

The Demographics of the U.S. Construction Management Undergraduate Students for 2015

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This paper presents the demographics of CM students from a national research study of undergraduate construction management (CM) students in bachelor degree programs in the U.S. The study utilized Qualtrics as an online survey instrument. The population of the students surveyed was 1,069 CM students from 36 university CM programs across the Associated Schools of Construction regions. Demographic information of region, major, year in school, gender, ethnicity, and age were collected from the students. The results were analyzed and it was found that the overall gender population of CM students for 2015 was 87% (925) male students and 13% (144) female students. The majority of the participants were of the Caucasian ethnicity, at 84% (891), and 79% (890) of the participants were between the ages of 18-23. This study also discusses the impacts on the CM industry.

Key Words: Undergraduate Construction Management Students' Demographics

Introduction

The Architectural, Engineering, and Construction (AEC) industry is in a constant state of change reacting to changing economics, labor force, technology, and government regulations. The process of what is considered engineering and construction is expanding in the ever changing global market (Benhart & Shaurette, 2014; Bernold, 2005). To keep pace with industry, construction management programs must change the way they teach and prepare graduates for industry. Construction professionals now have to do more than just problem solve. They must be able to be innovative in design and execution, utilizing creative thinking along with understanding math and science principles. They must also be able to work within multidisciplinary teams of other industry professional and communicate effectively across those disciplines (Benhart & Shaurette, 2011; Bernold, 2005; Knight, 2011; Sounder & Gier, 2006). As the CM education industry looks to make changes to meet the need of the industry, it makes sense to also look at the demographics of the current CM students in CM programs across the nation to determine curriculum needs in educational programs that train the next generation of CM professionals. This is analogous to a company doing extensive marketing research to get to know everything there is to know about their client, and then tailoring their marketing, service, and business model to that client. Just as in marketing, the CM education industry needs to know the demographics of their students'. It's also important for CM programs to understand the demographics of the undergraduate population for recruiting, to assess how diverse the student population is and where more research and effort is needed. As part of a national study on CM student's learning styles, the authors were able to collect extensive demographic information on the CM undergraduate populations for the spring 2015 school year. This paper presents those finding.

Methodology

The population of the full study was undergraduate and graduate college students in CM programs that were members of the ASC for the spring semester 2015. The participant sample for the study was chosen based on their

related discipline (purposive sampling) and because they were available (convenience). The goal was to obtain a very large sample population in order to mitigate the threats to external validity from the sampling technique utilized. To obtain a large sample size for each of the student demographic sub-groups a list of 203 faculty from 131 universities that were identified as ASC members from the seven ASC regions across the nation was compiled. Of the 131 universities invited to participate in the study, 36 universities responded with participants for a 27% university response rate. Because of FERPA regulations, there was no access to the participating university students email contacts, so the researchers relied on the participating university faculty to send the survey link via email to their student body. From the beginning of the spring semester in January 2015, through the end of March 2015, a survey invitation was emailed once a week to the participating faculty, who then forwarded it on to their student body. Since human subjects were utilized for this study, IRB approval was applied for and granted by the governing university IRB. See Appendix A for the complete list of participating schools.

Demographics were collected using vetted demographic collection methods for online surveys strategies (Hunter, 2012; McPeake, Bateson, & O'Neill, 2014; Ward, Clark, Zabriskie, & Morris, 2012; Weigold, Weigold, & Russell, 2013). Information collected from the students included:

- School attending—to determine region.
- Major—Architecture, Engineering, Construction Management, Interior Design, or Other.
- Year in school—Freshman, Sophomore, Junior, Senior, Graduate.
- Gender—Male, Female.
- Ethnicity—Caucasian, African American, Hispanic, Asian, Middle Eastern, Mixed, or Other.
- Age—18 to 20, 21 to 23, 24 to 26, 26+.

The participating population sample was emailed a link to the Qualtrics online survey platform to collect demographic information and other research survey responses. The first part of the survey collected the student demographic information without collecting any further identifying information. The second part of the survey collected responses to questions about their learning styles. Further analysis will be conducted and reported from these results in future publications. The whole sample (selected) was emailed the survey but the actual sample (participating) were those who clicked on the link. Within the Qualtrics survey instrument, the participant's responses to the questions were compiled. Qualtrics recognizes IP addresses, so students could only take the survey once (Qualtrics, 2015). At no point was any identifying information collected that could connect the participant to the results. On average, it took the participants ten minutes to complete the survey. The data was then exported into an Excel spreadsheet for descriptive statistical analysis.

Results

Gross participation included 1,313 responses from 36 different schools across the nation. Within the 1,313 responses, using list-wise deletion, 106 incomplete surveys were removed, calculating to an 8% dropout rate. After the incomplete surveys were filtered out, there were a total of 1,207 complete survey responses. The total number of email survey requests that were sent out from the participating school faculty members is unknown, since there was no access to the 36 participating university CM program's student body. The data file was sorted into the different demographic groups for analysis; by major, by region, by year in school, by gender, by ethnicity, and by age. Once the data was sorted, descriptive statistical analyses were performed. When sorted by majors, the participant population consisted of 91% (1,100) CM majors, 4% (44) engineering majors, 3% (34) interior design majors, 1% (14) architect majors, and 1% (15) other majors. Figure 1 shows the breakdown of the participants by major.

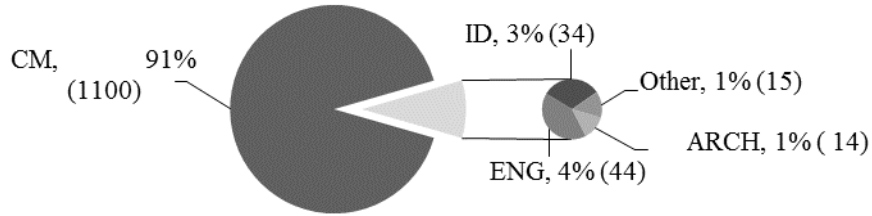


Figure 1 Study Population by Major

Because this study focused on CM students, the other majors were filtered prior to analysis, leaving a total of 1,100 CM majors to analyze. Of those, 3% (31) were graduate students. Because of the small population size relative to the full population, and because most prior research has focused on undergraduate students, the graduate students were filtered from the data. This left a sample population of 1,069 undergraduate CM students. The data was then analyzed to determine the regions, year in school, gender, ethnicity, and age of undergraduate majors.

Region

The regional demographics of the CM population, determined by where they were going to school, were spread out across seven different regions, based on the ASC regional boundaries. Figure 2 shows the regions defined by the Associated Schools of Construction.

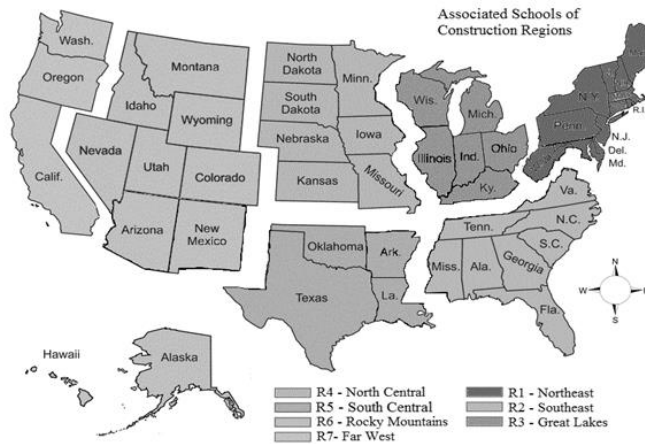


Figure 2 ASC Regions Map

Region 1 - Northeast provided 8% (85) of the participant responses. Region 2-Southeast provided 17% (181) of the participant responses. Region 3 - Great Lakes provided 20% (219) of the participant responses. Region 4 – North Central provided the largest participants responses, at 26% (282). Region 5 – South Central provided 10% (106) of the participant responses. Region 6 - Rocky Mountains provided 14% (157) of the participant responses, and Region 7 – Far West had the fewest at 5% (51) participant responses. Figure 3 shows the breakdown of the student populations by region.

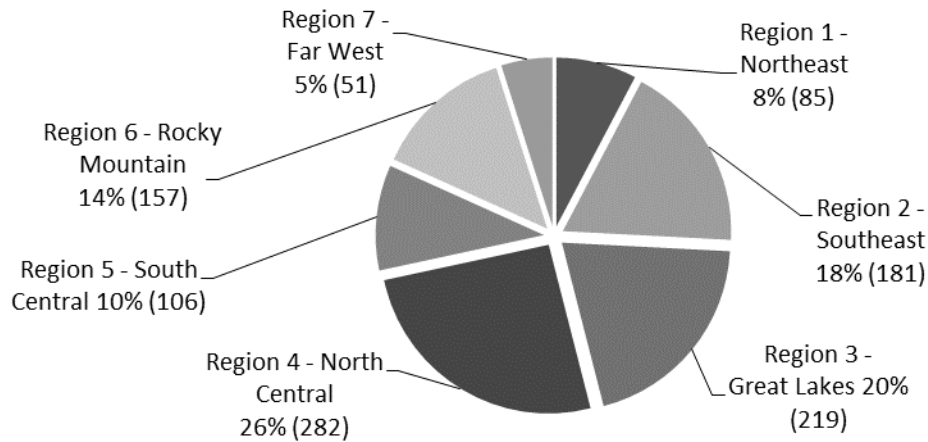


Figure 3 CM Population by ASC Regions

Year in School

The year in school demographics of the CM population was categorized as Freshmen, Sophomore, Junior, Senior, and Graduate Students. Of the CM population based on year in school, Freshmen represented 14% (152) of the population, Sophomores represented 23% (242) of the population, Juniors represented 29% (307) and Seniors were the largest populations group, at 33% (368). The total number of participants broken down by year in school is shown in Figure 4.

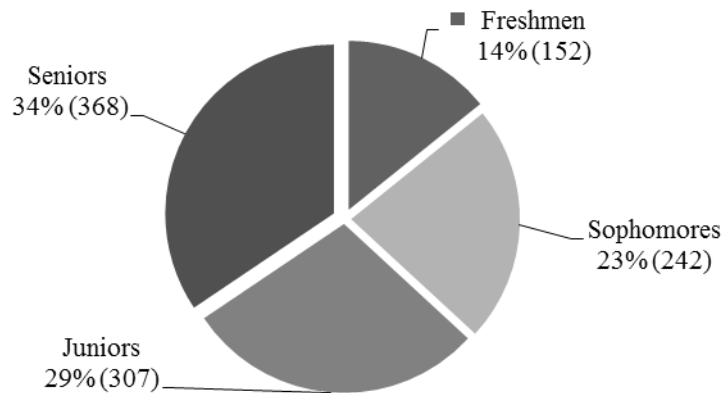


Figure 4 CM Population by Year in School

Gender

The gender demographics of the CM population were also analyzed. Of the 1,069 CM undergraduate students who participated, 87% (925) were male students, while 13% (144) were female students. Figure 5 shows the breakdown of gender for the CM population.

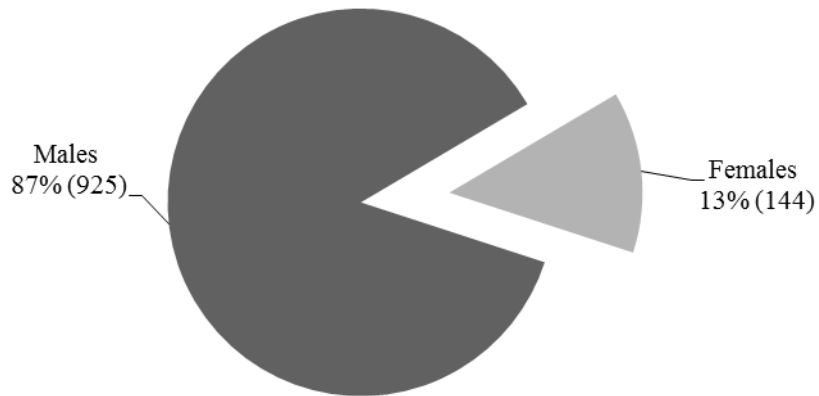


Figure 5 CM Population by Gender

Ethnicity

The ethnicity demographics of the CM population were categorized by Caucasian, Black/African American, Hispanic/Latino, Asian, Native American, Middle Eastern, Mixed, or Other. Caucasian was the largest population represented at 84% (891) while Native Americans were the smallest ethnicity represented in the population at .04% (4). Figure 6 shows the breakdown of the CM populations by ethnicity.

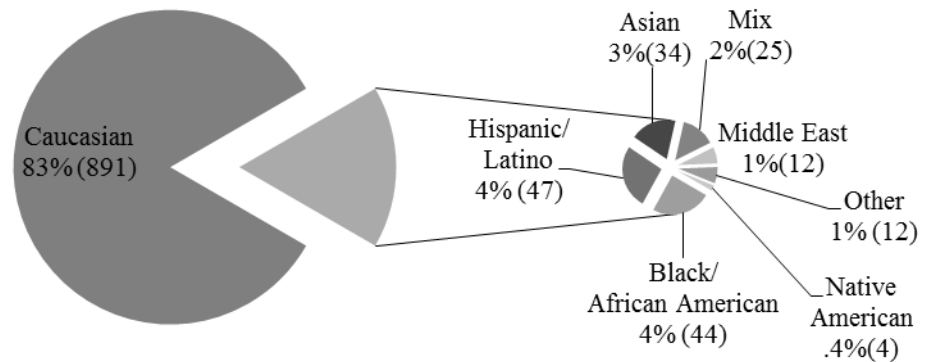


Figure 6 CM Population by Ethnicity

Age

The age demographics of the CM population were categorized according to the following categories; 18 to 20 years old, 21 to 23 years old, 24 to 26 years old, and 27+ years old. The 27+ years old category had the fewest responses at 8% (83) while the 21 to 23 years old had the largest number of responses at 45% (480). The combination of 18 to 21 and 21 to 23 year old students represent 79% (890) of the participants. The average age of the population in this study was 21 years old. Figure 7 shows the age breakdown of the CM population.

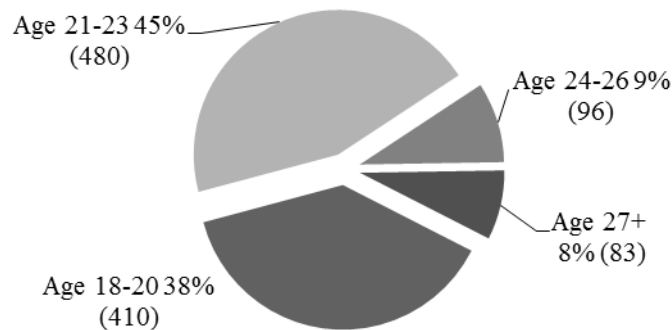


Figure 7. CM Population by Age

The average age of the CM population in this study was 21 years. The average age of Region 6 was 24.8 years old. Further review of the Region 6 schools reveals that 50% of the participants of Region 6 came from Brigham Young University (BYU). The average age of the BYU CM students is 24.3 years old. Another school in Region 6 with older students was Utah Valley University (UVU). Of the 12 CM participants from UVU, eight students were 27+ and older. Their students' average age was 31.5 years old. Between BYU and UTU, 27+ students' account for 61% of the entire 27+ student and 27% of the student population in Region 6. This "regional affect" is dependent or caused by the students age, not the region itself.

Demographics Summary

The sample population for this study consisted of 1,069 CM students with a good sample spread across the United States. Their years in school ranged from freshman to seniors. The gender makeup of the population was 87% (925) male students and 13% (144) female students. The majority of the participants were of the Caucasian ethnicity, at 84% (891), and 79% (890) of the participants were between the ages of 18-23.

Discussion

The difference in gender among CM students found here is of note. With 13.5% of CM students found to be female in this study, there is a notable difference with other studies. In research conducted only at CM programs with more than 340 total students, females made up only 7.8% of the student body (Bigelow, Bilbo, Mathew, Ritter, & Elliott, 2015). Bigelow et al. (2015) also reported from the Bureau of Labor Statistics that only 6.4% of construction managers are female. Both of those findings are considerable lower than the 13.5% female portion of the population found here. The results of this study should be considered reliable so it is interesting to see the portion of female students increase so dramatically. These results indicate one of two scenarios either; female students were simply more likely to respond to the survey, or female participation is on the rise, as most of these students will not hit the industry for a few years. Only time will tell which is the case.

There is a lack of diversity amongst CM undergraduate student in both gender and ethnicity. More recruiting for both females and ethnic diversity is needed in CM program. Questions that this study brings up are how do the student demographics compare to the demographics of the industry? How do the CM program current demographics match those needs? Have the demographics changed through the years? What do the demographics mean for CM educators? Should CM programs recruit differently? Is there need for industry partners to participate in recruitment? What are the repercussions of such a low representation of female and ethnic minority students? Can they be compared to the minority employment and subcontractor requirements that many public projects require? Can the 4% Hispanic student population be compared to the percentage representation of Hispanic in the construction workforce? With such a large Hispanic workforce, why are they so poorly represented in CM programs? How does the demographics of CM college students compare to construction industry, other technology

(STEM) degrees, national workforce, and population as a whole?

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Appendix A. Associated Schools of Construction (ASC) Participating Schools

Region 1 - North East	85	Region 5 - South Central	111
Central Connecticut State University	5	Louisiana State University	30
Norwich University	31	Texas A&M University	81
Pennsylvania College of Technology	25		
SUNY Delhi	16	Region 6 - Rocky Mountain	147
Temple University	4	Brigham Young University	80
University of Massachusetts - Amherst	4	Colorado State University	33
		Northern Arizona University	12
Region 2 - South East	199	Utah Valley University	12
Georgia Institute of Technology	4	Weber State	10
Kennesaw State University	2		
Southern Polytechnic State University	20	Region 7 - West Coast	54
Virginia Tech	173	Cal Poly San Luis Obispo	12
		California Baptist University	5
Region 3 - Great Lakes	222	New School of Architecture	9
Michigan State University	25	Washington State University	16
Northern Kentucky University	7	California State University	12
Northern Michigan University	6		
Purdue University	138		
University of Cincinnati	24		
University of Wisconsin-Stout	16		
Western Illinois University	6		
Region 4 - North Central	282		
Minnesota State University Mankato	48		
Pittsburg State University	60		
South Dakota State University	20		
Missouri State University	79		
Southeast Missouri State University	29		
University of Nebraska - Kearney	34		
University of Northern Iowa	12		
		Total Schools	36
		Total Participants	1100