0.059	-.294**	-.236*	0.128	0.094	-.195*	-.220*	0.086	0.094	0	-0.071	-0.145	-.243**	0.105	0.051	-0.064	-0.07
	r	0.29	0.314	0.294	0.281	0.006	0.012	0.135	0.175	0.045	0.013	0.231	0.176	0.5	0.235	0.104	0.006	0.181	0.304	0.294	0.253
	N	73	73	74	74	72	72	76	76	77	77	76	76	76	76	77	77	77	77	73	73
Tender-	Coef.	-0.157	-0.108	-.337**	-.324**	-0.084	-0.031	-0.15	-0.147	0.038	0.087	0.053	0.075	.266**	.170*	.497**	.460**	.216*	0.097	0.104	0.106
mindedness	r	0.09	0.145	0.001	0.001	0.239	0.384	0.094	0.072	0.37	0.19	0.321	0.23	0.009	0.042	0	0	0.028	0.167	0.187	0.156
	N	75	75	76	76	74	74	78	78	79	79	78	78	78	78	79	79	79	79	75	75
Impulsiveness	Coef.	.348**	.266**	0.122	0.124	-0.1	-0.063	0.054	0.046	0.062	0.094	0.084	0.035	-0.042	-0.029	0.124	0.089	-.185*	-0.1	-0.164	-0.1
	r	0.001	0.004	0.143	0.109	0.195	0.266	0.317	0.319	0.292	0.167	0.23	0.363	0.356	0.382	0.134	0.176	0.049	0.153	0.077	0.164
	N	77	77	78	78	76	76	80	80	81	81	80	80	80	80	81	81	81	81	77	77
Hard Working	Coef.	0.16	0.088	0.136	0.103	0.056	0.095	.321**	.332**	0.152	.180*	0.136	0.162	-0.018	0.057	-.185*	-0.111	-0.084	-0.113	0.025	0.071
	r	0.081	0.2	0.116	0.166	0.316	0.19	0.002	0.001	0.088	0.041	0.115	0.062	0.436	0.286	0.049	0.136	0.227	0.136	0.414	0.256
	N	78	78	79	79	76	76	81	81	81	81	80	80	81	81	81	81	82	82	77	77
Organization	Coef.	-0.015	0.003	-0.108	-0.082	0.068	0.121	0.135	0.116	.218*	.248**	.229*	.250**	0.155	.197*	.266**	.371**	0.16	0.128	.217*	.244**
	r	0.449	0.488	0.171	0.208	0.278	0.118	0.115	0.12	0.026	0.006	0.021	0.006	0.084	0.02	0.008	0	0.075	0.096	0.029	0.009
	N	78	78	79	79	76	76	81	81	81	81	80	80	81	81	81	81	82	82	77	77
Self-Controlling	Coef.	0.004	-0.018	-0.052	-0.062	-0.004	-0.036	0.07	0.013	0.059	0.002	0.096	0.049	.212*	0.143	0.082	0.094	0.115	0.015	0.188	.177*
	r	0.487	0.427	0.326	0.272	0.486	0.364	0.27	0.447	0.302	0.491	0.199	0.314	0.03	0.072	0.233	0.167	0.153	0.442	0.051	0.044
	N	77	77	78	78	76	76	80	80	81	81	80	80	80	80	81	81	81	81	77	77
Dedication	Coef.	0.01	0.062	-0.025	0.023	0.147	0.067	0.09	0.064	0.155	0.158	0.099	0.062	0.125	0.099	0.09	0.102	0.177	0.115	.222*	.240*
	r	0.465	0.274	0.416	0.414	0.102	0.263	0.213	0.268	0.083	0.06	0.192	0.274	0.135	0.163	0.212	0.153	0.057	0.13	0.026	0.012
	N	77	77	78	78	76	76	80	80	81	81	80	80	80	80	81	81	81	81	77	77

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

APPENDIX E
RESPONSE TABLES

Table E-1. Interaction in peer groups.

The following responses displayed a gender-based interaction difference, but the connotation cannot be determined:

- "I think in larger groups women tend to not speak their opinions as much, generally speaking of course."
- "Peer group interaction depends on the personalities of those involved, male or female. I have observed that women are good communicators and once on task can accomplish a great deal. I have also learned that women communicate differently than men sometimes resulting in a problem or hiccup of their professional growth."
- "One or two women in a group could work like some catalyst if properly behaved."
- "They are very understanding of goals and try to obtain the goals but with minimum disturbance of the group unity."
- "Women who want to work in construction interact very well with the construction team"
- "Tend to group together."
- "Work better, try harder to please coworkers. More assistance provided to fellow female workers. Sometimes social emotional obstacles are present (argue about little things)."

The following responses displayed a neutral or equal observation about interaction in peer groups and differences cannot be determined:

- "These are difficult questions since so many people are different."
- "Close enough to equal"
- "Interact well… same as men."
- "Very well, no different than anyone else."
- "Same as men."
- "Women appear to work together just as well as men. We have not had any gender issues in this regard."
- "The men treat the women as equals and everyone is mutually respectful. At company meetings men listen to women as much as other men. People interact as friends and colleagues."
- "Women get along just fine, are well liked and respected."
- "They work very well."
- "Women do well in peer situations"
- "Great. There is no differentiation between men and women."
- "Well."
- "Just as well as men."
- "It is hard to answer this… various individuals interact differently. I cannot say anything definitive about "women" or "men" on this."

Table E-1. Continued.

The following responses displayed a neutral or equal observation about interaction in peer groups and differences cannot be determined:
• "There is no specific difference in how the women interact." • "Great!" • "They interact admirably and equal if not better than men at work." • "Just as well as men, if not better. Subjectivity and individuality are the biggest determinants not sex." • "Observations are in PE, APM, PM, Estimating employee groups. Work and interact well with peer groups. Leaders in many groups." • "Slightly better than men do."
The following responses displayed that the respondent had no basis for an opinion:
• "Have not been around women in the trade I work in." • "No peer group experience with women."

Table E-2. Differences in productivity.

The following responses displayed that there was no difference between male and female employee's productivity at work:

- "I haven't witnessed any major differences in productivity. Both do their work and both are social. Both ask for assistance in equal amounts."
- "None" (9 such responses)
- "No differences"
- "No difference."
- "I have observed no differences between the genders as a whole."
- "The women tend to be more organized than the men, but both are equally productive."
- "No significant difference."
- "No difference. They perform equally."
- "No observed productivity differences."
- "I haven't noticed any stand out differences in productivity between men and women."
- "None if managed correctly."
- "No discernable difference."
- "There is no difference between male & female employees in productivity. If one is going to work hard it doesn't matter which sex."

The following responses displayed situational connotations in their answers:

- "By design by God most women are not as strong physically as men. If they are operators or something like that they are as productive as men. Most productivity is a personal attitude and both men and women have more or less productivity based on their mental attitude."
- "When it comes to physical labor it's just the plain and simple truth between muscle mass. Or more specifically testosterone and estrogen, the muscle mass I have is impossible for a woman to have unless they inject testosterone into their bodies. Now as far as operating equipment whether it is a grader, loader, back dump or what have you there is no difference but just individual skill of that person."

The following responses displayed that the respondent did not have information in order to make a comparison of productivity:

- "I did not observe a difference as the jobs were different."
- "No opinion."

Table E-3. Women in the trades.

The following comments were found to be more general statements about gender differences rather than attributed to certain trades:

- "Physically and mentally. Weaker in strength (most often) Stronger mentally (60% of time?)"
- "May not be able to do same physical tasks as well as men. Heavy lifting is an example."
- "There are some things that women will not do because of some characteristics."
- "Skills involving public relations, human resources."
- "It depends on the person, not the gender."
- "Based on physical strength only."
- "Maybe for tighter to reach places."
- "Work with more creativity requirements and more communication understanding will be better done by women than men."
- "Women do not have the same physical strength."
- "Different qualities of women suit different jobs. The same applies for men too."
- "I agree that some jobs/trades are more suitable for men but if women are given an opportunity, they will also try to perform well."
- "Women are more suited for work that need patience and carefulness, sensitivity or emotion-affected. Such as host of radio."
- "Some skills are just better comprehended and performed that are related to the gender."
- "If it involves heavy lifting.... a woman's body just isn't made for that... physically, they are not made to do heavy lifting."
- "Depends what it is but yes there are true differences between male and female that are not sexist but just a fact of life. Women are more thought out, have higher pain tolerance, frugal, less apt sudden outbursts of aggression and so on but if you study testosterone and estrogen you can find allot of answers there."
- "Women typically work better in a setting that is conducive to order and structure whereas a man is better under physical strength requirements- this is not always the case as every person is different but, from my experience, this is what I have observed."

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BIOGRAPHICAL SKETCH

Amber Marlene Wangle was born in Columbus, Georgia, to John Michael and Arlene Wangle. After graduating summa cum laude from Niceville Senior High School in 2001, she began her collegiate education at the University of Florida.

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