

Rethinking Construction Curriculum: A Descriptive Cause Analysis for Soft Skills Gap among Construction Graduates

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The notion that people are creating construction projects success not processes and systems is widely accepted among construction stakeholders. Increasingly, a number of construction scholarly publications argue that there is a human factor to nearly every successful construction firm. However, scholars argue that a soft skills gap among the entry-level workforce is challenging the construction industry. The aim of this paper is to define the soft skills gap among construction graduates in entry-level positions, revealing the major causes of that gap, and then proposing criteria that can be used to conduct a normative analysis for the possible methodological approaches to tackle the soft skills gap and define the best one of them. The paper conducts an exploratory literature-based discovery mixed with a research approach involving a detailed literature review and critical examination for scholarly construction publications, industry reports and accreditation bodies' manuals. The analysis of that literature supported by the experiential knowledge of the researchers revealed five major causes that, in combination or isolation, contributed to the soft skills gap. The paper then defines needed criteria domains.

Key Words: Construction Education, Construction Industry, Curriculum, Gap, Soft Skills

Introduction

The distinguished quality of the United States' higher education institutions is widely acknowledged internationally. A large number of graduates of US higher education institutions continue to play a major role in the scientific and technological development worldwide. Therefore, the excellence of the workforce is a critical asset in any human capital plan in the US. To sustain that goal, governmental policies start focusing on higher education competitiveness. Two strands have emerged toward that goal: the first one focuses on education and general skills, whilst the second one focuses on the investigation of competency in the employment context. The notion of workplace-related skills was raised in the early 1990s, when the **S**ecretary of Labor appointed the **C**ommission on **A**chieving **N**ecessary **S**kills (**SCANS**) (Huitt 1999) to determine the skills that graduates need to succeed in the high performance workplace, as well as to help educators understand how curriculum and instruction must change to correlate those skills among students. The road toward solving the employability problem goes ever on.

Currently, the US construction industry is faced with many challenges including globalization, financing, environmental impact, competition, and change under technical forces (i.e. technology, new materials and processes), and the rise of customer expectations. Various scholarly publications argue that the soft skills level or lack of soft skills among the construction workforce is a serious challenge (Cooke-Davies 2002; Darnell 2005; Geoghegan and Dulewicz 2008; Gido and Clements 2012). Developing skills in construction school graduates is a key stone of the industry's resilience and has become a priority of both industry and academia.

What are Soft Skills?

Gilman (1989) defines the word "skill" alone as "the ability to use one's knowledge effectively and readily in execution or performance;" it is "a learned power of doing something competently." Oxford dictionary (Press 1989) identifies 'soft skills' as "personal attributes that enable someone to interact effectively and harmoniously with other people." In current literature, there is a lack of consensus on the definition of soft skills among scholars. Snell et al. (2002) defines soft skills as "skills, abilities, and traits that pertain to personality, attitude and behavior rather than formal or technical knowledge". Snell's definition can match many other scholarly definitions e.g. Non-technical Skills (Walters and Sirotiak 2011), Non-cognitive Skills (Sirotiak 2008), Non-academic Skills (Selamat et al. 2013),

Employability Skills (McGrath-Champ et al. 2010), Lifelong Skills (Toor and Ofori 2008), Generic Skills (Kruss et al. 2012), Essential Skills (Othman 2014), Key Competencies (Ahn et al. 2012), Transferable skills (Ayarkwa et al. 2012), Enterprise Skills (Merrifield 2013) and General Capabilities (Gann and Salter 2001). The definition of "soft skills" can include not only skills and competences relevant to employment, but also those that are related to the community such as: Citizenship, Ethics, and Diversity (Hall and Jaggar 1997).

In this paper, we define "soft skills" as the needed ability and traits that are often used to describe the non-technical skills. Soft skills include but are not limited to: communication soft skills, workplace thinking soft skills (critical thinking and problem solving), collaboration soft skills (teamwork), conflict resolution soft skills, workplace professionalism soft skills, workplace productivity soft skills, stress-management soft skills (adaptability and change management), social intelligence soft skills, self-management soft skills, planning and organizing soft skills, workplace ethics soft skills, workplace diversity soft skills, and so on.

Why Soft Skills?

There is a broad consensus amongst construction academia and industry that for construction school graduates to be ready to enter the workforce, they should be equipped with hard skills (Technical) and soft skills (Non-Technical) that enable them to apply their knowledge directly in the work setting. However, the vast majority of reports and scholarly literature regarding construction employability are arguing that employers are complaining about the low level of soft skills of newly hired construction graduates (Ahn et al. 2012; Group 2004; Huitt 1999; Institute for a Competitive Workforce 2012; Representatives 2012). In addition, employers believe that the lack in soft skills competences affect work performance, output, and efficiency.

Like all other business organizations, construction firms are continuously applying changes to their business practices. Companies are replacing current traditional construction delivery methods with new innovative ones, using new managerial concepts and using flatter organizational forms with a wide line of authority among employees (Jackson and Hancock 2010). Moreover, four generations of employees' composition: traditionalists, baby-boomers, generation X and generation Y/Millennials are now interacting side by side in the workplace while they have different values, experiences, and styles (Kehrli and Sopp 2006). All of that is contributing to misunderstandings and frustrations among employers. Managing construction projects successfully requires a mixture of soft skills and technical skills. Lack of soft skills among construction graduates in entry-level positions is one of the challenges that will face the construction industry's future. It could affect schedules and costs, and ultimately critically delay projects and put at risk the economic benefits of those projects (Al-Momani 2000).

The construction industry as a whole is also rapidly shifting towards becoming a service industry competing in a global market place. This requires new types of skills among employees such as diversity, cultural knowledge and awareness, and virtual team communication and collaboration (Playfoot and Hall 2009). In parallel with that, a changing of attitudes to the purpose of undergraduate education is starting to emerge under the pressure of industry, government and accreditation institutes. For all of these reasons, soft skill competences among construction graduates need to be developed to match the industry needs and construction program needs to take the lead in creating a foundation of these skills among their graduates (Green et al. 2009).

Methodology

Literature-based discovery (Chen et al. 2011) method and root-cause analysis method are used to conduct this research. Literature-based discovery refers to the use of academic publications to find new relationships between existing knowledge, while root-cause analysis is a method of problem solving used to clearly understand what is causing a problem. The research involves a detailed literature review and critical examination for three major information sources: scholarly construction publications, accreditation manuals and reports, and industry reports. The data is extracted using a qualitative approach, and then a mixed method approach is used to analyze the data. The literature review defines the soft skills gap. The literature-based discovery approach combined with the root-cause technique helps in defining five causes that contribute to the existence of the gap. Then, the researchers propose criteria that they will use as a starting point to conduct a normative analysis to

the methodological options and at the end of the research to assess the inference quality of the research. Figure (1) conceptualizes the paper methodology.
This paper is part of a (**Research and Development**) study. The researchers seek to discover a new perspective of reducing the soft skills gap and develop a decision aid model to help academia in better implementing soft skills in construction education**.** The researchers used a descriptive argument to develop this paper. The paper focuses on describing the process of developing the eligibility criteria only.

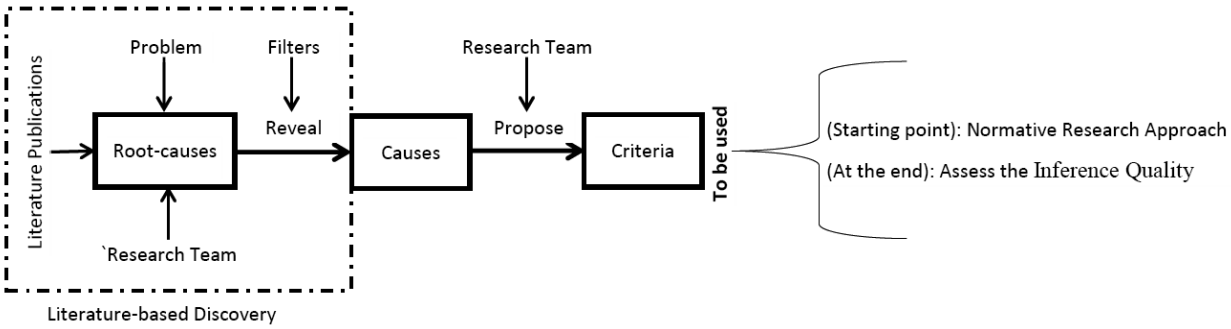

Figure 1: The paper methodology

Results

Soft Skills Gap: There is evidence of a significant gap between the construction industry's needs for soft skills and the preparedness of construction graduates.

In the construction industry, the soft skills gap is partially a knowledge gap and also a supply/demand problem. Andrews and Higson (2008) argue that there is an increasingly wide 'gap' between the skills and capabilities of graduates and the requirements and demands of the work environment. Many employers have expressed dissatisfaction with their newly hired graduates, especially with respect to soft skills. Other employers state that projects could fail due to the lack of soft skills among project staff rather than lack of technical competency (Alpern 1997), (Russell et al. 1997), (Shtub et al. 1994).

Construction literature clearly highlights the existence of a soft skills gap between the construction industry's needs and the level of soft skills ability in graduates from construction programs. The literature has many examples of soft skills related innovations (Achor and Achor 2000; Alter and Koontz 1996; Berryman et al. 2004; Chinowsky and Vanegas 1996; Cho et al. 2014; Fiori and Songer 2009; Grosskopf 2004; Hauck 1998; Jackson 2005; Mills and Beliveau 1999; Nassar 2002; Riley et al. 2008; Senior 1998).

Recent competitiveness reports done by Institute for a Competitive Workforce, clearly indicate that there is a significant and growing skills gap in the all US industry sectors including construction (Institute for a Competitive Workforce 2012). In these reports, soft skills gain more focus and the gap is highlighted using a quantitative approach. For instance, late 2012, the Association for Talent Development (ASTD) conducted a survey for its members to explore the skills gap issue in their firms (Parker 2012). Prior to the survey, ASTD defined the skills gap as a "significant gap between an organization's current abilities and the skills it needs to achieve its goals. It is the point at which an organization can no longer grow or remain competitive because it cannot fill critical jobs with employees who have the right knowledge, skills, and abilities." The survey respondents were from different industries with different backgrounds. The outcomes of the survey indicate that the majority of the respondents, 84%, mention a skills gap in their firms. Likewise, 54% of the respondents rank "leadership and executive level" skills at the top of the skills gap that their organization is experiencing. Given that leadership and executive level skills are soft skills, the survey highlighted more soft skills as the highest areas for skills gaps in the respondents organizations like: managerial and supervisory skills, communication/interpersonal skills, profession- or industry-specific skills and customer service skills, whilst skills like: basic skills, technical/it/systems skills and sales skills received lower ranking.

Another quantitative indicator for the soft skills' gap was evident in a 2012 survey conducted throughout North Carolina by Workforce Development Boards of North Carolina (Representatives 2012) to employers in all 100 counties including construction employers. The aim of the survey was to identify the skills gaps and the recruiting challenges, determine the current skills' needs, and find out which skills were critical among newly hired employees. The survey found that 58.9% of the respondents had indicated that Communication and Interpersonal Skills represented a primary gap in the workplace, while 46.8% of them indicated a gap in Critical and Analytical Thinking, and 45.4% admitted a gap in Problem Solving.
Construction management literature has more focus on the technical side of construction knowledge whilst it somehow ignores the non-technical part. Pant and Baroudi (2008) argue that the focus of construction management literature has always been on the hard skills, shifting 'soft skills' from the forefront to the background. Both Russell et al. (1997) and Ceran and Dorman (1995) argue that construction managers must supplement their traditional functions with other non-engineering knowledge and skills to meet today's professional demands for which they become responsible. While there is a development in thinking about the nature of 'soft skills' and its role in construction projects, such an approach has not changed significantly.

Factors Contributing to the Soft Skills' Gap

Applying the literature-based discovery and Roots' Cause Analysis methods to extract and analyze information from scholarly construction-related papers and reports resulted in defining five reasons for the soft skills gap. In combination or isolation, those reasons contribute to the continued existence of the soft skills' gap and the failure of current remedial approaches.

1. The existing content, definition, interpretations and approaches for soft skills used among construction educators and employers are not clear:

An acceptable standardization for construction industry-related soft skills classification has not yet been identified. For all stakeholders, it is a big challenge to figure out how to identify soft skills. The majority of scholarly studies on industry-related soft skills are using overwhelmingly ambiguous expressions and terms to represent soft skills. This renders a different interpretation for them by employers in different settings (Male et al. 2009). This also results in a mix up and confusion for understanding the skills gap content, whether it is non-technical skills (Pant and Baroudi 2008), employability skills (Andrews and Higson 2008), interpersonal skills (Egbu 1999), critical skills, emotional intelligence (Darnell 2005; Goleman 2006), (Goleman 2006), or soft skills (Hager et al. 2000; Muzio et al. 2007; Pant and Baroudi 2008).

There is little to no standardization of soft skills needs data among construction academia and industry. This contributes to an information gap on soft skills requirements for current and future construction jobs' needs and makes it difficult for construction academia to design appropriate curriculum to address those needs.

2. Both the construction industry and academia are not aware of the nature and magnitude of the soft skills gap:

The dominant view is that construction schools are unable to offer the needed soft skills without any clarifications or precise dimensions to what is really needed (Group 2004). There are no consensuses on standard or good tools to assess students' soft skills level during education and/or immediately after graduation.

Construction academia scholars need to better understand the employers' soft skills needs in order to prepare graduates with the needed soft skills abilities. Recent researches conducted by construction academia are often based on examining abstract and non-measurable phenomena (Representatives 2012). Alternatively, different measurement indicators are used by other stakeholders. Employers prefer to use opinion surveys to measure the soft skills gap, while economists and policy makers use educational achievement as indicators. This has contributed to more dispersion for the measurements and ultimately for the remedies in academia.

While this could be due to the challenges to quantify the soft skills cultivation, it is unlikely that they will address the soft skills gap and develop appropriate remedies without an objective soft skills measurement or benchmarking

tool or methodology. Tackling the gap will rely in highly subjective and possibly misleading methodologies unless we use standardized and measurable methods.

3. Current solutions to bridge the soft skills gap are unstructured:

The construction academia is working towards bridging the soft skills gap. However, remedial efforts based in part on educators' personal judgments and in part on some cursory and scattered researches are not enough. The United States has no cohesive national strategy focused on skills or particularly soft skills education (Institute for a Competitive Workforce 2012). However, there are scattered efforts toward this goal. In the construction literature, there are numerous examples proposing specific alignments for construction education including (Achor and Achor 2000; Alter and Koontz 1996; Berryman et al. 2004; Chinowsky and Vanegas 1996; Cho et al. 2014; Fiori and Songer 2009; Grosskopf 2004; Hauck 1998; Jackson 2005; Mills and Beliveau 1999; Nassar 2002; Riley et al. 2008; Senior 1998) and many others. These examples could be valuable if standardized, yet there is an absence of notable progress toward applied efforts in construction practice. The researchers are still debating a central, unclear problem without consensus or answers to critical questions, such as: How do we embed soft skills in the curriculum? What is the best delivery method? How do we assess students' soft skills level and how do we assess them after graduation? How can we benefit from collaboration with industry? How can we share the best practices between schools? How can we improve our students' usefulness and cultivation from those efforts after graduation? These findings and unanswered questions signify that the construction program's curricula are not currently satisfying the industry's needs (Bilbo et al. 2000).

4. The existing construction education curriculum cannot sufficiently support students to cultivate soft skills competencies to match the industry's needs. There is a lag between the construction curriculum updates as it compares continuous changes in the industry:

Construction Management and Building Construction are relatively new disciplines in academia (Ciesielski 2000). The first formal construction courses can be traced back to the 1920s (Dietz and Litle 1976). Massachusetts Institute of Technology, Union University, and Yale University developed courses in construction that focused on technical processes and technology without any management content (McDaniel 2010). By the 1940s, the educators designed construction to meet the demand for federal government projects and representatives of the building industry (Gunderson et al. 2002). Since that time, construction procurement was dominated by a single delivery design / bid / build (DBB) (Miller et al. 2000). Construction educators developed the construction curriculum to satisfy industry needs which were based on DBB delivery methods. For that, the curricula of construction programs are influenced by the DBB traditional contracting system (Riggs 1988).

Established curriculum of construction schools serve the needs of the industry with more technical knowledge compared with non-technical knowledge (Pant and Baroudi 2008). The changes in business practices and job roles have influenced the increased demand for soft skills by industry and gradually shifted their expectation of construction graduates' abilities. The construction education fails to view the employer as the customer (Institute for a Competitive Workforce 2012). Traditionally, the Higher-Education has served two primary customers equally: the individual and the employers. Past publications strongly argue that Higher-Education needs to change the focus from serving individuals to serving employers. However, constructing education sustains using the old traditional curriculum frameworks with minimal or slow changes to address the new challenges for the industry. This produces a lag between construction school graduates' abilities and the construction industry's expectation.

5. Soft skills are regarded as less important than technical skills by construction higher education accreditation bodies:

The American Council for Construction Education (ACCE) and the Accreditation Board for Engineering and Technology (ABET) are the default accreditation institutes for construction schools in the US. Reviewing the current accreditation criteria for both ACCE and ABET indicate the lack of recognition for soft skills as a needed critical outcome for construction schools.

Reviewing the recent ACCE standards shows that they require a stand-alone course for three soft skills: oral communication (and/or oral presentation), ethics and human behavior. The standards also ask to incorporate/ integrate few other soft skills in the curriculum. However, soft skills such as: Effective Meetings skills, Conflict Resolution Skills, Negotiation skills, Stress Management skills, and many others are not addressed. Similarly, requirements of soft skills by ABET standards is lacking. Neither ACCE nor ABET provides a clear tool or methodology to implement the proposed soft skills set or how to audit them.

When comparing ACCE and ABET standards with other accreditation standards for other degrees it becomes evident that others put more emphasis on soft skills. The Association of MBAs (AMBAs) and the European Quality Improvement System (EQUIS) incorporate a larger number of soft skills. For example AMBA's MBA focuses on both personal and interpersonal skills. It includes interaction and communication skills as well. EQUIS includes self-criticism, coping with complexity, self-awareness, critical thinking, teamwork, communication, interpersonal skills, and leadership.

While it is difficult to teach or measure soft skills, they are proving increasingly valuable in the construction industry. Construction accreditation standards have recently begun promoting and requiring the inclusion of soft skills in the curriculum once they recognized their impact on improving the breadth of knowledge of the graduates and in response to the increasing demand of the construction industry.

Discussion

For success in the workplace, construction industry employers need qualified entry-level graduates who possess needed soft skills coupled with their technical skills. There is a soft skills gap among construction school graduates. The soft skills gap is a result of various factors that contribute to the problem. There is a lack of consensus, clear vision, standardization and common language on the soft skills gap between industry and academia. The researchers propose criteria that can be used to conduct a normative analysis for the possible methodological approaches to tackle the soft skills gap and define the best one of them. Those are:

- Developing the foundations of soft skills among graduates is the construction academia's responsibility. Therefore, alignment is needed for the construction schools' curricula.
- Standardizing the soft skills and using them all to design the solution.
- Clearly organizing the industry and academia input in developing the remedies.
- Prioritizing the soft skills based on the construction industry's needs.
- Benchmarking the existing state of soft skills among construction graduates and setting future development goals.
- Having a continuous development component so that it keeps monitoring the soft skills status and developing the solution based on up-to-date data from industry.

The researchers use these criteria to define the best methodological approach to tackle the soft skills gap among construction graduates using a normative analysis. They develop a decision aid model that produces a reliable holistic soft skills curriculum for construction education and offers a continuous collaboration system between industry and academia to ensure the increase of soft skills cultivation among construction graduates and ultimately reducing the soft skills gap.

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