

# Student Diversity Issues in Construction Management Education

Joseph Raiola, MS and Jacob P. Kovel, Ph.D., P.E.  
Central Connecticut State University  
New Britain, Connecticut

Student diversity, and how to increase it, is a significant problem in some undergraduate construction management programs. This study, the first of a two-part series, reviewed women and minority student enrollment in Central Connecticut State University's Construction Management program and compared the demographics to populations including: the United States Construction Management profession, the University, Connecticut, New England and United States. When compared to the general problem, Central Connecticut State University showed a significant shortfall of women students while minority students were underrepresented to a much lesser degree. However, when compared to the construction industry, the exact opposite was true. These results create an interesting dilemma. It may be possible to increase the percentage of women in Central Connecticut State University's CM program but it appears that to do it will require a fundamental shift in how women perceive the construction industry. On the other hand, increasing the representation of minority populations would be more of a challenge because of regional demographics and the availability of students. Further study may be necessary to determine if student diversity is really a problem that can be addressed at the University level. The second part of the study will be to identify potential methods for increasing enrollment and retention, and then test them.

**Key Words:** Diversity, Student Enrollment, Demographics

## Introduction

The construction industry is one of the nation's largest industries, but not among the most diverse. As the population grows, the construction industry will continue to grow to meet its needs. This growth needs to come from all sectors of the population. Educational institutions should consider reflecting on demographics of the industry and society to best meet the needs of all stakeholders. During the course of this discussion there are several terms that will be used repeatedly. The following are the most common:

- **Construction Manager (CM)**—Management positions, exclusive of administrative assistants; responsible for leading, controlling and planning construction activities.
- **Construction Production Worker** – Construction field worker to first foreman level, all trade's people.
- **Construction Industry** – All members of the construction industry, manager and production workers.
- **Minority** – Individuals with the demographic classification of Black/African American, Black, Non-Hispanic, American Indian/Alaskan, Asian/Pacific Islander, Hispanic/Latino, Hispanic, or two or more races.
- **Underrepresented Population** – The total of both Minority and Women populations.

This research is being conducted in two phases. Phase I research compared construction management student demographics at the University to national construction demographics. Based on findings from Phase I, the specific details of Phase II will be developed. Phase II research will examine perceptions of construction management as a profession from a state wide technical high school system. It is unclear if students, teachers and school counselors understand the opportunities available to students in the Construction Management profession. Construction Management provides potential for gainful employment and a worthwhile career path for all populations. This research will seek to understand perspectives on construction management from multiple constituents in a high school system.

### *Problem Statement*

The problem for this phase of the study was to compare demographics of underrepresented students seeking a degree in Construction Management from Central Connecticut State University to multiple demographics to determine if any program changes need to be made. Going into the study it is believed that women and minorities are underrepresented in the program when compared to industry demographics.

### *Statement of need*

Research in the field of underrepresented populations in CM is limited. This study could serve as the basis for future research in CM program student diversity. Member schools of the American Council of Construction Education or the Associated Schools of Construction may find this useful in beginning to compare respective programs.

### *Assumptions / Limitations*

It is assumed that the demographics of underrepresented students enrolled in Central Connecticut State University's CM program should reflect demographic trends of underrepresented populations. There are some limitations in the approach taken by this study. The key difficulties include:

1. Demographic information is a snapshot in time; a combination of averages and individual years were used for comparison.
2. Statistical analysis was not completed to examine statistical significance of findings.
3. Minority groups were not broken out into individual demographics (i.e. Asian, Hispanic, Black etc.).

### *Research method*

The researchers collected demographic data from Central Connecticut State University, the U.S. Census Bureau, the U.S. Bureau of Labor Statistics and Connecticut Technical High Schools. Once this information was compiled, a comparative analysis based on descriptive statistics was performed.

### *Background Information*

#### *Demographics of the Construction Industry*

The United States construction industry is dominated by white males. It is one of the few national industries that women and minority groups have failed to make significant inroads. In 2010, the Department of Labor reported that nationally the construction industry, as a whole, was only 8.9% female and 31.5% minorities. During the same time, women held 6.8% of those positions defined as construction management and minorities held 14% (U.S. Bureau of Labor Statistics, 2010). In the Catalyst report of 2011 similar evidence was presented; 8.9% of all construction industry workers were female and 9.3% of Financial Post 500 Construction Companies had female senior officers (Catalyst, 2011).

Positions in the construction management field continue to be among the most sought after and higher paying careers in the construction industry. By 2018, the construction management profession is projected to grow 26.1% and construction industry growth is projected at 18.5%. Construction manager is one of the highest paid positions in the industry, with a national median pay in 2008 of \$38.39 / hour (U.S. Bureau of Labor Statistics - Office of Occupational Statistics and Employment Projections, 2010). Construction managers held 551,000 jobs in 2008. About 61 percent were self-employed, many as owners of general or specialty trade construction firms (Bureau of Labor Statistics, U.S. Department of Labor, 2011). The number of construction production workers, as a percentage of all construction employees, has decreased from 86% in 1967 to 74% in 2002 (CPWR, 2008). It is unclear if this trend is projected to continue.

This research is particularly useful in the Science, Technology, Engineering and Math (STEM) field. While Construction Management is not a field specifically falling under the umbrella of STEM, many of the sub-components are STEM oriented. As such CM suffers from many of the demographic challenges that the STEM field

suffers from. A lack of underrepresented populations in STEM fields has been identified as a major concern by the National Science Foundation. Although not discussed in this research, K-12 education has been identified as a primary means to increase underrepresented populations in STEM (Hill, Corbett, & Rose, 2010).

### *Women in Construction*

Women hold multiple roles in the construction industry. The CPRW reports women made up 10% of the construction industry as a whole, in the following classifications and percentages: 21% manager/professional, 27% production and 52% clerical/support (CPWR , 2008). In 2008, women comprised 8.2% of the construction management workforce of 1.24 million people (U.S. Bureau of Labor Statistics , 2008).

The percentage of women employed in production occupations is low when compared to other industry sectors. Construction production is comprised of 2.6% women, whereas the percentages in other sectors are Manufacturing 26%, Services 18.6%, Wholesale/Retail 15.5% and Transportation 8.5% (CPWR , 2008). And unlike many other industries, the percentage of women in the construction industry has remained virtually unchanged. Since 1964 the percentage of jobs occupied by women in education, trade, transportation, utilities, local government, professional and business service, leisure and hospitality, and financial activities has grown. In mining and logging, construction, information, federal government, state government and manufacturing percentage growth has stayed close to constant (U.S. Bureau of Labor Statistics - Division of Information and Marketing Services, 2011). From 1985 to 2005 the number of women in the construction industry grew by 73.5%. Although this is substantial growth, men have experienced a similar growth rate, mitigating the overall percentage change of women (CPWR , 2008). In 2007, the construction industry employed the lowest percentage of women (9.4%) among all industries surveyed and less than 20% of the national average (U.S. Bureau of Labor Statistics, TED: The Editors Desk, 2009).

Although women are outnumbered by men in the construction industry, pay rates are generally similar. The ratio of women's to men's earnings was 92% in 2009, the highest ratio in the United States (U.S. Bureau of Labor Statistics TED: The Editors Desk, 2011). This should make the field more attractive to women seeking employment.

### *Minorities in Construction*

The United States construction industry is 31.5 % minority (Black or African American 5.4%, Asian 1.7%, Hispanic or Latino 24.4%). Minority construction managers are reported to be 14% of the CM population (U.S. Bureau of Labor Statistics, 2010). Most minority construction workers are production workers. The CPWR reports "79% of the construction workers are employed in production positions, but 87% of racial minorities are production employees." Ten percent of all construction managers are racial minority and only 16% of minorities are self-employed compared to 25% of all construction workers (CPWR , 2008).

The Hispanic or Latino population in the United States construction industry is noteworthy. From 1990 to 2005, this population has jumped 156%, bringing the reported percentage of Hispanics or Latinos to over 27% of the construction production workforce (CPWR , 2008).

## **Data Collection and Analysis**

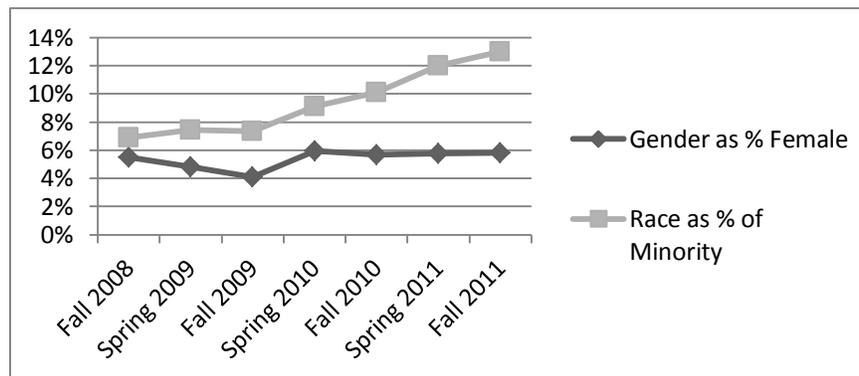
The emphasis of this study was Construction Management students enrolled in Central Connecticut State University's CM program from Fall 2008 – Fall 2011. The diversity of these students was compared to various other demographic benchmarks for women and minority populations. The data was entered into a spreadsheet and descriptive statistical analysis was used for comparison.

Data was collected from a variety of sources/categories and in a variety of intervals. Information provided by the Central Connecticut State University Office of Institutional Research and Advancement was used in the data collection categories of Central Connecticut State University Construction Management program, Central Connecticut State University Department of Manufacturing & Construction Management, and Central Connecticut State University undergraduate population. Data for the Northeast and Connecticut was taken from the US Census 2010 and represents Associated Schools of Construction (ASC) Region 1 States. ASC Region 1 States are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania,

Rhode Island, Vermont, and West Virginia. The Connecticut Technical High Schools data was student reported from the school year 2009 - 2010 and represents students enrolled in Manufacturing and Construction Related Trades. These trades are Architectural Technologies, Automated Manufacturing, Carpentry, Computer Aided Drafting & Design, Electrical, Heating, Ventilation & Air Conditioning, Manufacturing Technology, Masonry, Plumbing & Heating, Pre-Electrical Engineering & Electronics and Welding & Metal Fabrication. For national data, women and minority statistics in construction and construction management were extracted from U.S. Bureau of Labor statistical data.

The Technical High School students were chosen as a comparison point in this study because their enrollment shows interest in construction. Students enrolled the technical high school must apply and gain admittance into the school. Once admitted into the school they must also gain acceptance into their specific trade. This population was chosen as a comparison demographic because of the student's demonstrated predisposition towards the construction related profession. With many of the construction managers coming up from the trades this population is an excellent comparison point and has the potential to influence demographics in the future.

The enrollment of the CM program at Central Connecticut State University during the 7 semesters of study ranged from 218 – 252 students, with a mean of 236 enrolled. Women's enrollment ranged from 10 – 15 with an average of 12.7 enrolled. Minority enrollment ranged from 15 – 29 with an average of 22.3. The percentage of women in CM at Central Connecticut State University has stayed constant over the past 7 semesters, at approximately 6%. Enrollment percentages of minority students during the same period increased from 7% to 13%.



*Figure 1: 7 semester enrollment comparison Central Connecticut State University CM program*

Overall, the enrollment numbers were generally aligned with the percentage of U.S. women in Construction Management. The 7 semester average is slightly lower when compared to the overall U.S. percentage. When locally compared to the Central Connecticut State University Department of Manufacturing & Construction Management, CM is also slightly lower. As the percentage of women undergraduate students enrolled at Central Connecticut State University is markedly higher, the percentage of women in the CM program is disconcerting. This may demonstrate the campus culture with regard to women's interest in studying technology programs at Central Connecticut State University.

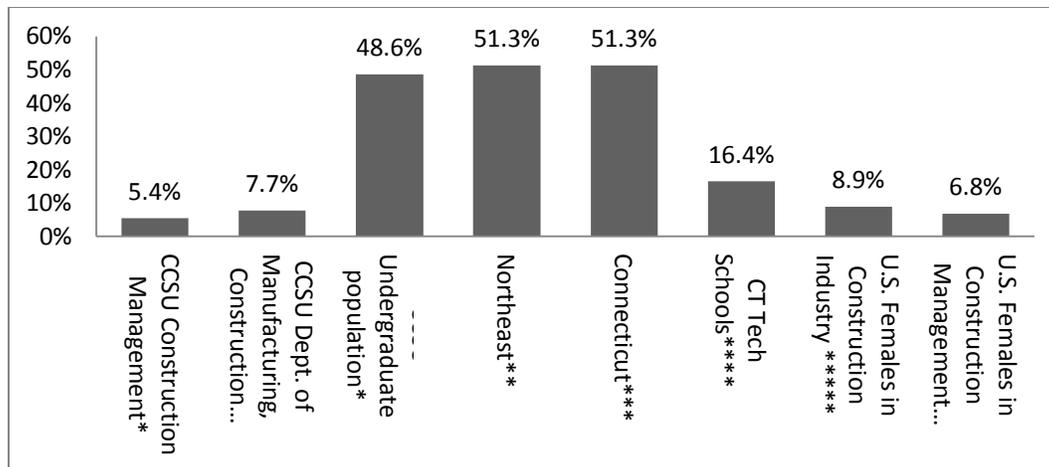


Figure 2: Gender Percentages

\*Mean reported from fall 2008 - fall 2011

\*\* Northeast data was taken from US Census 2010 data and represents ASC region 1 States

\*\*\* Connecticut data was taken from US Census 2010 data

\*\*\*\*CT Tech School data is only from 2009 - 2010 and represents students enrolled in Manufacturing and Construction Related Trades

\*\*\*\*\* 2010 Department of Labor Statistics Data

It is also interesting to note that the percentage of women enrolled in high school technology programs is more than double the number enrolled in undergraduate technology programs at the University. Exploring what is happening to these students is the focus of the second phase of the study. In the next phase of the study technical high school perspective will be explored further. It seems to be a natural feeder program from the technical high school construction trades into construction management yet the demographics differ.

Another problem in recruiting women to the CM program could be the field itself. Studies suggest that the field of construction management requires different personal characteristics for women. It was found that women had to be more autocratic than men to succeed in the construction industry. In a male dominated profession such as construction management women need to be “self-confident, charismatic and more autocratic than usual (Arditi & Balci, 2009).” This may pose a problem for women who assume traditional gender roles of females.

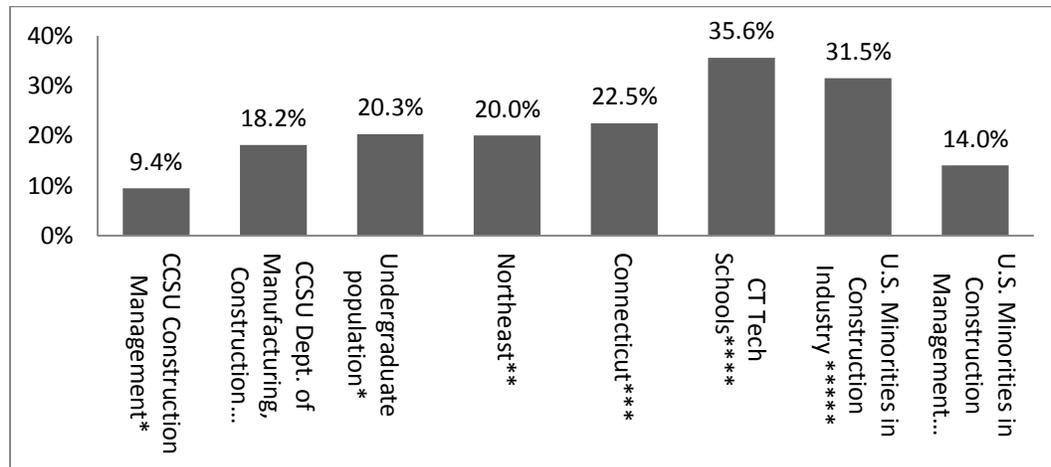
Construction management may also require different qualifications for women but Arditi and Balci (2009) found that typically women’s managerial abilities exceeded men’s in three areas; sensitivity, customer focus, and authority and presence. With the changing face of construction these skill may be more important than ever before. The increasing focus on lean construction relates directly to quality and the customer (Ballard, 2000). Delivering a project that meets and exceeds customer satisfaction is becoming increasingly more important, skills at which women excel.

In “How to Recruit Women and Girls into the STEM Classroom,” Milgram states that by not including women in a field that field will suffer from the lack of a woman’s perspective. Women make up roughly half of the population and to not include them may result in lack of consideration. Women also miss out in some very rewarding careers by not being included. STEM is also cited as the workforce of the future; the STEM jobs have higher salaries and job growth will increase faster than non-STEM jobs (Milgram, 2011). This becomes an issue when so few women are attracted to construction management that they cannot influence other women to the field. This trend is evident at the university level, where the number of women faculty is small and the number of women students remains small. To some extent this is self-perpetuating because, unless more women enter the field, there will continue to be a shortage at the upper end.

Recruitment of women may be difficult because of the reasons mentioned but demographics would support it. Approximately half of Connecticut, the Northeast and Central Connecticut State University undergraduate students are women (U.S. Department of Commerce Economics and Statistics Administration: U.S. Census Bureau, 2011). This means that there is a large pool of qualified candidates to draw from. Construction pays the highest percentage of a male’s salary in industry, a big plus. Research has demonstrated that women have the same managerial skills as

men and exceed the males in multiple areas. With so few women in construction management, a challenge is educating the female population and breaking old gender stereotypes. More challenges exist and greater research in this area is needed. The Central Connecticut State University CM program may benefit from pathway partnerships with the Connecticut Technical Schools to increase female recruitment but these pathways are currently under used.

Central Connecticut State University's CM minority population is also slightly low when compared to other demographics. The 7 semester average is low compared to the other indicators. While the 7-semester average for minority students is only 9.4%, the trend has been upward and the current percentage of minorities enrolled in Construction Management is 13%, closely aligning it to the U.S. average. The numbers are even approaching regional demographics for the overall student and regional numbers.



*Figure 3: Minority Percentage*

\*Mean reported from fall 2008 - fall 2011

\*\* Northeast data was taken from US Census 2010 data and represents ASC region 1 States

\*\*\* Connecticut data was taken from US Census 2010 data

\*\*\*\*CT Tech School data is only from 2009 - 2010 and represents students enrolled in Manufacturing and Construction Related Trades

\*\*\*\*\* 2010 Department of Labor Statistics Data

Unlike women though, the percentage of minority students available to recruit from is much smaller. Recruitment efforts may be difficult because of the limited number of available minority students. The Northeast, Connecticut and Central Connecticut State University undergraduate minority populations are approximately 20%. About one half of this population is female, leaving only 10% of total population in the category of minority male. Even adjusting these figures for minority women in construction, the Central Connecticut State University CM program numbers are very close to the regional demographics. Unless there is a broader population base to tap, growth in this area will be extremely difficult. Attention should be called to the technical school minority population enrolled in construction related trades, at 35.6%. This is the largest minority population interested in the construction related trades we directly accessible. Further exploration into the disparity in percentages from high school to university is a worthy study.

Many minorities work in construction production so the transition may be easier for members of production to move into management. One possibility is placing a focus on industry relations to encourage minorities to pursue management positions. Partnerships with construction firms to educate the minority population employed in industry may provide results. This model has worked in training for secondary school administrators and MBA programs. The Central Connecticut State University CM program may benefit from pathway partnerships with the Connecticut Technical Schools to increase minority recruitment. With over 35% of the minority student population interested in a construction related trade, a focus on this group as a feeder system may result in minority percentage growth. Further research would be needed to implement both models.

## Conclusions

The initial hypothesis that women and minority students are underrepresented in the CM program at Central Connecticut State University was only partially correct. When compared to industry demographics, the percentage of women in the Central Connecticut State University CM program is similar, although it is decidedly lower than the general female population. For minority students the reverse is true. When compared to industry the percentage at Central Connecticut State University is lower while when compared to the general population the numbers are similar. This leads to several interesting questions, the key one being whether or not there is a need to change the program demographics.

Does this mean there is a problem? On the one hand, the program seems to be attracting a number of women that is representative of the industry. If the industry demographic is not changing, should the program be concerned? On the other hand, there seems to be a shortfall in the recruitment of minority students to the program. However, numbers indicate that there is no room to grow based on regional demographics. This is a dilemma that needs to be addressed.

At this point, it is too early to say if a diversity problem actually exists at the University level or if the issues originate at another level. In order to determine what comes next additional research is required. Areas for future research include:

1. Analysis of what brought women and minority students to the Central Connecticut State University CM program, to see if there is a concept to exploit.
2. Recruitment and retention methods for women and minority students in CM to identify new methods in attaining and keeping those students.
3. Review the Associated School of Construction Region 1 school demographics to see how other schools are dealing with the same issues.
4. Review the Connecticut construction industry demographics to determine if there is any significant difference between them and the national demographics.
5. Analysis of perspectives on construction management from technical high school students, guidance counselors, and teachers

With the demographic challenges that exist for underrepresented populations, it is necessary to examine what can be done to recruit and, especially, retain underrepresented individuals. One conclusion is that we can support an underrepresented individual's choice to stay in the construction profession by providing proper role models for underrepresented populations in this field and by providing innovative recruitment and retention programs (Yates, 2001). Providing training, flexible hours, equal pay and school visits were also identified as recruitment and retention tools (Greed, 2000). Women need role models in STEM fields (Milgram, 2011). Our practices should embrace these ideas and provide proper support to our underrepresented populations based on this.

In order to increase underrepresented enrollment in CM, remarketing of its options for graduates should be explored. Motivation is paramount to student success in any endeavor and, traditionally, men like "thing-oriented" careers while women prefer "people-oriented" careers. STEM careers are perceived to "impede on communal goals (i.e. orientation to care about other people) so women are not interested in them (Cherney & Campbell, 2011). It may benefit the CM community to adjust its marketing plan to demonstrate the people benefits of CM, including interpersonal relationships and how structures developed improve communal goals.

K-12 education includes important influences for STEM and CM students. Students should be advised properly during middle school and high school as to proper placement in a STEM program of study. An emphasis should also be placed on students when they first arrive at a higher education institution to assure the student is properly placing themselves for success. Student advising is an imperative step early in the process (Whalen & Shelley II, 2010). We should examine our advising practice in K-12 and early college years to ensure underrepresented individuals are aware of CM careers. During informal discussions with many high school students, guidance counselors, and parents many were unaware of the careers options in provided by a CM.

Underrepresented populations in CM need to be addressed differently than a majority population until they gain a "critical mass". Women and girls need to hear they can succeed in a CM career. Too many educators do not encourage women and girls into this career field (Jones, 2010). Once an underrepresented population gains a critical mass the culture of that organization will change. The critical mass does not have to be just underrepresented

individuals. On the contrary; we need people with ideas, data, and resources that are socially aware. It seems that underrepresented populations have not reached that critical mass (Greed, 2000) and much work is still left to change the traditional system. It is intended that this research continue, build and help in this work.

The next phase of this research will look at the diversity populations in the Connecticut Technical High Schools and try to identify why the numbers of the women and minority populations fall so noticeably in the transition to college. Keeping these students could dramatically affect the Central Connecticut State University CM program.

## References

- Arditi, D., & Balci, G. (2009). Managerial Competencies of Female and Male Construction Managers. *Journal of Construction Engineering and Management*, 1275-1278.
- Ballard, G. (2000). Lean Project Delivery System. *Lean Construction Institute*, 1-7.
- Bureau of Labor Statistics, U.S. Department of Labor. (2011). *Occupational Outlook Handbook, 2010,11 Edition*. Washington: U.S. Bureau of Labor Statistics .
- Catalyst. (2011). *Women in Male-Dominated Industries and Occupations*. New York: Catalyst.
- CPWR . (2008). *The Construction Chart Book*. Silver Springs, MD: CPWR – The Center for Construction Research and Training.
- Greed, C. (2000). Women in the Construction Professions: Achieving Critical Mass. *Women in the Construction Professions*, 181-196.
- Hill, C., Corbett, C., & Rose, A. S. (2010). *Why So Few? Women in Science, Technology, Engineering and Mathematics*. Washington, DC: American Association of University Women (AAUW).
- Milgram, D. (2011, November). How to Recruit Women and Girls to the Science, Technology, Engineering and Math (STEM) Classroom. *Technology and Engineering Teacher*, 4-8.
- U.S. Bureau of Labor Statistics. (2008). *Quick Facts on Nontraditional Occupations for Women*. Washington: U.S. Bureau of Labor Statistics.
- U.S. Bureau of Labor Statistics - Division of Information and Marketing Services. (2011, March). *Spotlight on Statistics - Women at Work*. Retrieved February 11, 2012, from U.S. Bureau of Labor Statistics: [http://data.bls.gov/cgi-bin/print.pl/spotlight/2011 women/home.htm](http://data.bls.gov/cgi-bin/print.pl/spotlight/2011%20women/home.htm)
- U.S. Bureau of Labor Statistics - Office of Occupational Statistics and Employment Projections. (2010, December 3). *Career Guide to Industries, 2010-11 Edition*. Retrieved February 8, 2012, from U.S. Bureau of Labor Statistics: <http://data.bls.gov/cgi-bin/print.pl/oco/gg/cgs003.htm>
- U.S. Bureau of Labor Statistics. (2010). *Annual Table: Employed persons by detailed occupation, sex, race, and Hispanic or Lation ethnicity*. Washington: U.S. Bureau of Labor Statistics.
- U.S. Bureau of Labor Statistics TED:The Editors Desk. (2011). *Women's Earnings and Employment by Industry, 2009*. Washington: U.S. Bureau of Labor Statistics.
- U.S. Bureau of Labor Statistics, TED: The Editors Desk. (2009). *Women and employment by industry*. Washington: U.S. Bureau of Labor Statistics.
- U.S. Department of Commerce Economics and Statistics Administration: U.S. Census Bureau. (2011). *Age and Sex Composition: 2010*. Washington : U.S. Department of Commerce Economics and Statistics Administration.
- Yates, J. K. (2001). Retention of Nontraditional Engineering and Construction Professional. *Journal of Management in Engineering* , 41-48.