

# **Critical Literature Review on the Diversity and Inclusion of Women and Ethnic Minorities in Construction and Civil Engineering Industry and Education**

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## **ABSTRACT**

Research about diversity in Construction and Civil Engineering (CCE) has been conducted from both the academic and industrial points of view. Researchers have suggested several strategies to further attract women and ethnic minorities (WEMs) to CCE at both academic and industry levels, mainly due to the skilled labor shortage, as well as to preserve the future success of the U.S. economy. Accordingly, this literature review aims to present the current levels of diversity and inclusion of minorities in CCE at academic and industry levels, while it identifies effective strategies for increasing diversity, recognizes knowledge gaps, and suggests recommendations for future research. The review is conducted by searching relevant papers from leading construction management and engineering education peer-reviewed publications. The findings indicate that although the low participation of minorities in CCE industries and education has been studied a few times from a gender point of view, it has not received adequate attention from the ethnicity perspective, especially at the academic level. This paper contributes to the body of knowledge by bringing together information related to the underrepresentation of WEMs in CCE academia and workforce environments and identifying the potential reasons for this low participation.

## **INTRODUCTION**

The construction industry is an essential part of the U.S. economy that is rapidly growing. It is estimated that by 2030, construction volume will increase by 85% globally (Oxford Economics, 2015), and more specifically, there will be 11% growth in the number of construction jobs in the United States from 2016 to 2026 (BLS, 2019). Taking into account the current job market in the construction industry and its expected growth, the demand for a construction workforce will also increase, which is a crucial concern of the U.S. construction industry. The labor shortage in the U.S. construction industry has been highlighted for the last three decades, and despite the attention of scholars and industry leaders, there is still a concern that this issue is becoming worse (Goodrum, 2004). Owners and contractors in the Construction Industry Institute concluded that existing source of hiring in this industry will not be sufficient in the near future and there will be a need to utilize the virgin source of candidates that is

women and people of color to meet the construction industry workforce demand (Construction Industry Institute, 2015). Nevertheless, in 2015 women comprised only 9% of the total construction workforce (BLS, 2017) and in 2018 their share increased very slightly to 9.9% of total employment in construction (BLS, 2018). These statistics clearly indicate that women have been substantially underrepresented in construction workforce relative to their share of total employment (equal to 46.8% in 2015 and 46.9% in 2018). However, in 2018, Hispanics comprised 30.7% of the total construction workforce almost the double of their share of total employment (equal to 17.3%). However, African Americans comprised 6.2% of the construction workforce nearly half of their share of total employment equal to 12.3% (BLS, 2018). One strategy to meet this demand is to utilize all available labor resources, including women and ethnic minorities (WEMs), who are currently underrepresented in the construction workforce. Diversifying the construction workforce will not only help the industry to meet its demand, but is also an effective strategy to ensure the economic growth of the nation. However, diversifying the engineering workforce requires systematic improvements across all levels of education, which means high school to college, college to graduate school, and schools to the workforce, because women and racial minorities are the main proportion of this *leaky pipeline* of transition (Clewell, Anderson, & Thorpe, 1992).

While some previous studies highlighted the barriers WEMs face in the construction industry, other studies were conducted on recruitment and retention of students, including WEMs, in construction and civil engineering programs. Nevertheless, there is still a low interest among these students in construction-related programs and occupations. Therefore, the main goal of this paper is to present a comprehensive review of the literature on diversity in the both the civil engineering and construction workforce, as well as in education, to determine potential reasons for the ongoing underrepresentation of WEMs in these areas

## **RESEARCH METHODOLOGY**

In order to reach the objective of the study, a holistic literature review was conducted. The *Journal of Professional Issues in Engineering Education and Practice*, *International Journal of Construction Education and Research*, *Journal of Construction Engineering and Management*, and *Construction Research Congress (CRC) conference proceedings* were the main concentrations for collecting information. The main reason for this selection was that the mentioned journals have more studies on WEMs in CCE comparing to other journals and will let cover most of the studies in the limited number of pages for this paper. Therefore, literature for the purpose of the study was grouped in three categories: (1) WEM high school students in CCE programs; (2) WEM college undergrad/grad students in CCE programs; (3) WEMs in the CCE workforce.

## **RESULTS - LITERATURE REVIEW**

### **CCE High School Students**

Schools are the primary source of social institutions shaping gender-appropriate behaviors, interests, and feeling of inclusion, regardless of a student's race and/or gender. Moreover, diversity and inclusion is essential in engineering education because

the lack of gender diversity in engineering reduces creativity and will negatively affect all students (Smith, Parr, Woods, Bauer, & Abraham, 2010). However, studies have indicated that the perception of the construction industry among students is not at all satisfying. Moore and Gloeckner (2007) interviewed a group of 24 female construction management (CM) high school students, and they found that the high school educational climate was the most negatively influential factor, with only one out of these 24 students enrolling in a CM program immediately after high school.

Other major factors discouraging students from opting for CCE programs and occupations have been studied in numerous research studies. Both male and female high school students have reported salary, promotion opportunities, working conditions and long-term learning as the most important factors impacting their career decisions for the construction industry (Chileshe & Haupt, 2010). More specifically, female students' perceptions of the construction industry (i.e., dirty, physically demanding, manly, and sexist), and lack of understanding about the construction industry and job opportunities, as well as culture and stereotypes are the most frequent reasons given that prevent female students from enrolling in construction management programs. Moreover, school-age girls indicated their reservations about construction careers that dealt with the social working conditions in the male-dominated environment and the physically demanding nature of construction jobs (Chileshe & Haupt, 2010).

Family roles in influencing female and male students to pursue a career or academic major has also been investigated through some studies. Based on the results of one study on high school junior and senior students in Houston, it was found that only 29% of the students' families responded "yes" to agree with their children pursuing a career in the construction industry (Bilbo et al., 2009). However, students with a close family member in the construction industry are more willing to pursue similar goals (Shields & Kisi, 2011). The high school students chose the construction career independent of their belief that employment is easily obtained in the construction sector (Kisi et al. 2011). In addition, "family disapproval" was one of the main factors discouraging Hispanic 11<sup>th</sup> grade high school students from pursuing a construction career. In addition, low wages and dangerous and dirty working conditions were other barriers discouraging Hispanic students (Escamilla et al., 2016).

Factors positively influencing high school students towards a CM program are not very different between female and male students. However, some factors are more powerful in attracting female students including internships, field trips to job sites, having a father in the industry, community services, and a father taking daughter to work, which might be a "silver bullet" in attracting females to the construction industry. On the contrary to the aforementioned influential factors, advertising, high school counselors, mentoring programs, female role models, having a mother in the industry, and a mother taking a student to work are less effective in influencing students of both genders (Lopez et al., 2011). Therefore, the role of the family in influencing children, especially females and racial minorities is undeniable.

Besides the negative perception of high school students toward the construction industry, many studies have criticized the ineffectiveness of high school counselors and teachers. High school counselors have the lowest influence on the career choice of students in construction programs, and teachers deem the construction industry as a career more compatible for people with low education levels, which further

discourages students from pursuing a college degree or career in this industry (Koch, 2007). Although high school counselors and teachers are ineffective on the career choices of students in construction, female students are more influenced by them, yet insignificant (Chileshe & Haupt, 2010). Francis and Prosser (2012) investigated the role of high school counselors in attracting students to construction professions and found out that most counselors did not have knowledge of the construction industry, and more importantly they exhibited a gender bias by directing more male students to construction occupations than female students. Surprisingly, students who transferred into a CM program indicated that they did not previously know there was a CM program, which further proves the poor performance of high school counselors (Oo et al., 2018). In addition, lack of knowledge among high school teachers and counselors related to construction careers was also a contributing factor preventing Hispanic students from getting accurate information about the construction industry and related opportunities (Escamilla et al., 2016).

### **CCE College Grad/Undergrad Students**

Exposure to CCE is the essential component to recruit and retain students into CCE programs. Universities can lead this exposure by providing on-campus activities and events like an engineering or construction career day, a high school science fair on campus, and/or open-house activities on campus. Exposing female students to CM programs early, providing sufficient career counseling, encouraging female students to take more science courses, and providing a gender-inclusive learning environment can all help to attract and retain female students in construction practices (Adogbo et al., 2015). The College of Engineering at Purdue and the University of Texas at Austin have strong programs to attract women engineering students, which allow high school students to explore educational and career opportunities. High school students benefit from meeting with industry professionals to discuss their options (Menches & Abraham, 2007). Interestingly, Ohland et al. (2015) have found that the retention of students in civil engineering (CE) varies by race and not by gender. Although Asian and Hispanic male students choose CE less frequently than other races, they exhibit higher graduation rates. Conversely, Black students of both genders are underrepresented in both choosing CE and finishing the degree. In addition, Asian, Hispanic and White CE students who leave a CE major will get replaced by students transferring to a CE program, but this is not true among Black students. Nevertheless, the high retention rate of CE programs does not mean the success of any sub-population of students. In addition, career outcome expectations are significantly different between female and male civil engineering students (Shealy et al., 2016). Female students are more concerned with addressing societal issues, and are more likely to consider helping people as a career outcome incentive (Bielefeldt, 2014). Therefore, promoting and making a clear connection between civil engineering and how it can address societal issues such as water supply, environmental degradation, poverty, and disease could empower the interest of female students to consider civil engineering as a future career (Shealy et al., 2016). This strategy was utilized in the Department of Civil and Environmental Engineering at Rowan University. Revisions in the curriculum of the program by assigning case studies and movies related to social issues and learning about ancient societies and how they used engineering effectively, have improved diversity and inclusion in the department (Hartman et al., 2019).

However, those students who are already in CCE majors have reported the positive factors influencing them. The most influential factors for choosing a major in CCE among freshman students were the people around the students, university-related attributes (such as financial opportunities and reputation), and image of the construction industry in the country of the students' residence. In contrast, student attitude, personal interest in the major, and high school performance were the least influential factors (Durdyev & Ihtiyar, 2019). Although fewer female students enroll in undergraduate construction management programs, they exhibit a statistically higher motivation level than male students. In addition, these female students are highly confident in their educational abilities and are determined to finish their programs successfully (Escamilla et al., 2016). There are many ways to increase the numbers of students, especially WEMs, that choose CCE majors. Conducting summer camp programs to attract potential high school students to construction management programs and careers, similar to the efforts of several university programs like Auburn University and the University of Florida, can be implemented (Elliott et al., 2016). Another strategy to increase the enrollment and retention of female students in civil engineering and construction programs is recruiting more female faculty members. The idea behind this strategy is that women faculty members can be role models for female students and positively affect their perceptions (Asadi, Akhavian, & Behzadan, 2016).

As discussed, most of the efforts to recruit female and other students to construction programs have happened at the college level. However, the sooner actions are taken to attract students, the more satisfying the results will be. Interestingly, women who became interested in construction during childhood, high school, and college were more satisfied with the construction industry, compared to women initiating interest post-college (Morello et al., 2018). The Architecture, Construction, Engineering (ACE) mentor program is one of the main and most efficient non-profit organizations helping and guiding high school students to pursue careers in construction, offering internship opportunities and encouraging higher education. In 2018, the ACE mentor program hosted 9,663 students in 36 states, including 61% minority and underserved students and 34% females. The ACE mentor program pays specific attention to reflect diversity by recruiting women and minority mentors as role models. The results of this program are very satisfying, indicating that almost 75% of ACE seniors entered college in construction-related majors or skilled craft programs. This program has also been very rewarding in increasing diversity. The annual report of the ACE mentor program shows that the percentages of Hispanic and African-American students entering college in architecture and civil engineering are more than double the national rates in the comparable fields (ACE Mentor Program, 2018).

### **CCE Workforce**

The underrepresentation of WEMs in construction professions may be due to the industry's history of being conflict dominated and full of discrimination against women. The underrepresentation of women in construction professions is evident by their share (equal to 2.6%), which unfortunately, has not changed from 1983 to 2010 (Bigelow et al., 2015). Similarly, the share of women in the building trades has remained around 3% (Moir et al., 2011). Besides the low share of women, there are some major carrier barriers they face in these professions, further discouraging them, including: sexual abuse; fewer promotion opportunities; inequality in task assignments,

in a way that women are excluded from site-work and mainly assigned office-work; discrimination in recruiting and hiring; socialization problems with co-workers; and double standards for performance evaluations (Infante-Perea et al., 2016; Azhar & Griffin, 2014; Abdullah et al., 2013). Studies on the challenges women encounter in construction occupations are ample and they mostly indicate the same barriers women have gone through over time. Further, the male-dominated culture and gender clichés in the construction industry have not changed desirably. In academia, female faculty members are less satisfied, compared to their male colleagues, with how they fit in their departments. Female faculty reported fewer opportunities, a sense of exclusion from informal social gatherings, and less support from their institutions while on a tenure track (Jones, 2010).

In contrast to the number of studies on women in the construction industry, very few studies have concentrated on the issues of ethnic minorities. However, considering that Hispanics constitute the major portion of the U.S. construction workforce, some studies were conducted on their issues. The annual share of Hispanic workers has increased continuously, and they represent the majority of the construction workforce in some states, including New Mexico, Arizona, and Nevada (54.2%, 43.2%, and 39.7%, respectively) (United States Census Bureau, 2011). It is estimated that Hispanics will soon comprise the majority of the construction workforce in other states as well in order to meet the demands of the industry. Nevertheless, they continue to have problems in the industry. Cultural and language barriers are two of the main issues leading to a higher rate of injury among Hispanic workers (Al-Bayati & Abudayyeh 2016). Safety training for these types of workers should be provided in their own language to be more effective (Menzel and Shrestha, 2012). Most of the Hispanic construction workers preferred not to speak out about safety issues in the construction site in the fear that they can lose the job (Shrestha and Menzel, 2014). In addition, since Hispanic workers have relatively lower educational levels, they mainly work in lower-paying jobs, including construction laborers, carpenters, and painters. Nevertheless, even when controlling for occupation (carpenter and painter), years of work experience, educational level, and geographic location, Hispanics still earn lower wages, compared to their white non-Hispanic counterparts, which is proof of racial discrimination (Goodrum, 2004). Additionally, African Americans in the construction industry constitute a lower share than their Hispanic counterparts, and they generally are the least in number in the construction workforce (Choi et al., 2018). Nevertheless, the barriers African American workers have in the industry have not yet been studied.

## **CONCLUSION AND RECOMMENDATIONS**

This paper provided a holistic literature review on the diversity and inclusion of Women and Ethnic Minorities and provided useful insight into the ongoing underrepresentation of minority groups in CCE education and workforce. Although previous scholars have studied the underrepresentation of female students, both at high school and college levels, and gave some useful strategies to attract female students to CCE programs, there is still much room for improvement. On the contrary, very few studies addressed the barriers that racial minority groups face in the workforce or academia. It should be noted that although scholars gave ample attention to increasing the share of women in CCE programs and the workforce, racial minorities, such as Hispanics and African Americans, have not received enough attention.

Although personal interest is a major factor shaping students' future career interests and educational goals, family as well as high school teachers and counselors play major roles in keeping students already in CCE programs encouraged. To improve the enrollment of WEMs, to construction programs, universities have to take the leading role by educating high school counselors about opportunities for women, inviting students and counselors to construction sites, and partnering with institutions like Society of Women Engineers (SWE). Informing high school counselors about the strengths of civil engineering by providing information about the possible job opportunities and current salary levels can also help counselors to better understand and explain civil engineering to prospective students. However, to meet the demand of the industry with qualified and highly-skilled labors and employers, these strategies need to be implemented more frequently and nationwide. Only when most high schools have plans to educate their academic and career counselors with updated information about construction occupation opportunities, can practitioners expect a change in the attitudes and perceptions of high school students, specifically WEMs. Providing some information, perhaps in the form of handouts, about opportunities in CCE programs and jobs to the families of WEMs could be useful to help them guide their children regarding career and an academic major decision. At the college level, whether associate, bachelor, or graduate degree, universities need to take the role in informing students by inviting industry experts to campus, providing more job fairs, and including courses that are more relevant to societal issues, which can further improve the retention of WEMs and/or attract them to CCE careers in the future.

Unfortunately, WEMs who already gained some education and are working in the industry are facing significant barriers, including the gender and racial wage gaps, fewer promotion opportunities, sexual abuse, gender stereotypes, etc. All of these barriers can discourage WEMs, to the point that they might decide to leave the industry, further exacerbating the labor shortage. Although the Equal Employment Opportunity was established in 1964 to protect U.S. employees from discrimination based on race, color, religion, sex, or national origin in terms of firing, hiring, promotion and wages (*US EEOC Home Page.*), such discrimination against WEMs still exists in the CCE industry. Discrimination against women is not only occurring in industry, but also happening in academia, where women are having problems as female faculty members. This issue can prevent increasing female faculty members as successful female role models for female students.

Ample studies have investigated the retention and recruitment of women in CCE programs, very few studies have studied the conditions of racial minorities like Hispanics and African Americans at high school and college levels to determine their main barriers, and the ways to attract them to CCE majors. As discussed earlier, there is a need to implement a nation-wide program to educate high school leaders to provide correct and updated information about opportunities in CCE majors and professions. However, the problems of WEMs in the CCE industry are complicated and more effort is required to close the gender and race gap. Finally, to further decrease gender and racial discrimination, there is a need for an association exclusively representing the needs and concerns of women in the industry, and a similar organization for ethnic minority groups.

It is highly recommended to conduct more research to determine the potential

reasons for the low participation of Hispanics and African Americans in CCE programs. It is highly possible that there are other contributing factors influencing WEMs' participations that have not been studied yet. Future research can explore other influential factors such as College Campus Climate, WEMs' academic involvement and interactions with faculty and professors and WEMs' self-confidence and self-assessment in their major. After significant influential factors on WEMs are investigated, strategies and approaches to improve WEMs' participations can be implemented by educational experts. Nevertheless, it requires effort of most nation's universities to conduct annual surveys to determine the factors and improve WEM's recruitment and retention in future CCE workforce.

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## REFERENCES

- ACE Mentor Program. (2018). *ACE Mentor Program Yearbook 2018*. Retrieved from <https://www.acementor.org/files/6015/3617/3378/2018-ACE-Yearbook.pdf>
- Adogbo, K., Ibrahim, A. D., & Ibrahim, Y. M. (2015). Development of a Framework for Attracting and Retaining Women in Construction Practice. *Journal of Construction in Developing Countries*, 20(1).
- Al-Bayati, A. J., & Abudayyeh, O. (2016). Safety Challenges in the U.S. Construction Industry: The Hispanic Workforce Perspective. *Construction Research Congress 2016*, 2967–2971.
- Asadi, E., Akhavian, R., & Behzadan, A. H. (2016). Women in Construction Workshop: Outreach to Female Students from Developing Countries. *Construction Research Congress 2016*, 130–139.
- Bielefeldt, A. (2006). Attracting women to engineering that serves developing communities. *2006 American Society for Engineering Education National Conference Proceedings*. Washington.
- Bielefeldt, A. R. (2014). Global Interests among First-Year Civil and Environmental Engineering Students. *Journal of Professional Issues in Engineering Education and Practice*, 140(2).
- Bigelow, B. F., Bilbo, D., Mathew, M., Ritter, L., & Elliott, J. W. (2015). Identifying the Most Effective Factors in Attracting Female Undergraduate Students to Construction Management. *International Journal of Construction Education and Research*, 11(3), 179–195.
- Bilbo, D., Lavy, S., Myres, D. J., & Waseem, M. (2009). Sources of high school juniors' and seniors' perceptions of the construction industry. *Journal of the American Institute of Constructors*, 33(2), 3–10.
- BLS. (2019). Occupational Outlook Handbook. Retrieved March 21, 2019, from Bureau of Labor Statistics website: <https://www.bls.gov/ooh/management/construction-managers.htm>
- BLS. (2017). Women in the labor force: a databook (Report 1065). Retrieved October 9, 2019, from <https://www.bls.gov/opub/reports/womens-databook/2016/home.htm>



- BLS. (2018). Labor Force Statistics from the Current Population Survey. Retrieved from <https://www.bls.gov/cps/cpsaat18.htm>
- Chileshe, N., & Haupt, T. C. (2010). An empirical analysis of factors impacting career decisions in South African construction industry. *Journal of Engineering, Design and Technology*, 8(2), 221–239.
- Choi, J. O., Shrestha, P. P., Lim, J., & Shrestha, B. K. (2018). *An Investigation of Construction Workforce Inequalities and Biases in the Architecture, Engineering, and Construction (AEC) Industry*.
- Clewell, B. C., Anderson, B., & Thorpe, M. E. (1992). *Breaking the barriers : helping female and minority students succeed in mathematics and science*.
- Construction Industry Institute. (2015). *Is There a Demographic Craft Labor Cliff that Will Affect Project Performance?*
- Durdyev, S., & Ihtiyar, A. (2019). Structural Equation Model of Factors Influencing Students to Major in Architecture, Engineering, and Construction. *Journal of Professional Issues in Engineering Education and Practice*, 145(2).
- Elliott, J. W., Thevenin, M. K., & Lopez del Puerto, C. (2016). Role of Gender and Industry Experience in Construction Management Student Self-efficacy, Motivation, and Planned Behavior. *International Journal of Construction Education and Research*, 12(1), 3–17.
- Escamilla, E., Ostadalimakhmalbaf, M., & Bigelow, B. F. (2016). Factors Impacting Hispanic High School Students and How to Best Reach Them for the Careers in the Construction Industry. *International Journal of Construction Education and Research*, 12(2), 82–98.
- Fielden, S. L., Davidson, M. J., Gale, A. W., & Davey, C. L. (2000). Women in construction: the untapped resource. *Construction Management and Economics*, 18(1), 113–121.
- Francis, V., & Prosser, A. (2012). Does Vocational Guidance Become Gendered When Discussing Construction? *Journal of Construction Economics and Building - Conference Series*, 1(1).
- Goodrum, P. M. (2004). Hispanic and Non-Hispanic Wage Differentials: Implications for United States Construction Industry. *Journal of Construction Engineering and Management*, 130(4), 552–559.
- Hartman, H., Forin, T., Sukumaran, B., Farrell, S., Bhavsar, P., Jahan, K., Macey, D. (2019). Strategies for Improving Diversity and Inclusion in an Engineering Department. *Journal of Professional Issues in Engineering Education and Practice*, 145(2).
- Infante-Perea, M., Román-Onsalo, M., & Navarro-Astor, E. (2016). *Perceived Career Barriers for Future Female and Male Spanish Building Engineers: Case of Occupations Related to Work on Site*.
- Jones, J. (2010). Closing the Gender Gap. *Civil Engineering Magazine Archive*, 80(7), 60–63.
- Kisi, K.P., Shields, D.R., and Shrestha, P.P. (2011). Factors influencing high school students to pursue a construction baccalaureate. *47<sup>th</sup> ASC Annual International Conference Proceedings*, Omaha, NE.,
- Koch, D. C. (2007). Experiences and relationships that influence construction management students' career choice. *3rd Annual Proceedings of the Associated*

- Schools of Construction International*, 353–363. Flagstaff, Arizona.
- Lopez, C., Puerto, D., Guggemos, A. A., & Shane, J. (2011). *Exploration of Strategies for Attracting and Retaining Female Construction Management Students*.
- Menches, C. L., & Abraham, D. M. (2007). Women in Construction—Tapping the Untapped Resource to Meet Future Demands. *Journal of Construction Engineering and Management*, 133(9), 701–707.
- Menzel, N. N. and Shrestha, P.P. (2012). Social Marketing to Plan a Fall Prevention Program for Latino Construction Workers. *American Journal of Industrial Medicine*, 55, 729-735.
- Moir, S., Thomson, M., & Kelleher, C. (2011). *Unfinished Business: Building Equality for Women in the Construction Trades*. Retrieved from
- Moore, J. D., & Gloeckner, G. W. (2007). A Theory of Women’s Career Choice in Construction Management: Recommendations for Academia. *International Journal of Construction Education and Research*, 3(2).
- Morello, A., Issa, R. R. A., & Franz, B. (2018). Exploratory Study of Recruitment and Retention of Women in the Construction Industry. *Journal of Professional Issues in Engineering Education and Practice*, 144(2), 04018001.
- Ohland, M. W., Lord, S. M., & Layton, R. A. (2015). Student Demographics and Outcomes in Civil Engineering in the United States. *Journal of Professional Issues in Engineering Education and Practice*, 141(4).
- Oo, B. L., Li, S., & Zhang, L. (2018). Understanding Female Students’ Choice of a Construction Management Undergraduate Degree Program: Case Study at an Australian University. *Journal of Professional Issues in Engineering Education and Practice*, 144(3).
- Orr, M., Hazari, Z., Sadler, P., & Sonnert, G. (2009). Career motivations of freshman engineering and non-engineering students: A gender study. *American Society for Engineering Education*.
- Oxford Economics. (2015). *Global Construction 2030*. London.
- Reason, R. D., Cox, B. E., Quaye, L., & Terenzini, P. T. (2010). Faculty and Institutional Factors that Promote Student Encounters with Difference in First-Year Courses. *The Review of Higher Education*, 33(3).
- Shealy, T., Valdes-Vasquez, R., Klotz, L., Potvin, G., Godwin, A., Cribbs, J., & Hazari, Z. (2016). Career Outcome Expectations Related to Sustainability among Students Intending to Major in Civil Engineering. *Journal of Professional Issues in Engineering Education and Practice*, 142(1).
- Shields, D., & Kisi, K. (2011). Factors Influencing High School Students to Pursue an Engineering Baccalaureate. *American Society for Engineering*
- Shrestha, P.P. and Menzel, N.N. (2014). Hispanic Construction Workers and Assertive Training. *Work* 49, 517-522.
- Smith, H., Parr, R., Woods, R., Bauer, B., & Abraham, T. (2010). Five Years After Graduation: Undergraduate Cross-Group Friendships and Multicultural Curriculum Predict Current Attitudes and Activities. *Journal of College Student Development*, 51(4), 385–402.
- United States Census Bureau. (2011). Current Population Survey (CPS). Retrieved February 28, 2019, from <https://www.census.gov/cps/data/cpststablecreator.html>
- US EEOC Home Page. Retrieved from <http://www.eeoc.gov/>