

# Professional Certifications in Construction Industry: A Comparative View from Students and Companies

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This paper presents research on professional certifications available to recent graduates of the construction industry. A mixed methods study was conducted to better understand student and industry expectations related to professional certifications. The goals for this study were: (1) to generate a preliminary list of the most frequently desired certifications for recent graduates in construction management (CM); and (2) to verify students' awareness of certifications available in construction. The researchers conducted an online survey with senior students of undergraduate programs in the United States, and surveyed industry during a construction specific career fair. Both questionnaires requested that they indicate the certifications they regarded as desired or beneficial. Students' were also asked to mark certifications they already have and the ones they were unfamiliar with from a previously developed list of 44 certifications. The data obtained provides insight into which professional certifications were more frequently desired by industry, and how aware students are about the subject. Statistical analysis using a multidimensional scaling of the data showed differences between groups as a whole. Chi-square tests were also conducted and showed significant differences between groups for several certifications as well.

**Key Words:** professional certifications; industry; undergraduate; curriculum; construction

## Introduction

Construction is a multidisciplinary industry and it can be served by graduates of many disciplines (Ahn, Annie, & Kwon, 2012). The industry is fragmented by different specialties (Dave & Koskela, 2009; Chan & Sher, 2014) that have different job requirements and skills.

Some professions have formal associations to provide guidelines for recent graduates in order for them to be licensed. In the case of construction managers, no individual license is necessary in order to work as such. Certifications are not the same as a license. The latter is a government requirement necessary for some professionals or companies to perform work legally (Bruce, Gebken, & Strong, 2010, Tucker et al., 2012). On the other hand, most construction-related certifications are voluntary, and acquired by professionals for a variety of reasons, such as prestige, company or job requirement, or to achieve a higher salary (Bruce, Gebken, & Strong, 2010; Tucker et al., 2012). They are generally developed by private companies, organizations, or professional associations. Kelly (2007) indicates that certifications have been important in areas such as information technology, health, and safety, and their importance for engineering has been growing in recent years.

Although some papers have been published analyzing specific certifications (Rapp & Pan, 2010; Bruce, Gebken, & Strong, 2010; Tucker et al., 2012; Smith, 2012) for the construction industry, the researchers found only one study that has evaluated eight different certifications, although its focus was academia (Olsen, Taylor, & 2011). Research indicates that a complete review of construction certifications can be overwhelming given the great number of certifications (Bruce, Gebken, & Strong, 2010), and the wide range of specialties in the construction industry. Except in studies focusing on specific certifications, an overall sense of the desirability of those certifications by the industry was not found, (Bruce, Gebken & Strong, 2010; Carns & Bender, 2002). From a higher education perspective, Benhart and Shaurette (2014) indicate that due to constant industry changes, undergraduate programs need to be adaptable enough so that recent graduates meet the industry requirements.

Therefore, the goal for this study was to examine an extensive list of professional construction-related certifications for industry desirability and students' awareness of those certifications. With this data, researchers provide a broad view of available professional certifications related to construction. The research questions for this study are:

- (1) Which professional certifications are seen as most desirable for recent graduates by the construction industry?
- (2) Which professional certifications are perceived by senior CM students as most and least important?
- (3) Which professional certifications do current senior CM students already have?
- (4) How does industry's view of certifications, compare to senior students' view with regard to the desirability of various professional certifications?

## Method

This study used a questionnaire for quantitative data collection from industry and students. Both questionnaires had the same structure: demographic information followed by a list of 44 certifications, and an option for "other certification". Preliminary online research was conducted by the authors, and the list was reviewed by faculty from Purdue University's construction management program. Due to industry's fragmentation, the researchers recognize that the list might not be complete for all available certifications. The list includes items in the areas of safety, project management, scheduling procedures, estimating, technical software, sustainability, and specialty construction. Industry participants were asked which certifications were perceived as beneficial for their recently hired construction management professionals. Students were asked three questions based on the same set of 44 certifications: (1) which certifications they already have; (2) which certifications they want to have in the following five years, and (3) which certifications they were not familiar with. Both questionnaires were based on selection or not of certifications, therefore yielding frequency data.

For the analysis of the results, descriptive statistics were used to describe the demographics of both samples, as well as answering research questions one through three. Two additional statistical tests were completed for answering research question four: (1) chi-square tests for each certification, assuming independence of each certification; and (2) a multidimensional scaling, to obtain a broader sense of all certifications together for the two different groups. Chi-square tests were performed for each certification using the industry input compared with the students' perception for the next five years, to see if there are significant differences between them, at the 5% level. According to Gaur and Gaur (2009), the chi-square test of independency is used to assess whether two variables are or are not independent of each other. It is frequently used for analyzing discrete data. Multidimensional scaling (MDS) is a technique that can be used to compare data points from groups to visualize similarity or disparity between each point. In order to do this, data is modeled according to calculated distances that then can be plotted in a geometric plane (Borg & Groenen, 2005).

The industry population for this study is the United States construction industry. The selected sample for this group was the companies attending a construction specific Purdue University career fair, during the fall of 2014. The same method of sample selection was used by Ahn, Annie, and Kwon (2012). In the career fair sampled for the certification study, 130 companies from all regions of the country were present.

For the student sample population, the researchers sent invitation emails to 202 faculty of programs associated with the Associated School of Construction, across the United States. Faculty were invited to send the invitation email with the survey link to their senior level students. Because the students were not contacted directly, the researchers are not able to report a response rate for students. The researchers consider any student planning to graduate in the Fall of 2015, Spring of 2016, and Summer of 2016 to be seniors. Data from students were collected from August to October of 2015. Participation was voluntary and anonymous.

Possible limitations of this study are that certifications created after Fall of 2014 were not included; there has been a one year gap between the industry survey and the student survey; and the list of certifications may not have included all possible certifications available. The delimitations for this study are that data was collected on the perception of certification desirability based only on the recognition of name or abbreviation. No implications about validity of the certifications are part of this study. For this intent, please refer to McKillip and Cox (1998).

## Results

From the 130 companies that were present at the construction specific Fall 2014 career fair, the researchers received back 106 responses. The high responses rate and the breadth of company profiles represented a diverse group of construction organizations. Most companies were general contractors (42%), followed by companies that had multiple (more than two) areas of interest (18%), specialty contractors for mechanical, electrical and plumbing (MEP) fields (14%), general contractors who do specialized healthcare construction (7%), and specialty contractors other than MEP (7%). Figure 1 (left) illustrates the work segment of surveyed companies. Most of the individuals responding were part of construction operations (71%), followed by human resources professionals (22%), and others or no response (8%).

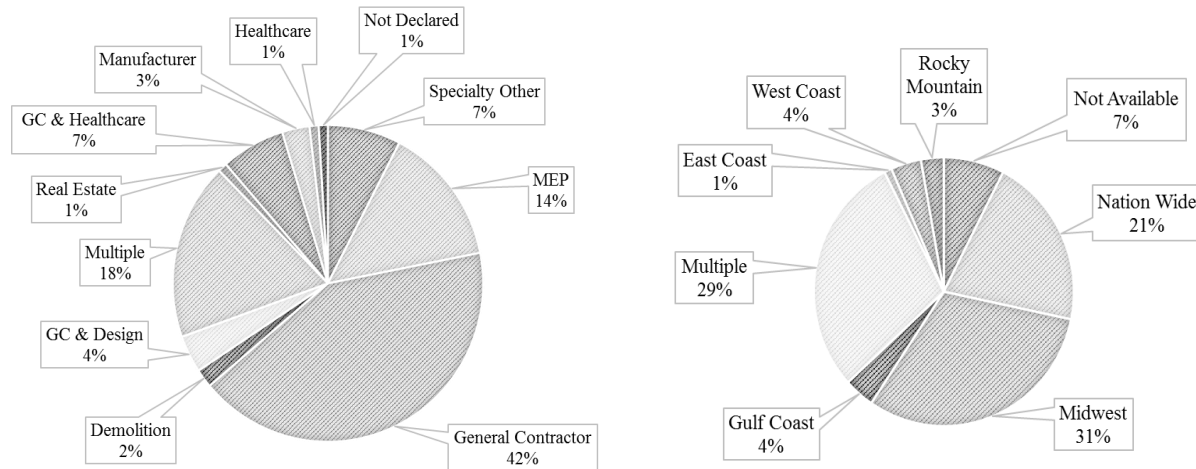


Figure 1 – Company main work segment (left) and geographic regions of jobsite location (right)

The size of responding companies also varied from 28% with a range of one to 200 employees, 43% with 201 to 1,000 employees, and 20% with 1,001 to 5,000 employees. Very large companies with more than 5,000 employee companies accounted for 9% of surveyed companies. Regarding company locations, most had headquarters in the Midwest (60%), but with jobsites in various regions of the United States. Figure 1 (right) illustrates the distribution of jobsite locations of companies that were surveyed. Geographic regions were well represented with 50% of the respondents working on jobsites nationwide or in multiple regions of the US.

A total of 97 students completed the online survey, but six were eliminated because they indicated a degree completion date other than Fall 2015, Spring 2016, or Summer 2016. Only 63 students indicated their regional affiliation. Of these, most (67%) were from the gulf coast region, followed by the Midwest region (24%). Students from other regions accounted for 10% of respondents for this question. The vast majority of respondents were male (92%); only 7 females responded to the questionnaire, and one student preferred to not specify gender. This gender difference can be generally seen in the program's undergraduate student demographics. Eighty-five of the 89 responding students indicated they have had previous work experience in construction. It should be noted that the majority of the respondents were not from the same university as the career fair.

Job offers for students seem to be evenly spread among the sample. Of the 89 students that responded to this question, 25% indicated they already accepted their full time offer, 36% have received an offer, but not accepted yet, and 39% had not received an offer for full time employment yet. The researchers remind readers that this data includes students graduating in Spring and Summer of 2016. Most responding students indicated that they wish to work for commercial general contractors (59%), construction management firms (38%), and industrial general contractors (31%). In this question students could choose more than one option, and it is interesting to note that 11% indicated an interest in working in design companies.

Students were asked to indicate, on a scale from one to 10, how important they think certifications are for their professional future. Students were also asked how important CM classes were in helping them obtain a certification

either, in the past or if they felt the classes would help them gain certification in the future. The importance of certification showed a mean response of 7.7, with a standard deviation of 1.77. The importance of CM classes in obtaining certification obtained a score of 6.16, with a standard deviation of 2.36.

Survey results from industry indicated that the average number of certifications seen as beneficial for recent CM graduates per company is 6.99, with a standard deviation of 5.17. Figure 2 shows which professional certifications are seen as most commonly desired for recent graduates by the construction industry, therefore answering research question 1.

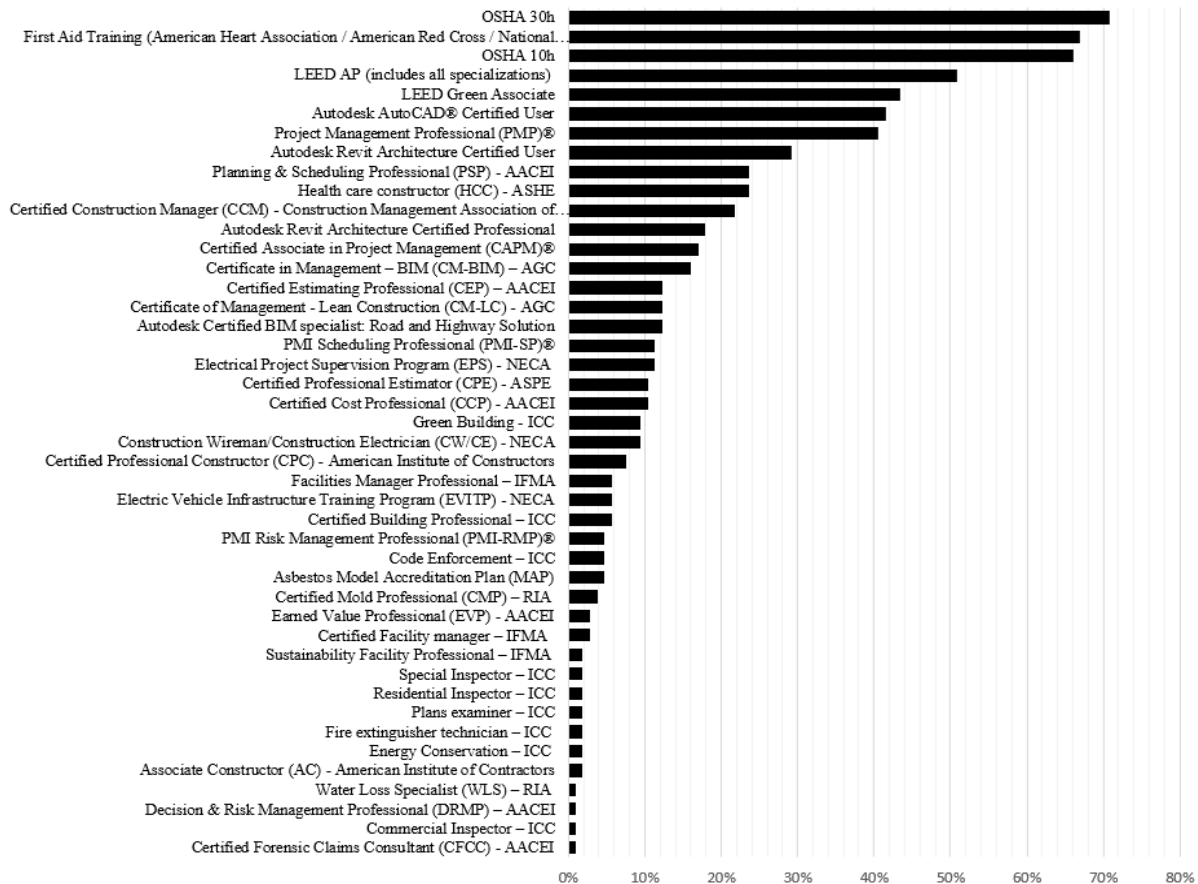


Figure 2 – Desirable certifications for industry

In order to answer research question two, researchers analyzed the frequency of professional certifications indicated by students as important for their first five years after graduation, and the ones they are unfamiliar with. Figure 3 summarizes the findings in a comparative table between professional certifications most cited as important and the ones students were unfamiliar with. The five certifications most mentioned by students were Project Management Professional (PMP), followed by both LEED certifications, Certified Construction Management (CCM), and Certified Professional Constructor (CPC). Of the 85 valid student responses, the mean number of professional certifications indicated as important for students was 16.9, with a standard deviation of 14.2, indicating great variance in responses.

Within the ‘other’ category students mentioned the Certified Occupational Safety Specialist (COSS) and Construction Quality Management for Constructors (CQM-C). Also, one of the faculty mentioned that the survey did not include certifications by the National Association of Home Builders. These must be seen as limitations of this study and are a consequence of the industry fragmentation regarding professional certifications. Also, importance of certification seems reduced if students already have that certification. This trend can be seen by comparing the results for OSHA 10h, OSHA 30h, and first aid training in Figure 4, with the same certifications level of importance in Figure 3.



Figure 3 – Frequency of professional certifications cited by students regarding importance (lighter color) and unfamiliarity (darker color)

Research question three is answered by analyzing descriptive data from surveyed students. Most students indicate they have OSHA certifications, with 64 indicating they have the OSHA 10h, and 53 as having the OSHA 30h. Thirty students have indicated they have first aid training, ten students indicated they have Autodesk AutoCAD certifications, 8 indicated as having the Autodesk Revit Certification. Figure 4 indicates the distribution of earned certifications of surveyed students. Twenty one professional certifications not listed in Figure 4 were not mentioned by students.

In order to answer research question four and compare industry and students’ perceptions, researchers performed independent chi-square tests for all certifications. The null hypothesis for the test is that there is no significant difference between industry and students’ perceptions for a certain certification; the alternative hypothesis is that there is a significant difference between industry and students’ perception for a certain certification. Significance was tested at the 5% level. No significant differences were found for: Health care constructor (HCC) ( $p = 0.556$ ); Autodesk AutoCAD® Certified User ( $p = 0.305$ ); Autodesk Revit® Certified User ( $p = 0.063$ ); and LEED AP (includes all specializations) ( $p = 0.329$ ). All other professional certifications had significant differences between

students and industry professionals ( $\rho \leq 0.05$ ). Combined data for certifications that students already have as well as those they wish to have in the next five years when compared with industry data, showed that no significant differences emerged for First Aid Training ( $\rho = 0.297$ ); Health care constructor (HCC) ( $\rho = 0.348$ ); and LEED AP (includes all specializations) ( $\rho = 0.256$ ). All other professional certifications had significant differences between students and industry professionals ( $\rho \leq 0.05$ ).

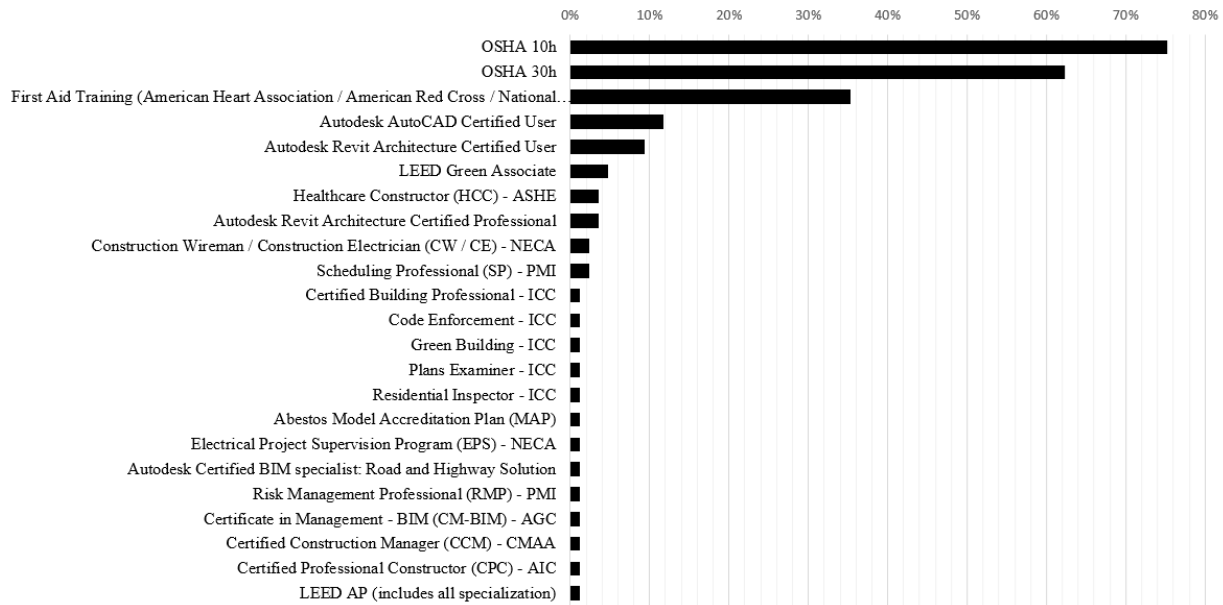


Figure 4 – Professional certifications acquired by surveyed students

After conducting chi-square tests, a multidimensional scaling was performed to compare data points from industry and from students. Respondent 1 from industry provided the origin point. All other respondents were located based on the distance from that point. Figure 5 shows the plotted result for the analysis.

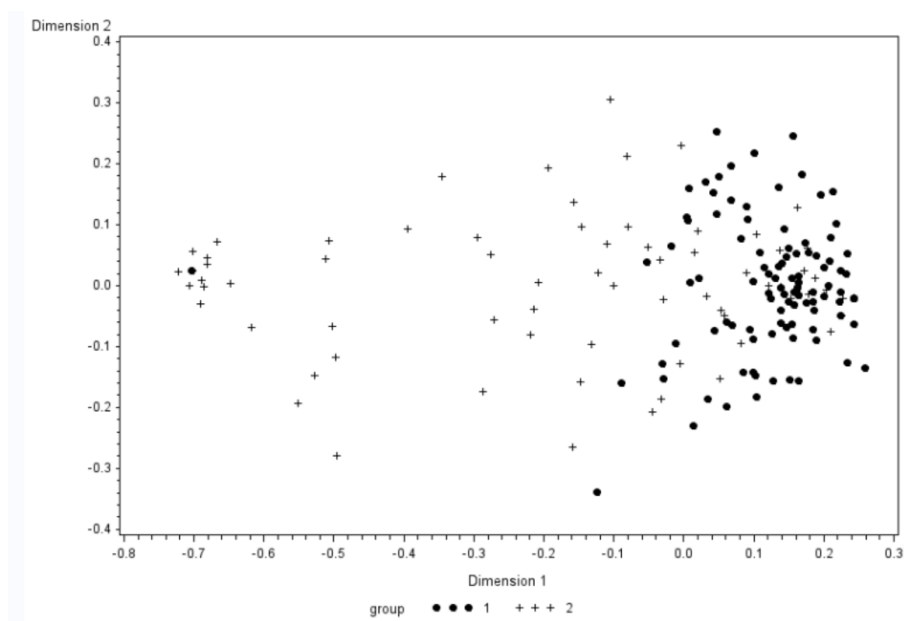


Figure 5 – Multidimensional scaling for industry (group 1 •) and students (group 2 +)

Results indicate that industry is much more cohesive in determining important certifications for recent graduates. The graph also seems to indicate an outlier for industry around coordinate (-0.72, 0.02). This point corresponds to

the respondent who selected all certifications. Several students indicated all certifications to be important, therefore approximating themselves to that industry point. We can also observe through the graph that although there are several students within the industry cluster, students seem to be more scattered, indicating disagreement between them in regards to which certifications are important for the beginning of their professional lives. Through the analysis of this graph and the chi-square tests researchers answer research question four, indicating a disagreement between student and industry view of most commonly desired professional certifications. Industry also has a higher agreement for which certifications are more desirable than students.

## Discussion

Findings from industry indicate a strong interest in safety precautions. It was interesting to see that none of the certifications received zero votes. The great range of responses indicates the highly fragmented nature, confirming Bruce, Gebken, and Strong's, (2010) comments about the great number of certifications available. LEED certifications (LEED AP, and LEED Green Associated) were placed fourth and fifth in the list of most mentioned certifications. This parallels the higher number of papers published about LEED certifications (Bruce, Gebken, & Strong, 2010; Tucker et al, 2012). Most certifications mentioned were applicable to a number of different specializations, such as safety (First Aid, OSHA 30h, and OSHA 10h), design software (AutoCAD certified user), and sustainability (LEED AP, and LEED Green Associate). Certifications that are specific to specializations were not frequently mentioned. Among these specialized certifications are the Water Loss Specialist and Asbestos Model Accreditation Plan. Surprisingly, certifications that have a more inclusive CM content, such as the Associate Constructor (AC – AIC) or Certified Professional Constructor (CPC – AIC), were also not frequently mentioned. Further studies about these findings can help clarify the reasons for this.

From a student point of view, findings confirm what Carns and Bender (2002) mentioned about lack of motivation for students. Few have indicated having certifications already, other than safety related ones (OSHA 10h, OSHA 30h, and first aid training). This is not surprising as programs accredited by the American Council for Construction Education (ACCE) are required to have safety in their program (American Council for Construction Education, 2014). On the other hand, the same ACCE requirements specify estimating as part of construction curriculum, yet neither industry nor students' results indicate estimating related certifications to be on top tier for importance. This might be related to the emphasis given to safety by industry in response to the number of fatalities in the construction industry. Killingsworth et al. (2014) indicate increasing investments and efforts from industry and government to enhance safety on jobsites in United States. Students seem to vary greatly on their selection of important certifications, which can be assessed by the 14.2 standard deviation regarding the number of important certifications selected. Many of them also indicate no awareness of the many certifications available. This fact might be a consequence of the fragmented nature of the industry. Fragmentation of the construction industry is noted frequently in literature (Ahn, Annie, & Kwon, 2012; Chan & Sher, 2014; Dave & Koskela, 2009). Further research is needed to understand this high variation in students' perception of certification importance and awareness. Awareness can be a challenge due to the high number of certifications available.

Findings of the chi-square tests for disparity of students and industry responses on certifications indicate that students lack awareness of which certifications might actually be beneficial for industry. Group differences were found even for safety certifications, indicating that even though students are aware of the importance of safety, perhaps they are not aware of how much this is desired by industry. The multidimensional analysis confirms this fact. It also indicates that even though the construction industry is fragmented, there is a much higher agreement between professionals as to which certifications are most desirable, than agreement between students on the same subject. Student results indicate they are not aware of industry needs and wants regarding professional certifications for recent graduates. Previous research indicates that through increasing industry-student partnership, such as through mentorship programs, students can better understand AEC industry needs, and therefore make more informed decisions regarding their professional development (Wandahl, Abdel-Wahab, & Grant, 2014).

## Conclusions

This study provides a preliminary list of the most desirable certifications from the construction industry point of view and has compared it with the perceptions of senior students from undergraduate construction management programs in United States. Findings show that safety certifications (OSHA 10h, OSHA30h, and First Aid Training)

are considered by industry to be mostly frequently desired from students, followed by sustainability related certifications. Safety certifications are also the ones students indicate as most frequently earned. Even though agreement appears to be obtained regarding safety certifications, students seem to have very low agreement about which certifications are most important and how many they should have upon or shortly after graduation.

Statistical tests also indicate that student and industry perceptions of the most desirable certifications are different. Industry seems to be a more cohesive group, even though it is a fragmented industry. Student results indicate they may not have a sound understanding of industry expectations. Further study is needed in order to better understand: (1) differences between certifications related to content areas covered by program accreditation; (2) reasons for the disconnect between industry and student views on most desirable professional certifications; and (3) procedures that could be implemented to reduce this industry/student disconnect within undergraduate CM programs.

## References

- Ahn, Y., Annie, R., & Kwon, H. (2012). Key competencies for US construction graduates: Industry perspective. *Journal of Professional Issues in Engineering Education & Practice*, 138(2), 123-130.
- American Council for Construction Education (ACCE). (2014). *Standards and criteria for accreditation of postsecondary construction education degree programs*. ACCE.
- Benhart, B. L., & Shaurette, M. (2014). Establishing New Graduate Competencies: Purdue University's Construction Management Curriculum Restructuring. *International Journal of Construction Education and Research*, 10(1), 19-38.
- Borg, I., Groenen, P. J. F. (2005). *Modern multidimensional scaling: Theory and applications* (2nd ed.). New York: Springer.
- Bruce, R. D., Gebken, R. J., & Strong, S. D. (2010). Evaluating Self-Perceived Benefits of Credentials in the Building Design and Construction Community: CPC, LEED-AP, and DBIA. *International Journal of Construction Education and Research*, 6(3), 165-178.
- Carns, D., & Bender, W. J. (2002). Certification Preparation Class. In *ASC Proceedings of the 38th Annual Conference* (pp. 17–24). Blacksburg: Virginia Polytechnic Institute and State University. Retrieved from <http://ascpro0.ascweb.org/archives/2002/carns02.htm>
- Chan, C. T. W., & Sher, W. (2014). Exploring AEC education through collaborative learning. *Engineering, Construction and Architectural Management*, 21(5), 532–550. doi:10.1108/ECAM-04-2013-0036
- Dave, B., & Koskela, L. (2009). Collaborative knowledge management—A construction case study. *Automation in Construction*, 18(7), 894–902. doi:10.1016/j.autcon.2009.03.015
- Gaur, A. S., & Gaur, S. S. (2009). *Statistical methods for practice and research a guide to data analysis using SPSS* (2nd ed.). Los Angeles: Response.
- Killingsworth, J., Stentz, T., Ph, D., Moser, A., & Grundman, J. (2014). Effective Instructional Methods for Providing Safety Training to Construction Workers. In *50th ASC Annual International Conference Proceedings*. Washington DC.
- McKillip, J., & Cox, C. (1998). Strengthening the criterion-related validity of professional certifications. *Evaluation and program planning*, 21(2), 191-197.
- Olsen, D. A., Taylor, J. M., & Holk, J. (2011). Do Professional Credentials Supported by ASC Member Schools Focus on Those Most Likely to Enhance a Students' Professional Development? In *47th ASC Annual International Conference Proceedings*. Omaha.
- Rapp, R. R., & Pan, J. (2010). Disaster restoration professional body of knowledge. *International Journal of Construction Education and Research*, 6(3), 202-218.
- Smith, B. W. (2012). Changes in OSHA Crane Rules : A Preliminary Look at the Economic Impact on Individual Construction Operations. In *48th ASC Annual International Conference Proceedings*. Birmingham: Birmingham City University.
- Tucker, J. R., Pearce, A. R., Bruce, R. D., McCoy, A. P., & Mills, T. H. (2012). The perceived value of green professional credentials to credential holders in the US building design and construction community. *Construction Management and Economics*, 30(11), 963-979.
- Wandahl, S., Abdel-Wahab, M., & Grant, F. (2013). Facilitating Student Learning From Construction Practice: A Case Study From Denmark And Scotland. *International Journal of Technology and Engineering Education*, 23.