

# **The Impact of Experiential Learning: Assessing the Outcomes of Internship Experiences for Students Entering the Construction Industry**

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## **ABSTRACT**

The state of the economy has brought changes in the construction industry creating a more competitive employment environment in the construction industry as well as an increase in project requirements due to complexity, duration of work, fewer employees to do the work, and the type of projects being undertaken. These changes have created an increased need for managers to possess both technical skills and also emotional competencies. Employers are now seeking to hire individuals who exhibit emotional competencies and other soft skills, such as empathy, verbal communication and relationship building.

Soft skills improve the development and maintenance of relationships among the diverse group of professionals necessary to complete projects. With the construction industry being nomadic in nature, the ability to develop and maintain relationships can be especially important. Employers are placing more emphasis on these soft skills when evaluating potential hires and starting salaries.

With these changes comes the realization that students seeking to gain employment in the industry need to have a competitive edge. While soft skills are critical for students graduating from construction focused programs, opportunities to learn and enhance these skills are not always available within the curriculum. The majority of students graduating from college programs today are part of a generation referred to as Millennials—a generation differing greatly from those that have come before them.

For Millennials to gain a competitive edge and maximize employment opportunities, they must first have an understanding of what the industry perceives students need to be successful in the industry. Program curriculums must also find a way to produce students that offer more than just technical knowledge to employers. This is not always possible within existing programs trying to meet the demands of accreditation requirements within the credit hours required. One option construction focused programs could consider to incorporate opportunities for students to gain a competitive edge would be through the mandatory participation of a structured internship experience.

This research sought to address these issues and offer insight into what characteristics industry felt were necessary for student success. The work also sought to establish whether students had an understanding of these characteristics and whether they felt they were strong or deficient in these areas. The research also identified the role internships played in current accredited construction focused programs and whether student participation in internships had an impact on their understanding of the characteristics required to be successful in the construction industry.

## **DEDICATION**

This research is dedicated to my beautiful mother, Dora Frances Short, whose constant love and support gave me the courage to return to school to further my education; and whose tenacity I inherited, which allowed me to see it through to completion.

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# Chapter 1 Introduction

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## 1.0 Introduction

The state of the economy has created a more competitive employment environment in the construction industry. These conditions have made it important to maximize the amount of knowledge provided to students as well as enhancing additional skills that will help them gain a competitive advantage in the job market. Some of the pressures placed upon university construction programs include increased requirements in curriculum content from program accreditation councils, and changing demands in industry needs. Additionally, many programs are facing pressure to reduce required credit hours from University officials. Construction education programs that operate on a semester schedule require from 124 to 144 credit hours for students to obtain a degree (Chapin et al. 2003). Due to these pressures, it is difficult to incorporate into the construction curriculum, all the required information as well as courses that enhance other skills that may offer students a competitive advantage.

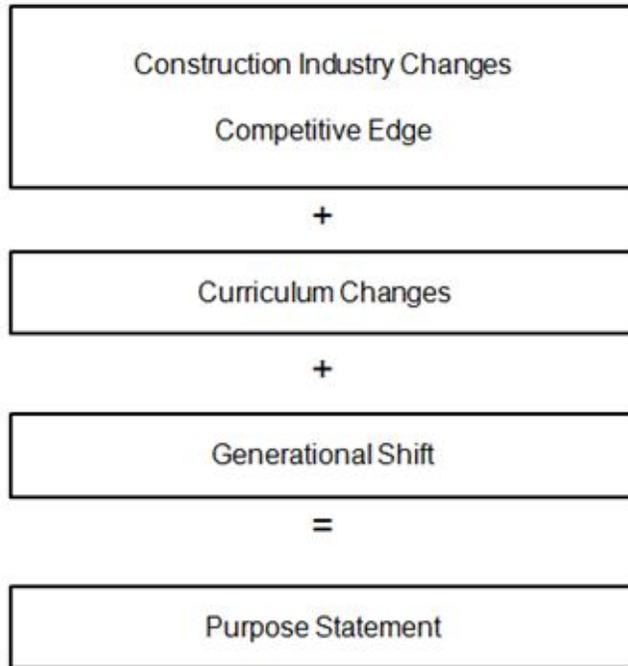
University construction management and construction engineering and management programs offer curriculum primarily composed of classroom experiences, based in theory. Applying classroom knowledge to real world situations can be difficult for students as they have varying learning styles. Learning engages the entire physiology. Teachers cannot simply address the intellect of students (Caine & Caine 1991, LPA 2010). Students require not only exposure to information but also need to be an active participant in the acquisition of that information.

Knowledge presented in the classroom environment can be enhanced by hands on or real world experience through experiential learning. This is not possible in all courses.

Additionally, instructor control of the learning process is the most common teaching style of the traditional lecture classroom (Monson 2011). The student benefits of exposure to practice as part of a curriculum are well documented (Otero-Keil & Basantis 2000, Schuurman et al. 2008, Fiori & Pearce 2009). Experiential learning gives students exposure to more than the academic side of an industry and enables a student to apply classroom material more effectively (Tener

1996, Fiori & Pearce 2009). Maximizing the understanding of theory through active learning measures will result in a more engaged student that participates in their education. The link between the classroom and the real world is essential to the growth of the student (Wiggins 1999, Fiori & Pearce 2009).

Students graduating today are part of Generation Y, also known as the Millennium Generation. Research has shown that these students often lack the soft skills necessary for building successful relationships with Generation X and Baby Boomer generations—the majority of whom own the construction companies and manage industry projects (Conference Board et al. 2006). These soft skills are critical to the student graduating from a construction program but are not always available within the curriculum. Developing soft skills among construction company employees creates an enhanced environment for recognition of incentives in sharing knowledge by exchanging and combining their knowledge (Nelson & Winter 1977, Dubois & Gadde 2000, Davis & Walker 2009). From the leadership point of view today, organizations that do not pay sufficient attention to “people” and “cultural” variables are consistently less successful than those that do (Anteby and Khurana 2008). In the construction industry, it is necessary for a group of individuals from diverse backgrounds with varying expertise or trades to come together to



**Figure 1: Purpose Statement Development Process**

accomplish the end goal of completing a project. Improving soft skills can improve the development and maintenance of relationships among this diverse group of professionals. The change in industry which has created a need for students to have a competitive edge, changes in the construction curriculum and the generational shift that is now occurring in the construction industry has guided this research as demonstrated in Figure 1.

### **1.1 Construction as an Industry has Changed**

Traditionally project management is understood as using the right tools and techniques for being successful, regardless of a project manager's match of personality with project type (PMI 2004, Müller & Turner 2010). Many construction companies offer some type of training for employees during their orientation or during their tenure with the company. This training is usually safety oriented training required by Occupational Safety and Health Administration (OSHA) and technical training for trades (OSHA 2013, Gann 1998, Wilkins 2011) . What is often missing is the understanding that project managers not only manage projects but also people. As mentioned before, the construction industry is comprised of people with diverse

backgrounds and varying expertise which must work closely together to accomplish the goal of finishing a project. Each of the stakeholders within a project must be able to work with one another to adhere to the prescribed schedule and meet the needs of the project (Müller & Turner 2010).

Project manager training and development should focus not only on technical and management skills, but also on development of leadership competencies. Transformational leadership, and concern for people, is necessary on more-demanding projects (Müller & Turner 2010). The current state of the economy has created an increase in project requirements due to complexity, duration of work and fewer employees doing more work, the types of projects being undertaken today, and this has created an increasing need for emotional competencies in the manager (Müller & Turner, 2010).

## 1.2 Educational Changes

Formal education has changed with the incorporation of computer technologies. With more information available and the rate at which new information is being produced, one of the more important skills for students to have is knowing how to learn (Pink 2006).

Learning can be seen as a qualitative change in a person's way of seeing, experiencing, understanding, and conceptualizing something in the real world rather than as a quantitative change in the amount of knowledge someone possesses (Ramsden 1988, Weimer 2002). The increased use of computer technology in the classroom has made an abundance of information available to students 24 hours a day. Most information a person wants to acquire can be found just by typing a few words into a search engine. More important than memorization is for students to have a comprehension of what is being taught.

Societal changes and the abundance of people in the workforce looking for work have created a need to produce students that offer more than just technical knowledge. Students entering employment need to find ways to stand out above the rest. Mastery of design, empathy, and

other seemingly 'soft' aptitudes is now the main way for individuals and firms to stand out in a crowded marketplace (Pink 2006). These soft aptitudes are much more difficult to measure than those captured by standard aptitude tests, that measure knowledge retention.

The capacity to see the big picture is perhaps the most important skill in this time of remarkable prosperity and plentitude (Pink 2006). Many are crunched for time, deluged by information, and paralyzed by the weight of too many choices. The ability to see the big picture, rather than just details, allows us to distinguish between what really matters and what merely annoys (Pink 2006).

### **1.3 The Competitive Edge**

Last century, machines proved they could replace human backs. This century, new technologies are proving they can replace human left brains (Pink 2006). Only the human mind can think metaphorically and see relationships that computers could never detect. Metaphorical thinking is also important because it helps us understand others. That is one reason marketers are supplementing their quantitative research with qualitative investigations into metaphorical minds of their customers (Zaltman 2003, Pink 1998, Pink 2006).

In the next 30 years, according to UNESCO, more people worldwide will be graduating through education than since the beginning of history (Robinson 2006).

During the second half of the twentieth century, routine mass production jobs were moved to other countries where the cost of labor was much less. Students seeking employment will need to do what workers abroad cannot do equally well for much less money. Developing and maintaining relationships rather than executing transactions and synthesizing the big picture rather than analyzing details (Pink 2006).

Today's challenging times also emphasize the importance of effective leadership (Leslie 2009). According to the latest research, IQ accounts for between 4 and 10 percent of career success.

More important are the qualities that are harder to quantify such as communication skills, leadership and personality. These are characteristics not measured on aptitude tests (Pink 2006).

For construction employees, it is important to constantly think ahead—to see the big picture. Many people get caught up in the details of a project without considering how those details work together. Managers and trades people need to understand how all the systems and materials come together for the completed project. For example, structural engineers must have an understanding of a building's expected and potential use and what types of loads the building will be subjected to so they can design a structure that can withstand these loads.

So what does this mean for the students graduating from construction programs? The most important factors for students searching employment in the construction industry are by order of importance: (1) oral communications; (2) listening ability; (3) enthusiasm; (4) written communication skills; and (5) technical competence (Badger et al. 2007, Walsh 1993). As noted earlier, the traditional classrooms focus on the latter two of these skills, written communication and technical competence. Other research has been done on key construction competencies for the construction industry that also emphasized technical competence but found other qualities such as leadership, ethics and collaboration important as well (Ahn et al. 2012). Qualities such as communication skills, leadership, personality, and enthusiasm are referred to as soft skills. A more general definition of soft skills would be desirable qualities that do not depend on acquired knowledge. The 2008 International Encyclopedia of Social Sciences, (Volume 8, 2<sup>nd</sup> Edition) defines soft skills as “core abilities and personal attributes that complement hard skills, that is, the technical knowledge required of an individual in the workplace. The term refers only to key abilities that can be applied to job performance.” The definition goes on to emphasize that soft skills are difficult to measure compared to technical skills, which have a straightforward or measurable impact on outcome. A simple one-

dimensional definition does not exist for soft skills though the concept includes communication skills, self-confidence, integrity, respect, leadership, conflict management and collaborative skills (Darity 2008).

The US Department of Labor acknowledges the importance of soft skills for young workers to gain a competitive edge. They cite a report that young workers lack soft skills and specifically notes those lacking include professionalism, work ethic, oral and written communication, teamwork and collaborative skills, critical thinking and problem-solving skills (DOL 2013, The Conference Board et al. 2006). This research will identify several of these skills in the results of the data collection. For the purpose of this paper, a focus will be the on the soft skills self-confidence, work ethic, communication, personality, and leadership. Incorporating these qualities and creating enthusiasm in students can be much more difficult, especially in a system that is already overloaded.

#### **1.4 Challenge to Curriculum**

The need to cover content strongly influences, if not dictates, most instructional decisions. The race to cover as much content as possible has negative consequences for students. It reinforces learning strategies that focus on memorizing, regurgitating and forgetting (Weimer 2002). There have been research studies showing that students retain little understanding of course content (Arun and Roksa 2011). While many students can reproduce large amounts of factual information on demand, many are unable to show that they understand what they have learned (Weimer 2002).

Students need to leave college knowing content and knowing how to learn more. Content can be used as a vehicle to develop learning skills and promote self awareness of learning. Letting the students experience the content first hand and do the work themselves, promotes continual learning (Weimer 2002). Experiential learning can offer students that opportunity to experience content first hand. Typical activities classified as experiential learning include interning, field

work, service learning, in-class simulations, and others (Riley et al. 2007, Pearce et al. 2010), although some researchers include any learning that involves doing something, including taking notes in a lecture or participating in a discussion (Domask 2009, Pearce et al. 2010).

Experiential learning through an internship program may be a vehicle to enhance the acquisition of knowledge. The term internship can be defined as any official or formal program where a novice acquires practical industry related experience (Chapin et al. 2003) where the learner is directly involved in the phenomena being studied (Cantor 1995). One goal of an internship is for students to acquire new knowledge. Site-based activities lead to the acquisition of knowledge as students' experiences serve as a catalyst for deeper investigation into a topic that was only given limited attention in class. Students may also utilize internships to generate new knowledge or insights through original research (Parilla and Hesser 1998).

The accreditation requirements for construction programs require increasingly more information be covered in the coursework throughout the educational process. Although the programs are required to increase content, credit hours have not increased. Universities require an average of 130 hours for students to receive a degree (Chapin et al. 2003). If internships can provide an opportunity to meet several standards then incorporating them into the curriculum can assist in programming. Internship programs are an integral part of many engineering and construction programs throughout the country ( Otero & Basantis 2000, Tener 1996, Wiggins 1999, Fiori & Pearce 2009). If there were no tangible benefit associated with participation, internships as part of a curriculum could be eliminated.

### **1.5 The New Generation**

Sean Estill, a CMA member and mechanical engineer for Leland Saylor Associates, San Francisco, says, "Many in the older generation can barely use excel, but the young people only work on-screen and are very comfortable with computer modeling" (Abaffy 2011). Internships

can help students understand the difference between information and knowledge as well as understand the importance of non-digital skills and reliance on those skills.

The traditional students graduating from college today are from a new generation. Born between 1982 and 2003, Generation Y, or the Millennials, have been hailed as the new 'Great Generation' (Wilson & Gerber 2008). Figure 2 shows the age groups associated with Millennials as well as Generation Xers and Baby Boomers.



Figure 2: Generations by Birth Year (based on Underwood 2011b)

It is important to realize the mindset of this age group of students. Since 1998, the Beloit College Mindset List is compiled each year by two professors at Beloit College in Wisconsin (Beloit 2011). It was originally created as a reminder to faculty of dated references, and quickly became a catalog of the rapidly changing worldview of each new generation. This list can serve as a reminder that the way college students view the world can be very different from the way the world is viewed by those with which the students will be required to work. The list for the class of 2014 notes that “since ‘digital’ has always been in the cultural DNA, students have never written in cursive and with cell phones to tell them the time, there is no need for a wrist watch.”

For this generation, adulthood is being delayed past their 20’s. Because of our rapidly-increasing lifespan, the 20’s for Millennials is going to be extended adolescence (Underwood 2011b). First-Wave Millennials just happen to be the generation that is catching this new wave,

just as Boomer women caught the Women's Movement wave, and just as Generation Xers caught the computer wave (Underwood 2011b).

Unlike prior generations that left school and instantly got serious about a career commitment, Millennials are using their first decade of adulthood have fun, delay the serious commitment of marriage and parenthood, and importantly postpone serious commitment to an employer (Underwood, 2011b).

The job-hopping characteristic of the group is linked to their lack of commitment, something the Millennials themselves confirm (Underwood 2011b, Abaffy 2011). Millennials are showing less loyalty to employers than any previous generation of twenty-somethings, including job-hopping Gen Xers who are currently 30 to 46 years old (Underwood 2011b).

Having always used computer technology, it is difficult for Millennials to distinguish between information and knowledge. Being accustomed to instant access these students will need to acquire the patience of learning. The Millennial Generation has not known a time without common use of computer technology and they are expecting to use it in most every aspect of their lives. This differs from the previous two generations who had to become accustomed to using computers and advanced technologies.

With technology and social networking so prominent in the lives of students today, building face to face relationships is not a prevalent skill. They are used to instant communication in an informal, sterile environment. Most personal relationships are built within the safe, nurturing environment of the over protective family and with a few peers (Beloit 2011).

Convenience has always been provided for this generation. Hand writing notes for people is unheard of with this generation whereas many of the older people they will be working with require written forms of notations (Beloit 2011). Even within the classroom, many students opt for taking notes on their computer and netbooks rather than suffering the arduous task of hand

writing. Typing can be much faster than writing out information and with auto correct features of word processing programs, mistakes get corrected without the user having to review their work.

A Pew survey found that 58% of the respondents cited a lower work ethic as being the biggest deficiency of Millennials compared with previous generations (Abaffy 2011, PEW 2010). Many corporate professionals around the country repeatedly say that Millennials don't want to work the pay-your-dues hours that entry level usually requires, that their generation often views overtime as an unacceptable intrusion upon their work-play balance, which is very important to them. And, this make-the-world-a-better-place generation is so eager to do *meaningful* and *relevant* work that they sometimes consider entry-level assignments to be beneath them (Underwood 2011b).

Far more than Gen Xers, and differently than Boomers at the same age, Millennials have a high regard for themselves, not just as individuals, but also as a group (PEW 2010). Wherever they are—college, high school, sports team, theater group, student government, clubs—they are more inclined to think of anything done by their youth peers as competent, effective, and promising. This can become a problem when students begin working with persons of older generations who have spent years or even decades learning the trade and working their way up the ranks to management positions that Millennials now feel are where they should begin their career. Once they begin work, their self efficacy may be affected as they realize they still have much to learn. Self efficacy, or the belief in their ability to succeed in a particular situation, is important for students entering employment. Self efficacy helps students see challenging problems as tasks to be mastered, develop a deeper interest in on the job learning, form a stronger sense of commitment to the industry and recover quickly from setbacks and disappointments (Bandura 2006).

Self efficacy is a belief, based in social cognitive theory, that provides the foundation for human motivation, well-being and personal accomplishment. Unless people believe that their actions can produce the outcomes they desire, they have little incentive to act or to persevere in the face of difficulties (Anderman & Anderman 2009).

Self-efficacy should not be confused with outcome expectations, which are a person's judgment of the consequences that their behavior will produce. Confident individuals anticipate successful outcomes. Students who are confident in their social skills anticipate successful social encounters. The opposite is true of those who lack confidence. People who doubt their social skills often envision rejection or ridicule even before they establish social contact. When self-efficacy and outcome expectation differ, the self-efficacy belief is more likely to determine the behavior (Anderman & Anderman 2009). Self-efficacy correlates with student motivation, performance, academic choices and achievement (Pajares 1996).

The seven distinguishing traits of the Millennial Generation are: special, sheltered, confident, team-oriented, achieving, pressured and conventional (Wilson & Gerber 2008). Millennials are excellent team players. They care about the entire organization in which they work, not just their own jobs (Underwood 2011a., Abaffy 2011). They have long worked in task groups and are skilled in collaborative effort. Millennials are developing strong team instincts and tighter peer bonds (Wilson & Gerber 2008).

They are the largest, healthiest, and most cared-for generation in American history (Wilson & Gerber 2008). Many Millennials grew up being shuttled from teachers to tutors to coaches and then back to the parents. They had far less unsupervised free time than their parent's generation and, as a result, are comfortable working with older adults (Underwood 2011a, Abaffy 2011). Boomers are more internally driven, operating with an inner compass. Millennials respond best to external motivators and are highly rationalistic (Wilson & Gerber 2008). A down

side to this attribute is that Millennials are used to being guided and told what to do, when to do it and how to do it. Resourcefulness is one of the top current leadership deficits (Leslie 2009). It will be important for today's students to learn to be more resourceful if they are to successfully lead.

This lends itself to the generation's high level of tolerance and acceptance of others. Tolerance has always been represented in their lives (Beloit 2011). Internships can provide students a safe environment to realize that not all situations are accommodating to those with differences and the need for relating to those who have differing opinions. Seeing the time it takes to construct in the field can help build an understanding that everything isn't instant. Manual labor takes time and can encounter difficulties.

### **1.6 Purpose Statement**

When universities cannot accommodate the incorporation of soft skills into the curriculum, this knowledge can be obtained through experiential learning, more specifically internship programs. Personal observations and experience have revealed that industry trade workers are more likely to take the time to educate those in the role of student than persons already employed in the industry. This opportunity must be exploited to provide students with an opportunity to apply the knowledge they gain in the academic setting and enhance communication and relationship building among those who will become their peers.

The constructivist learning model emphasizes that learning is affected by the context in which an idea is taught and that experiential learning is the most effective way to embed material. Bloom's Taxonomy (Bloom 1954) of ordered thinking skills correlates to this same model as seen in Figure 3. The lowest level of the thinking process is knowledge which is taught in the classroom. Moving up in order, comprehension and then application are skills that can be enhanced through experiential learning. Participation in an internship program offers students the opportunity to put theory into practice. Applying the information in a field setting can then

further thinking skills to the analysis stage and beyond. Internship programs provide a means to support construction education curriculum and provide the student with the opportunity to see the application of theoretical concepts learned in the classroom, taking place in an environment that is not as prescribed and safe as the classroom.

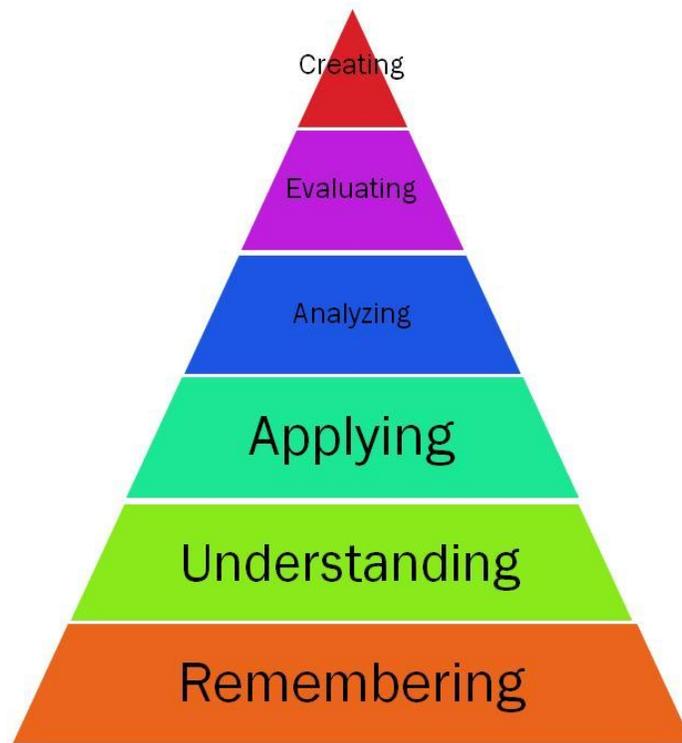


Figure 3: Based on Bloom's Taxonomy of Thinking Skills

### 1.7 Research Scope

The scope of this research will be limited to investigating internships with respect to how they influence the soft skill development and perceived self efficacy of undergraduate students currently enrolled in accredited construction focused programs. This scope will also include an investigation into what industry hiring personnel perceives are the characteristics students require to be successful in the construction industry. This investigation will be approached from academic, student and industry perspectives to allow an accurate portrayal of the role internships play in student success in the construction industry.

## 1.8 Summary

The transient nature of the construction industry makes it unique among many other professions. Building relationships among the trade persons can be difficult as people are not engaged with the same people on a daily basis. Different trades will rotate on and off the project based on the project schedule. Additionally, each project will have a different set of subcontractors working on site. Enhancing the soft skills of employees can directly affect the success of a business. The building of relationships among the various, diverse trades helps promote the sharing of knowledge and flow of the project work.

Students entering the construction industry today are part of the Millennial generation. These students often lack the soft skills necessary for building successful relationships with Generation X and Baby Boomer generations—the majority of whom own the construction companies and manage industry projects. With technology and social networking so prominent in the lives of students today, building face to face relationships is not a prevalent skill.

The state of the economy has created a more competitive employment environment in the construction industry. Societal changes and the abundance of people in the workforce looking for work have created a need to produce students that offer more than just technical knowledge. Students entering employment need to find ways to stand out above the rest. It is important to offer students an opportunity to enhance their verbal communication, listening skills and ability to build relationships. These soft skills are critical to the student graduating from a construction program but are not always available within the curriculum.

The learning-centered environments of many construction education programs promote foundational knowledge on which subsequent learning rests and awareness of learning. Students need to leave college knowing both content and knowing how to learn more. Content is important for students to develop learning skills and promote self awareness of learning.

Letting the students experience the content first hand and do the work themselves, promotes continual learning.

Incorporating first hand and real world experiences can be difficult for many construction education programs due to the demands on curriculum content by accreditation agency requirements. One way this opportunity can be provided to students is through an internship program. Internship programs offer students the opportunity to apply content learned in the classroom in a real world setting. They can help students understand the difference between information and knowledge. During the internship program, students will have the opportunity to interact with persons employed in the industry with whom they intend to work. This offers an opportunity to enhance student's soft skills critical for success in the construction industry today.

# Chapter 2 Background

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## 2.0 Introduction

The construction industry has experienced great change over the past twenty years with many innovations in building materials, computer technology, project delivery and people management (Hendrickson 2008, Lee et al. 2011). The industry has also experienced a reduction in work due to a downturn of the economy, resulting in less demand for employees (Yates 2010). Despite the recent economic conditions of the past few years, the construction industry has continued to thrive. Bill Badger, a professor at Arizona State University, believes “in the next thirty years we will build more things on this earth than we have in the last two thousand years” (Badger et al. 2007). With the creation and incorporation of innovative project delivery methods, computer modeling of buildings and building processes, and increased use of technology on the job site it may become difficult for university construction programs to incorporate all the knowledge and skills into their curriculums that students will need to make a successful start in the industry.

In order to gain a better understanding of these issues, the research will investigate previous work completed across four domains. These domains include construction, education, internships and the generational attributes and learning styles of Millennials. Figure 4 is a Venn diagram representation of the literature domains reviewed in this section. This will allow the researcher to evaluate the key aspects associated with internships and student success characteristics.

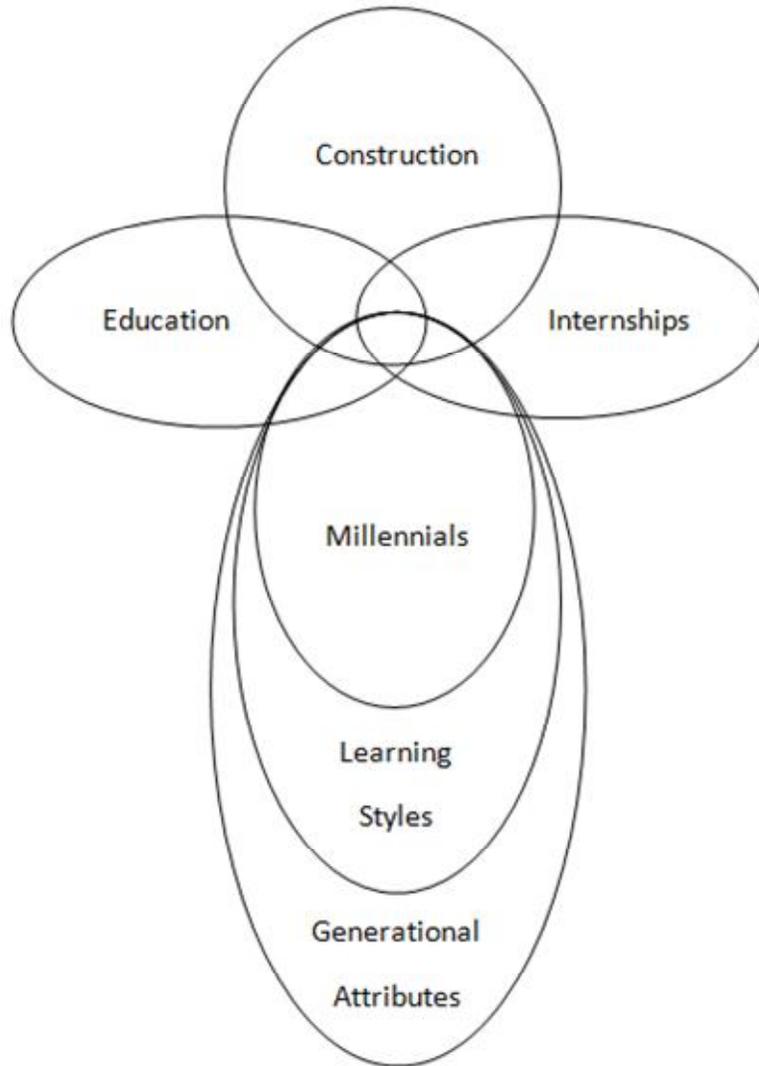


Figure 4: Venn Diagram of Literature Reviewed

## 2.1 Skills Required by the Industry

Persons knowledgeable about the different fields of construction such as carpentry, drywall, painting, and masonry, have always been in demand by employers in the construction industry. In addition to these technical skills, employers are looking more closely at soft skills of potential employees such as personality, drive, willingness to learn, teamwork skills and effective communication (Yates 2010). As the construction industry continues to grow globally there is an increased demand for graduates who possess the skills necessary to work in inter-

disciplinary and multi-cultural teams (Fiori et al. 2012). These skills have always been sought out by employers but with the current economic conditions, there is a growing emphasis on the importance of these skills for company success. A survey conducted by Lee et al. (2011) found that alumni of their program identified stress management, conflict management, time management and change initiation were important issues students need included in their education. Additionally, employers want future employees to have construction experience-- specifically hands on experience (Yates 2010). These are areas that need to be addressed as the Generation X and Millennials fill those positions left open by retiring baby boomers (Lee et al. 2011).

## **2.2 Importance of Soft Skills**

The focus on relationship building and other soft skills, such as communication, have been shown to be an important quality for those entering the current workforce as our society enters the new age of globalization and powerful technologies (Pink 2006). This Conceptual Age is placing a greater emphasis on skills like relationship building, empathy and emotional intelligence. Society is seeking out soft skills such as the ability to empathize with others, to understand the subtleties of human interaction, to find joy in one's self and to elicit it in others (Pink 2006).

Building relationships and improving emotional intelligence requires students interact with not only their peers but with those with whom they intend to work. Offering opportunities for this interaction is difficult and limited within the traditional classroom setting. The construction industry is a strongly based upon relationships. It is important for students to enter employment with the ability to communicate effectively so they can build and maintain relationships within the industry.

Following industry leads, The Myers Lawson School of Construction at Virginia Tech requires new graduate students to take a course in leadership that promotes emotional intelligence as an

important quality for managers and those in leadership positions to be successful. Promoting emotional intelligence helps students improve their communication skills as well.

### 2.3 Educational Approach

McMillan (2008) believes there are 4 types of knowledge: personal experience, tradition, authority and research. Much of what is learned by students throughout their educational history is authority knowledge—information transmitted to them by those who are considered authorities on the subject. Since the 90's, education has had a heavy focus on producing knowledge workers whose thinking style has shaped the character, leadership, and social profile of the modern age (Pink 2006).

Students want to have a part in their education and it is imperative that they be given the agency to do so. It is important to use activities that help students build confidence in their ability to learn as they develop self-awareness (Weimer 2002). A shift toward a more inquiry based pedagogy is slowly taking place and producing a less teacher-centered approach to learning and a more learner-centered classroom.

In an effort to enhance the learning of students, some teachers have begun incorporating materials and exercises aimed at the introduction of 'real world' aspects to the learning environment. A common approach to this is the use of the case study. This has the advantage of being based on real world problems, and it offers faculty a good measure of control on how and what is learned. Case studies have their advantages and can be powerful teaching and learning aids (Venkatesh et al. 2003). The case study's obvious limitation of course, is its abstractness. The case may depict the players and the climate vividly and in rich detail, but the portrait is fixed; it is static. Real ecologies cannot be predicted in advance. They feature power wielders and turfs and competing cliques. (Venkatesh et al. 2003). College students need more than just an abstract idea on paper or within a slide show. They need to have the opportunity to fully experience that which they are being taught.

## 2.4 Learning Theory

From birth, humans learn from their surroundings and external influences. Our language, speech and often our morals are learned from our interactions with and observance of others. This learning does not end once we become adults. Individuals receive information through education, training, interactions with people and environment, and other ways throughout their lives. What information we choose to acquire or retain and how we utilize that information is related to human agency (Bandura 2006). Students must acquire knowledge, not just receive it. For students to be active learners and acquire information, they require discovery and invention (Weimer 2002). Combining visual images with written text can help students remember what they read (Burmark 2002). Providing opportunities for students to physically experience the information, such as situated learning, when possible, has also been proven to aid in the retention of information. Situated learning is active, adaptive inquiry, where the learner continually tests their understanding of the use context and adapts their inquiry as needed (Venkatesh et al. 2003).

When situated learning is not possible or appropriate, then problem-based learning can offer a similar outcome. Problem-based learning is based on the idea that students need to be told less and to discover more (Weimer 2002). It allows the student to be an active participant in their learning and promotes leadership qualities. As students become more involved in their learning, they are able to construct their own knowledge through a learning model known as constructivism.

In the 80 years that construction education has existed, changes have occurred within the curriculum to keep pace with the many new demands within the industry. A way some education programs are dealing with these changes is by shifting to a more inquiry-based, or constructivist, classroom. Inquiry-based learning has driven many new applications in construction management programs (Abdelhamid 2003, Beliveau & Peter 2002, Gier & Hurd

2004, Lucko 2006, Montoya et.al. 2009, Scott & Fortune 2009, Sirotiak & Walters 2009, Monson 2011) such as the use of capstone projects (Monson 2011). Students need the opportunity to relate the knowledge presented in the classroom to what they already know, to make that personal connection so that the information becomes embedded and acquired instead of just received.

Within the constructivist paradigm, students are able to take responsibility for their learning. Without this responsibility, students may feel little commitment to learning and feel they cannot function without structure and imposed control (Weimer 2002). Students allowed to make their own decisions and provided opportunities to learn from one another can improve their self-efficacy.

Student skill development as a function of the curriculum should be addressed by faculty (Cates & Cedercreutz 2008). Those students seeking employment in the construction industry will need more than just technical skills to get them noticed by employers. Leadership education must be an essential part of every construction program. Successful construction managers need to have the ability to be sensitive to the relationships of the people around them (Badger et al. 2007). In a 1995 study of construction experts, Stephen Mead and Gay Gehrig found that construction education should increase 'people skills' by developing specific courses which will help professionals develop and strengthen these key skills (Monson 2011). This shift in what is becoming more important for success will affect what is taught in the construction classroom and how it is taught.

Undergraduate education can be improved through the application of consistent active, problem-based learning (Monson 2011). If there is no consistency and the active learning situations are more episodic then students may not adapt to this learning style (Monson 2011). The more completely students accept the passive role imposed on them in the traditional

classroom, the more they tend to adapt to the world as it is and to the fragmented view of reality deposited in them (Friere 1993). Learning is a life-long process and students must be actively involved in their learning to continue being life-long learners. By taking an active role in their learning, students also increase their perceived self efficacy. The process of learning is inseparable from individual empowerment (Kincheloe 2004).

The traditional student of today's classroom is part of a generation referred to as the Millennial generation. This generation is willing to put in the work, however, school for them is not something from which they expect enlightenment or personal transformation (Wilson & Gerber 2008). They commonly hold the idea that education is something done unto them and have experienced a life where every minute of their day was planned by someone else. Millennials also have an issue of entitlement, and feel they are special. Too often, they overestimate the value of their efforts and clamor for grades that should go only to the very best. Their generation's achievement orientation appears to have trumped other, better traits such as self knowledge and intellectual modesty (Wilson & Gerber 2008). This generation wants to be told what to do, when to do it and how to do it. Their future success depends on their ability to feel confident enough in their learning ability to make their own decisions about their education. If educators can provide a classroom climate that is challenging but not threatening to students then learning can be enhanced by that challenge (Caine & Caine 1991, LPA 2010). This may be possible by providing students some ownership over their own learning where the educator serves more as a guide than a dictator.

#### **2.4.1 Pedagogy**

Within traditional pedagogies, the instructor acts as the source of knowledge for students, assignments adhere to outlined course content, and the focus remains on individual student accountability (Buch & Wolff 2000, Monson 2011). These are rarely appropriate when one is dealing with Millennials (Wilson & Gerber 2008). The advancements of computer technology

have made an abundance of information available to students 24 hours a day. When facts become so widely available and instantly accessible, each one becomes less valuable. What begins to matter more is the ability to place these facts in context (Pink 2006). When students recognize their own importance in helping to shape the future of this increasingly global, interconnected society, the significance problem fades away. Simply telling them this is not enough, it must become pervasive in the learning environment (Wesch 2008). By adjusting the pedagogy based on the curriculum needs of students, educators can expose students to information determined to be essential for success, enabling students to develop a greater understanding of the material and of the significance of what is being taught.

The teacher is no longer merely the one who teaches, but instead teachers and students become jointly responsible for a process in which all grow (Friere 1993). This environment of shared power, while still offering the structure and guidance that is so familiar to the Millennials, can be a less threatening environment minimizing anxiety and enhancing learning.

According to theories and research related to self-regulated learners, students' motivation, confidence, and enthusiasm for learning are all adversely affected when teachers control the processes through and by which they learn (Weimer 2002). Socratic teaching requires teachers and students to have a willingness to participate, to engage, and to respond to challenges. Its aim is to demonstrate that students have their own valuable resources and share the responsibility for learning. The teacher manages the situation, but so does the student because he or she can refuse the form of management or else redirect it (Too 2000).

## **2.5 Construction Education**

Undergraduate programs in construction have been around for over 80 years. In that time, there have been many changes and improvements in the construction curriculum. The oldest continuing building construction program in the country construction program is located at the University of Florida which began in 1935 (UFL 2012). In 1948, they created the first Master

Degree program in the field of construction. Since that time, the construction education curriculum has seen many changes. As the numbers of degrees grew, the Associated Schools of Construction (ASC) was formed as an association for the development and advancement of construction education. According to the ASC website, today there are 123 member universities, colleges and technology schools. In 1975, the University of Florida's building construction program was the first program accredited by the American Council for Construction Education (ACCE) (UFL 2012). ACCE is an organization that advocates for quality construction education and strives to promote, support and accredit quality construction education programs (ACCE 2013).

### **2.5.1 Construction Curriculum and the Traditional Student**

The construction curriculum has had to undergo many changes with the advancement of computer technology and innovative developments in the field of construction, engineering and technology. Accreditation programs such as the American Council for Construction Education (ACCE), who determine the guidelines for accrediting construction education programs, have strict curriculum content demands leaving little flexibility for teachers to incorporate topics other than those required. Some accredited programs have credit hour requirements that mandate students take a minimum of 18 hours per semester if they are to graduate in four years. For those programs that are on a semester system, the hours required for a construction degree range from 124 up to 144 credit hours (Chapin et al. 2003). Chapin (2003) found that the average of programs operating on a semester basis, required 130 credit hours to obtain a degree.

### **2.6 A Generational Shift in the Workforce- The Millennials**

According to Abaffy (2011), the US Census shows the Millennial generation will compose the majority of the construction workforce by 2018. This new generation joining the ranks will be educated with degrees in building construction science, engineering and construction management. They have a different set of values from their predecessors and this can create

issues in some instances. Having a degree that is recognized by the industry can give them an inflated sense of confidence. Once they are placed in the field with skilled tradespersons, project managers and superintendents who have worked in the industry for decades, they can find themselves losing their sense of self-efficacy. It is important to use activities that help students build confidence in their ability to learn as they develop self-awareness (Weimer, 2002).

Weimer (2002) reviewed research on the Millennial Generation and defines them in her book, *Learner Centered Teaching: Five Key Changes to Practice*. According to her, Millennials are defined as having been raised in a structured environment, with parents who planned every minute of their day. They arrive at the college level less well prepared than those from previous generations and often lack solid basic skills. Many students lack confidence in themselves as learners. Students need to be able to receive an assignment, analyze it, break it into a set of separate tasks, move to complete those steps in a timely manner, and deliver a quality product. Millennial attitudes are different from previous generations of students. They blame others for their poor performance and inabilities and do not take responsibility for their own actions. In 2008, the Research and Training Center on Community Living, at the University of Minnesota, released a manuscript outlining the similarities and differences between the four main generations of working age currently employed in industry. Tables 1 and 2 outline some of the differences between these four generations (Tolbize 2008).

A shift toward a more inquiry based pedagogy is slowly taking place and producing a less teacher-centered approach to learning and a more learner-centered classroom. Millennials rely on instructors and others in perceived positions of authority to make their decisions and push when decisions are not made for them. When class assignments are made with general instructions, students want to know more details. They are not used to making the decisions for themselves (Weimer 2002). They are reluctant and seemingly lazy because they are

Table 1: Generational Differences (based on Tolbize 2008)

	<b>Traditionalist *</b>	<b>Baby Boomer</b>	<b>Gen X</b>	<b>Gen Y **</b>
<b>Work Ethic</b>	Hard working	Workaholic	Only work as hard as needed	
<b>Attitudes toward authority/rules</b>	<ul style="list-style-type: none"> <li>• They value conformity, authority and rules, and a top-down management approach</li> <li>• 13% included authority among their top ten values</li> </ul>	<ul style="list-style-type: none"> <li>• Some may still be uncomfortable interacting with authority figures</li> <li>• 5% included authority among their top 10 values</li> </ul>	<ul style="list-style-type: none"> <li>• They are comfortable with authorities and are not impressed with titles or intimidated by them</li> <li>• They find it natural to interact with their superiors</li> <li>• 6% included authority in their top 10 values</li> </ul>	<ul style="list-style-type: none"> <li>• They believe that respect must be earned</li> <li>• 6% included authority in their top 10 values</li> </ul>
<b>Expectations regarding respect</b>	<ul style="list-style-type: none"> <li>• Deference</li> <li>• Special treatment</li> <li>• More weight given to their opinions</li> </ul>	<ul style="list-style-type: none"> <li>• Deference</li> <li>• Special treatment</li> <li>• More weight given to their opinions</li> </ul>	<ul style="list-style-type: none"> <li>• They want to be held in esteem</li> <li>• They want to be listened to</li> <li>• They do not expect deference</li> </ul>	<ul style="list-style-type: none"> <li>• They want to be held in esteem</li> <li>• They want to be listened to</li> <li>• They do not expect deference</li> </ul>
<b>Preferred way to learn soft skills</b>	<ul style="list-style-type: none"> <li>• On the job</li> <li>• Discussion groups</li> <li>• Peer interaction and feedback</li> <li>• Classroom instruction-live</li> <li>• One-on-one job coaching</li> </ul>	<ul style="list-style-type: none"> <li>• On the job</li> <li>• Discussion groups</li> <li>• One-on-one coaching</li> <li>• Classroom instruction-live</li> <li>• Peer interaction and feedback</li> </ul>	<ul style="list-style-type: none"> <li>• On the job</li> <li>• One-on-one coaching</li> <li>• Peer interaction and feedback</li> <li>• Assessment and feedback</li> <li>• Discussion groups</li> </ul>	<ul style="list-style-type: none"> <li>• On the job</li> <li>• Peer interaction and feedback</li> <li>• Discussion groups</li> <li>• One-on-one coaching</li> <li>• Assessment and feedback</li> </ul>
<b>Preferred way to learn hard skills</b>	<ul style="list-style-type: none"> <li>• Classroom instruction-live</li> <li>• On the job</li> <li>• Workbooks and manuals</li> <li>• Books and reading</li> <li>• One-on-one coaching/computer based training</li> </ul>	<ul style="list-style-type: none"> <li>• Classroom instruction-live</li> <li>• On the job</li> <li>• Workbooks and manuals</li> <li>• Books and reading</li> <li>• One-on-one coaching</li> </ul>	<ul style="list-style-type: none"> <li>• On the job</li> <li>• Classroom instruction-live</li> <li>• Workbooks and manuals</li> <li>• Books and reading</li> <li>• One-on-one coaching</li> </ul>	<ul style="list-style-type: none"> <li>• On the job</li> <li>• Classroom instruction-live</li> <li>• Workbooks and manuals</li> <li>• Books and reading</li> <li>• One-on-one coaching</li> </ul>

Table 2: Generational Differences (Based on Tolbize 2008)

	<b>Traditionalist *</b>	<b>Baby Boomer</b>	<b>Gen X</b>	<b>Gen Y **</b>
<b>Feedback and supervision</b>	Attitudes closer to boomers'	May be insulted by continuous feedback	Immediate and continuous	Immediate and continuous
<b>Attitudes regarding loyalty to their employer</b>	<ul style="list-style-type: none"> <li>• Considered among the most loyal workers</li> <li>• About 70% of those interviewed would like to stay with their organization for the rest of their working life</li> </ul>	<ul style="list-style-type: none"> <li>• They value company commitment and loyalty</li> <li>• About 65% of those interviewed would like to stay with their organization for the rest of their working life</li> </ul>	<ul style="list-style-type: none"> <li>• Less loyal to companies than previous generations but loyal to people</li> <li>• About 40% of those interviewed would like to stay with their organization for the rest of their working life</li> </ul>	<ul style="list-style-type: none"> <li>• Committed and loyal when dedicated to an idea, cause or product</li> <li>• About 20% of those interviewed would like to stay with their organization for the rest of their working life</li> </ul>
<b>Work/life balance</b>		Sacrificed personal life for work	Value work/life balance	Value work/life balance
<b>Perceived elements of success in the workplace</b>	<ul style="list-style-type: none"> <li>• Meet deadlines (84%)</li> <li>• Willingness to learn new things (84%)</li> <li>• Get along with people (81%)</li> <li>• Use computers (78%)</li> <li>• Speak clearly and concisely (78%)</li> </ul>	<ul style="list-style-type: none"> <li>• Use computers (82%)</li> <li>• Willingness to learn new things (80%)</li> <li>• Get along with people (78%)</li> <li>• Meet deadlines (77%)</li> <li>• Organizational skills (73%)</li> </ul>	<ul style="list-style-type: none"> <li>• Use computers (79%)</li> <li>• Meet deadlines (75%)</li> <li>• Willingness to learn new things (74%)</li> <li>• Speak clearly and concisely (72%)</li> <li>• Get along with people (71%)</li> </ul>	<ul style="list-style-type: none"> <li>• Use computers (66%)</li> <li>• Meet deadlines (62%)</li> <li>• Multitasking (59%)</li> <li>• Willingness to learn new things (58%)</li> <li>• Speak clearly and concisely (55%)</li> </ul>
<b>Preferred leadership attributes</b>	<ul style="list-style-type: none"> <li>• Credible (65%)</li> <li>• Listens well (59%)</li> <li>• Trusted (59%)</li> </ul>	<ul style="list-style-type: none"> <li>• Credible (74%)</li> <li>• Trusted (61%)</li> <li>• Farsighted (57%)</li> </ul>	<ul style="list-style-type: none"> <li>• Credible (71%)</li> <li>• Trusted (58%)</li> <li>• Farsighted (54%)</li> </ul>	<ul style="list-style-type: none"> <li>• Listens well (68%)</li> <li>• Dependable (66%)</li> <li>• Dedicated (63%)</li> </ul>

\*Also referred to as Silent Generation

\*\* Also referred to as NextGen, Millennials, and NetGen

accustomed to teachers who talk most of the time and who answer their own questions at the first sign of student hesitation (Weimer 2002). A Pew survey found that 58% of their respondents cited a lower work ethic as being the biggest deficiency of Millennials compared with previous generations (Abaffy 2011).

The vacuum created by the large numbers of baby boomers (born between 1946 and 1964) now beginning to retire will draw Millennials into managerial roles at an early age (Abaffy 2011). The Millennials are a direct reversal from the trends associated with Boomers and represent a sharp break from the traits that are associated with Generation X (Wilson & Gerber 2008). In order to mentor the next generation of construction professionals, baby boomers must understand the Millennial mind set to help groom them for leadership roles (Abaffy 2011).

Family is a keyword for the Millennials, as alienation was for the Boomers (Wilson & Gerber 2008). The Boomers and Gen Xers who are mentoring the Millennials entering the industry need to understand the importance of this sense of family to the new generation of employees and create an atmosphere that minimizes anxiety and is conducive to learning. Most Boomers are of the retirement age and are, or will soon be, exiting the workforce. This will create open positions that will need to be filled by younger generations.

#### **2.6.1 Soft Skills and Social Intelligence**

As Generation X and Millennials begin to fill positions made available by retiring Baby Boomers, it is important to address skills employers are seeking. As noted earlier, employers are looking more closely at soft skills such as personality, drive, willingness to learn, teamwork skills and effective communication in their potential employees (Yates 2010).

University faculty recognize today that professional constructors must possess strong skill sets in leadership and management as well as knowledge of all modern construction related technologies (Badger et al. 2007). Learning arises as much from the learner's social

participation in the experience as from technical skills mastery and cognitive operations. The content of learning what is learned and the social context in which learning occurs are intimately related (Venkatesh et al. 2003). Students must understand that their actions produce results and that different actions are likely to produce much more desirable results (Weimer 2002). Students need to gain a real world understanding of the dynamics on job sites such as the importance of having to make last minute changes and on the spot decisions. These are situations that can be discussed in the classroom or practiced in a simulation exercise but those types of learning take place in sterile, controlled environments. Similarly, discussion of collaborative work and role playing exercises in the safe environment of the classroom among peers only relays information to students that must be experienced in a true work situation to appreciate the concept. The unique opportunities of the site should be seen as a learning 'gold mine' that cannot be clearly identified until the parameters of the position have been identified (Parilla & Hesser 1998).

David Goleman (1995) hypothesized that emotional capabilities are more important for leadership than intellectual abilities (Müller and Turner 2010). These abilities include communicating, motivating, and human relationship skills (Badger et al. 2007). Organizations have reported that the strength of future employees lie in the areas of building and mending relationships, compassion and sensitivity (Leslie 2009). This new focus on what comprises leadership for the construction industry today is a result of social and economical changes.

Employers are more selective in their hiring, looking more closely at personality, the ability to communicate effectively, and construction experience -- particularly for positions where students got their hands dirty and spent time in the field. Students having these skills are becoming crucial in the tight economy so they can set themselves apart (Yates 2010).

Educational researchers have demonstrated that students learn best at the post-secondary level when they are: (1) actively engaged in the learning process; (2) have a hands-on experience with the material that they are trying to learn or understand; and (3) have high, but achievable, expectations (Cross 1994, Gameson & Chickering 1987). Put quite simply, the research on teaching and learning strongly supports the use of experiential education such as an internship (Ewell 1997, Parilla & Hesser 1989).

## 2.7 Experiential Learning

Many university programs offer curriculums that are primarily based upon classroom activities, textbook knowledge and theories. Applying this theory to real world situations can be difficult for students as they have varying learning styles. Learning engages the entire physiology. Teachers can't just address the intellect of students (Caine & Caine 1991, LPA 2010). Students need to not only be exposed to information but to be an active participant in the acquisition of that information. Knowledge presented in the classroom environment can be enhanced by hands on or real world experience. This is not always possible in courses, especially those without a lab component. Even where a lab component is available, the traditionally presented coursework is from the academic prospective, in a prescribed and safe environment.

Instructor control of the learning process is the most common teaching style of the traditional lecture classroom (Monson 2011). The constructivist learning model emphasizes that learning is affected by the context in which an idea is taught and that experiential learning is the most effective way to embed material. Bloom's Taxonomy of ordered thinking skills correlates to this same model (Bloom 1954). Figure 5 is a representation of Bloom's Taxonomy of Thinking Skills. In this model the lowest level of the thinking process is knowledge which is taught in the classroom. Moving up in the hierarchy, comprehension and then application are skills that can be enhanced through experiential learning. Internships are experiential in nature. Participation in an internship program offers students the opportunity to put theory into practice. Applying the

information in a field setting can further thinking skills to the analysis stage and beyond.

Internship programs provide a means to support construction education curriculum and provide the student with the opportunity to see the application of theoretical concepts learned in the classroom, taking place in an environment that is not as prescribed as the classroom.

Students learn better when they construct their own knowledge (Burmark 2002). Constructivism prescribes a whole new level of student involvement with content. It makes content much more the means to knowledge than the end of it. The focus is less about covering information and more about using it to develop unique and individual ways of understanding (Weimer 2002). The best form of constructivism is experiential learning (LPA 2011).

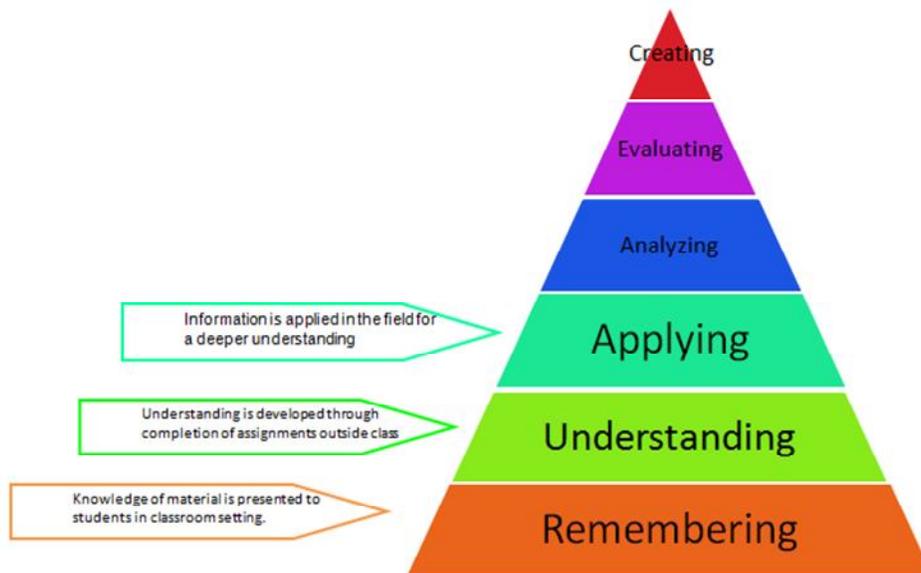


Figure 5: Bloom's Taxonomy of Thinking Skills Relative to Experiential Learning

(Based on Bloom's Taxonomy)

Experiential active learning can occur anywhere. Providing opportunities to the learner to actively engage in the experience of comprehending, reflecting and doing, can be done in a laboratory setting, in a classroom using a case study as stimulus, or out in the field under actual

working conditions (Venkatesh et al.2003). Any opportunity to move the learning into the actual context in which the knowledge will be used should be used. Learners learn best when they take classroom learning out into the local community and apply it to real problems faced by real clients (Venkatesh et al. 2003).

### **2.7.1 Internships as Experiential Learning**

The internship experience is conceptualized as a partnership between construction industry work sites and the university's academic environment (Adcox 2000) and involve an off-campus experience under the supervision of an advisor at the site (Howery 1993, Parilla & Hesser 1998). Faculty put together challenging and complex learning experiences and then create environments that empower students to accomplish goals (Weimer 2002). For a lot of students who lack confidence in themselves as learners, having to admit they have a problem prevents many of those most in need of help from taking advantage of it (Weimer 2002). The internship process offers students a unique and valuable opportunity to practice and improve their ability to view the world through an industry related perspective. In reflecting upon their field experience, students can connect their personal experiences with the larger social world (Parilla & Hesser 1998).

The real power of experiential learning comes when it enables students to comprehend previously learned material in new and different ways (Schon 1983). Experience enriches the lessons students previously learned and grounds them in reality (Parilla & Hesser 1998). Students learn by linking established concepts to new situations (Ewell 1997, Parilla & Hesser 1998). Abstract ideas take on new meaning as they encounter the context firsthand. Their interactions furnish them with new insights that they can use to examine previously learned material critically (Parilla & Hesser 1998).

Participation in an internship offers students an extended opportunity to link theoretical material, perspectives and ideas as well as apply their previously learned knowledge and understanding

to a real organizational setting (Hesser 1996, Howery 1983, Ostrow et al. 1999, Parilla & Hesser 1998). It also provides them the chance to acquire new knowledge and insights about their field of study and, in the process, increase their understanding of the world (Parilla & Hesser 1998).

Overall, the internship invites and challenges students and faculty supervisors to move to deeper levels of understanding as new meanings and syntheses become necessary and possible (Parilla & Hesser 1998). Site supervisors report that their motivations for working with interns include the opportunity to recruit and screen potential employees, the desire to contribute to the socialization of the next generation of practitioners and their personal interest in serving as a mentor to a college student. From the vantage point of the faculty member, a good placement site is one where students can meet their educational goals and make a contribution to the organization (Hill 1983, Parilla & Hesser 1998).

## 2.8 Internships

Some construction education programs incorporate internship programs into the curriculum to provide opportunities for students to engage in experiential learning. The internship experience is generally looked upon as the most important part of a construction management student's professional preparation (Adcox 2000, Hager et al. 2003, Wasserman 2008). Despite this, many construction programs, while they do have some type of internship process, do not always require participation as part of the curriculum.

To meet the demands of the future, construction education is slowly moving toward inquiry-based learning which can be seen as a reconnection of subject content and instructional practices through master/apprentice problem solving. Master/apprentice instruction is a holistically realized constructivist learning environment (Monson 2011). An option similar to this master/apprentice model is the internship program. While it does not afford the same depth of learning the apprentice receives, students who wish to obtain a degree can gain much by way of the internship process.

A goal of an internship is for students to acquire new knowledge. Site-based activities lead to the acquisition of knowledge as students' experiences serve as a catalyst for deeper investigation into a topic that was only given limited attention in class. Students may also utilize internships to generate new knowledge through original research or to develop new insights through grounded theory (Parilla & Hesser 1998). Chapin et al. (2003) conducted a research study on the extent that ASC member schools incorporate cooperative learning in their curriculum. More than three quarters of the respondents indicated they felt that a formal internship or coop experience was necessary. Although there is a university structure by which the coop is administered, many of the students find their own coops. Most schools were confident that coops helped the student, not only to find permanent employment, but also at a higher starting salary (Chapin et al. 2003). Senior (1997) reported the need for an internship as part of the construction curriculum to be almost universally supported by ASC faculty across the country (Hager et al. 2003). If internships can provide an opportunity for students to develop critical skills, then incorporating them into the curriculum can assist in learning outcomes. If there were no tangible benefit associated with participation, internships as part of a curriculum could be eliminated.

The interdisciplinary nature of construction project teams is such that they will always involve people from different organizations with different backgrounds, skills and knowledge (Dainty 2006). The ability for team members to efficiently communicate with one another is a necessary component for the successful completion of projects. Students currently graduating from construction related programs, born between 1982 and 2003, are Millennials (Wilson & Gerber 2008). Millennials differ from previous generations in several ways including communicative skills.

The term internship can be defined as any official or formal program to provide practical experience for beginners in an occupation or profession. Alternatively, an internship may be

any period of time during which a beginner acquires experience in an occupation or profession. An intern is defined as a student or recent graduate undergoing supervised practical training. The commonality in all of these definitions is the concept of a formal program, where a novice acquires practical industry related experience (Chapin et al. 2003).

Internship programs allow students the opportunity of experiential learning. Some students may choose to participate in a cooperative educational program (co-op), which is similar to the internship. There is an official distinction between the terms internship and cooperative education but some will use the terms interchangeably to reference any work experience recognized by the school as part of the expected education experience (Chapin et al. 2003). With respect to the construction industry, the internship experience is conceptualized as a partnership between the industry and the university's academic environment (Adcox 2000) and involves an off-campus experience under the supervision of an advisor at the site (Howery 1993, Parilla & Hesser 1998).

For the purpose of this paper, the internship is defined as an experiential learning opportunity in which a student works within industry in a revised employee role. Internships typically last around 12 weeks; are completed during the summer months between the Spring and Fall semesters; may or may not involve direct supervision; may or may not provide monetary compensation for the work performed; and the student may or may not receive academic credit for their experience. The cooperative educational program is similar to the internship in that the student works within industry in a revised employee roll but differs in that the co-op usually takes place during an entire semester lasting between four and six months; usually involves some type of direct supervision; students are paid for the work performed; and the student receives some type of academic credit for their experience.

### 2.8.1 Background

Formal cooperative education was innovated at the University of Cincinnati in 1906 by Professor Herman Schneider (Collins 1986; Chapin et al. 2003). Between 1921 and 1943 at least one college per year started a cooperative education program. College implementation of cooperative education programs increased after 1943. Two or three colleges started cooperative education programs each year between 1943 and 1963. The number of cooperative students in 1990 was greater than 200,000 (Chapin et al. 2003).

Since 1906, the concept of the coop and internship has become an educational initiative that has transcended time, disciplines, and programs. Schneider's cooperative system of education introduced the concept of linking theory with practice through the alternation of time spent in classroom instruction with time spent in work based practical experience in the students' chosen fields. Even though students were exposed to engineering theory through pictures in a text or demonstrations in a lab, these would only be abstract concepts until the students actually began to apply them in a work setting (Cates & Cedercreutz 2008).

The guiding principles under which the cooperative education model was established include: a sequential training environment in which students come to understand theory through its practical application; conditions of actual employment (not artificial conditions imposed upon employers which could reduce the experience to a laboratory experience in a campus environment) (Cates & Cedercreutz 2008).

In most professional fields, providing students with practical skills to complement theory is a prerequisite to certification for practice. In disciplines such as medicine, it would be unthinkable to offer a curriculum that did not have a practice component. Fields of study in engineering and applied science also have strong practice requirements (Venkatesh et al. 2003). It is expected, and is increasingly a differentiator among programs, that high quality academic courses of study in the professions include direct, hands-on application of theoretical knowledge under

supervision. This is the standard model of learning and credentialing in the professions such as teaching, social work and medicine (Venkatesh et al. 2003, CAEP 2013, CSWE 2013, LCME 2013). There are academic programs that require students to participate in a semester or summer long internship program or co-op experience as part of their curriculum or as a graduation requirement. Each university program will set their own requirements for student graduation but some majors agree on the requirement for internship participation. Students majoring in the teaching fields at accredited schools are required to complete at least one semester of student teaching (CAEP 2013). Students in medical fields (LCME 2013), social work (CSWE 2013), psychology (APA 2013), and many other physical and mental health fields at universities with accredited programs must also work a minimum of one semester or summer within their field of study. Other fields of study may require participation by the program and not by accrediting programs or by the profession. These fields make individual decisions based on their program needs. Some graduate programs may also require an internship experience as part of the student's degree fulfillment such as the Master of Public Administration program offered at Virginia Tech.

Internship experience assists construction students to develop competence in their professional practice, learn to apply knowledge, develop a set of professional understanding, learn to examine their practice, learn from their experience while seeking to meet the needs of the construction profession. It is designed as a field based demonstration of the course work competencies, which have been identified as necessary for successful construction management practice (Adcox 2000).

Three critical elements required in any internship include:

- a) it must be a real work situation;
- b) the student must participate on the same basis as other workers, and
- c) there must be systematic and continuous examination of the experience in relation to their chosen discipline (Hirschfield & Adler 1973, Hager et al. 2003).

A common complaint about internships is that experience alone does not warrant the awarding of academic credit (Whitaker 1989, Parilla & Hesser 1998). Sound academic internships require an extended experience coupled with the ability to make sense of that experience (Parilla & Hesser 1998). Many internship programs in the current construction curriculums are not mandatory. Those internships that are part of the required curriculum are often more structured with a set of required standards and goals.

According to constructivist theories, students need not wait until they have developed expertise before they interact with content (Weimer 2002). Actual work settings provide a rich learning environment and present the learner with a broad range of stimuli that would not be possible in classroom inquiry based projects such as a case study. Importantly, the stimuli are “raw” in that the learner must process them. The learner must decide what the problem is before attempting to deal with it. Problem formation, in other words, is a challenge that confronts the learner in actual work settings in a way that it cannot in a case study (Venkatesh et al. 2003).

An important consideration for mandatory participation in internship programs are the standards set for students during the learning experience. The decision to provide academic credit is based on the standards established for the university internship program.

### **2.8.2 Internship Standards**

Internships involve an off-campus experience under the supervision of an advisor at the site (Howery 1993, Parilla & Hesser 1998). The internship offers students an extended opportunity to apply their previously learned knowledge and understanding to a real organizational setting (Hesser 1996, Howery 1983, Ostrow et al. 1999, Parilla & Hesser 1998, Hager et al. 2003). It also provides them the chance to acquire new knowledge and insights about the construction industry and, in the process, increase their understanding of the industry processes (Parilla & Hesser 1998).

Internships offer students a unique and valuable opportunity to practice and improve their ability to view the world. In reflecting upon their field experience, students can connect their personal experiences with the larger world (Parilla & Hesser 1998). According to Howery, internships allow students to ‘link theoretical material, perspectives and ideas to the practical concerns of concrete examples’ (Howery 1983, Parilla & Hesser 1998). By experiencing the theory of the classroom in the context in which the student will utilize the information, they are able to develop a deeper understanding of the information and its importance.

Affectively complex learning environments emphasize the types of experiences that exemplify what it is actually like as a professional in a particular field. Behaviorally complex learning environments emphasize the active application of knowledge and skills learned to a practical situation. Perceptually complex learning environments emphasize relationships among conceptual understanding, information seeking, and problem solving (Kolb 1984).

What is key is the ability to sequence a set of related learning experiences so that they build on each other (Weimer 2002). An example specific to construction curriculum is where the student can see how the schedule they created is actually implemented in the field; how the estimates they practiced in a course exercise are used to determine what materials are needed to complete a phase of work; how the collaborative team exercise they performed in a class models the relationships they will experience in the field.

Structuring the internship keeps the academic side of the internship in the forefront. Students approach internships with a different set of priorities than faculty members. Instructors must ensure that students don’t become so enchanted with their new job that they lose sight of the main goal of the internship which is to increase their understanding of the construction world by analyzing the experience (Parilla and Hesser 1998).

When structured internship programs provide academic responsibilities as part of their standards, students often give priority to the roles associated with being an employee and downplay the academic side of the internship (Parilla & Smith-Cunnien 1997, Parilla & Hesser 1989). Students also devote more energy to the experience side of the internship because it is more exciting and produces more anxiety for them than the academic side (Parilla & Hesser 1989). This is an issue that must be addressed both prior to the internship as well as during the participation of the student in the internship process.

The American Council for Construction Education (ACCE) and the Accreditation Board for Engineering and Technology (ABET) standards have no method for developing or structuring an internship program for construction education (Hager et al. 2003, American Council for Construction Education 2007, Wasserman 2008). At present, it is up to the individual institutions to decide whether participation in an internship program is part of the required curriculum or whether participation is voluntary. Each institution is also responsible for developing their own standards for providing credit for this participation.

### **2.8.3 Mandatory versus Optional**

As stated previously, in most professional fields, providing students with practical skills to complement theory is a prerequisite to certification for practice. Many academic programs from different disciplines require students to participate in a semester or summer long internship program or co-op experience. Students in the teaching fields are required to complete at least one semester of student teaching. Students in medical fields, social work, psychology, nutrition and many other physical and mental health fields must also work a minimum of one semester or summer within their field of study. These fields make individual decisions based on their program needs.

Construction based programs at universities have different requirements with regard to the internship or co-op experience. Prior research has shown that 91% of Associated Schools of

Construction have some type of coop or internship program for their students with most completed during the summer (Chapin et al. 2003). 58% are required programs while 42% are optional (Chapin et al. 2003, Wasserman 2008). In an effort to promote leadership in their construction program, the Del E Web School of Construction at Arizona State University established a mandatory field internship requirement (Badger et al. 2007). Minnesota State University's building construction program and Purdue University's Construction Engineering and Management program also require students to participate in an internship to obtain their degree (Wasserman 2008, Hager et al. 2003). The Construction Management programs at Auburn University, East Carolina University and Virginia Tech do not require internship participation as part of their degree fulfillment.

When asked, most faculty want to include an active learning component in their courses, but hesitate when they estimate the coordination effort that would be required to do so (Venkatesh et. al. 2003). Within construction education, the ACCE addresses internship as part of the requirements for program accreditation but does not provide any guidance for the structure or development of that internship experience (Hager et al. 2003, ACCE 2013).

At Auburn University and East Carolina University, where the internship participation is optional, there are no educational components, standards or guidelines set for the student. To maximize learning opportunities, the internship should have some type of structure or listed requirements so that students integrate their field experience with prior learning. Students need to connect their experiences at the site with the construction knowledge they have gained from courses (Parilla & Hesser 1998). If there are no guidelines then students may find themselves in more of a summer job than a true internship.

#### **2.8.4 Structured versus Non-structured Internship Programs**

Learning in the classroom usually takes place in a structured environment. Teachers develop a program for students to follow throughout the semester and usually require several various

forms of feedback. These can be represented by tests, quizzes, presentations and other assignments. During the internship process, structure can be lost with the student providing no formal feedback, especially if the internship is not mandatory and the student receives no academic credit for participation.

The goal of the internship is for students to integrate their prior learning to the field experience, making connections between classroom-based knowledge and knowledge gleaned from their experience. This connection of their experiences at the site with the construction knowledge they have gained from the classroom is most likely to occur through careful structuring of the internship (Parilla & Hesser 1998). James Coleman (1976), Pat Cross (1994) and Peter Ewell (1997) have all documented how direct experience decisively shapes individual understanding and learning occurs best in the context of a compelling presenting problem and reflection. The key to a successful internship is to structure it to combine experience and reflection (Parilla & Hesser 1998). The National Society for Experiential Education (NSEE) has developed best practices for the promotion and execution of academic internships (Parilla & Hesser 1998). The NSEE believes that regardless of the experiential learning activity, both the experience and the learning are fundamental. They believe that all parties involved in the experiential learning process should be empowered to follow the 8 principles of good practice for all experiential learning activities outlined in Table 3 (NSEE 2013).

**Table 3: 8 Principles of Good Practice for all Experiential Activities**  
 (Adapted from the National Society for Experiential Education 2013)

<b>8 Principles of Good Practice for all Experiential Learning Activities</b>	
<b>1.</b>	Intention
<b>2.</b>	Preparedness and Planning
<b>3.</b>	Authenticity
<b>4.</b>	Reflection
<b>5.</b>	Orientation and Training
<b>6.</b>	Monitoring and Continuous Improvement
<b>7.</b>	Assessment and Evaluation
<b>8.</b>	Acknowledgement

### 2.8.5 Benefits to Stakeholders

The internship program can offer many benefits to stakeholders including universities, faculty, students, and industry. Placing students with construction companies creates an opportunity to build a relationship between the company and the University. Forming working relationships with the companies affords opportunities for equipment donation, scholarships, faculty sabbaticals and is a source for members for advisory boards (Hager et al. 2003).

Faculty benefit from having students participate in internship programs by having a more engaged classroom. Student's are able to apply class content immediately, making course material more relevant and increasing student's confidence in the classroom (Venkatesh et al. 2003). Faculty members can better explain concepts in the classroom to students, who have experience in the construction industry (Chapin et al. 2003).

Internships motivate students to work hard early in their academic programs in order to secure internships and result in improved grades upon conclusion of those internships (Koehler 1974, Hager et al. 2003). Working with students during their internship process allows faculty to develop relationships with industry members affording the opportunity for research faculty to collect field data by students who are immersed in a rich source of information. One benefit of collaboration between researchers and students on real projects is a sense of trust established between the parties that increases the engagement of students in the process (Maguire et al. 2003, Pearce et al. 2012)

Students seem to gain the most benefit from participating in an internship program. The internship allows the student to engage in learning professional technical skills as well as social skills (Venkatesh et al. 2003). By actively participating in the work along with peers with more expertise in the area, students not only learn from their co-workers but also have the opportunity to share their own knowledge with others (Venkatesh et al. 2003). The internship must include opportunities for socialization in the profession to maximize learning opportunities. Along with

learning technical skills, it is necessary for students to become acquainted with the profession's norms and values, processes and social dynamic. This contributes to the student's growing sense of identity as a professional (Venkatesh et al. 2003).

While actively engaging in real work and being socialized into a community of practice while engaging in the work, learning tends to be viewed by the student as meaningful. Besides the professional self-identity that may develop through such contacts, interacting with practicing professionals helps to validate and ground concept learning in relevant ways (Venkatesh et al. 2003). Student evaluations of the internship experience have also mentioned a heightened sense of self-efficacy (Venkatesh et al. 2003, Flesher et al. 1996, Hager et al. 2003).

Students can become successful critical thinkers by taking risks and fighting fears of failure and of the unknown (Keely et al. 1995, Weimer 2002). Even seniors have difficulty interpreting 'real world' situations (Parilla & Hesser 1998). The internship allows students to be in a learning environment while facing these fears and participation in the job site activities demystify the process.

Graduates commonly recommend the greater use of internships (Lutz 1979, Sherohman & Havir 1989, Stevens & Reynolds 1982, Parilla & Hesser 1998). Alumni of one program rated their internships as the single most valuable course they took in college (Stevens & Reynolds 1982, Parilla & Hesser 1989). Marshall (1999) reported that internships provide an opportunity for the student to link theory to practice and to reflect on situations outside the classroom where problems are real, solutions are complex and individualized challenges are possible (Hager et al. 2003). The internship presents an opportunity for students to share the responsibility and pursue their own learning goals, including the opportunity to share in the decision about how the learning will be demonstrated and evaluated (Parilla & Hesser 1989).

Internships help students learn about the complexities of formal organizations (Chow & Hemple 1988, Giles 1986, Houghland & Franklin 1988, Johnson et al. 1987) and communities (Fagan 1985, Gondolf 1980, Hesser 1999, Pestello et al. 1996, Parilla & Hesser 1998). Additionally, internship participation provides opportunities for a) permanent placement with the sponsoring agency; b) clarifying career choices; and c) increasing a self esteem (Smith 1964, Flesher et al. 1996, Hager et al. 2003, Wasserman 2008, Hauck et al. 2000).

Industry can reap several benefits from the internship programs as well. The industry can screen prospective employees from a pool of cooperative education students and collaborate with education faculty to influence the undergraduate programs to further meet their needs.

From the vantage point of the faculty member, a good placement site is one where students can meet their educational goals and make a contribution to the organization (Hill 1983, Parilla & Hesser 1998). While some industry employers utilize interns as low cost labor, observations support a hypothesis that employers see internship placement as an investment in the future (Cates & Cedercreutz 2008). Students provide benefits to the jobsite as well. Supervisors report that interns contribute because they view the site with fresh eyes and will, at times, ask questions that cause employees to rethink practices they had taken for granted (Parilla & Hesser 1989).

## **2.9 Research Focus**

The previous sections highlighted the current literature related to the various components of this study. These include characteristics of the construction industry, an overview of construction education and pedagogical challenges, internships and generational differences. The focus of this research lies at the intersection of these topics where a clear gap exists in the literature. Figure 6 represents some of the current literature addressing the four areas discussed and where the research focus lies.

Based upon the review of the literature, a gap in the research was identified. There was limited evidence of research conducted upon the educational benefits of internships within construction education. There is no research on assessing how these internships affect student development soft skills or perceived self efficacy within construction education. There is a need to determine how internships allow learning possibilities and provide an environment for application within current academic curriculum. Lastly, there was no research that highlighted the impact of internship experiences on the millennial generation of students entering into the construction industry.

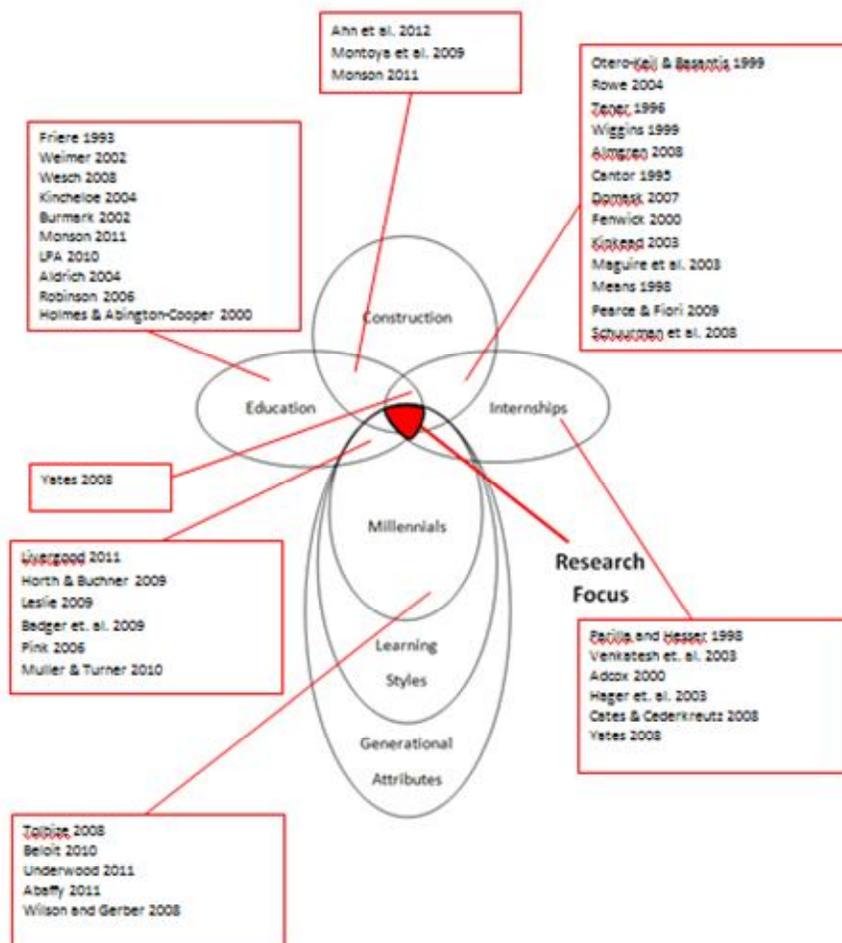


Figure 6: Literature Map

These identified gaps led to the development of three problem statements.

1. The current academic environment/curriculum has limited opportunities for experiential learning possibilities or an experiential learning environment.
2. Experiential learning environments through internships have not been fully studied in terms of academic benefits for today's students when considering students who have not participated in an internship, students who have participated in an unstructured internship and students who participate in a structured internship program with an educational component.
3. Experiential learning environments through internships have not been fully studied in terms of industry benefits for today's employers.

These problem statements affect three stakeholder groups: construction education academic programs, students currently enrolled in those programs, and the construction industry partners who serve as a main hiring source for students.

## 2.10 Summary

The construction industry has experienced great change over the past twenty years, including a reduction in demand for employees. In response to these changes, employers are beginning to look more closely at soft skills of potential employees as well as hands on experience within the construction industry. There is also a shift occurring in the demographics of the construction industry. Baby Boomers are of the retirement age and are leaving or will soon be leaving the ranks of the employed. This will leave open positions that need to be filled with employees offering a wide range of skills, not just technical skills.

Construction education curriculums are designed to help students become ready to fill those open positions in the industry. Many curriculums have little flexibility for courses that extend beyond the existing paradigm of the traditional classroom. Students need to have an opportunity to apply classroom content in real world settings. These opportunities can also enhance student self efficacy and soft skill development.

One way these opportunities can be made available to students is through participation in an internship program. Internship participation offers students an alternative way to learn as they construct their own knowledge by applying classroom content in real world applications. During the internship, students also engage in informal learning in a safe environment. Students will have the opportunity to learn from and build relationships with the people with whom they will work.

There is a gap in the literature on assessing what internships really do for student development in the areas of soft skills and perceived self efficacy. This research will investigate internships with respect to how they influence student soft skill development and perceived self efficacy with regard to success in the construction industry. It will be approached from academic, student and industry perspectives. The following chapter will provide a detailed explanation of the methodology used to accurately collect this data.

# Chapter 3 Methodology

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### 3.0 Introduction

This section will provide a clear definition of the research purpose and the logic behind the research method chosen to meet the needs of this study. Survey assessment tools were used to collect both quantitative and qualitative data from three different populations.

1. ASC member academic institutions with a BC or CEM program,
2. Students currently enrolled in a university undergraduate construction program that meets the same criteria as the academic institutions and
3. Construction related industry professionals who are involved in the hiring of these students.

The three surveys were submitted together to the Institutional Review Board (IRB) at Virginia Tech for approval for use in this research. The surveys were approved under number IRB 12-453. A copy of the Virginia Tech IRB approval letter is available in Appendix A6.

The surveys were designed to answer the research questions posed through both open and closed responses. A pilot study was conducted for the student survey to ensure the validity of the survey tool, including the appropriate format, comprehension, ease of use and relevance of data collected. No pilot study was conducted for the academic or industry surveys. Both surveys were comprised mostly of closed response, multiple choice questions and it was assumed by the researcher that both sample populations were composed of professionals who would have little or no difficulty in answering the basic questions provided.

The sample populations used for data collection were selected based on their representation of the general population to provide the best opportunity for generalizability of the results. The logic behind their selection is explained in detail in this section.

### 3.1 Research Goals and Outcomes

The primary outcomes of this research will provide an evaluation of the impact of internship participation on student perceived self efficacy with regard to success in the construction industry, soft skill development and employability of students enrolled in construction based programs. Stakeholders include students, faculty, and industry members. Outcomes will determine how students and industry members view the relevance of internship programs; provide university programs with information on where students feel they are lacking with regard to achieving industry success; provide industry with a means for developing improved internship experiences; and assist faculty with a way to incorporate into the time constrained current curriculum practice, skills deemed necessary by industry for student success. Based upon the findings, a determination can be made on whether internship programs should be considered part of mandatory curriculum requirement of students enrolled in a construction curriculum. An additional outcome of the research will provide an overview of the role internship participation has in construction based programs at schools that are members of the Associated Schools of Construction.

Data will be collected from three sources. ASC member, construction focused programs will be solicited for participation in data collection aimed at determining the role of internship programs in construction education curriculum. Students representing the general population of construction education students will be targeted for data collection aimed at determining the level of importance students place on internships and at identifying student perception of self efficacy with regard to success in the industry. Data on soft skills will also be collected from the student population. Industry hiring professionals will be the third population targeted for data collection. This data will be used to determine what role internship participation plays in the hiring and starting salaries of new hire employees. This data will also be used identify characteristics industry feels students need to be successful in the construction industry.

Once the data collection is complete, data will be reviewed to see if participation in an internship experience affects a student's perception of their strengths and deficiencies relative to perceived self-efficacy within the industry. Discussion will be provided on the benefits of utilizing internship programs for incorporating skills that cannot be included in the standard curriculum or are difficult to teach in the traditional classroom setting. Whether participation in an internship program should be part of the required curriculum will also be discussed based on the data collected during the survey research.

### **3.2 Research Questions**

Three questions were developed to address the problem statements developed in Chapter 2.

The research methodology discussed in this chapter will address these questions

#### ***Research Question 1.***

What effect does student participation in an internship program have on student soft skills and perceived self-efficacy with regard to the construction workplace?

#### ***Research Question 2.***

How do construction industry hiring professionals consider internship participation when considering hiring new graduates of construction programs?

#### ***Research Question 3.***

How do construction industry and students perceptions compare when determining what characteristics are necessary for success in the construction industry?

For the purpose of this research, the academic population will be defined as the educational institutions that serve students in construction related degree programs; the students population is defined as those students enrolled in these construction related degree programs; and the industry population will be defined as those construction industry professionals that are seeking to employ these students.

### 3.3 Research Purpose

The primary purpose for this investigation is educational research, specifically action research. Action research is primarily distinguishable in terms of its purpose, which is to influence or change some aspect of whatever is the focus of the research (Robson 2002). Action research within the educational domain is used to solve specific classroom or school problems, improve practice or help make a decision at a single local site (McMillan 2008). For this study, action research was used to evaluate current standard pedagogy used in a construction based curriculum and to determine whether an alternative approach to curriculum may enhance perceived self efficacy and communication skills for students. In this case, the alternative approach being investigated is the implementation of an internship program. Figure 7 depicts the research method used for the collection of data used to answer the research questions.

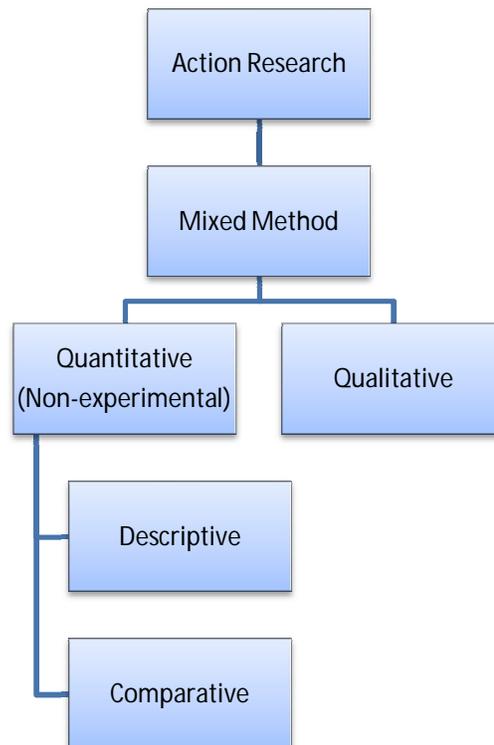


Figure 7: Research Purpose

### 3.3.1 Data Collection Approach

To meet the goals of the research, a mixed-method approach was utilized to gather both quantitative and qualitative information. The approach to the quantitative aspect of the data collection was non-experimental research characterized as either descriptive or comparative. Descriptive research includes studies that provide simple information on the frequency or amount of something (McMillan 2008). The information being collected from academia was used to describe whether the programs require internships as part of the degree fulfillment and how they are incorporated into the program as well as helped to characterize the realm of internships. Comparative studies examine the difference between groups based upon a variable of interest (McMillan 2008). The information collected can also be considered comparative if the data are being used to compare the programs requirement of internship participation as well as other components related to the internship experience, such as related workshops or documentation required. Identifying and additional data were collected for this research which can be used to compare the programs in ways other than the data collection's main purpose of identifying the role of internships within these programs. This additional data can be used to enhance programs. For this reason, the research would be described as comparative. Quantitative analysis was utilized to characterize the realm of internships; industry wants and needs; and to characterize the current student population.

The qualitative aspect of the data collection was needed to offer an accurate description of the student's perception with regard to their perceived self-efficacy and awareness of industry success needs. Data collection from the industry population on what characteristics are needed for student success was qualitative as well.

This research incorporated both a quantitative and qualitative analysis of the subject requiring a research approach combining descriptive and action oriented research. By using mixed methods in a single study the researcher is better able to match the approach to gathering and

analyzing data with the research questions (McMillan 2008). Using both quantitative and qualitative also strengthens the study by providing multiple perspectives (McMillan 2008). Some of the advantages to using mixed method research are provided by McMillan (2008) which include:

1. Provides more comprehensive data
2. Includes multiple approaches to compensate for disadvantages with using a single method
3. Allows investigation of different types of questions
4. Allows examination of complex research questions
5. Includes triangulation of complex research questions

In order to answer the proposed research questions, it was necessary to provide both closed response and open response questions. Some information collected required responses that were qualitative in nature because they were based on either the respondent's opinion or they were responses that were relative specifically to the respondent. Examples of these type responses would be those based on opinion such as listing several qualities or skills needed for success. Other information collected was quantitative in nature, based on closed response questions or open response questions. An example of closed response questions would be the use of a Likert scale to collect quantitative, non-cognitive data on student's perceived self efficacy. Another example would be to provide a question collecting generational identifying information by having students select the age range to which they belong. Examples of quantitative questions utilizing an open response were those that required the participant to state what their title is at their place of employment or name the institution where they are employed.

The tools utilized to gather this information needed to be able to collect both quantitative and qualitative information. The sampling frame and size of the sample was also considered when the method of data collection was developed.

### 3.3.2 Research Method

When completing action research, it is important to determine what kind of design will be employed, the nature of the data that need to be gathered, how that data will be collected, the sample from which the data will be collected and the circumstances under which it is being collected (Robson 2002, McMillan 2008).

To determine the method of collection and design of the instrument, it was necessary to consider the sample from which the data will be collected. The sample needed to successfully complete this research required data from three separate populations: the educational institutions that serve students in construction related degree programs; the students enrolled in these programs; and the construction industry professionals that are seeking to employ these students.

Collaboration between academia and industry is a growing trend actively encouraged as a means of competitiveness and innovation among many university programs (Cole 2009). Therefore, it was important to consider educational institutions that serve students seeking employment within the construction industry domain.

The typical student enrolled in today's undergraduate education is part of the Millennial Generation. The student population from which data was collected needed to be representative of the characteristics defined in the literature. These students also needed to be affiliated with construction education.

The construction industry would be considered the end client for these students enrolled in a construction education program as they will be employing students upon graduation. To obtain an accurate portrayal of the needs of this population, it was necessary to collect data from construction industry professionals, representing the spectrum of fields, who are involved in the hiring of these students.

### 3.4 Sampling Frame

This section will provide the logic behind the selection of the sample populations used to collect data for this research. For the academic sample population, it was important to consider educational institutions that follow some peer accepted standards for preparing students for the construction profession and promote innovation in the industry. Additionally it was decided that only four year institutions would be included as they provide the best opportunity for students to participate in some type of internship program.

The student sample population required the researcher to obtain information from students currently enrolled in a construction program that met the same requirements as the academic population. It was important to select students that could be considered representative of the general population of students in construction programs. The educational institution for this population must not require participation in an internship program as part of the curriculum requirements for program completion. This is necessary so data can be collected from both students who have participated in an internship program and students who have not participated in an internship program. This construction program must also be considered a peer among the leaders of the construction education programs.

It was necessary for the industry sample population used for this research to be companies that have a relationship with the students used in the data collection. These companies serve as the main hiring source for these students upon graduation. Individuals selected to complete the surveys will be those professionals participating in the career fairs as well as those who participate as classroom presenters and in informal meet and greet sessions on campus. Figure 8 provides a breakdown of the criteria for each of the three sample populations.

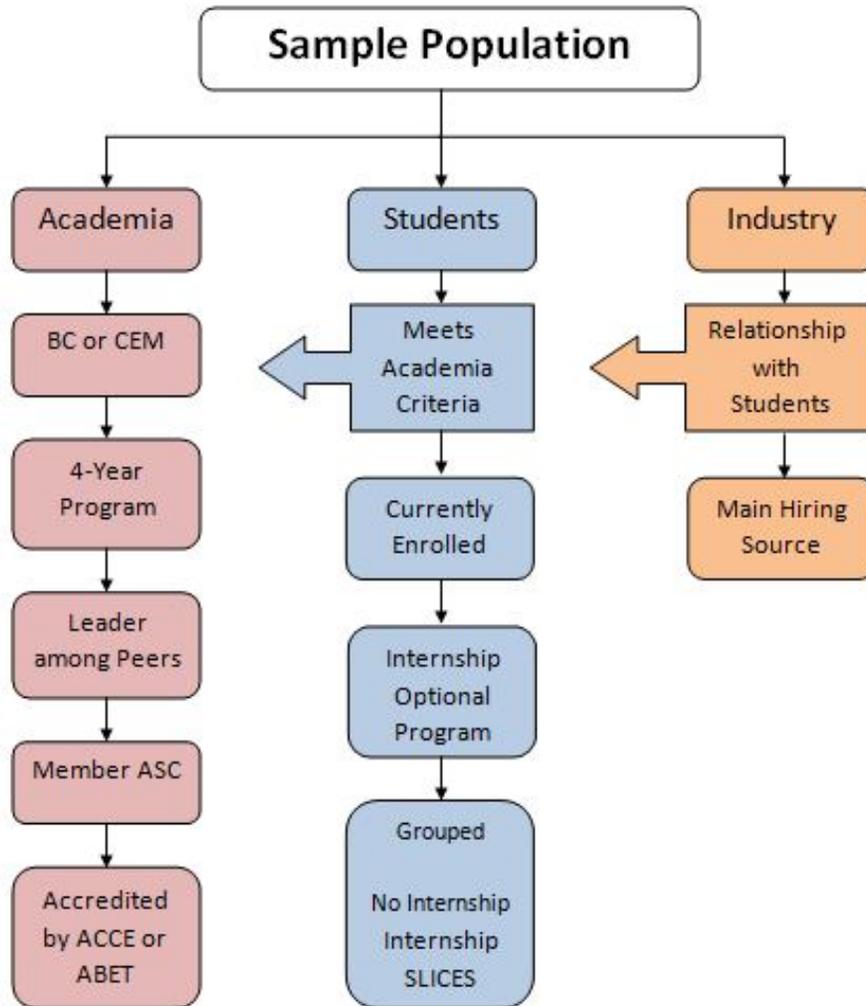


Figure 8: Sample Population

### 3.4.1 Academic Population

The investigation is seeking to make a determination about the use of internships in construction education, therefore the sampling framework for this primary research began with this general population. To understand the role the internship experience plays in construction related curriculum, it was necessary to find out what programs required from their students with regard to degree fulfillment. There are many academic programs that can be considered construction related such as building construction, civil engineering, mechanical engineering, structural engineering, architecture, environmental engineering, and more. In determining what programs should be reviewed, it was necessary to first identify what defines a construction

related curriculum for the purpose of this study. Educational programs whose focus is construction management, often listed as building construction or construction management (BC), which are focused on general construction industry processes as a whole and were used as the focus of this research. Programs identified as construction engineering and management (CEM) share many of the same course requirements as the building construction curriculum and also focus on construction management within the general construction industry process as a whole. Therefore, CEM programs were included as well.

Additionally, it was important to gather data from educational institutions that followed some peer accepted standards for preparing students for the construction profession and promoted innovation in the industry. This investigation looked at member schools of the Associated Schools of Construction (ASC).

The Mission Statement for ASC states that it is a professional organization for the development and advancement of construction education, where the sharing of ideas and knowledge inspires, guides and promotes excellence in curricula, teaching, research and service (ASC 2013a). It was developed in 1965 as an organization that could meet the needs of collegiate schools and departments with curriculums in construction. The founding members believed “building construction to be a legitimate and unique area of study of sufficient professional stature and academic level to justify four year degree programs at universities” (ASC 2013b). Members hoped to create a clear identity of the building construction programs at universities and to have building construction programs recognized by other allied disciplines such as architecture and engineering, the building construction industry and student candidates (ASC 2013b). Membership for ASC was limited, at that time, to educational institutions only at accredited colleges and universities who offered a minimum of four-year degree programs having a major emphasis on building construction. The organization has evolved to now include both organizational and individual membership. There are four classes of organizational

members: Institutional, Associate, Industry and Governmental. Institutional members are educational institutions that offer a baccalaureate or higher construction degree. Associate members are educational institutions that do not meet the institutional membership requirements and include junior or community colleges with two year programs. The sample population for this work focused on educational institutions that offer four year programs. Programs lasting four years offer students a greater opportunity to participate in some type of internship program.

### *Accreditation*

In addition to being an ASC member, accreditation of the educational program serves to strengthen the educational programs commitment to the industry. Participating academic institutions were required to also be accredited by either the American Council for Construction Education (ACCE) or the Accreditation Board for Engineering and Technology (ABET). These two organizations are responsible for evaluating curriculum of construction related programs to assure that the program has met standards set by the organization and deemed necessary to produce graduates who are ready to enter the professions. Both organizations utilize associated professional societies within their disciplines (ASCE, American Institute of Constructors) to guide these standards.

### *Characterizing the Realm of Internships*

This research was seeking to make a determination about the use of internships in education. Internship programs allow students the opportunity of experiential learning. Some students may choose to participate in a cooperative educational program (co-op), which is similar to the internship. There is an official distinction between the terms internship and cooperative education but some will use the terms interchangeably to reference any work experience recognized by the school as part of the expected education experience (Chapin et al. 2003).

### *Mandatory versus Optional*

Next, the type of internship programs available to students was considered. For the purpose of this investigation, internship programs were divided into two types with regard to curriculum requirements—mandatory and optional. Some programs may offer course credit for participation while others may not. Those that do offer course credit may also include an educational component which must be completed along with the experience. Whether internship participation is mandatory or optional, the process may be considered structured or non-structured. A chart breaking down the differences in mandatory and optional internship programs is listed below in Table 4.

**Table 4: Mapping of Construction Related Internship Programs**

<b>Internship Programs</b>	<b>Mandatory</b>	<b>Optional</b>
<b>Structured</b>	<ul style="list-style-type: none"> <li>• Has an educational component</li> </ul>	<ul style="list-style-type: none"> <li>• Has an educational component or workshop prior to participation</li> </ul>
	<ul style="list-style-type: none"> <li>• Workshop/coursework prior to participation</li> </ul>	<ul style="list-style-type: none"> <li>• Deliverables required</li> </ul>
	<ul style="list-style-type: none"> <li>• Workshop/coursework during participation</li> </ul>	
<b>Not Structured</b>	<ul style="list-style-type: none"> <li>• Documentation of participation needed</li> </ul>	<ul style="list-style-type: none"> <li>• No educational component</li> </ul>
	<ul style="list-style-type: none"> <li>• No educational component</li> </ul>	<ul style="list-style-type: none"> <li>• No workshop/coursework prior to participation</li> </ul>
	<ul style="list-style-type: none"> <li>• No workshop/coursework prior to participation</li> </ul>	<ul style="list-style-type: none"> <li>• No documentation of participation needed</li> </ul>

In most professional fields, providing students with practical skills to complement theory is a prerequisite to certification for practice (APA 2013, CAEP 2013, CSWE 2013, LCME 2013). In disciplines such as medicine, it would be unthinkable to offer a curriculum that did not have a practice component. Fields of study in engineering and applied science also have strong practice requirements. It is expected, and is increasingly a differentiator among programs, that high quality academic courses of study in the professions include direct, hands-on application of theoretical knowledge under supervision. This is the standard model of learning and credentialing in the professions (Venkatesh et al. 2003).

Once the academic participants were identified, a student population associated with a university that meets those requirements was selected.

### **3.4.2 Student Population**

In selecting the student population to be surveyed, it was necessary to identify a population that was representative of the general population. As previously determined, a mixed-method approach of data collection was used to provide more comprehensive data, compensate for disadvantages using a single method and allowed investigation of different types of questions such as open response and closed response.

The survey collected both quantitative information and qualitative information. The qualitative component of the student survey required the use of nonprobability sampling. Qualitative studies use nonprobability sampling exclusively (McMillan 2008). Due to the qualitative nature of part of the data collection, it was necessary to utilize purposeful sampling. Purposeful sampling is a nonprobability sampling approach that is used in both qualitative and quantitative educational research (McMillan 2008). Qualitative studies require participants be selected purposefully. There is a reason or justification for why the sample of individuals will provide the best information to address the research questions and the researcher uses his or her professional judgment for selecting respondents (McMillan 2008, Rea & Parker 2005). Utilizing

purposeful sampling allowed the investigator to select particular individuals who were particularly informative on the subject being investigated.

The use of qualitative data makes it difficult to make a statistical generalization to any population beyond the sample surveyed (Robson 2002). Though statistical generalization may not be possible in this investigation, other measures were taken by the researcher to offer a theoretical generalization of the data collected. Being thorough, careful and honest in carrying out the research and being able to show others the method and research practice in analyzing the data will offer an audit trail and improve the reliability of the study (Robson 2002).

McMillan (2008) offers several strengths and weaknesses for utilizing purposeful sampling as the sampling method. These are illustrated in Table 5.

Weaknesses for this sampling method were addressed in the design of the study. The academic data collection tool helped to characterize the realm of internships in construction education and also provided a brief description of the current enrollment of the program. This should help to address weakness 1 and 2 of this method.

**Table 5: Purposeful Sampling as a Sampling Method**

<b>Purposeful Sampling as a Sampling Method</b>	
<b>Strengths</b>	<b>Weaknesses</b>
<ol style="list-style-type: none"> <li>1. <b>Less Costly</b></li> <li>2. <b>Less time-consuming</b></li> <li>3. <b>Ease of administration</b></li> <li>4. <b>Usually ensures high participation rate</b></li> <li>5. <b>Generalization possible to similar subjects</b></li> <li>6. <b>Adds credibility to qualitative research</b></li> <li>7. <b>Assures receipt of needed information</b></li> </ol>	<ol style="list-style-type: none"> <li>1. <b>Difficult to generalize to other subjects</b></li> <li>2. <b>Less representative of an identified population</b></li> <li>3. <b>Results dependent on unique characteristics of the sample</b></li> </ol>

The population from which the researcher collected data was the population this research was designed to make a determination for, therefore weakness number 3 should not affect the

results. Participant recruitment for the student population included students currently enrolled in an ASC member school, having an ACCE or ABET accredited construction program at a university in the United States. Additionally, the program also did not require students to participate in an internship program as part of the curriculum requirements. This allowed the researcher to collect information from students who had not completed an internship as well as students who had completed an internship. The participants were then broken down into two groups, one group that participated in an internship and one group that did not participate in an internship. There was no gender exclusion so both male and female students were permitted to participate.

For the student population, it was possible to choose a site for recruitment that was representative of most others. This is a form of purposeful sampling called typical case sampling. In typical case sampling, the researcher investigates a group that is representative of many (McMillan 2008). Obtaining this typical case population required the researcher to identify those educational institutions that met the previously mentioned criteria and from which students could be recruited. Criteria for this included:

1. ASC member school
2. Four year degree program
3. ACCE or ABET accredited BC or CEM program
4. Internship participation not mandatory
5. Identifies internship program as either structured versus non structured
6. May offer for course credit option
7. Is considered a peer amongst leaders within the construction education system

There are several ASC member schools that could be compared that meet these criteria and are considered leaders in construction education among their peers. This made possible, identification of a program that would be representative of the group as a whole. Eight universities with comparable enrollment size, duration of their programs and that meet accreditation requirements are listed in Table 6. Of these eight universities four were excluded as a representative due to curriculum requirements of mandatory internship participation.

Arizona State, Colorado State and Purdue each have mandatory internship participation.

Clemson requires a minimum of 800 hours of approved construction experience which would not meet the definition of an internship for this study but still excluded them from selection since the experience was mandatory.

Auburn University and Cal Poly do not require internship participation as part of the curriculum requirements and do not offer a structured for-credit option. The University of Florida does not require participation in an internship but does offer a non-credit structured internship option for students.

Table 6: Comparable University Breakdown

	Mandatory	Non-Mandatory	Structured Option	For Credit
<b>Arizona State University</b>	X			
<b>Colorado State University</b>	X			
<b>Purdue University</b>	X			
<b>Clemson University</b>	X			
<b>Auburn University</b>		X		
<b>Cal Poly, San Luis Obispo</b>		X		
<b>University of Florida</b>		X	X	
<b>Virginia Tech</b>		X	X	X

Virginia Tech has both an accredited construction management program (BC) and an accredited construction engineering and management program (CEM) that do not require students to participate in a mandatory internship. Virginia Tech offers students the opportunity to participate in a structured internship course that provides course credit to meet one of the construction engineering and management electives but does not currently offer course credit for the construction management program. For these reasons, Virginia Tech was considered a program offering a typical case student population needed for this research.

Students currently enrolled in a construction related program at Virginia Tech comprised the student population. There was no age restriction for participation but participants were required to be scheduled for graduation after December 2012. Students graduating prior to December 2012 would be seeking fulltime employment instead of an internship opportunity and would fall outside the data collection period. Race was not a factor in the selection process and was not be part of the identifying data collected.

Once the student population had been identified, it was then be possible to determine the industry target population in alignment with these students.

### **3.4.3 Industry Population**

The industry population needed for this research was those companies that have a relationship with the student population previously identified. These companies serve as the main hiring source for students graduating from Virginia Tech. Companies that attended the spring and fall career fairs hosted by the Myers-Lawson School of Construction at Virginia Tech were solicited for participation in the data collection. Those companies that did not attend the job fair but did recruit Virginia Tech students through other means were also included. These other means of recruiting included: submitting job opportunities to the department for posting on the student list serve; coming to campus and speaking to classes about their work; and holding informal meet and greet sessions in the construction building on campus.

Those persons asked to participate were limited to those employees within the companies who are directly involved with the hiring process. These included human resource personnel, company executives, project managers who field resumes at job fairs, and superintendents involved in the recruitment of new hires.

### **3.5 Means and Methods of Considered and Evaluated Data Collection**

All standard methods of data collection may be employed in an action research program. The nature of the organization, the degree of cooperation that can be achieved, and the research

aims will influence the final choice (Wilson 2000). Four methods of data collection that can be used for this type research would be observation, interviews, document review or surveys. When determining the best match for data collection, each method should be reviewed to determine the viability for gathering the data needed, the advantages of using that method, and the disadvantages associated with the method for this type of research (McMillan 2008).

### **3.5.1 Observation**

A main issue with observation to consider is the extent to which the observer affects the situation under observation (Robson 2002). Observation of the academic and industry participants may lead to disruption of the workplace. This may cause the researcher to be met with resistance in participation and limit the sample size. Another issue with observation is observer bias which may lead to misinterpretation of the results (Robson 2002, McMillan 2008) or judgments about what is seen or heard, based on the frame of reference experienced by the interpreter (McMillan 2008).

Additionally, some data cannot be observed. Student's perceived self efficacy with regard to success in the construction industry is not directly observable. Determining industry emphasis on the internship process and participation is not something that is directly observable. Academic standards such as accreditation are not directly observable. In addition to the limitations of observation, the logistics of traveling to each of the industrial and academic participants would result in a small sample size.

Due to these limitations, observation of the research participants was not considered a viable means of data collection to meet the goals of this research.

### **3.5.2 Interviews**

Interviews are a form of data collection in which the questions are asked orally and responses are recorded either verbatim or summarized. Because interviews are conducted in person, more accurate, detailed responses can be collected through clarification and additional probing

(McMillan 2008). Additional information can also be collected that might not have been offered with less personal methods. Non-verbal and para-verbal responses can be observed and face to face interviews can cut down on the number of non-responses as well (McMillan 2008, Robson 2002).

Interviews have several disadvantages including being expensive and time consuming to conduct. For these reasons the sample size is usually small (McMillan 2008, Robson 2002). Interviews require respondents to commit their time which can also be difficult to schedule. Bias may affect the results of the data collection either during the interview process or during the interpretation of the results (McMillan 2008). During the interview, interviewees may provide responses they feel are seen as favorable and may be less apt to provide information that they feel are seen as negative. Interviewer bias can affect outcome as well during the interpretation of the results. The interviewer may interpret information provided in a way not intended by the interviewee (McMillan 2008, Robson 2002).

The needs for this research did not require rich, in-depth responses. Additionally, it was anticipated that the sample size needed to provide an accurate description of the role of internships in ASC member schools would not be considered small. For these reasons, interviewing was not considered a practical data collection technique for this research.

### **3.5.3 Document Analysis**

A third way to obtain information from the population is to review documents pertaining to the subject being researched (McMillan 2008, Robson 2002). The documents to be reviewed may include accreditation documents listing the course students must complete to fulfill degree requirements. Course requirements may also be listed on school websites and can be retrieved on-line. Obtaining this information could require little time commitment from the schools and would be considered reliable and free from bias.

Disadvantages of this method include privacy concerns from the member schools and the time commitment on behalf of the person collecting the data. Reviewing documents at all eligible universities would require the researcher to travel to each of the universities. Traveling to all the schools would require a great deal of time and expense. University program websites offer some information on program curriculum but may not contain the information needed and would require supplemental data collection methods. Due to the number of schools included in the sample size, this type of data collection was not feasible. The time commitment and the great expense associated with it made this method unattainable for this researcher.

#### 3.5.4 Surveys

Survey research is popular because of versatility, efficiency, and generalizability (McMillan 2008). Advantages include cost, anonymity, and ability to collect data from a large sample population. The cost of producing a survey includes paper and postage if the survey mailed. If done on-line, the cost of production is virtually free. The researcher determines the amount of identifying information collected and anonymity is an option. Even with those surveys that collect the interviewees name or other specific identifying information, there can still be a sense of anonymity when respondents complete the survey which may lead to more open, honest responses (Robson 2002). The survey also allows for a larger sample population, especially if the survey is completed on-line since there is no cost for the distribution. The survey could be completed at the respondents leisure which may improve the rate of response (Rea & Parker 2005). Surveys also offer the opportunity to provide the same questions to persons utilizing an online survey generation tool or through completion of a hard copy. Those persons reluctant to complete the survey online can be offered the opportunity to complete the survey by means of a hard copy so they are not excluded from participation.

Disadvantages of the survey include the lack of opportunity to probe for more information (McMillan 2008). Without the face to face contact, respondents may run quickly through the

responses without providing accurate information. Allowing respondents to complete the survey at their leisure may lead to them forgetting about the survey and may negatively affect the rate of response (Rea & Parker 2005). Due to the data that needed to be collected for this purpose, the advantages superseded the disadvantages. Some of the disadvantages were also addressed by the researcher.

The size of the survey was kept relatively small with most of the questions requiring a closed response. This encouraged the sample population to take the time to respond accurately and answer all the questions. The academic survey was done online and included a completion deadline. For those who did not respond by the deadline, a reminder e-mail was sent to those schools who had not returned a completed survey. For these reasons, the survey method of data collection was chosen for this research. Figure 9 highlights the reasoning behind and the implementation of surveys as the data collection tool.

### *Survey Development*

Surveys were utilized as the research method to collect data. Surveys are transparent (Robson 2002) making the researcher more accountable. Surveys also make the data collection procedures visible and accessible to others (Hakim 1987, Robson 2002), providing an opportunity to easily replicate the data collection.

The research utilized three survey assessment tools to obtain the information needed to complete the quantitative assessment. Each of the survey tools contains at least one open response question to collect qualitative data. In addition to the surveys, an alternative data collection tool was provided to the student participants asking for limited identifying data and qualitative information on students' perceived self-efficacy with regard to success in the construction industry.

When developing the survey tool, it was important to consider the population being studied. Without this consideration, the survey questions could be peripheral or tangential to the goals of the research study (Rea & Parker 2005). In order to understand the population to be surveyed, it is necessary to develop a sampling frame, identifying the working population from which data will be collected (Rea & Parker 2005). Only after this step was completed could an appropriate and useful survey instrument be developed.

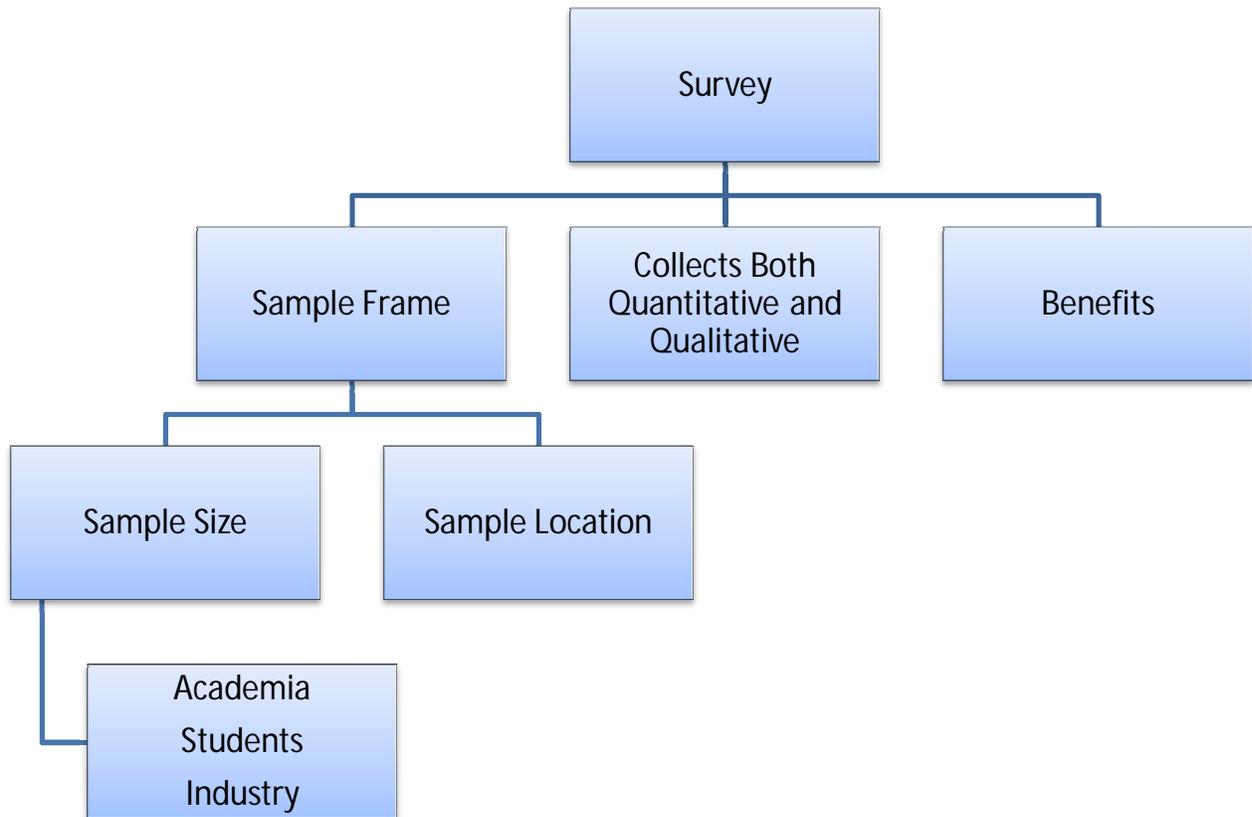


Figure 9: Survey as Data Collection Tool

### 3.6 Data Collection Tools

This research requires data collection from three separate sources. It was necessary to develop three separate data collection tools. Surveys have been selected as the method of data collection, therefore three separate surveys needed to be developed. Each of the surveys

collected identifying information as well as data needed to achieve the goals presented in Section 3.1 and answer the research questions presented in Section 3.2. The surveys needed to be designed so both quantitative and qualitative data could be collected from the participants. Figure 10 describes the survey data tools and their purpose for this research.

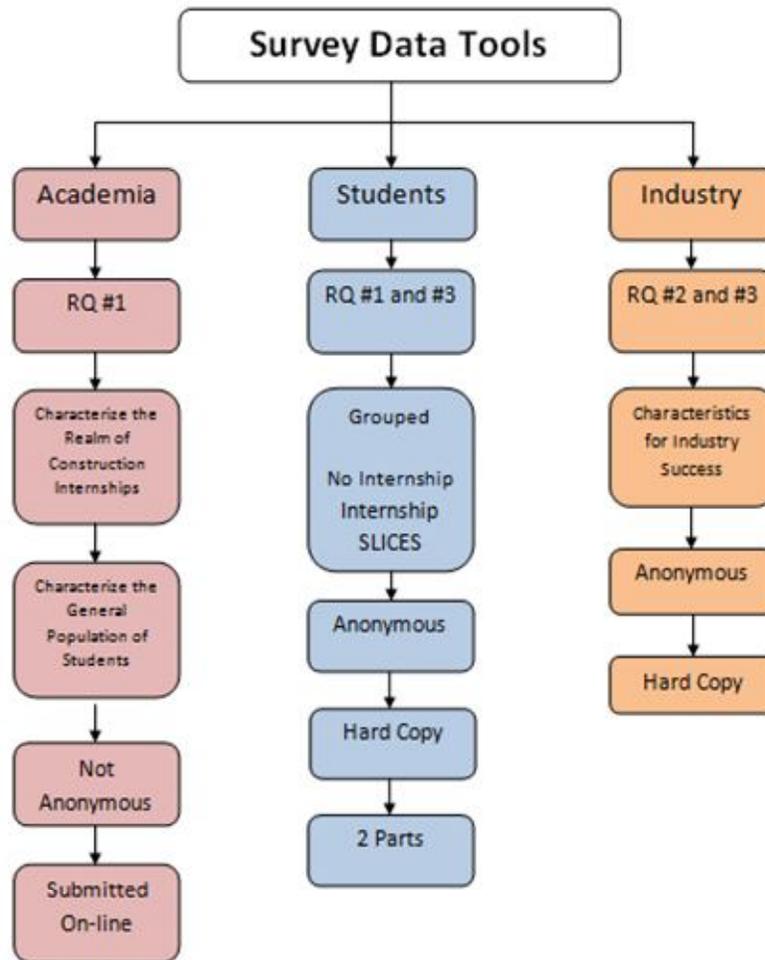


Figure 10: Survey Data Tools

**Academic survey**

The academic survey was used to characterize the realm of internship programs in accredited schools, the roles they play in the curriculum and defined the dimension of current internship programs. Anonymity was not an option for this survey so the researcher could identify which

educational institutions participated in the data collection. This information was important for providing a theoretical generalization of the results. A copy of this survey is available in Appendix A1 and A2.

### *Student Survey*

The student survey was the main source of answering research questions #1 and #3. This survey was anonymous in that only the researcher knows who completed the survey. Each survey was numbered and provided to participants in random order. The survey was offered to students for participation twice, once during the spring semester and once during the following fall semester.

Limited identifying data was collected. This survey was equally quantitative and qualitative. A copy of the student survey is available in Appendix A3. An additional data collection tool was developed to collect qualitative information about student awareness and understanding of success in the industry. This tool allowed students to identify the skills they felt they possessed that will help make them successful as well as identifying areas in which they felt they were deficient. This additional tool was developed using a matrix format that follows the same principles as the SWOT analysis tool.

SWOT is an acronym for strengths, weaknesses, opportunities and threats. A SWOT analysis is a matrix design that originated in the 1950s at Harvard Business School to provide a process for analyzing case studies (DeSilets & Dickerson 2008, Panagiotou 2003). The SWOT analysis technique is familiar and easily understandable by users and it provides a good structuring device for sorting out ideas (Piercy & Giles 1989). Researchers agree SWOT provides the foundation to gather and organize information to realize the desired alignment of variables or issues (Helms et al. 2008). Following this model, a form was created asking students to list their strengths and deficiencies.

This newly created data collection tool is named the Strengths Awareness Matrix (SAM). A copy of the SAM form is available in the student survey in Appendix A3. To ensure the validity of this new tool, a pilot test was completed to evaluate the appropriateness of the format utilized, the level of comprehension, the ease of use and the relevance of the data collected. Students enrolled in the structured internship program at Virginia Tech were used for the pilot study.

The structured internship program offered to students at Virginia Tech is referred to as SLICES. SLICES is an acronym for a research program entitled Synergistic Learning & Inquiry through Characterizing the Environment for Sustainability. This program was developed by two professors at Virginia Tech, Dr. Annie Pearce of Building Construction and Dr. Christine Fiori of the Myers-Lawson School of Construction (Fiori & Pearce 2009, Pearce et al. 2010). Students enrolled in this course receive course credit for completion. Students enroll in a one hour course during the Spring semester, complete research protocols during their summer internships and then enroll for a two hour course in the Fall semester.

During the Spring semester, students meet for five weeks to discuss the course requirements, deliverables and topics that are designed to help them complete assignments during their internship. Some of the topics included in the Spring semester course include resourcefulness, interviewing, research methodologies, data collection, personal awareness and identifying personal strengths (Fiori & Pearce 2009, Pearce et al. 2010).

Throughout the summer internship, students are tasked with completing five research protocols designed to help them investigate sustainability practices of the company employing them. Students are required to interact with persons of all levels within the company in order to complete the protocols.

Students meet again as a group during the Fall semester to complete a formal presentation of their work and discuss their findings with one another. The goals of the SLICES course are to improve student leadership abilities, social skills, cognitive and effective sustainability knowledge, managerial resourcefulness and information literacy (Fiori & Pearce 2009, Pearce et al. 2010).

The students enrolled in SLICES during the Spring semester of 2010 were asked to complete the form and the results were evaluated. Students were asked to verbally comment on the comprehension and ease of use of the form. No issues were reported at that time. During the coding process, the responses provided by the students were easily read and coded by the researcher. Upon completion of the pilot study, it was determined by the researcher that the SAM form would meet the needs of the research.

### *Industry Survey*

The industry survey was created to provide a clear understanding of how internship participation is perceived within the industry, and how industry characterizes the factors that lead to a student's success. A copy of this survey is found in Appendix A4. The survey collected limited identifying information related to the person completing the survey and the company with which they are affiliated. The job title and number of years in the industry were asked to ensure the person completing the survey was able to provide an accurate characterization.

### **3.7 Data Collection Process: Research Question #1**

Each of the surveys were created to help answer the questions presented in section 3.2. This section will provide a breakdown of the process followed through the data collection and how each of the surveys helped to answer research question #1. This first research question asks, "What effect does student participation in an internship program have on student soft skills and perceived self-efficacy with regard to the construction workplace?" The process followed to answer this question is presented in Figure 11.

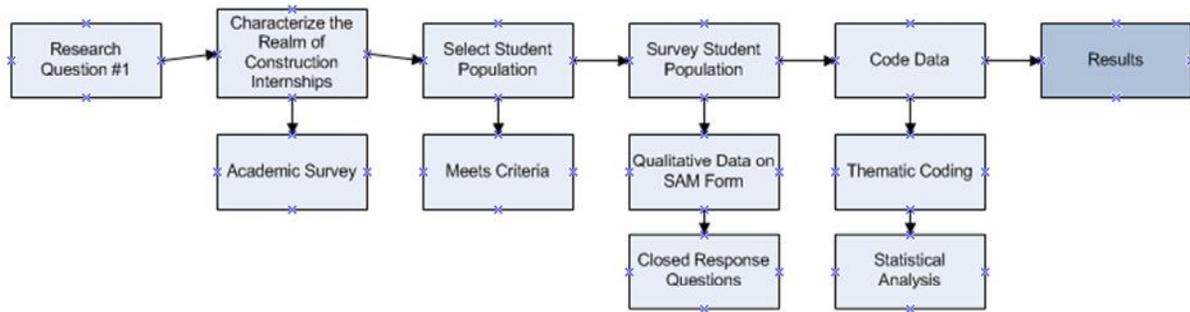


Figure 11: Research Question #1 Process

To respond to this question it was necessary to administer and analyze the academic survey to obtain a characterization of the student population currently enrolled in construction education programs. This enables the researcher to determine whether the student population is representative of the general population and improves the theoretical generalization of the results.

This question also required the administration and analysis of the student survey. The student survey data provided information on the soft skills, specifically communication preferences, of the student sample. The student survey also provided data on student reported self confidence and perceived self efficacy with regard to success in the construction industry through responses provided in the success/strengths and success/deficiencies boxes on the SAM form matrix. Students were also asked to identify whether they had participated in an internship experience or not.

### 3.7.1 Academic Survey Tool

The results obtained from the academic survey were used to characterize the realm of internships and the current student population. The initial sample population for this survey was all schools having Institutional membership in ASC. These programs were sent the academic survey and offered the opportunity to participate in data collection. This is in alignment with the

student survey and aims to improve the external generalizability of the student results. The survey was provided electronically using a survey tool program, SoGo Survey.

The ASC website provides basic information on member schools including the institutional name of the member, the contact person and their e-mail address. The researcher accessed this information to create an Excel spreadsheet listing the educational institution's name, contact person and e-mail address provided. This spreadsheet documented who was sent the survey and the response rate. Utilizing this resource, an electronic message was sent to the person listed as the ASC contact. The electronic message accomplished the following:

1. Describe the research;
2. Inform the participant how the data collected will be used,
3. Provide an estimated time needed to complete the survey; and
4. Ask for voluntary participation

The electronic message offered the recipient the option of having someone they feel would be more appropriate complete the survey. Should the recipient decide to not participate themselves, they were asked to either forward the message to a more appropriate person in their department or provide the researcher with the name and contact information of that person. If the name and contact information was provided, the researcher then sent an electronic message to the new contact person provided and the contact information was updated in the researcher records. No incentives were offered for participation in the research. If participants wished to request information regarding the results, the primary researcher contact information was provided.

#### *Academic Survey Content Overview*

The academic survey was composed of 17 standard questions. A copy of the academic survey is available in the appendix section of this report. The survey questions were broken down into unmarked sections collecting identifying information on the educational institution, current student enrollment information and course requirements for the program. The design of the

survey included the use of branching and skip logic to improve the flow of the questions presented to the participant. Because of this design, the questions were not numbered. Numbering the questions may cause confusion during the use of branching and skip logic as additional questions may appear and sections of questions will be skipped based on responses.

Branching is used when the response to a question requires additional information and directs the flow to other questions not immediately visible to the participant. This helps to prevent confusion on the part of the participant, making unrelated questions not part of the flow. The following is an example of branching used in this survey tool:

1. A question was presented asking if the program is accredited.
2. If the response was Yes, then an additional question popped up asking about the organization that provides the accreditation. This question was not visible until the participant selected Yes.
3. If the response was No, the additional question did not show itself and the participant moved to the next visible question.
4. If the response was No, then there was no logic in asking the additional question to the participant. Therefore it was not provided as a base question. If the additional question was immediately visible and the survey was designed to skip the second question based on a No response, then the participant may have become confused as to why the question suddenly disappeared or they were not given an opportunity to respond.

Skip logic was used in the initial questions. If the participant should note that they do not offer a BC or CEM program then the survey skips to the text box at the end. Since the data collection was for BC and CEM programs then there would be no reason to send the participant through the entire survey which asks questions about those specific programs. Skip logic was also used to direct the participant to the bank of questions that addressed the program or programs selected. For example, if the participant stated they only offer a BC program then the bank of questions addressing CEM programs was skipped.

Identifying information collected included the name of the institution and the name of the person completing the survey. Questions on the first page of the electronic survey collected this

information from the participant. The first page also asked what type of construction related programs are offered by the institution. Responses for this question include *Building Construction (BC)*, *Construction Engineering and Management (CEM)*, *Both Programs* or *Other*. If the participant selected *Other*, then a request to name the type of construction related program was made using an open ended response box. In the situation where the participant selected *Other*, then the survey skipped to the end of the survey due to the limitations stated for the data collection on this research. A text box was provided thanking them for their participation in the data collection and the main researchers contact information was provided for further questions. If the participant selected either the *BC*, *CEM* or *Both* option then they were progressed to the next question addressing the program selected.

Depending on the program selected on the first page, the participant was directed to a question asking about accreditation of the specific program. If *BC* was selected as the response, then the survey proceeded to questions relating to the BC program. If *CEM* was selected as the response, then the survey proceeded to questions relating to the CEM program. In the case where the participant selected both *BC* and *CEM* as programs offered by their institution, the flow of the survey proceeded first through a series of questions asking about the BC program and then proceeded to a series of questions asking about the CEM program. The paragraph at the top of the second page stated that the questions below were in reference to the program selected and named that program. The opening paragraph also provided instructions for the participant to return to the first page if they have selected a program accidentally.

Page 2 of the electronic survey asked the year the program was established and if the program selected is accredited. If the participant selected *Yes* as the response then a question appeared asking if the program is accredited by the Accreditation Board for Engineering and Technology (ABET), the American Council for Construction Education (ACCE) or *Other*. ABET and ACCE are responsible for evaluating curriculum of construction related programs to assure

that the program has met certain standards necessary to produce graduates who are ready to enter the professions. (ABET 2007) ABET evaluates engineering and technology related programs. ACCE evaluates building construction/ construction management and technology programs. For this reason, programs that are accredited by the ABET or ACCE were singled out for use in this investigation to improve the generalizability of the student survey results. If the participant selected *Other* as the response they were requested to specify the accrediting agency in an open response text box.

Once accreditation was addressed on the survey, additional information was collected on the current enrollment, gender breakdown of students, credit hour requirements for graduation and the role internship plays in those requirements. This information will assist in determining the generalizability of the student survey results. These questions were covered on page two of the survey. The last question on page two asked if a workshop was provided for students who participate in an internship to prepare them for the experience. Survey progression was based on the response to this question. If the response was *Yes*, the survey progressed to page three which addressed content and hours dedicated to the workshop. Once these questions were answered, the survey progressed to page four. If the response to the last question on page two was *No*, the survey skipped page three and progressed to page four. Page four asked if the program has a person dedicated to organizing internships for students.

Once page four had been completed, a text box was presented thanking the participant for their time and the main researcher contact information was provided for further questions.

### ***Academic Survey Analysis***

The data collected from the academic survey was quantitative. Some questions utilized an open response, such as indicating the participant's job title or indicating the number of students currently enrolled in the program. These responses are still considered quantitative as they

were not based on opinion and were used for descriptive purposes. The process for analyzing the quantitative data in this survey is presented in Figure 12.

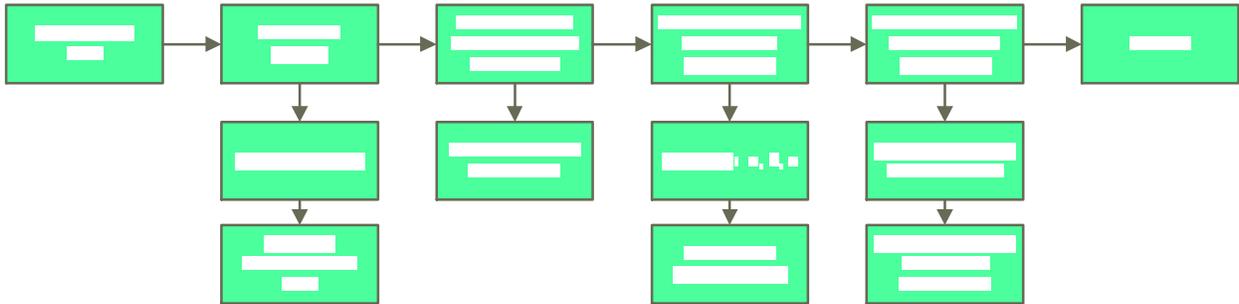


Figure 12: Quantitative Analysis for Academic Survey Tool

The results from the academic survey were completed using an online survey program called SoGoSurvey allowing the results to be exported directly from the program to a Microsoft Excel worksheet. The data transferred as it was provided by the participants. Quantitative survey questions offering a closed response were listed in the spreadsheet noting the responses assigned to each of the numbered questions. Multiple choice questions for this survey did not utilize a letter as an identifier for the response. Since the survey was completed on-line, participants were able to select their response by selecting a button next to the answer. These responses were noted in the spreadsheet as the response selected. For example, participants were asked about their construction related program. The closed responses offered were: *a. BC*, *b. CEM* or *c. Both*. If the participant selected *a. BC* as their response then the response transferred to the Excel spreadsheet as *BC*. If the question provides an open response and asks the participant to enter a number or other comment then the response, as provided, is transferred to the spreadsheet.

Closed responses, such as *yes* or *no* questions, were counted and totals generated for each of the responses. For numerical responses, such as enrollment numbers, a mean was calculated for the column. For responses where comments were entered, such as the question pertaining to what topics are covered in the workshop, no totals were calculated as these questions were for informational purposes only and not used in the analysis for this research.

This data was used to address research question #1. This information allowed a theoretical generalization of the data obtained from the student surveys. Research question #1 also required completion of the student survey tool.

### **3.7.2 Student Survey Tool**

In selecting the student population to be surveyed, selection was exclusive to students who are currently enrolled in a construction education program at an ASC member school that is ABET or ACCE accredited. This is in alignment with the academic survey and aims to improve the external generalizability of the results. BC and CEM students currently enrolled at Virginia Tech comprised the student sample population. All students were eligible to participate including those students currently enrolled in the 2012 structured internship course offered to students in the BC and CEM programs at Virginia Tech.

Surveys were administered during two semester periods. The first period was during the 2012 spring semester. The second period was during the 2012 fall semester.

Data was collected from those students enrolled in the structured internship course during one of the scheduled course meeting times. Those students in the structured internship course participated as part of the course but participation did not affect their grades. Other students were offered participation in the process through program class visits and through personal interaction by the researcher. The researcher approached students in Bishop Favrao Hall, a construction program building at Virginia Tech, to determine whether they were enrolled in one

of the construction programs and to determine what year they were currently in the program. A table was set up on the second floor of Bishop Favrao Hall where most classes take place. A table was also set up on the third floor of Bishop Favrao Hall where most students congregate to study. Students were asked by the researcher if they were interested in participating in the survey. All students were told verbally and the survey stated that participation was voluntary. There was no set number of participants for the pre-internship survey data collection. Students were not compensated for participating in the data collection process.

### *Student Survey Content Overview*

The student survey tool was comprised of two parts. Copies of both parts are available in the appendix of this paper. The first part of the tool was a four page questionnaire comprised of 24 multiple choice questions and one open response question. The second part was the SAM form used to collect qualitative information on student awareness and understanding of success in the industry. The surveys were anonymous to everyone except the main researcher. Each of the surveys and SAM forms was labeled with a number. Students did not provide their names directly on the survey tools. The surveys were then distributed to participants at random.

During the spring semester data collection period, students were asked to write their names on a post-it note attached to the front of the survey. This post-it note contained the number of the survey. Students were then instructed to remove the post-it note and give it to the researcher. The lead researcher then maintained a listing of student participants and the number assigned to their survey. It was necessary to keep a listing during the spring data collection period so students could complete a follow up survey during the fall, after the summer internships were complete. Students who completed the survey during the fall period did not use the post-it notes.

Students were told that their answers were anonymous and that the only person who would know which survey number they completed was the lead researcher. This information is not

provided to any other research partners or participants. The first four questions of the survey collected general identifying information. Students did not write their names on the survey forms. The first four questions asked for the name of the university, current year in the program, gender and age range. Questions five through eight addressed the student's internship participation. All the questions were multiple choice with two of the questions offering the option to choose *Other*. In the instances where the participant selected *Other* as a response, a line was provided for the student to write in their response.

Questions nine through 18 addressed student perceived self efficacy with responses utilizing a Likert scale. Questions 19 to 24 were multiple choice, addressing communication preferences. The final question was an open response question asking the student for their input on the topics or information they would like to have offered to help them prepare for entering the construction industry.

The SAM form offered students the opportunity to self reflect and list their strengths and deficiencies with respect to success in the industry. The form is two sided with the matrix box listed on both sides. One side of the form contains three questions collecting identifying information and instructions on how to complete the matrix. The other side of the form contains the matrix with blank response boxes. Students were verbally told to complete the success/strengths and success/deficiencies boxes of the SAM form by listing those things they felt were necessary for success in the construction industry. Students were also verbally told to complete the awareness/strengths and awareness/deficiencies boxes of the SAM form by listing those things they felt were not necessary for success in the construction industry.

The SAM form matrix is comprised of two headings, strengths and deficiencies. Below the headings are two empty boxes in each column for the student to provide their responses. Along

the left side of the matrix are two boxes containing the words success and awareness. The SAM form matrix is presented in Table 7 below.

Table 7: Strengths Awareness Matrix (SAM)

Strengths Awareness Matrix	
Strengths	Deficiencies
Success	
Awareness	

**Student Survey Analysis**

The student survey contained both quantitative and qualitative data collection questions. The quantitative and qualitative responses were coded differently depending on each individual question and how the responses are being used to meet the goals of the research and answer the research questions. Quantitative questions were analyzed using the same method as described in the academic survey tool section 3.7.1. The process depicted in Figure 13 is the quantitative analysis of the data collected from the student survey as it relates to research question #1.

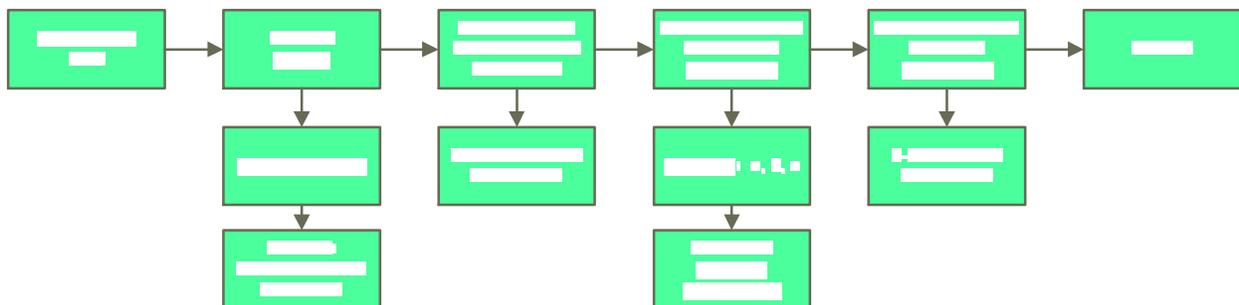


Figure 13: Quantitative Analysis of Student Survey Tool

Quantitative survey questions offering a closed response were listed in a spreadsheet noting the responses assigned to each of the numbered surveys. These questions included identifying data, such as student's year in program, and questions pertaining to student's communication preferences. Multiple choice questions utilizing a letter as an identifier for the response were noted in the spreadsheet as the corresponding letter response. For example, question #3 on the student survey asked for the participant to identify their gender by selecting one of the closed responses provided. The two responses were: *a. Male* and *b. Female*. If the student selects *a. Male* as their response, then the spreadsheet will identify that student's response for question #3 as the letter *a*. This information was also transferred to the spreadsheet used by the statisticians during the statistical analysis so the students could be placed into groups.

Questions using the Likert scale, which utilizes numerical assignment for responses, were noted in the spreadsheet as a numerical response. For this research, the student survey was the only survey using a Likert scale so this type of response will only be found in the analysis of the student survey. A Likert scale was used in the student survey for questions measuring perceived self efficacy. This was necessary so a mean could be determined during the analysis of the data. All other quantitative questions did not require a mean be derived from the responses.

### ***SAM Form***

For this population, the SAM form comprised the qualitative data that needed coded. Though the main data on this form is qualitative, there were three identifying information questions on the front of the form that collected quantitative data. These questions listed response options without a letter or numerical assignment. The transfer of this data was similar to the method described for the quantitative data analysis. Each of the responses were coded by assigning a letter to each of the response options. For example, three response options were provided for the question asking the participant's age. Each of these response options were later assigned

letters *a*, *b* and *c*. When the response was transferred to the data analysis spreadsheet, the letter assigned to the response was noted under the heading associated with that response. In the spreadsheet, the response for each participant was marked under the Age header with a letter *a*, *b* or *c* depending on the response the participant provided.

The qualitative data on the student survey required post coding. The process depicted in Figure 14 is the qualitative analysis of the data collected from the student survey as it relates to research question #1.

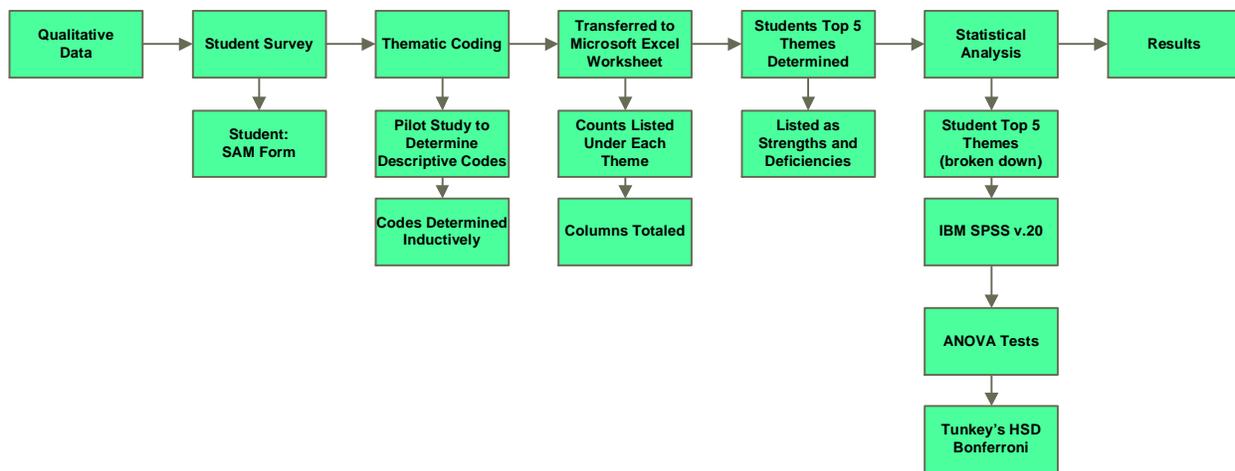


Figure 14: Qualitative Analysis of the Student Survey Tool

The SAM form completed by students required coding of the responses. The qualitative part of the SAM form was post coded using thematic coding. Free codes were first listed and clustered into areas the researcher felt were related. For example, free codes that were used by students on the SAM form during the pilot study included: “friendly”, “polite”, and “funny”. These words were interpreted by the researcher as terms used to describe a person’s personality and therefore clustered under the heading of *personality*.

Once this was completed the researcher was able to construct descriptive themes. These descriptive themes derived from the actual words used by the respondents and emic (from the

viewpoint of the respondent) words. The next step was to place each of the free codes beneath the corresponding descriptive code. This resulted in 38 original descriptive codes. This list was further condensed by combining codes that described categories similar in nature. For example, the descriptive codes of “positive/optimistic”, “persistent” and “personality” were combined under one heading labeled *personality*. This resulted in the final 24 analytic themes used to analyze the data.

The SAM form is a new data collection tool created by the researcher to gather qualitative data from the students in this survey. To ensure the validity of this new tool, a pilot test was completed to ensure the appropriate format, comprehension, ease of use and relevance of data collected. Testing was completed using students enrolled in the structured internship program at Virginia Tech during the Spring semester of 2010. The students were asked to complete the form and the results were evaluated. Nine students participated in the pilot study. Once the students completed the forms post coding was completed in the following steps:

1. Qualitative Responses from each of the forms were listed individually as free codes.
2. Line by line themes were identified among the responses utilizing actual words and emic words. This resulted in 38 different descriptive themes.
3. These descriptive themes were further condensed by combining those themes that were similar in nature resulting in 24 analytical themes or codes.
4. Each of the original responses were placed in a spreadsheet under one of the 24 headings based on the corresponding theme.
5. The number of responses under each analytical theme was calculated at the bottom of each column to determine which responses were most frequently listed by the students.

The 24 analytical codes resulting from the pilot study were utilized during analysis of the 2012 SAM forms completed by students during the data collection period. During this second analysis, the researcher found instances when the students listed an item that did not reasonably fall within one of the original 24 theme headings. To accommodate these items, a new category labeled *other* was added to accommodate the response and ensure proper representation of the students. Once all the data was transferred from the SAM Form to the

spreadsheet, a review was made of the new *other* category to determine whether there were any reoccurring items. It was determined that items relative to education were found frequently enough to justify adding another themed heading which was labeled *education*. Those items listed under *other* were then moved to the heading *education*. Adding these two additional categories resulted in a total of 26 theme headings used to code the SAM Forms for the student responses as well as the industry responses. Table 8 provides an overview of the 26 themes used during the thematic coding process. A copy of the themes used and some corresponding free codes is available in Appendix A5.

**Table 8 Thematic Codes used during the SAM Analysis**

Themes used for Coding					
1	Work Ethic	11	Handling Stressful Situations	21	Construction Skills
2	Punctuality	12	Trust	22	Construction Knowledge
3	Written/ Verbal Communication Skills	13	Physical Qualities	23	Computer Skills
4	Problem Solving	14	Creativity	24	Sports Skills
5	Personality	15	Cultural Awareness	25	Other
6	Confidence in Self	16	Diverse Interests	26	Education
7	Leadership	17	Common Sense		
8	Organization	18	Focus		
9	Time Management	19	Work Experience		
10	Patience	20	Learning New Skills		

Once the survey was completed, the data was input into spreadsheets using Microsoft Excel. A separate spreadsheet was created for each of the non-internship, internship, and SLICES populations, to facilitate analysis. The student files required several tabs due to the question

types and population types as well as separate tabs for each of the matrices on the SAM form responses. This data provided descriptive information on students soft skills, perception on self efficacy with regard to industry success and what characteristics they believed industry felt was necessary for success.

The survey response sheet was set up so that the number of the questionnaire was placed along the left column of the sheet with the question numbers placed along the top row side of the sheet. Responses were then input into the appropriate corresponding cell. Once all information was input, the number of responses for each column were totaled and placed beneath the final row of responses. Figure 15 is a representation of how the data spreadsheets were set up and data input into the cells.

The corresponding responses were then placed in the cell next to the questionnaire number. The responses from the general questions were placed in one spreadsheet. Question 25 on the survey was an open response and those responses were placed in a spreadsheet of its own. This sheet was set up with the questionnaire number listed along the left column of the sheet and the responses listed in the cells corresponding with the questionnaire number. Each response was given a separate cell to make the review of these responses easier.

	A	B	C	D	E	F	G
1	Participant	Q1	Q2	Q3	Q4	Q5	Q6
2	1	VT	a	a	a	a	b
3	2	VT	b	a	a	d	a
4	3	VT	a	a	a	a	a
5	4	VT	b	a	a	a	a
6	5	VT	a	b	a	a	a
7	6	VT	b	a	a	b	b
8	7	VT	c	a	a	b	a
9	8	VT	b	a	a	c	a
10	9	VT	c	a	a	a	a

Figure 15: Data Sheet Screen Shot

Another spreadsheet was created for the responses to the identifying information questions on the SAM form. This sheet was set up in a similar manner as the main student survey sheet.

The themes provided for the open responses listed on the SAM form matrix were placed on separate sheets. One sheet was created for each of the four matrix boxes. These sheets each displayed the responses for the strengths success, deficiencies success, strengths awareness and deficiencies awareness sections. The responses were placed on separate sheets to assist the researcher with the transfer of outcomes for later statistical testing. The number of the questionnaire was placed along the left column with the 26 themes listed across the top row. Each of the responses were coded, based upon their relationship with the 26 themes, on the survey sheet and then the information was transferred to the corresponding Excel sheet.

The students were allowed to list as many responses as they wanted in each of the four matrix boxes. Emphasis on one theme over another was not a measurement required for this research. During the transfer of the results to the spreadsheet, the researcher recorded a number 1 if the student listed a response that corresponded with a theme listed on the spreadsheet. The cell was left blank if the student did not list a response that corresponded with a theme listed on the spreadsheet. Once the responses were transferred to each of the four sheets, the columns were totaled to determine the top 5 responses. Data from the spreadsheets was also used in the spreadsheet required for the statistical analysis. This spreadsheet is available in Appendix A6.

### **3.8 Data Collection Process: Research Question #2**

This section will provide a breakdown of the process followed through the data collection and how the survey helped to answer research question #2. This research question asks, “How do industry hiring professionals consider internship participation when considering hiring new graduates of construction programs?” The process followed to answer this question is presented in Figure 16.

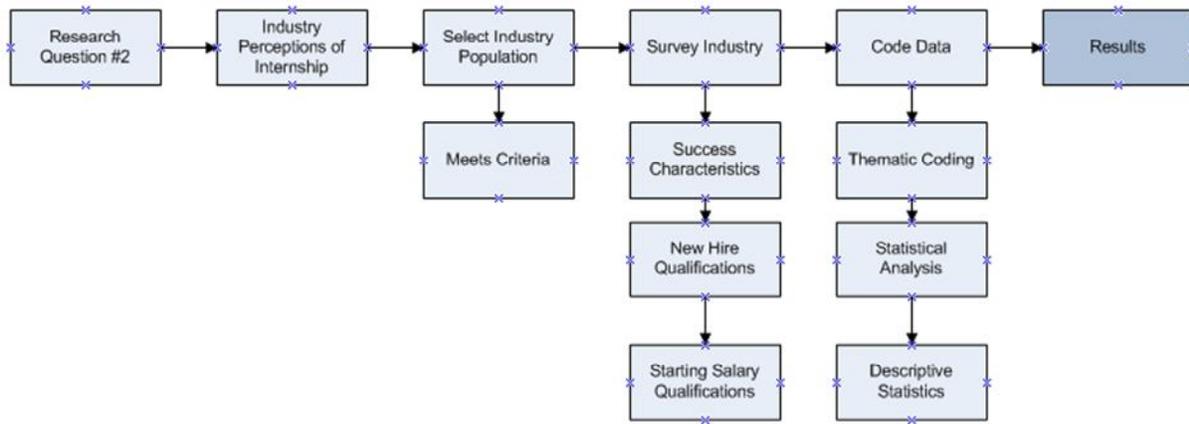


Figure 16: Research Question #2 Process

To respond to this question it was necessary to administer and analyze the industry survey to obtain industry view on the importance of internship process and what characteristics they felt students needed to be successful.

### 3.8.1 Industry Survey Tool

Industry members who actively recruit and hire Virginia Tech students were asked to participate in the data collection survey. This is in alignment with the academic and student surveys.

Questions on this survey helped in understanding the value industry places on the internship experience as well as to determine the level of participation they desire within that relationship.

All industry survey information was placed on three separate spreadsheets within one excel file.

One sheet contained the responses to the questionnaire with questions 12 and 13 being placed on a separate sheets. Question 12 was an open response question that had the potential to be lengthy. It was decided that these responses would be placed on a separate sheet to ensure clarity. Question 13 was an open response question that asks the participant what he or she feels are the top five characteristics students need to be successful in the construction industry.

These responses were coded using the 26 themes and required a separate sheet, for ease of analysis.

### *Industry Survey Content Overview*

This survey was comprised of nine multiple choice questions and five open response questions.

The first two questions collected data on the company where the participants were currently employed. These questions dealt with the type of industry and number of employees currently at that business. The next two questions collected information about the person completing the survey. Questions 3 and 4 were open response questions asking for the respondent's job title and the number of years they have worked in the industry. These questions served to validate the data provided on the remainder of the survey.

Questions 5 through 8 were multiple choice questions addressing hiring practices with regard to applicant's experience and education. These questions served to characterize the importance placed on work experience and formal education in the industry. Questions 9 through 11 addressed internships at the company. 9, 10 and 11 were multiple choice questions asking how many interns have worked at the company in the past, how often they are moved around during their time there and whether they consider internship experience to be the same as a co-operative experience. These questions provided an understanding of the amount of experience the company has with the internship process. Question 12 was an open response question asking the respondent to list the different positions held by interns at their company.

Question 13 asked the participant to list the top five characteristics they feel students need to be successful in the industry. This question was particularly important in that the responses will be used to compare with the responses provided by the students on the SAM form. Question 14 was a multiple choice question that also offered an open response. This question asked if the respondent feels industry should have a role in determining student academic requirements. The responses included *Yes*, *No* and *Sometimes*. If the respondent selected *Sometimes*, they were asked to clarify that answer in an open response box.

Once the surveys were completed, it was necessary to determine how the responses would be coded for analyzing. Coding methods are described in the next section.

### Industry Survey Analysis

The industry survey contained both quantitative and qualitative data collection questions. The quantitative and qualitative responses were coded differently depending on each individual question and how the responses are being used to meet the goals of the research and answer the research questions. On the industry survey, the question addressing the student characteristics needed for success required post coding.

The analysis of the quantitative questions is shown in Figure 17. The quantitative closed response questions on the survey were transferred to a Microsoft Excel sheet for analysis. The survey response sheet was set up following the same process as the student survey, with the number of the questionnaire placed along the left column of the sheet and the question numbers placed along the top row side of the sheet. Responses were then input into the appropriate corresponding cell. Once all information was input, the number of responses for each column were totaled and placed beneath the final row of responses.

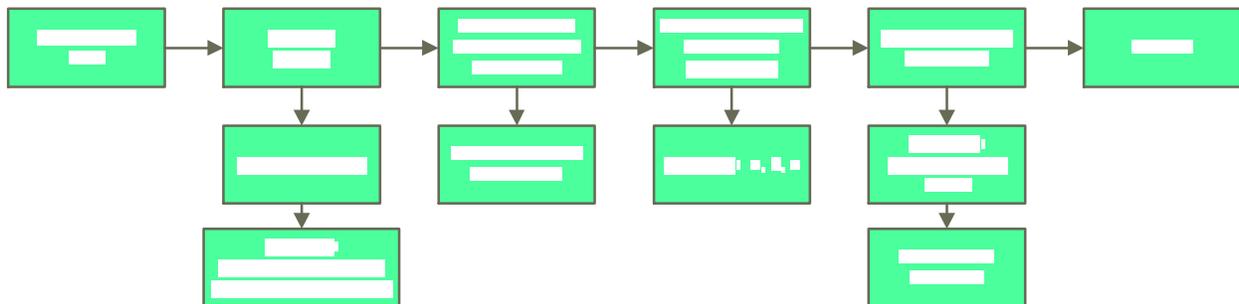


Figure 17: Quantitative Analysis for Industry Survey Tool

The qualitative open response questions on the survey was not post coded. These type of questions included quantitative questions with an option of *Other* asking for clarification as well as questions providing an open response area. Post coding refers to the coding of open ended

questions and those questions noted as *Other* with a request to specify during the analysis of the data. (Rea & Parker 2005) Each of these responses were transferred to the spreadsheet verbatim, as provided.

These questions were used to identify how the industry hiring professionals considered internship participation when hiring new employees. This information provided what industry placed emphasis on and what was considered for new hire starting salaries.

The qualitative data that required post coding was contained in question 13 on the industry survey. The qualitative data analysis process is depicted in Figure 18.

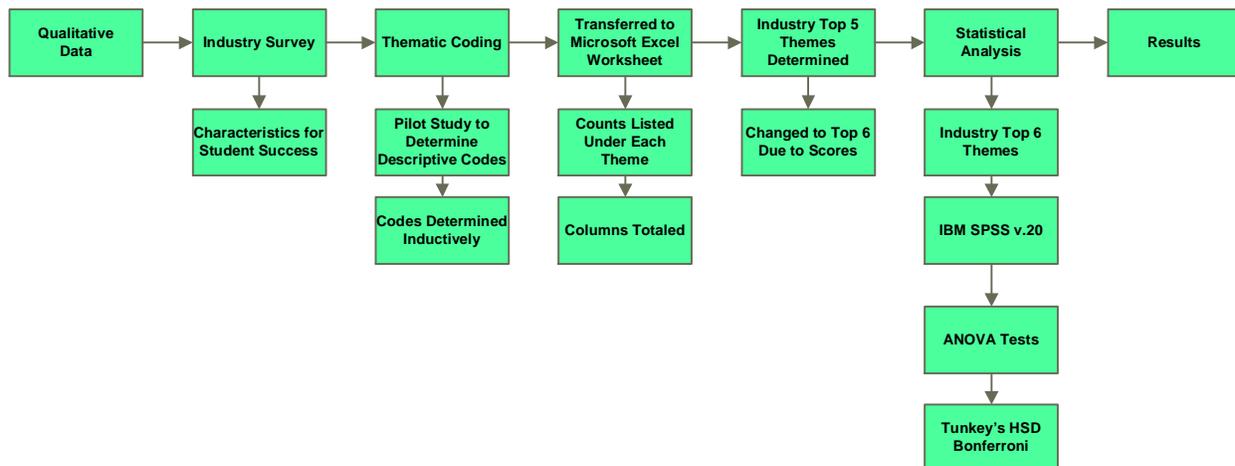


Figure 18: Qualitative Analysis for Industry Survey Tool

The sheet containing the responses for question 13 was arranged in a similar manner as the student survey SAM form response sheet described earlier. The 24 themes determined by the original pilot study and the 2 themes added later comprised the 26 themes used during the post coding process. The number of the questionnaire was placed along the left column with the 26 themes listed across the top row. Each of the responses were coded, based upon their relationship with the 26 themes, on the survey sheet and then the information was transferred to the Excel sheet. If a survey participant listed more than one theme in the responses for question 13, the number transferred to the Excel sheet reflected that number of responses.

Industry responses for this question were limited to five. If a participant listed more than one response for a particular theme, it was decided by the researcher that the participant placed great importance on that theme and the counts should reflect that importance. For example, participant number 98 listed two items in response to question 13 that were coded as *work ethic*. During the transfer of that information, the row reflecting number 98 responses showed the number 2 under the heading of *work ethic*. Figure 19 shows an actual screen clipping of the spreadsheet with an example of how this condition is represented.

A	B	C	D	E	F	G	H
	Themes	1	2	3	4	5	6
		<b>Work Ethic</b>	<b>Punctuality</b>	<b>Written and Verbal Communication Skills</b>	<b>Problem Solving</b>	<b>Personality</b>	<b>Confidence in Self</b>
Case No.	Survey No.						
95	96			1			
96	97	1		1			
97	98	2					
98	99	1				1	
99	100	1		1			
100	101	1				1	1
101	102					1	
102	103	2		1			
103	104	1		1		1	

Figure 19: Industry Coding Spreadsheet Screen Shot

Once all the responses were input, each of the columns were totaled to determine the top 5 responses. The score for the theme which placed fifth was only one point ahead of the sixth place theme. It was decided by the researcher that the sixth highest theme should also be included in further analysis. Therefore, the top 5 was changed to a top 6 to ensure an accurate representation of the characteristics industry members felt were necessary for student success.

The top 6 characteristics for success were added to the spreadsheet used for the statistical analysis. This sheet is available in Appendix A6.

### 3.9 Data Collection Process: Research Question #3

This section will provide a breakdown of the process followed through the data collection and how the surveys helped to answer research question #3. This research question asks, “*How do industry and students perceptions compare when determining what characteristics are necessary for success in the construction industry?*” The process followed to answer this question is presented in Figure 20.

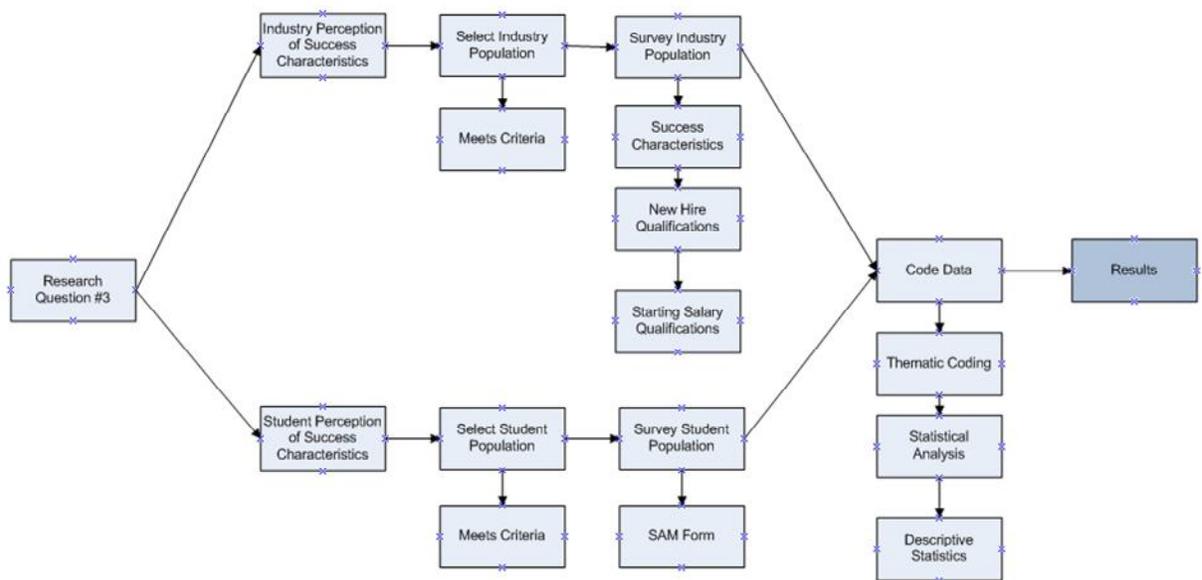


Figure 20: Research Question #3 Process

This question required the administration and analysis of the industry survey. The industry survey provides the industry top 6 characteristics students need for success in the industry. These top 6 characteristics were coded into the themes described in previous sections and used as a basis for the comparison between industry and student perceptions of what is needed to be successful in the construction industry.

This question also required the administration and analysis of the student survey to determine what characteristics students feel are needed to be successful in the construction industry.

### **3.9.1 Industry Survey Tool**

Industry members who actively recruit and hire Virginia Tech students were asked to participate in the data collection survey. This is in alignment with the academic and student surveys.

Questions on this survey helped in understanding the value industry places on the internship experience as well as to determine the level of participation they desire within that relationship.

The data needed from the industry survey for this question are found in the responses for question 13 on the survey tool. Question 13 was an open response question that asks the participant what he or she feels are the top five characteristics students need to be successful in the construction industry. These responses were coded using the 26 themes described earlier and required a separate sheet, for ease of analysis.

### ***Industry Survey Breakdown***

The breakdown of the industry survey is described in section 3.7.1. This survey tool was also used to respond to research question #2. A breakdown of the survey questions and the process used in post coding the responses for question 13 is listed under this section in detail.

### ***Industry Survey Analysis***

The analysis of the industry survey is described in section 3.7.1. The analysis of the data used for this research question is concerned only with the responses provided by industry survey participants for question 13. This question required qualitative analysis of the data. The qualitative analysis process is the same as noted in Figure 18.

### **3.9.2 Student Survey Tool**

The student population surveyed for this research was exclusive to students who were currently enrolled in a construction education program at an ASC member school that is ABET or ACCE accredited. This is in alignment with the academic survey and aims to improve the external

generalizability of the results. BC and CEM students currently enrolled at Virginia Tech comprised the student sample population. All students were eligible to participate including those students currently enrolled in the 2012 structured internship course offered to students in the BC and CEM programs at Virginia Tech.

### *Student Survey Breakdown*

The breakdown of the student survey is described in section 3.6.2. This survey tool was also used to respond to research question #1. A breakdown of the survey questions and the process used in post coding the responses on the SAM form are listed under this section in detail.

### *Student Survey Analysis*

The analysis of the student survey is described in section 3.6.2. The analysis of the data used for this research question is concerned only with the responses provided by student survey participants on the SAM form. This question required qualitative analysis of the data. The qualitative analysis process is the same as noted in Figure 14.

Once data was post coded and transferred to the excel sheets the information could be used to compare industry responses to student responses. Student response rates for the themes identified as the Industry top 6 themes were transferred to the same spreadsheet created for use for the statistical analysis. During the listing of responses on the statistical analysis worksheet, students were placed by groups depending on their identified internship participation. The three student groups were no internship, internship and SLICES.

## **3.10 Statistical Evaluation**

A component of this research was to determine if there were statistically significant differences between the industry group and the student group. Testing between the three student groups was completed, as well. After completing the original transfer of the data from the surveys to the group spreadsheets, another file was created for use with a statistical software program.

The researcher met with statisticians in the Laboratory for Interdisciplinary Statistical Analysis

(LISA) at Virginia Tech to discuss what would be required to run an analysis on the data produced from the surveys. After consulting with LISA, it was decided that the best option was to evaluate the industry top 6 characteristics compared with the student group as a whole and each of the three student categories separately.

In order to provide the LISA staff with the data necessary to perform a statistical analysis, a spreadsheet was developed listing each of the four survey groups (industry, non-internship, internship, SLICES) in the left column of the sheet. The survey participant questionnaire number along with the group identification was the first item input. To avoid confusion the groups were assigned a letter representing the group to which they belonged. Industry was assigned the letter *E* as they were seen as an employer group and so they would not be confused with the internship group. The student categories were *N* for non-internship participants, *I* for internship participants and *S* for SLICES participants.

The groups were input with industry first, followed by those students who had not participated in an internship, then those students who had participated in an internship and finally the SLICES group. This order was selected purposefully so the industry responses would be listed at the top of the spreadsheet to separate them from the student responses. The student responses were then listed so the SLICES were last after the internship group. The SLICES group was considered a small sample. It may not have been feasible to evaluate them separately creating the possibility that they may need to be included in the internship group. Placing them at the end following the internship group would have made this possible without affecting the location of the other groups, within the spreadsheet.

Once the groups and corresponding questionnaire numbers were input, a new column was created to the left of the questionnaire number so each of the individual responses could be

assigned a case number. This was necessary for the ease of LISA staff when running the statistical software program.

Continuing along the top row of the sheet an additional 28 columns were created. This resulted in a total of 31 columns on the statistician sheet. The first six columns contained identifying information and were listed, in order, as follows: Case Number, Survey Number, Gender, Year in Program, Number of Internships, Type of Survey (E, N, I, S). The information that corresponded with each participant was input into the cells under the proper column heading.

Following the identifying information columns, the industry top 6 categories were listed. These headings were placed in rank order according to the totals obtained in the original spreadsheets created to represent the data collected. These, in order, include: Work Ethic, Written and Verbal Communication, Personality, Learning New Skills, Leadership, Work Experience. Under each of these columns a number 1 was placed in the corresponding cell if the respondent's questionnaire noted the theme was mentioned. For the industry responses, a number 1 was placed in the cell regardless of what the industry score was for that theme. The student responses were not weighted and were not registered above a 1 originally and therefore just transferred as noted. If the theme was not mentioned by the participant then a value of 0 was placed in the cell to indicate that result.

Next to the top 6 theme columns, a total column was created and a formula for totaling the score of the top 6 inserted into the cells. This column allowed a score to be tabulated for each of the participants based on whether or not they identified the top themes.

The remaining 18 columns were used to calculate scores for the student responses for the strength success and deficiencies success. The same top 6 themes were listed as well as a total column for each of the two success categories. Each of the cells was noted with a value of

1 or a value of 0 depending on whether the participant noted the theme in their strength or deficiency response.

Following the total column for each category, an additional theme column was created for *Computer Skills*. This column was created at the request of the researcher. All three student groups identified *Computer Skills* in their top 5 themes and though it was not noted in the industry top themes the researcher felt it would be important to consider this during the statistical analysis. After the *Computer Skills* column was inserted, another total column for all seven themes was created. Figure 21 below is an actual screen shot of the deficiency columns as they appear on the statistical spreadsheet.

Case No.	Survey No.	Work Ethic	Written and Verbal Communication	Personality	Learning New Skills	Leadership	Work Experience	Deficiency Top Total	Deficiency Computer	Deficiency Top Total + Computer
		Deficiency Top 1	Deficiency Top 2	Deficiency Top 3	Deficiency Top 4	Deficiency Top 5	Deficiency Top 6			
139	91	0	0	0	0	0	0	0	0	0
140	92	0	0	0	0	0	1	1	0	1
141	100	0	0	0	0	0	1	1	0	1
142	115	0	0	0	0	0	0	0	0	0
143	120	0	0	0	0	0	0	0	1	1
144	126	0	1	0	0	0	1	2	0	2
145	131	0	0	0	0	0	0	0	0	0
146	144	0	0	0	0	0	0	0	0	0
147	145	0	0	0	0	0	1	1	0	1
148	2	0	0	1	0	0	0	1	1	2
149	4	0	1	0	0	0	0	1	0	1
150	6	0	1	0	0	0	0	1	0	1

Figure 21: Deficiency Column Example Screen Shot

Once the statistical spreadsheet was completed, it was forwarded to LISA for processing using statistical software. A copy of the raw data provided to LISA is available in the Appendix section of this paper.

LISA used IBM SPSS Statistics v. 20 for the analysis of the data provided. LISA produced some basic descriptive statistics based upon the data provided such as the student and employer means for the total responses and the top 6 themes individually. Once the means were determined, they ran a One-Way ANOVA (analysis of variance) to determine the

differences across the top 6 themes among the employer group and the three separate student groups. This produced a mean for each theme for each group. It also evaluated if there was a statistical significance of  $<.05$  or less between the groups for each theme. While the One-Way ANOVA can determine if there is a difference between groups, it cannot determine where those differences are located.

LISA then ran post hoc tests to help determine where the exact differences were located, if any were found. The statisticians selected two different tests to evaluate the differences. The two tests selected were Tukey's HSD and the Bonferroni. LISA statisticians selected these two tests due to their validity working with equal and unequal sample sizes. This was an important consideration since the sample size was different for each of the groups. The two tests are similar but have some differences and will help to validate the findings.

LISA then ran a One-Way ANOVA to determine the differences among the employer group and the three student groups along the top 6 total score. Following this, post hoc tests were run using Tukey's HSD and Bonferroni.

The next test was a T-test run to determine differences across the top 6 themes and top total score between all student and employers. This test was completed to determine whether belonging to a group had an effect on the theme selection. An additional T-test was then run to determine differences across the top 6 themes and top total score between the male and the female students to see if gender affected theme selection.

Next, a One-Way ANOVA was run to determine differences among students depending on the number of years in the program across the top 6 themes and top total score. No post hoc tests were completed.

An additional One-Way ANOVA was run to determine differences among students depending on the number of internships they had completed and the top 6 themes and top total score. Tukey's HSD and Bonferroni post hoc tests were completed following the ANOVA testing.

### *Strengths and Deficiencies*

The spreadsheet created for the LISA included the breakdown of student responses by strengths and deficiencies. For this section of the worksheet, the theme *Computer Skills* was added. This theme was selected by all three of the student groups in their top 5 themes. This information was used to further compare the student groups.

A One-Way ANOVA was run to determine differences among student groups across the strengths and deficiencies across the top 6 themes, including *Computer Skills*, and the top 6 totals for each of the two categories. Post hoc tests were conducted on each of the variables that produced a statistically significant difference to determine the location of those differences.

A T-test was also conducted to determine differences between male and female students across strengths and deficiencies.

Next, a One-Way ANOVA was run to determine differences among student years in program groups across strengths and deficiencies. Post hoc tests were run on those areas where a statistically significant difference was found to determine where the differences were located.

Further data analysis included a One-Way ANOVA to determine differences among students based on the number of internships they participated in across strengths and deficiencies. Post hoc tests were conducted on those themes that showed a statistically significant difference.

Once the tests were completed, the analysis and interpretation of the data began. These results will be presented in Chapter 4. Some of the information obtained from the surveys is presented using descriptive statistics, displayed in charts and graphs. The results obtained from the LISA statistical analysis of the data are described in detail.



# Chapter 4 Findings

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## 4.0 Introduction

This chapter presents the data collected from the academic, industry and student surveys and an interpretation of the findings. The general findings of the research are presented along with a description of the statistical analysis completed at the LISA laboratory at Virginia Tech. The statistical analysis includes both descriptive statistics as well as data on the comparison of each of the groups with each other and among the industry's identified top 6 characteristics students need to be successful in the construction industry. These characteristics are referred to as themes.

Data collected from each of the sample groups was utilized to achieve the goals established for this research and to address the research questions presented in Section 3.1. These research questions were developed to address the problem statements listed in Chapter 2.

### 4.1 Research Question #1

*What effect does student participation in an internship program have on student soft skills and perceived self-efficacy with regard to the construction workplace?*

The methodology followed to address research question #1 was broken down in section 3.6. The methodology process is depicted in Figure 22.

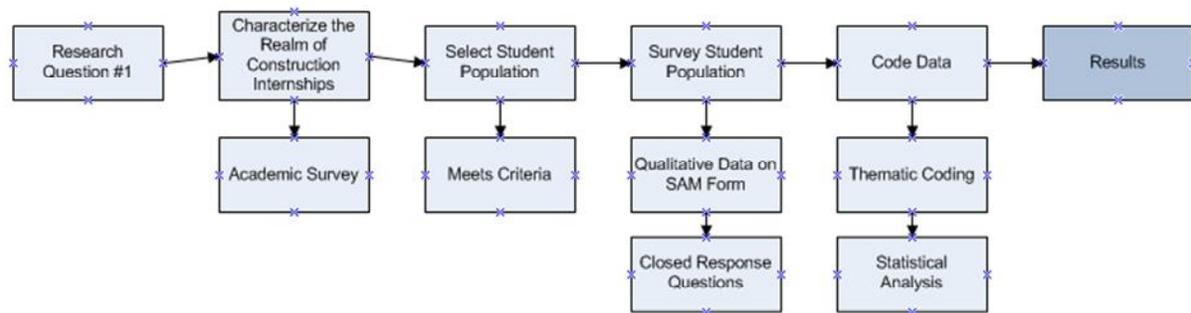


Figure 22: Research Question #1 Process

The academic survey was analyzed first to provide the researcher with the realm of construction internships within construction education and the realm of the current student population in those programs. This question also required the analysis of the student survey closed response

questions that addressed communication preferences, self confidence and the qualitative data on the SAM form.

#### **4.1.1. Academic Survey Results**

For the academic sample population, it was important to consider educational institutions that subscribe to some peer accepted standards for preparing students for the construction profession and promote innovation in the industry. Additionally it was decided that only four year institutions would be included as they provide greater opportunity for students to participate in some type of internship. Educational programs whose focus was on construction management, were members of the Associated Schools of Construction and were accredited by either ACCE or ABET were selected for participation. ASC membership and program accreditation aligns with these standards. The academic survey breakdown and analysis process is listed in section 3.7.1.

#### ***Realm of Construction Students in Construction Education***

86 university programs meet the requirements for the academic population for this research.

The electronic survey was fully completed by 25 universities. 21 programs were identified as having a Building Construction (BC) program only, 3 identified as having a Construction Engineering and Management (CEM) program only and one identified as having both BC and CEM programs. The participating program dates of conception range from 1939 to 2004.

Enrollment in the BC programs varied from 347 at Auburn University to 50 at John Brown University. The average number of students for the BC group was 175. Enrollment in the participating CEM programs varied from 325 at Iowa State University to 10 at University of New Mexico. The average enrollment for the CEM group was 144.

The university programs completing the survey provided data on the breakdown of male and female students. Some participants provided percentages instead of hard numbers. The percentages provided were calculated into numbers during the analysis of the data. One

program did not disclose the breakdown of males and females and was excluded from the calculated averages. The BC programs had an average of 158 males and 13 females. The CEM programs had an average of 129 males and 14 females. Table 9 shows the number of university programs participating in the survey sample for BC and CEM; the mean current enrollment for each of the programs; and the mean of males and females enrolled in the program.

Table 9: University Program Generalization Data

University Program Generalization Data			
	BC	CEM	Both
<b>Participants</b>	21	3	1
<b>Enrollment</b>	$\mu = 175$	$\mu = 144$	--
<b>Gender</b>	m=158, f=13	m=129, f=14	--

### *Realm of Internships in Construction Education*

The BC programs required between 120 and 180 hours for degree completion with an average of 130 credit hours. The CEM programs required between 128 and 180 credit hours for degree completion with an average of 128 credit hours. Within those credit hours, 20 of the total programs required participation in an internship program. One of the programs who stated participation was *mandatory* indicated they did not give course credit and one program noted some students received course credit for participation in an internship.

Of the 6 programs that stated participation in an internship program was *optional*, two stated course credit was provided for participation and three stated that some students were provided with course credit for participation.

Of the 20 programs requiring participation in an internship program as a requirement for degree completion, only 8 of the BC programs offered the students a pre-internship workshop and none of the CEM programs reported they provide this workshop. The time devoted to the workshop varied from 1 hour to 10 hours with an average of 5 hours.

18 programs reported having an educational component associated with the internship program. 16 of those programs made internship participation mandatory with 2 making participation optional. All 18 of these programs required deliverables. Examples of the deliverables include reports, final paper, oral presentations, on-line discussions, summary papers and final reports.

4 of the programs requiring students to participate in an internship required documentation of the participation. Documentation differs from deliverables in that they only provide proof of participation. Examples of documentation include time sheets, signed agreements, and weekly logs.

Table 10 provides an overview of the program requirements and options with regards to internship participation for those university construction programs participating in the data collection for this research.

The data received from the academic survey provided a sample overview of the realm of student internships in construction education. The data also provided the realm of students enrolled in construction education programs at the participating universities. These results help to offer a theoretical generalization of the student population used in answering research questions #1 and #3.

Table 10: Overview of Construction Program Internship Requirements

Internship Programs	Mandatory	Number reported	Optional	Number reported
<b>Structured</b>	Educational Component	16	Educational Component	2
	Workshop Prior to or during internship	8	Workshop prior to or during internship	1
	Deliverables Required	16	Deliverables Required	2
	Course Credit Provided	19	Course Credit Provided	2
	<b>Not Structured</b>	Documentation Required	4	Documentation Required

#### 4.1.2 Student Survey Results

The student sample population required the researcher to obtain information from students currently enrolled in a construction program that met the same requirements as the academic population. It was important to select students that were considered representative of the general population of students in construction programs. The educational institution for this population must not require participation in an internship program as part of the curriculum requirements for program completion, but still offer some type of for-credit internship opportunity. This is necessary so data can be collected from both students who have participated in an internship program and students who have not participated in an internship program. This construction program must also be considered a peer among the leaders of the construction education programs. The program meeting these requirements and selected for student data collection was Virginia Tech. This university program offers both a building construction degree (BC) and a construction engineering and management degree (CEM), does not require participation in an internship program as part of the curriculum requirements and

offers students a for-credit structured internship course. The student survey and analysis process is provided in section 3.7.2.

### *Characterizing the Student Survey Population*

Several of the identifying information questions allowed a characterization of the current student population. The information obtained from the student survey responses is presented in the following paragraphs.

127 students participated in the student survey data collection for this research. Student participants ranged from one year to 5 years or more in the program. Students representing the third year in the program were the largest group of the sample. Participants included both male and female students. Males were the predominant gender representing at 114 males compared to 13 females. This male to female ratio is in alignment with the university construction focused academic programs discussed earlier. Figure 23 provides a representation of male and female student participants by school year.

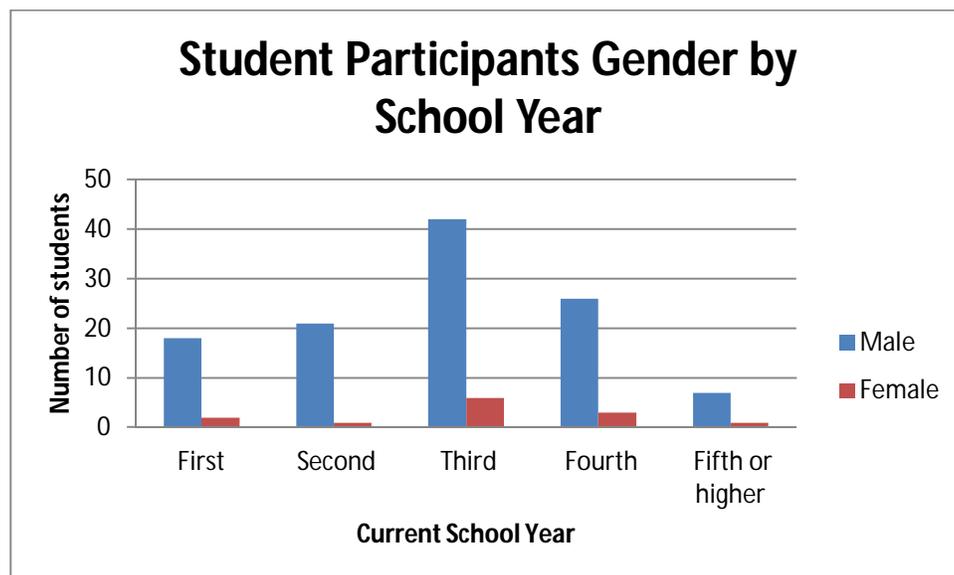


Figure 23: Student Participants Gender by School Year

All students surveyed identified themselves as part of the generation known as Millennials. Of the 127 students who completed the surveys, 37 had not participated in an internship program,

84 had participated in at least one internship, and 6 students were enrolled in the 2012 SLICES course. Figure 24 provides a breakdown of internship participation by year in program for the students who completed the survey.

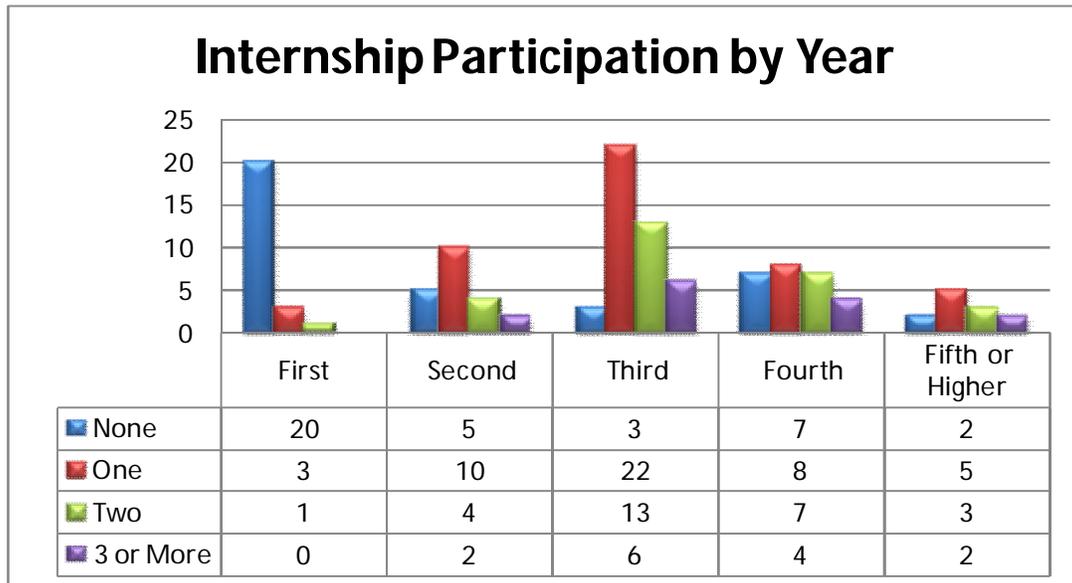


Figure 24: Student Internship Participation by Year in Program

Students who participated in an internship program obtained their internship through various resources including career fairs held at the university, through family or friends, company recruitment and on their own. Figure 25 is a representation of the source students surveyed used to obtain their internship. The largest majority were obtained at the career fair followed by family or friends. These two categories accounted for 81% of the sources. Only 14% of the students sought out the internship on their own. This is indicative of the generational attributes of Millennials in that they are used to structure and guidance.

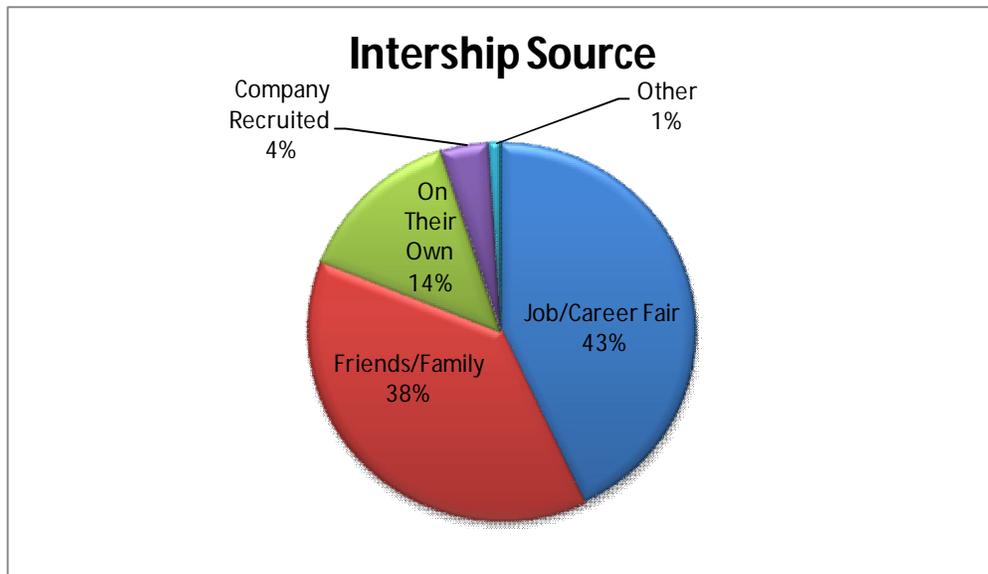


Figure 25: Source of Student Internship

### Student Self Confidence Rating

A question addressing the self confidence of students was included in the student survey. This question was incorporated into the survey to determine the level of self confidence of the participating students. This question utilized a five point Likert scale and was designed using a sentence that the students would then rate based on their level of agreement. This question was presented as a simple sentence stating, "I am self confident." An example of the Likert scale used for this question is shown in Figure 26 below.

Definitely Not	Disagree Somewhat	Not Sure	Agree Usually	Absolutely Agree
1	2	3	4	5

Figure 26: Likert Scale Example

The student sample was divided into three separate groups. These groups were those who had not participated in an internship program, those who had participated in an internship program and those students enrolled in the SLICES course. The mean of each group's reported confidence level was compared to the total mean of the entire student sample. The students

rated themselves high both as an overall group and within each separate group. The group total mean was 4.3 out of 5. Those who had participated in an internship had the highest group mean at 4.4 and those who had not participated in an internship had the lowest mean at 4.2. The high confidence level in these students could be symptomatic of their generational attributes as all participants identified themselves as Millennials. As the literature has shown, this generation tends to over represent their skills. Figure 27 shows the breakdown and comparison of the student sample reported self confidence level.

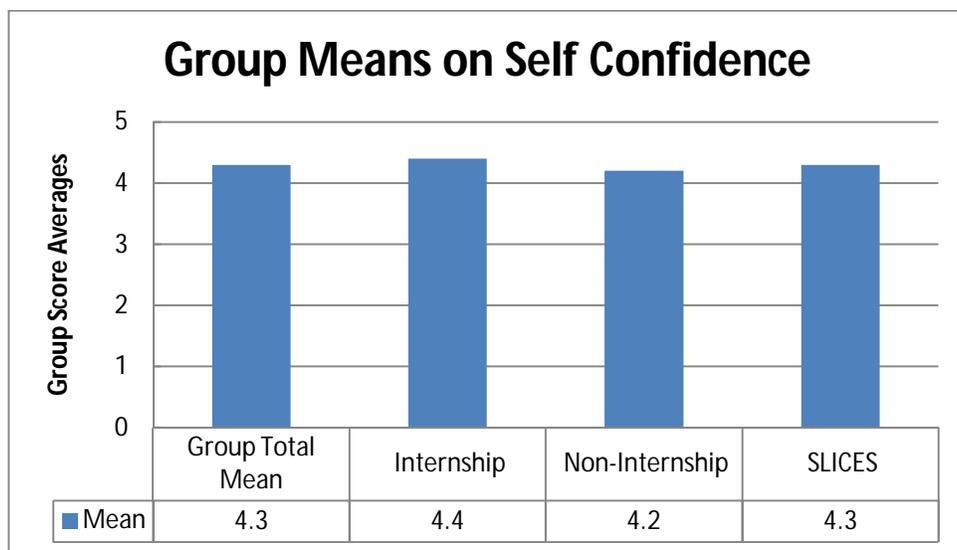


Figure 27: Group Means on Student Reported Self Confidence

### *Characterization of Student Soft Skills*

Four questions on the student survey asked participants to identify their preferred forms of communication with different groups of people including friends, family, classmates and co-workers. These questions were closed response and the students were presented with four options from which to choose their answer. The responses allowed students to select from two forms of written communication and two forms of verbal communication. The responses included texting, e-mail, phone calls and face-to-face conversations.

The student responses were converted into percentages so the three student groups could be compared with one another as well as the overall sample group. Since the number of students in each group varied, percentages allow the reader to gain a better understanding of how each group compares. The student responses for each of the different groups of people are presented in Figure 28 below.

The preferred form of communication with friends was overwhelmingly face-to-face, receiving 63% of the total group response. All three groups selected face-to-face at a rate of almost 3 times that of phone, the choice selected as second place. Only one of the students, from the internship group, selected e-mail as their choice. Interaction with friends is mostly social and often takes place in person so it would be understandable that face to face would be the preferred option for this group of people.

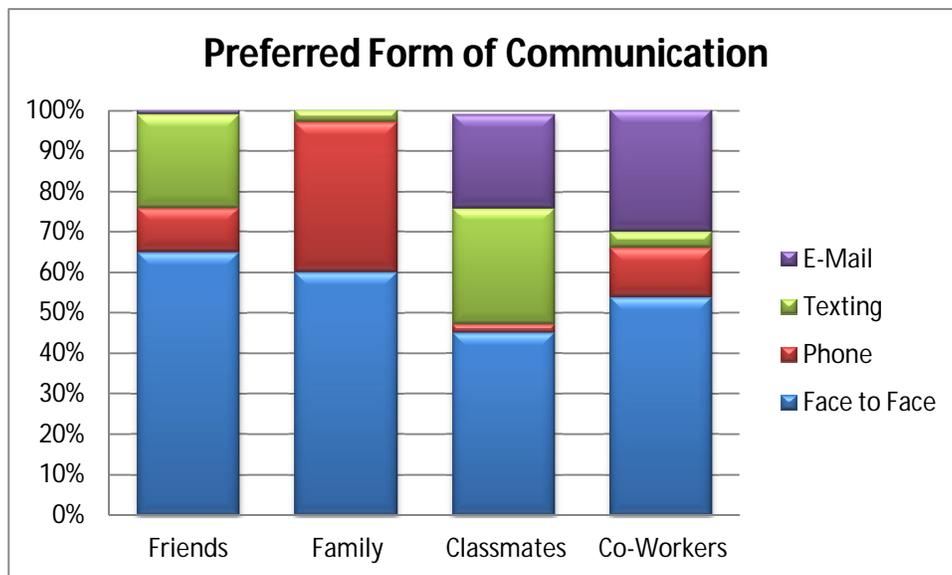


Figure 28: Student Reported Preferred Forms of Communication with Select Groups

When selecting a preferred form of communication with family, students overwhelmingly selected the verbal options. Face-to-face communication was chosen as the preferred form at 60% with phone calls as their second choice. None of the students selected e-mail for their

response for this group. This generation places great value on family and familial relationships making these results understandable, as well. Interactions with both friends and family are safe and personable. Face to face conversations would be more meaningful with these groups with whom participants would have closer, personal relationships.

When asked about the students preferred form of communication with classmates, students selected face-to-face as the preferred way with texting and e-mail both having a noteworthy representation. Face-to-face was selected by 45% of the total group of students with texting and e-mail being chosen by 29% and 23%, respectively. Students are naturally going to have personal interaction with fellow students, especially with the growing use of group work in academic curriculums. This generation relies heavily on computer technology. Texting and e-mail are easy for students to do anywhere, at any time even during classes. These results are in alignment with generational attributes.

Students were also asked to identify their preferred form of communication for co-workers. This research asked students if they had participated in any internships but did not ask if they had previous employment service. Working with volunteer organizations could be considered by the students as co-workers since the environment would be similar to a workplace environment.

Again, face-to-face communication was selected as the total group preference with 54% of the total responses. E-mail came in as a close second with 30% of the total group selecting this choice. This category, co-workers, had the highest representation of e-mail chosen as the preferred form of communication among the four groups of people. E-mail responses varied from zero to 2% among the friends, family and classmates groups. This could be indicative of e-mail use considered multi-generational in alignment with the workplace population.

Students were also asked whether they preferred completing work tasks individually or in a group. This question was added to the survey to gain some understanding of the socialization

among the student participants. This question was a closed response with only the two options available for students to select. The results of this question were close to equal with the majority selecting group as their choice. Figure 29 provides a breakdown of the group totals compared with each individual group of students. Working in groups is a preference of the Millennial generation. While the results from this question showed a preference for group work by all three student groups, the results were close to equal.

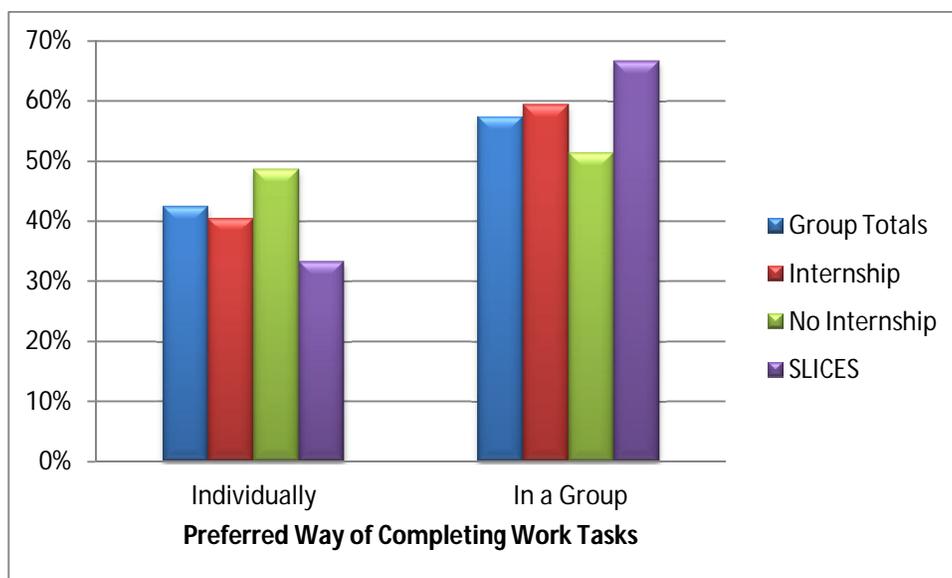


Figure 29: Student Reported Preferred Way of Completing Work Tasks

Finally, students were asked to identify their preferred form of turning in assignments. This question was closed response offering three choices including written form, verbal presentations, and electronically. It was included in the survey to compare selections with student responses provided on the SAM form. Written form was selected by the total group as the highest preferred form with 56% of students selecting this and only 8% selecting verbal presentations. Figure 30 provides a breakdown of the group totals compared with each individual group of students. Writing is not something this generation usually prefers though the preference for this group reported writing as the preferred form of turning in assignments. One

possible explanation for this preference would be to consider the generations of those teaching students and grading assignments. These would be members of the Baby Boomer and Generation X generations who prefer reading hard copies over electronic ones. Students may be accustomed to providing written copies of assignments for their professors and may have influenced their response for this question.

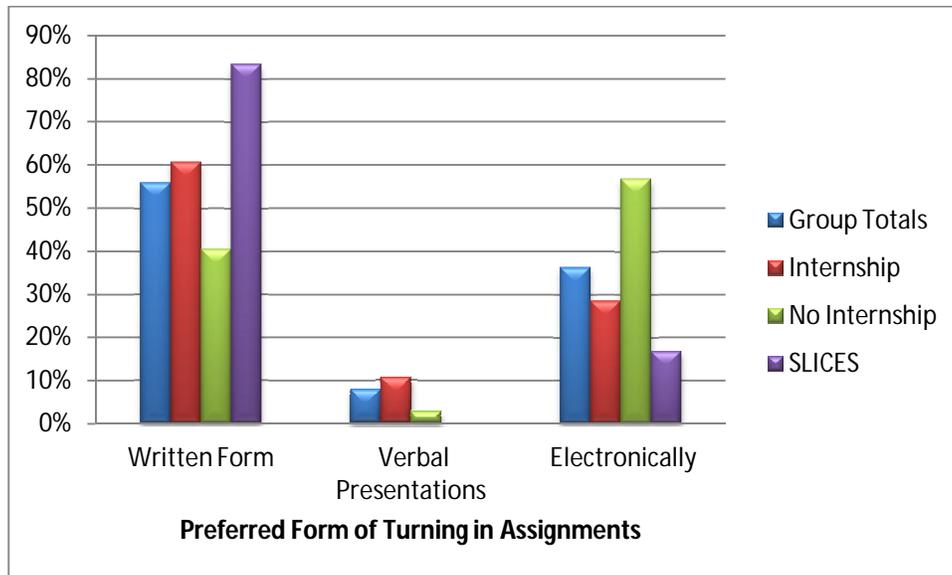


Figure 30: Student Reported Preferred Form of Turning in Assignments

### Student Success Characteristics

The qualitative data collected from the student population on the SAM form provided information on what students felt was necessary for success in the industry. The layout of the form allowed students to separate those responses by strengths and deficiencies. Prior to completing the SAM form, the enumerated survey contained one question asking students if they knew what they needed to be successful in the construction industry. This question directly relates to research question #1 and was included in the survey to provide a measurement of student perception of what is needed for industry success. This response utilized the 5-point Likert scale described earlier in this section. Of the 127 student responses, the majority, 62, selected *agree usually* as their choice. 38 of students selected *not sure* as their response. Only one

person responded that they definitely did not know what they needed. This means that two thirds of the students who participated in the survey believe they do know what is needed for them to be successful in the construction industry.

Once the students completed the forms, the responses were coded based on the 26 themes described in Chapter 3. Once the information was transferred to the spreadsheet, theme columns were totaled to obtain the top 5 categories for each of the three student groups. This data was collected to gain an understanding of student awareness of what is needed to be successful in the construction industry and to respond to research question #1. This meant using the data from the Success row of the matrix on the SAM form. Responses from the Strength/Success and Deficiencies/Success boxes were coded separately. This offered the opportunity to total the overall responses to determine student awareness of success characteristics and separate responses indicating where students believed they had strengths and where students felt they were deficient.

Results for each of the student groups is presented in Figure 31, Figure 32 and Figure 33.

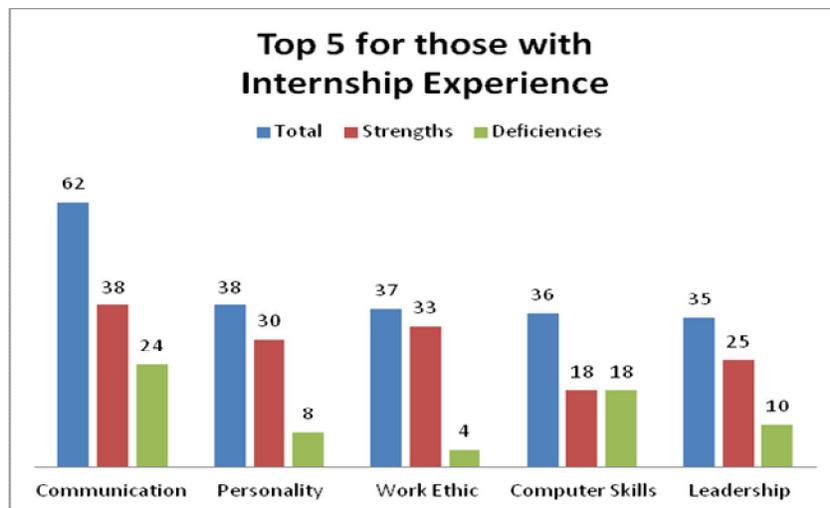


Figure 31: Top 5- Internship Experience

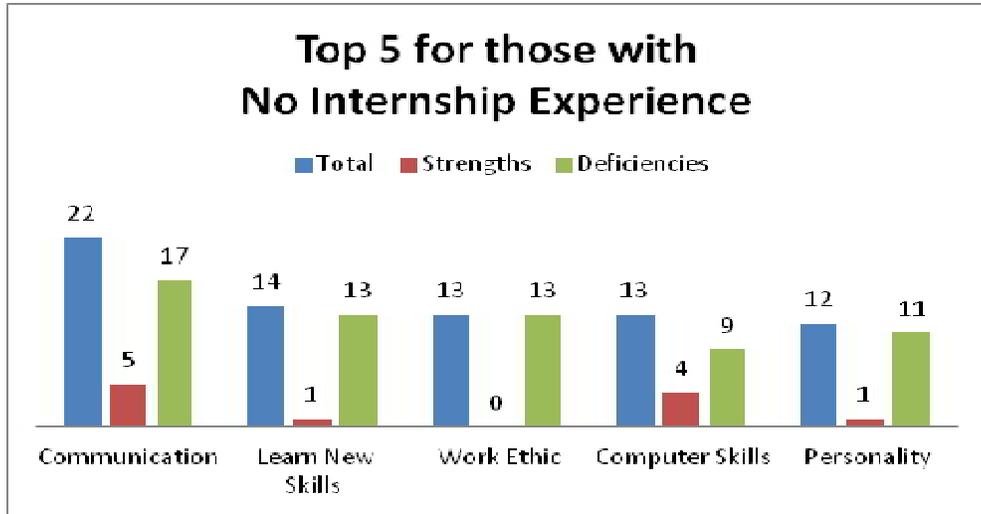


Figure 32: Top 5- No Internship Experience

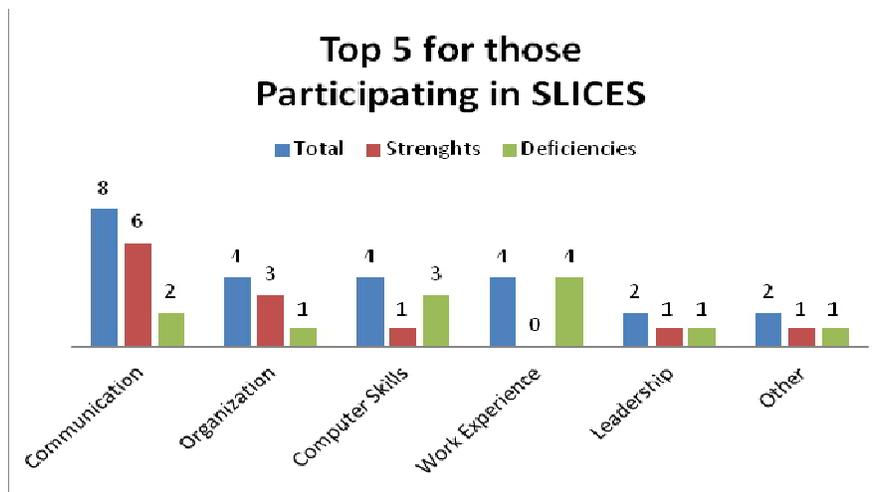


Figure 33: Top 5- SLICES Group

There were similarities among each of the three student groups with regard to the top 5 themes chosen. All three student groups identified communication as their top theme.

#### *Internship Experience Group*

For those students who had internship experience, *communication* was rated the highest of the themes. 62 responses were recorded with 38 students noting it as a strength and 24 students noting it as a deficiency. The next four themes were close, separated in count by one point. In

rank order, these themes were *personality, work ethic, computer skills, and leadership*. Each theme was mentioned in both the strengths matrix box and the deficiencies matrix box. Figure 31 shows the top 5 themes for those students with industry experience and how the totals break down into strengths and deficiencies.

### ***No Internship Experience Group***

Students who reported they had no internship experience also selected *communication skills* as their top theme. This group had four of the same themes in their top 5 as those students with internship experience. *Learning new skills* was the differing theme. The second through fifth themes for this group were separated by only one point with a two way tie for third. Another difference between this group and those students who have internship experience is the breakdown of strengths and deficiencies. With this group, the students noted most of their top 5 themes as areas in which they were deficient. Figure 32 shows the top 5 themes for those students with no industry experience and how the totals break down into strengths and deficiencies.

### ***SLICES Group***

The SLICES group had six participants. These students also had internship experience. This group selected *communication* as their top theme similarly to the other two groups. This group required reporting 6 top themes due to a 2 way tie for fifth place. Four students reported work experience as one of the three themes tied for second place. All four students reported this theme as a deficiency.

The SLICES group differed from the previous two groups discussed in that only three of their top themes were similar to the group with internship experience and those without internship experience. *Organization, work experience* and *other* were the three differing themes. Figure 33 shows the top 6 themes for those students in the SLICES group and how the totals break down into strengths and deficiencies.

#### 4.1.3 Summary

The breakdown of students who participated in the data collection are representative of the characterization of students currently enrolled in construction education provided by the academic survey results. Students were divided into three groups: students who had not participated in an internship, students who had participated in at least one internship and students currently enrolled in the 2012 SLICES course. Of the 127 students who completed the surveys, 37 had not participated in an internship program, 84 had participated in at least one internship, and 6 students were enrolled in the 2012 SLICES course.

On a scale of 1 to 5, students as a group rated their self confidence level high at 4.3. The students who had not participated in an internship rated lowest among the three groups at 4.2. The preferred form of communication among friends, family, classmates and co-workers was face-to-face. Phone calls were the second preferred form closely followed by texting. Few students selected e-mail as their preferred form of communication for any of the categories except co-workers where that was the second place choice.

Two thirds of the students who participated in the survey believe they do know what is needed for them to be successful in the construction industry. Among the themes selected by the three groups, *Communication* was rated highest for all three groups. Additionally, all three groups listed *Computer Skills* as one of their top 5 themes. *Personality*, *Leadership* and *Work Ethic* are separately shared between at least two of the different groups.

Students in the groups who had participated in an internship and those in the SLICES course listed the majority of their top 5 success themes in the strengths box of the SAM form matrix. Many of these students believe the characteristics needed for success are characteristics they currently possess. The students with no internship experience listed the majority of their top 5 success themes in the deficiency box of the SAM form matrix. These students believe the characteristics needed for success are characteristics they do not currently possess.

## 4.2 Research Question #2

*How do industry hiring professionals consider internship participation when considering hiring new graduates of construction programs?*

The methodology followed to address research question #2 was described in section 3.8. The methodology process is depicted in Figure 34.

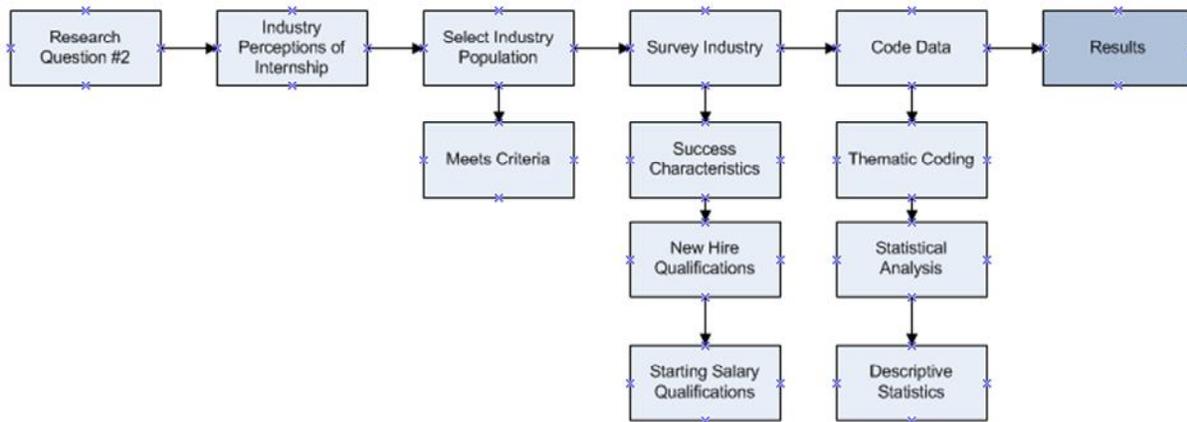


Figure 34: Research Question #2 Process

### 4.2.1 Validation of Industry Population

Obtaining an accurate representation of what characteristics students need to be successful in the industry requires data collection from a population that has a relationship with the students included in the research. The students participating in the student survey were from the BC and CEM programs at Virginia Tech. It was determined by the researcher that companies serving as the main hiring source for these students upon graduation would provide the most relevant data for this study. The industry population from which data was collected included those professionals participating in the Myers-Lawson School of Construction Fall 2012 and Spring 2013 career fairs, as well as those who participated as classroom presenters and in informal meet and greet sessions on campus during that same time period.

The industry survey developed and utilized for this research included questions collecting limited identifying data on the participant and the company they represent. The first question on the industry survey was an identifying question asking the type of industry the participant would associate with the company they represent. The responses revealed that the large majority of the participants, almost half (48%), associated with *Construction Management*. Coming in second (17%) was *Commercial* followed closely by *Other* (13%). For the category *Other*, respondents were able to write in an open response identifying their industry type. The top two responses for this write in were Heavy Civil and General Contractor. Figure 35 shows the categorical breakdown by percentage of the industry type representation of the participants in the industry survey. This shows a sufficient representation of the different areas within the construction industry and the data should provide an accurate generalization of what students need to be successful in the industry.

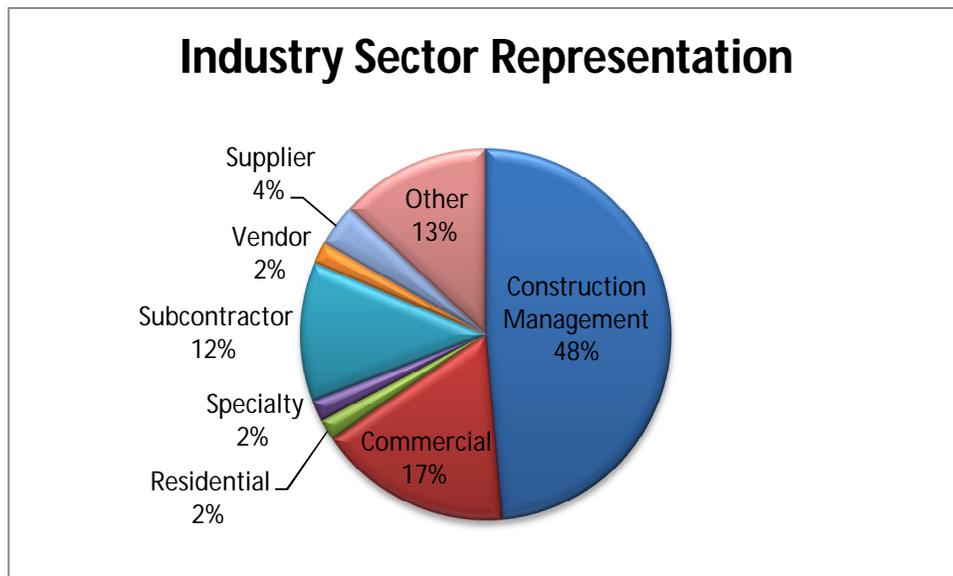


Figure 35: Industry Sector Representation

Included in the survey are questions asking about the participant's job title, years in the construction industry, number of employees at the participant's company and number of interns the company has worked with in the past. These questions were included to give the

researcher a feel for the validity of the responses provided. The participant's job title and years at the company were open response questions allowing the participant to write in the response.

85% of the responses noted that more than 100 employees worked at their company. 70% of the responses noted that more than 10 interns had worked with their company in the past.

Based on these numbers the researcher felt confident in the validity of the responses provided on the industry survey by the participants, as they had adequate experience working with and hiring interns.

#### 4.2.2 Industry Survey Results

To respond to research question #2, the industry survey was developed to determine what characteristics industry felt was necessary for students to be successful in the construction industry. Two questions on the industry survey directly address what industry perceived as these necessary characteristics.

Question 5 of the industry survey is a closed response question asking participants to select from four choices, the qualification they consider MOST important when hiring new employees. The four choices available for selection were education, experience, communication skills and previously worked with your company. This question was included in the survey to determine how the industry would rate education and experience with soft skills and relationships. The question instructs participants to select one option. If more than one option was selected then that participant's response was unable to be used in the total. Each of the four choices was selected by at least two participants. *Communication Skills* was selected most frequently with 51 responses while *Experience* was a close second with 48 responses. Figure 36 shows the four choices with the rate of response by the industry participants for each.



Figure 36: Most Important Qualification for New Hires

Three additional questions were included in the industry survey which addressed the industry view on education and experience with regard to starting salary. Question 6 asked the participant if they consider participation in an internship as work experience. This question was closed response offering two choices, either *yes* or *no*. A total of 110 responses were received for this question. 109 noted *yes*, they did consider participation in an internship as work experience. Only 1 person selected *no* as the response. This result indicates participation in an internship is beneficial to students in that they earn work experience. This is important since experience was selected by almost half of the industry participants as one of the most important qualifications for new hires.

Question 7 asked the participant if new employee hires with a college degree would be offered a higher salary than those without a college degree. This question was also closed response offering three choices: *yes*, *no*, *it would depend on (please specify)*. Those persons who selected the third option were offered a space to specify what the conditions would be for consideration. There were 109 responses provided by participants. The majority of participants, 71, selected *yes* as the response. Three participants selected *no* as their

response. 35 participants selected *it would depend on* as the response with the majority of the follow up write in responses listing experience as the condition that would influence the salary. This is in alignment with the responses to question 5 which noted experience considerably favored over education.

Question 8 asked the participant if new employee hires with industry experience would be offered a higher starting salary than someone without industry experience. This question offered three response choices: *yes, no, it would depend on (please specify)*. Those persons who selected the third option were offered a space to specify what the conditions would be for consideration. This question also received 109 responses. The majority of participants, 78, selected *yes* as their response. 13 participants selected *no* as their response. 18 participants selected *it would depend on* as the response with 15 of those writing in the follow up section responses relating to the “type of experience” and “level of experience” as the condition dependent on the salary. These write in responses indicate an agreement that experience was a strong indicator of new hire starting salaries. The responses for question 8 were in alignment with question 5 which noted experience heavily favored as one of the most important qualifications for new hires.

All but one of the industry representatives surveyed agreed that participation in an internship would be considered work experience. 78 participants agreed that experience would get a new employee a higher starting salary with an additional 15 participants noting other conditions along with experience would be a consideration. A breakdown of these three questions is shown in Table 11.

Table 11: Industry Response for Salary Determinants

	Yes	No	Depends On
Internship = Work Experience	99%	1%	-----
Degree = Higher Starting Salary	65%	3%	32% (most wrote experience)
Experience= Higher Starting Salary	72%	12%	16% (type or level of experience)

The fifth survey question dealing with what industry perceives as necessary characteristics for success is Question 13. This question asked the participant to identify the top five characteristics they felt students needed to be successful in the construction industry. This is an open response question where participants can write in any response they desire. Five spaces were provided for participants to complete their answers. Some participants completed less than five while some participants added additional answers at the bottom of the last response area. All answers provided were included in the spreadsheet noting the results of the data.

Once the spreadsheet was developed to record the industry responses, the columns were totaled to obtain the top 5 themes. The decision was made by the researcher to include the sixth top theme because only one point separated it from the theme ranking in fifth place. This resulted in the researcher comparing the top 6 themes to the student responses. The top 6 themes, in rank order, included: Work Ethic, Communication Skills, Personality, Learning New Skills, Leadership, Work Experience. Figure 37 shows the industry top 6 themes along with the number of times the theme was listed as a response. The industries top 6 themes accounted for 60% of the total responses.

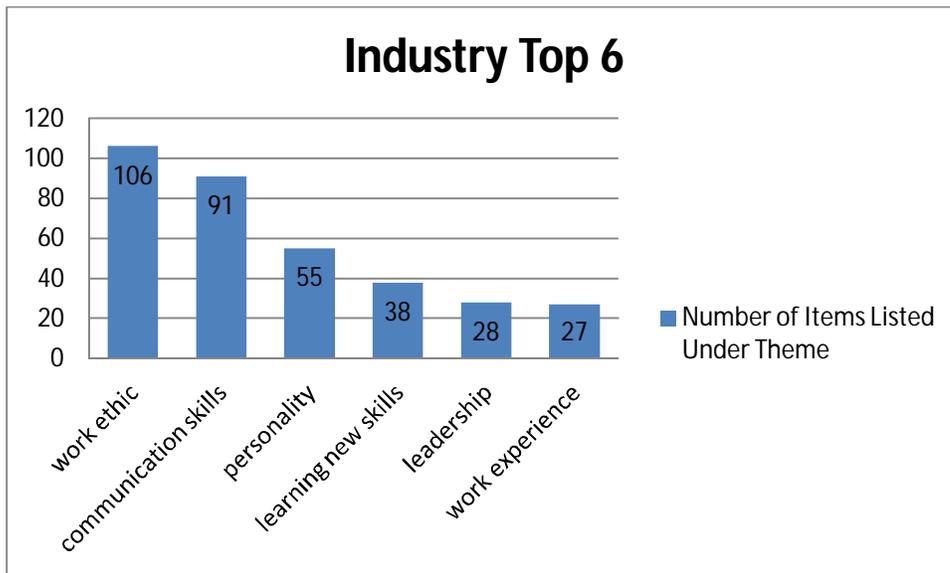


Figure 37: Industry Top 6 Success Characteristic Themes

#### 4.2.3 Summary

The majority of industry participants agreed that both education and experience will result in a potential new hire with a higher starting salary. 65% noted that education influenced starting salary and 35% indicated that education plus experience would influence starting salary. With respect to experience, 72% indicated that experience would influence starting salary with an additional 12% saying the level and type of experience would influence starting salary. 99% of the industry participants agreed that internship participation was considered experience.

In the closed response question on the most important qualification for new hires, 44% believed Experience was the most important while 47% believed communication was most important. In this question, education was selected by only 6% of the participants. These results indicate industry places great emphasis on experience as one of the most important qualifications for new hires and starting salaries.

Of the top 6 success characteristic themes, *Work Ethic* and *Communication Skills* were the top 2 selections significantly ahead of the next selection. The top 6 themes also included *Work*

*Experience*, which is reinforced by the results provided in the closed response questions. The remaining top 6 themes included Personality, Learning New Skills and Leadership. This meant that half of the industry top 6 themes were items that are considered soft skills.

### 4.3 Research Question #3

*How do industry and students perceptions compare when determining what characteristics are necessary for success in the construction industry?*

The methodology followed to address research question #3 was broken down in section 3.9.

The methodology process is depicted in Figure 38.

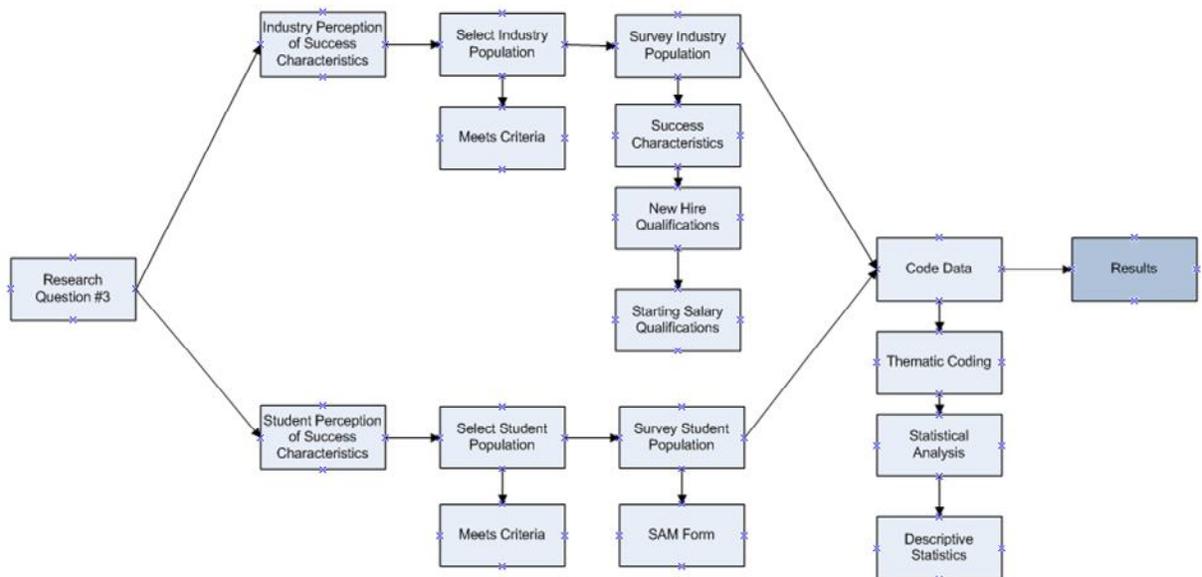


Figure 38: Research Question #3 Process

#### 4.3.1 Group Comparison of Industry Top 6 Themes

To respond to research question #3, data was analyzed from both the industry and the student surveys. Qualitative data from Question 13 on the industry survey and from the SAM form responses on the student survey were reviewed to see how the top themes from both groups compared. The industry results were compared to each of the three student groups separately

to determine if participation in an internship program would affect the relationship. Table 12 lists the top 6 themes for the industry participants and notes whether each of the three student groups selected the same theme in their top selections.

Table 12: Industry Top 6 Theme Comparison

INDUSTRY TOP 6 THEMES						
	Work Ethic	Communication Skills	Personality	Learning New Skills	Leadership	Work Experience
<b>No Internship Experience</b>	X	X	X	X		
<b>Internship Experience</b>	X	X	X		X	
<b>SLICES Group</b>		X			X	X

4.3.2 Summary

Each of the three student groups had at least three of the industry top 6 themes in their group top selections. This indicates that the students have an understanding of what industry perceives to be necessary characteristics for success in the construction industry. Those students with no internship experience and those students with internship experience had four of the top 6 themes in their top picks. Both of these groups had *Work Ethic*, *Communication Skills* and *Personality*. The difference existed with the students with no internship experience having *Learn New Skills* while the students with internship experience selected *Leadership*.

All three student groups included Computer Skills in their top 5 themes. This is indicative of previous research on the emphasis being placed on the increasing use of technology in the construction industry.

#### 4.4 Analysis of Variances

A statistical analysis was conducted on the industry and student responses to determine if there were any significant statistical differences between the means of the two groups. A test result is considered statistically significant if it is unlikely the results occurred by chance. The analysis conducted on the data will provide us with a determination, to a confidence interval of 95%, that the responses provided by the particular groups under specific themes would be repeated if the test were conducted again using a similar population.

A Microsoft Excel spreadsheet was developed containing the industry top 6 themes and responses in those themes by each of the industry participants and each of the student participants. Several identifying information columns were included for the student data responses such as gender, year in program and number of internships. For the purpose of this analysis, industry participants were noted as employers and will be referred this way in the results for this section.

The industry top 6 themes were listed along the top columns of the spreadsheet. Industry and student responses were input in the corresponding cells below each theme indicating when a participant had noted the theme in their survey responses. Columns were also created along the top, listing each of the themes to indicate whether students had listed the theme as a strengths or deficiency. The strengths and deficiency columns were separate and used only for student responses. This spreadsheet was created for use by the LISA laboratory at Virginia Tech to determine if there were significant statistical differences between the means of the groups. A copy of this spreadsheet is available in the Appendix section.

#### 4.4.1 Results

The mean score for the top 6 themes identified by industry was computed. The mean was generated for the student group as a whole and the employer group. The student mean was 2.27 with a standard deviation of .988. The employer mean was 2.7 with a standard deviation of 1.045. This identifies the average number of instances each group member identified one of the top 6 themes in their selections.

The means of each of the groups regarding the top 6 themes were also computed. Figure 39 shows the proportion of students who noted that the particular theme was a valuable characteristic. The information on the statistical spreadsheet noted a score of 1 if the theme was noted by the participant. A score of 0 was recorded if the theme was not noted by the participant. This allows the means for this chart to be interpreted as the percentage of students who noted the theme as a valuable characteristic.

	Work Ethic	Written and Verbal Communication Skills	Personality	Learning New Skills	Leadership	Work Experience
Mean	.39	.66	.38	.24	.32	.27
N	127	127	127	127	127	127
Std. Deviation	.491	.475	.487	.431	.469	.445

Figure 39: Student Means for Top 6 Themes

Figure 40 shows the proportion of employers who noted that the particular theme was a valuable characteristic. The information on the statistical spreadsheet noted a score of 1 if the theme was noted by the participant. A score of 0 was recorded if the theme was not noted by the participant. This allows the means for this chart to be interpreted as the percentage of employers who noted the theme as a valuable characteristic.

	Work Ethic	Written and Verbal Communication Skills	Personality	Learning New Skills	Leadership	Work Experience
Mean	.67	.75	.47	.32	.25	.25
N	110	110	110	110	110	110
Std. Deviation	.471	.438	.502	.468	.432	.432

Figure 40: Industry Means for Top 6 Themes

Once the means were computed, a One-Way ANOVA (analysis of variance) was completed. This test determined if there were any statistically significant differences between the means of all four groups (employer, internship, no internship, SLICES). This test is useful when comparing three or more means. The base for a statistical significance would be anything less than .05 for this research. This interprets as a 95% confidence interval in the significance. Each of the One-Way ANOVA tests and subsequent post hoc tests as well as t-tests conducted are described below. Table 13 shows the themes where statistically significant differences were found and the groups that had the statistically significant differences between the means.

- a. In the first round of ANOVA testing, a significance difference was found with the theme *work ethic*, between groups. The statistical significance of this theme/group was .000. This means there is a 1/10000 chance that the results are generated by chance alone. The ANOVA test indicates if there are differences present but does not tell where exactly those differences are.

Since a significant difference was found, two post hoc tests were generated to determine where the significances were located. Post hoc tests identify differences between two means. The two post hoc tests used by LISA to determine how many and the location of the differences were Tukey's HSD and Bonferroni.

Table 13: ANOVA results by theme

Theme	Group #1	Group #2	Tukey Significance	Bonferonni Significance
<b>Work Experience</b>	Males	Females	.000	.000
<b>Work Experience (Deficiency Matrix)</b>	Internship	SLICES	.003	.003
	No Internship	SLICES	.032	.036
<b>Work Experience (Deficiency Matrix)</b>	Male	Female	.000	.000
<b>Work Experience (Strength Matrix)</b>	Male	Female	.001	.001
<b>Work Experience</b>	1 Internships	3 + Internships	.031	.037
<b>Soft Skills</b>				
<b>Work Ethic</b>	1 Internship	3+ Internship	.022	.026
<b>Work Ethic</b>	Employer	Internship	.003	.003
	Employer	No Internship	.003	.003
<b>Work Ethic</b>	Employer	Students as a Group	.000	.000
<b>Communication (Strength Matrix)</b>	Internship	SLICES	.030	.034
	No Internship	SLICES	.037	.042
<b>Personality (Deficiency Matrix)</b>	Male	Female	.002	.002

Both post hoc tests found a statistically significant difference in the means under the theme *work ethic* between the employer group and two student groups. The mean difference between the employer and internship groups in both tests was .244. The mean difference between the employer and no internship groups in both tests was .321. Both tests found the significance for both groups to be .003. The ANOVA found the mean in this theme to be .67 for employer group, .43 for the internship group and .35 for the no internship group.

- b. The second test conducted was a One-Way ANOVA to determine differences among the employer group and the three student groups along the top total score. A significant difference was found between groups of .007. Therefore, the two post hoc tests were conducted to find the location of the differences. The post hoc tests showed the difference was found between the employer group and the no internship group. Both tests showed a mean difference of .619 with a significance of .008 for the Tukey and .009 for the Bonferroni.

The employer mean generated by the ANOVA was 2.70 with the mean for the no internship group at 2.08.

- c. A t-test was generated to determine the difference across the top 6 themes and the top total score between all students as one group and employers. A t-test was appropriate since the comparison was between only two groups. Two statistically significant differences were found in the *work ethic* theme and the top total score. Both significant findings were based on equal variances not assumed. This is defined as all things not being equal among the two population variance distributions. The *work ethic* theme significance was .000 and the top total score was .001.
- d. Another t-test was generated to determine the differences across the top 6 themes and gender. There was one significant difference found under the theme *work experience* with equal variances not assumed. The means for the male group in this theme was .30

while the means for the female group were .00. This result could be explained by the different opinions as to what constitutes work experience by the two different genders.

- e. A One-Way ANOVA test was run on the data to determine differences among student years in program across the top 6 themes and the top total score. No statistically significant differences were found among any of the groups.
- f. A test was run to determine differences among the students grouped by the number of internships they had participated in across the top 6 themes and top total score. A .010 significant difference was found under the theme *work ethic*, between groups. Finding this difference, the two post hoc tests were conducted finding the location of the difference between the group who had participated in *one* internship and the students who had participated in *3 or more* internships. Tukey's HSD found a difference of .022 while Bonferroni found a difference of .026.

The mean for in this category for those participating in *one* internship was .56. Those students who participated in *3 or more* internships had a mean of .14.

- g. A One-Way ANOVA test was run on the data to determine if there were significant differences among each of the student groups and the top 6 themes broken down into strengths and deficiencies. A significant difference was found among three categories. The first difference was between groups under the *work experience*-deficiency theme. Next was between groups under the deficiency top total. The last difference was found between groups under the *communication skills*-strength theme.

The post hoc tests revealed differences for *work experience*-deficiency theme in two groups. A significant difference was found between the internship group and the SLICES group. Additionally, there was a difference between the no internship group and the SLICES group. The significance level between the internship and SLICES groups for both tests was .003. For the difference between the no internship and SLICES groups, Tukey's found a significance of .032 and Bonferroni found a significance of .036.

The means for these groups under this theme were .13 for the internship group, .24 for the no internship group and .67 for the SLICES group.

The second difference under this ANOVA was under the top total score for deficiency.

The post hoc tests revealed the significance was not present.

The third difference reported by the ANOVA was between groups under *communication skills*. Again, the differences were between the internship group and the SLICES group as well as the no internship group and the SLICES group. For the internship and SLICES groups, the significance found by the Tukey and Bonferroni post hoc tests were .030 and .034, respectively. When looking at the Tukey and Bonferroni results for the differences between the no internship and SLICES groups, the significance was .037 and .042, respectively.

- h. A t-test was performed between gender and the top 6 themes broken down by strengths and deficiencies. Significant differences were found under the *personality-deficiency* theme of .002, *work experience-deficiency* theme of .000, and *work experience-strength* theme of .001. All three deficiencies differences were based on equal variances not assumed.
- i. A One-Way ANOVA test was run on the data to determine differences among the students based on the number of internships they had participated in and the top 6 themes broken down by strengths and deficiencies. Only one significant difference was found under the *work experience-strength* theme between groups with significance of .012.

The post hoc tests found the differences lie between the group who participated in *one* internship and the group who participated in *3 or more* internships. The Tukey and Bonferroni tests found a significance of .031 and .037, respectively.

These nine tests concluded the statistical analysis of the data for this research. Five One-Way ANOVA tests were performed on the data with four of those finding a statistical significance in the difference of the means among the groups tested. These findings resulted in additional post hoc tests being run on the same groups to determine the location of the differences. LISA used two different post hoc tests, Tukey's HSD and Bonferroni, to analyze the data. These two tests were chosen because they were able to analyze data from groups having unequal sample sizes. Three t-tests were also performed on the data. T-tests were used during these analysis due to the number of groups being compared were limited to two.

Conclusions drawn from the descriptive statistics and statistical analysis of the data collected from the sample populations used will be summarized in Chapter 5.

# Chapter 5 Conclusions and Discussion

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## 5.0 Introduction

The current state of the economy has created a more competitive employment environment in the construction industry. This competitive environment has created an increased need for managers to possess both technical skills and also emotional competencies. Employers are now seeking to hire individuals who exhibit emotional competencies and other soft skills, such as communication, personality and leadership.

Developing soft skills such as communication, leadership and relationship building (which is relative to personality), among employees creates an enhanced environment for the sharing of knowledge and combining of knowledge so projects can be completed effectively and efficiently. This interaction can also improve the self efficacy of students participating in internships with regard to success in the construction industry. Soft skills improve the development and maintenance of relationships among the diverse group of professionals necessary to complete projects. Employers are placing more emphasis on soft skills, such as communication, and work experience when evaluating potential hires and determining starting salaries.

With these changes comes the realization that students seeking to gain employment in the industry need to have a competitive edge. While communication, personality and leadership are critical for students graduating from construction focused programs, opportunities to learn and enhance these skills are not always available within the curriculum. The majority of students graduating from college programs today are part of a generation referred to as Millennials. This generation differs greatly from the Baby Boomers and Generation Xers that have come before them, notably in the area of communication.

For Millennials to gain a competitive edge and maximize employment opportunities, they must first have an understanding of what the industry perceives students need to be successful in the industry. Program curriculums must also find a way to produce students that offer more than

just technical knowledge to employers. This is not always possible within existing programs due to credit hour limitations and accreditation requirements. One option construction focused programs could consider to incorporate opportunities for students to gain a competitive edge would be through the mandatory participation of an internship experience.

This research sought to address the issue of providing students with a competitive edge and offer insight into what characteristics industry felt were necessary for student success. The work also sought to establish whether students had an understanding of these characteristics and whether they felt they were strong or deficient in these areas. The research also identified the role internships played in current accredited construction focused programs and whether student participation in internships had an impact on their recognition of the characteristics required to be successful in the construction industry.

## **5.1 Research Overview**

Three research questions were developed to address the problem statements presented in Chapter 2. The questions addressed the impact internship participation had on students soft skills and self efficacy with respect to success and student employability. Data was collected from three sample populations: Academic institutions, students and industry. Criteria were established for each of the sample populations and surveys were developed to collect the data from each of those eligible within the populations.

To address the research questions, a mixed-method approach was used to gather both quantitative and qualitative information. For the quantitative aspect, data collection was non-experimental characterized as descriptive. This data provided simple information on the frequency of responses to specific questions asked. Three separate surveys were used to collect the data on each of the sample populations. This data was used to create descriptive statistics based on the responses. A statistical analysis was conducted using the identifying

information on the student survey and the qualitative information collected on the student SAM form and the top 6 success characteristics identified by the industry population.

## **5.2 Research Question #1- Impact on Student Soft Skills and Self Efficacy**

The first research question addresses the effect student participation in an internship program has on student soft skills and perceived self-efficacy with regard to the construction workplace.

The data shows that each of the participating student groups identified at least two soft skills in their top 5 characteristic themes of what students need to be successful in the construction

industry. Those students who did have internship experience, but were not enrolled in the SLICES course, identified three soft skills in their top 5 themes. Both the internship and

SLICES groups identified the majority of their top 5 themes as strengths they felt they currently possessed. The group with no internship experience identified their top 5 themes as areas they

were deficient. Based on these results, participation in an internship program does affect the

self efficacy of students perceived success in the construction industry. Those students who did not participate in an internship program did not believe they currently possessed the skills

required to be successful in the construction industry.

All three of the student groups rated their self confidence high with an average of 4.3 on a scale of 1 to 5. The group with internship experience rated highest at 4.4 with the students with no

internship experience rated lowest of the groups at 4.2. This high rating is indicative of the Millennial generation, being known for having a high sense of self and considering themselves

special. These results indicate internship participation improved the self confidence of the participants.

All three of the student groups listed communication as the number one theme in their top 5 themes and showed a preference for communicating face to face with friends, family,

classmates and co-workers. 100% of the SLICES students listed communication as a strength.

Almost half, 45%, of the students in the group with internship experience listed communication as a strength and 14% of those with no internship experience listed communication as a strength. Based on these results, participation in an internship program did appear to influence the student perception of soft skill abilities, specifically communication.

### 5.2.1 Characterizing the Realm of Internships in Construction Education

The academic survey was presented online to those university programs that were ASC members, accredited and offered a four year program in either building construction (BC) or construction education and management (CEM). 86 programs met the qualifications for participation and were targeted for the academic survey with 25 fully completing the questions. This resulted in a response rate of 29%. Of these 25 programs, 21 had a BC curriculum only, 3 had a CEM curriculum only and one offered both curriculums.

20 of the responding programs required participation in an internship program. One of the programs who stated participation was *mandatory* indicated they did not give course credit and one program noted some students received course credit for participation in an internship.

6 programs stated participation in an internship program was *optional*, with two of those stating course credit was provided for participation and three stating that some students were provided with course credit for participation.

Of the 20 programs requiring participation in an internship program as a requirement for degree completion, only 8 of the BC programs offered the students a pre-internship workshop and none of the CEM programs reported they provide this workshop. The time devoted to the workshop varied from 1 hour to 10 hours with an average of 5 hours.

18 programs reported having an educational component associated with the internship program. 16 of those programs made internship participation mandatory with 2 making participation

optional. All 18 of these programs required deliverables. Examples of the deliverables include reports, final paper, oral presentations, on-line discussions, summary papers and final reports.

4 of the programs requiring students to participate in an internship required documentation of the participation. Documentation differs from deliverables in that they only provide proof of participation. Examples of documentation include time sheets, signed agreements, and weekly logs.

These results indicate construction education programs realize the importance for students to participate in internship experiences. Most of the mandatory programs had students produce some type of educational component which can help educators evaluate the learning experiences of the student internship process.

Few of the programs offered students a workshop prior to them beginning their internship. Those that did offer a workshop devoted as little as one hour to the course. This barely offers enough time to explain educational deliverables, much less instruct students on what to expect once they arrive on site.

### **5.2.2 Student Population Criteria**

The student population sampled for this research focused on students currently enrolled in either the Building Construction or Myers-Lawson School of Construction programs at Virginia Tech. These programs offer accredited, four year construction focused programs. Participation in an internship is optional for both programs though a structured, for credit internship course is made available to students. This made Virginia Tech unique among the other programs and an optimal location for gathering student data that could be considered representative of the general population. Virginia Tech is also considered a peer among the leaders of construction education programs.

Survey completion took place during the Spring 2012 semester and again in the Fall 2012 semesters. 127 students participated in the student survey data collection. Years in the program ranged from first year to 5 or more years. Students reporting being in their third year in the program were the largest group of the sample. Males were the predominant gender represented with 114 males to 13 females. This representation is in alignment with other university programs participating in the academic survey. All students identified themselves as being in the 17-29 year age range classifying them as Millennials.

During the analysis of the student surveys, the population sample was divided into three separate groups. The division was based on internship participation and included those who had participated in an internship, those who had not participated in an internship and those currently enrolled in the structured internship program at Virginia Tech referred to as SLICES. 84 of the students had participated in an internship program by the Fall 2012 semester, 37 students had not participated in an internship program and 6 students were enrolled in the SLICES internship program.

### **5.3 Research Question #2- Industry Consideration of Internship Participation**

Industry professionals were surveyed to determine what value was placed upon internship participation among those hiring. 110 surveys were completed by the industry population. Half of the participants represented construction management with at least 10 other industry types represented. 85% had more than 100 employees working at the company they were representing and 70% noted that they had worked with 10 or more interns.

Participants were asked to decide which of four proposed qualifications were most important for new hires. The qualifications offered for selection included *Education, Experience, Communication Skills and Previous Employment with Company*. *Communication Skills* was

selected the most with 51 responses followed by *Experience* with 48 responses. This is in alignment with the literature noting the importance of soft skills when selecting new employees.

Questions on experience versus education were included in the industry survey. Responses provided by the participants indicate the industry places great emphasis on both education and experience. Education was a determinant in a higher salary for new hires for 97% of participants with 35% noting experience was also a contributing factor. 88% of the participants agreed that experience was a determinant in a higher salary for new hires with 16% noting the level of or type of experience being a contributing factor. 99% of the participants agreed that internship participation was considered to be experience. These results show the importance of both obtaining a degree and participating in an internship for students seeking employment as a new hire for a company.

Industry participants were asked to list the top 5 characteristics they felt students needed to be successful in the industry. The responses were coded using the same 26 themes used for coding the student SAM form responses. The resulting top themes were *Work Ethic*, *Communication Skills*, *Personality*, *Learning New Skills*, *Leadership*, and *Work Experience*. The top theme calculations resulted in a top 6 instead of 5 due to there being only a 1 point difference between fifth and sixth place. *Work Ethic* received 106 responses and *Communication Skills* received 91 responses. *Personality*, the next closest theme, received about half that of Communication scoring a 55.

Based on these results, industry places great value on experience when considering new hires. Industry considers internship participation as work experience and therefore participation benefits the students employability. Along with work experience, industry noted three soft skills in their top characteristics for success. These soft skills were communication, personality and

leadership. These are the soft skills employers are now seeking in potential new hires along with technical skills.

#### 5.4 Research Question #3- Industry Perceptions versus Student Perceptions on Success Characteristics

Qualitative data was collected from the industry on what they felt were the characteristics students needed for success in the industry. The responses for this question were coded using the thematic coding process described earlier. Based on the responses, a listing of the top 6 themes was developed. The original goal was to create a top 5 listing but the fifth and sixth place themes were separated by only one point so the researcher decided to include the sixth theme in the top listing.

The resulting top 6 themes for industry were *Work Ethic, Communication Skills, Personality, Learning New Skills, Leadership, and Work Experience.*

Qualitative data was also collected from the students on their perceived strengths and deficiencies with regard to industry success using the SAM form described earlier. Total responses were calculated for each theme providing a student group total as well as totals for each of the separate student groups. Totals for overall mentioning of the theme were calculated and used to create a top 5 theme listing for each of the three student groups.

For the students with internship experience, *Communication* was the top theme receiving 62 responses. The next four themes were separated by only one point and were, in rank order, *Personality, Work Ethic, Computer Skills and Leadership.*

Students without internship experience had a top 5 listing that included, in rank order, *Communication, Learning New Skills, Work Ethic, Computer Skills and Personality.*

*Communication* was the clear leader with 22 responses. Each of the other four responses were separated by only one point ranging from 14 responses to 12 responses. What stands out for

this group is that most of the responses reported in the top 5 themes are listed under deficiencies. 17 of the 22 responses for *Communication* were noted as deficiencies. All the *Work Ethic* responses were noted as deficiencies.

The SLICES group had a top 6 themes listing due to a 2-way tie for fifth place. The sample size for this population was small having only 6 students. *Communication* was selected as the top theme receiving 8 responses. 6 of these were listed as strengths. Second through fourth place themes were tied for *Organization*, *Computer Skills*, and *Work Experience*. These three themes each received four responses. All *Work Experience* responses were noted in the deficiencies category. In fifth and six place were *Leadership* and *Other*. Each of these two received two responses, split between strengths and deficiencies. All three student groups listed *Computer Skills* in their top themes as well. This could be indicative of the current state of the industry with the growing use of Building Information Modeling and mandatory use requirements in some companies and governmental agency contracts.

Student top themes were in alignment with most of the industry themes. Students seem to have an understanding of what industry feels is necessary for student success. Communication was ranked highest in all three student groups and was second on the industry top themes.

Students with no internship experience and students with internship experience both had 4 of their top 5 themes represented on the industry top listing. SLICES had three matching themes.

Based on these results students and industry have the same beliefs in what is needed for success in the construction industry. All three student groups had computer skills represented in their top listings while industry did not. While this is considered an important skill, some industry professionals noted that this was something that could be learned in the field and they were more interested in other characteristics that were not easily learned on the job site.

## 5.5 Statistical Analysis

Once the industry top 6 themes were determined, they were compared to the student responses to see if there was a correlation between the two groups. The Laboratory for Interdisciplinary Statistical Analysis (LISA) conducted the statistical analysis of the two population samples. LISA used IBM SPSS Statistics as the statistical software. Information provided to LISA was based on the industry top 6 themes. The student population was divided into the three groups based on internship participation. Student responses were provided based on whether the theme was mentioned, whether it was mentioned as a strength and whether it was mentioned as a deficiency.

The greatest difference in means between the two groups was in the theme *Work Ethic*. Student mean for this theme was .39. This translates as 39% of the student group as a whole mentioned this theme on their SAM form. The industry mean calculated as .67 meaning 67% of the industry participants mentioned work ethic as a necessary characteristic for industry success. The remaining five themes means were separated by less than 10% each.

Several One-Way ANOVA tests were conducted on the data comparing the employer and student groups as well as testing comparing other factors like gender or number of internships. When a statistically significant difference was found using the One-Way ANOVA, two post hoc tests, Tukey's HSD and Bonferroni, were run to determine where the difference was located. These post hoc tests were selected for use since the sample size for each of the groups was unequal. T-tests were run on data comparisons where the groups being compared was limited to two.

The themes found during the LISA analysis were among *Work Experience*, *Work Ethic*, *Communication Skills* and *Personality*. Of the nine tests conducted, differences in Work Experience showed up four times and in Work Ethic three times. Communication Skills and

Personality each showed differences in one test. All four of these themes are included in the industry top 6 themes, Work Ethic being the top theme.

It was noted earlier in the results that almost half of the Industry participants selected *Work Experience* as one of the most important qualifications. *Work Experience* also had a strong preference in the Industry top themes. The only student group to select this theme among their top 5/6 was the SLICES group with all the responses noting it as a deficiency. This could be interpreted to mean that those students who participated in SLICES understood the great importance industry places on this characteristic in their new hires and for success, but felt they did not possess this skill at a level to be successful.

*Work Ethic* was noted by the industry as being the most important characteristic students needed for industry success. Both the Internship group and the No Internship group had *Work Ethic* as their third highest themes. The SLICES group did not have this theme in their top listing. This might be attributed to the mindset of those students who choose to enroll in the course. The SLICES course is not a mandatory course though students can receive credit and use this course as one of their electives. These students may not have considered *Work Ethic* as a characteristic because it is something they feel is already apparent about them.

*Communication Skills* and *Personality* are both considered soft skills. Both of these characteristics are instrumental in allowing individuals to create and maintain relationships with other people. This is an especially important quality in the construction industry. All three student groups listed *Communication Skills* as their top theme.

## 5.6 Limitations

There are several limitations to consider with this research that may affect the results.

1. Qualitative research is most reliably generalizable to the group being studied, at the time they are studied, under the circumstances in which they are studied. The

researcher took steps to collect data from sources that were representative of each of the general sample populations.

2. The number of students included in the SLICES group is very small. The results for this group, when dividing the student group, are difficult to generalize. Additionally, this group could have been incorporated with the internship participation group, since they also participated in an internship, which may have altered the means of that group.
3. Completion of the SAM form required students to hand write responses. Millennials are not writers and this may have affected the number of responses provided on this form. Had the survey been electronic, there is a possibility that more responses would have been provided by the participants.
4. The thematic coding conducted by the researcher is subject to researcher bias. During the coding process, a researcher must try to interpret what is meant by the participant based upon the participant frame of reference. Some of the thematic codes were comprised from emic words while some were created from the interpretation of the researcher.
5. Reporter bias is always a limitation as some may not truthfully report their answers. One example may be students reporting having completed an internship when they have not. Another example would be a student inflating their level of confidence score.
6. No opportunity was provided on the student survey for those students who reported having not participated in an internship to explain why they had not. Some students may have chosen to not complete an internship experience because they were in school during the summer when most internships occur, worked a job close to home or for a family business, or were members of the military.
7. Data was not collected from either of the groups on why the top themes were considered important for success. This might reveal additional differences between the groups.

## 5.7 Conclusions

The industry professionals participating in this research identified what they felt students needed to gain a competitive edge in the marketplace and obtain higher starting salaries. Great emphasis was placed on both work experience and soft skills. The soft skills of most importance were communication skills, personality and leadership. Experience and communication skills were selected by a total of 91% of the industry as the most important qualification of new hires, over education and previous employment with the company.

These themes associated with soft skills were prevalent in both the industry and the student group qualitative responses on the surveys. All three student groups and the industry group placed great importance on effective written and verbal communication. This theme was selected well ahead most of the other top themes in each group. Effective communication and personality are the basis for creating and maintaining relationships, something that is very important in the construction industry. As stated before, this skill is especially important in an industry that is dynamic in nature and necessitates a group of diverse persons cooperatively working together to complete projects.

Both the literature and this research showed the importance industry places on soft skills for new hires. Constraints to curriculum content from meeting accreditation standards have left many programs with little flexibility to incorporate formal opportunities for developing and enhancing student soft skills. One solution to this issue is utilizing experiential learning opportunities, specifically participation in an internship program. Internship participation would also help the students gain a competitive edge as industry participants almost exclusively considered internship participation to be work experience. Participating in the internship experience also allows students the opportunity to work among the ranks of those they will be working with upon graduation, allowing opportunities for improving self efficacy.

It is important to note that while participants in all three of the student groups were able to identify most of the same top themes as industry, those students who had not participated in an internship experience noted most of their top theme responses as deficiencies. While students seemed to have an understanding of what characteristics were needed to be successful in the construction industry, participation in an internship was the defining factor in whether students felt those characteristics were a strength for them or a deficiency.

Based on these observations and the results of the analysis of the data collected from the industry and student population samples, participation in an internship program should be considered a pertinent part of the academic requirements for students enrolled in construction education programs.

## **5.8 Discussion**

Participation in internship experiences can help students apply classroom theoretical information in real world settings, enhance soft skill development, build relationships among those who will be their working peers, obtain employment upon graduation, and earn a higher starting salary. To maximize these opportunities, academic programs should provide students with formal guidance prior to entering the internship. This could be in the form of either a pre-internship course or workshop. Regardless of the format, sufficient time should be devoted to introducing the students to topics such as what to expect when arriving on site, importance of proper communication, how to maximize learning opportunities and other things that will help them feel confident in their success.

Requiring educational based deliverables throughout the internship will allow educators to measure the progression and effectiveness of the internship experience while providing the opportunity for intervention should there be issues. Offering students a structured internship program that requires educational based deliverables can serve both construction education

programs and students. It can provide programs with an opportunity to enhance student learning and maintain relationships with industry partners. It can provide students with the tools they need to prepare themselves for and maximize the learning potential of the internship experience.

### **5.9 Contributions to the Body of Knowledge**

This research provided several contributions to the industry body of knowledge. The first contribution is the development of the tool used to measure students perceived strengths and deficiencies, known as the SAM form. This tool can be used to also measure student awareness of their personal strengths in general.

An evaluation of the impact of experiential learning, specifically internships, on students self efficacy in the construction industry is provided in the results of the research. The data provided a definition of what industry considers most important for new hires to obtain job offers and higher starting salaries as well as the importance industry places on soft skills of potential new employees.

A final contribution of this research provided an evaluation of how students and industry members view the effectiveness of the internship program and a determination as to whether experiential learning should be considered a required component of construction education curriculum.

### **5.10 Future Research**

Future research to be considered would be to duplicate this research using a larger student and industry population sample. This would allow the results to be more easily generalized.

Additionally, the student survey could be offered in an electronic version to encourage students to provide more responses on the SAM form. Inter-rater reliability could be conducted during the thematic coding process to validate the coding used.

Having a larger group in the structured educational internship course would allow a better comparison between the three student groups used in this research.

During the statistical analysis of the data, there were recurring significant differences found between the male and female groups. Further research could be conducted on how each of the genders define themes such as work experience, personality and work ethic.

Another recommended research would be determining what factors lead females to choose construction as an academic program and career despite the industry being such a male dominated field.

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# Appendix

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## Appendix A- ASC School Survey E-mail Message

Kathleen M Short

ASC Survey E-mail Message

IRB #12-453

ASC member-

Researchers at Virginia Tech are conducting an investigation on the role of internship programs in the curriculum of ASC member schools. Information collected will be included in a student dissertation and may be used in a future publication. Time needed to complete the survey should not exceed 20 minutes. Please respond to all of the questions.

Participation is voluntary. If you are willing to participate in the study, please use the link below to access the survey. If you feel there is another person at your institution that would be more appropriate to complete the survey, please forward this e-mail message to that person or provide us with the name and contact information for that person.

Thank you for your participation.

Link

ASC member-

Researchers at Virginia Tech are conducting an investigation on the role of internship programs in the curriculum of ASC member schools. Questions are related to either Construction Management (Building Construction) curriculums or Construction Engineering and Management curriculums.

You are being sent this survey because you are listed as the ASC contact person for your university. If there is another person at your institution that would be more appropriate to complete the survey, please provide us with the name and contact information for that person. This information can be sent to Kathleen Short at [kmsvtu@vt.edu](mailto:kmsvtu@vt.edu).

Participation is voluntary. If you are willing to participate in the study, please use the link below to access the survey. Information collected may be included in a student dissertation and may be used in a future publication. The questions on this survey have been approved through the Virginia Tech IRB process. Time needed to complete the survey should not exceed 20 minutes. Please respond to all of the questions.

Thank you for your participation.

<-----Place this line where you wish the survey link to appear----->

Regards,

Kathleen M Short

Graduate Research Assistant

Department of Building Construction

Virginia Tech

(703) 304-3459

## Appendix B- ASC School Survey Tool

ASC School Survey- To be completed on-line

The purpose of this survey is to collect information on the role of internship programs in the curriculum of ASC member schools. Information collected will be included in a dissertation and may be used in a future publication.

Time needed to complete the survey is estimated not to exceed 20 minutes. Participation is voluntary. Please respond to all of the questions. Thank you for your participation.

- 1 Name of Institution  
Contact Person
- 2 Which of the following construction programs does your school offer?  
Construction Management (BC)

At this point, the questions will be asked of each program that is checked.

- 3 What year was your program started?
- 4 Is your program accredited by (ACCE, ABET, Other)?
- 5 How many students are currently enrolled in your program?  
What is the breakdown of males and females in the program? Males \_\_\_\_\_ Females
- 6 \_\_\_\_\_  
How many credit hours are students required to complete to be eligible for graduation from the program?
- 7
- 8 Does your program incorporate an internship opportunity for students?
- 9 Is participation in an internship mandatory or optional?

At this point, the questions will be asked of each choice that is checked.

- 10 Is course credit received for participation?
- 11 What is the duration of the internship?
- 12 Is there an educational component required with the internship?
- 13 Is a workshop provided for students prior to beginning the internship?
- 14 Does your program have a person who is responsible for organizing internships for students?

Qualitative responses

- With regard to the educational component, what types of deliverables are students responsible for?
- 15
- 16 What subjects/material is covered in the workshop?
- 17 How many classroom hours are dedicated to the workshop?

## Appendix C- Student Survey Tool

### Student Survey – Spring, 2012

The purpose of this survey is to collect information to help identify potential areas of development for students currently enrolled in construction programs to gain a competitive edge. Your responses will help determine where resources can be used in areas where needs exist. Please respond as honestly and openly as possible to ensure accurate results. Time for completion of the survey is estimated to be no more than 15 minutes.

Participation is voluntary and responses are anonymous. Each response form is identified only by a number. Information collected will be used in a dissertation and possible future publication. Please respond to all of the questions. Thank you for your participation.

1. What is the name of the university or college you attend?  
\_\_\_\_\_
2. What is your current year in the construction program?
  - a. First
  - b. Second
  - c. Third
  - d. Fourth
  - e. Fifth or higher
3. What is your gender?
  - a. Male
  - b. Female
4. Which range of numbers does your age fall within?
  - a. 17-29
  - b. 30-44
  - c. 45 and older
5. How many internships have you participated in?
  - a. None
  - b. One
  - c. Two
  - d. Three or More
6. Will you be participating in an internship this year?
  - a. Yes
  - b. No
  - c. Not sure yet
7. If you are participating in an internship this summer, what type of company will you be working with?
  - a. Construction Management
  - b. Commercial Builder
  - c. Residential Builder
  - d. Specialty Builder
  - e. Subcontractor
  - f. Vendor
  - g. Supplier
  - h. Other (please identify): \_\_\_\_\_

8. If you are participating in an internship this summer, how did you obtain your internship?
- I found it at a job fair or other school source.
  - I knew company through a family member or a friend
  - I sought out the internship on my own.
  - The company contacted me.
  - Other (please identify): \_\_\_\_\_

Please respond to statements number 9 thru 18 using the scale listed below.

9. I am comfortable approaching my peers for information.

<b>Definitely Not</b>	<b>Disagree Somewhat</b>	<b>Not Sure</b>	<b>Agree Usually</b>	<b>Absolutely Agree</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

10. I am comfortable approaching persons in a higher position than me for information.

<b>Definitely Not</b>	<b>Disagree Somewhat</b>	<b>Not Sure</b>	<b>Agree Usually</b>	<b>Absolutely Agree</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

11. I have good verbal communication skills.

<b>Definitely Not</b>	<b>Disagree Somewhat</b>	<b>Not Sure</b>	<b>Agree Usually</b>	<b>Absolutely Agree</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

12. I have good written communication skills.

<b>Definitely Not</b>	<b>Disagree Somewhat</b>	<b>Not Sure</b>	<b>Agree Usually</b>	<b>Absolutely Agree</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

13. I am confident asking questions.

<b>Definitely Not</b>	<b>Disagree Somewhat</b>	<b>Not Sure</b>	<b>Agree Usually</b>	<b>Absolutely Agree</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

14. I am self-confident.

<b>Definitely Not</b>	<b>Disagree Somewhat</b>	<b>Not Sure</b>	<b>Agree Usually</b>	<b>Absolutely Agree</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

15. I know my strengths.

<b>Definitely Not</b>	<b>Disagree Somewhat</b>	<b>Not Sure</b>	<b>Agree Usually</b>	<b>Absolutely Agree</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

16. I know what I need to be successful in the construction industry.

<b>Definitely Not</b>	<b>Disagree Somewhat</b>	<b>Not Sure</b>	<b>Agree Usually</b>	<b>Absolutely Agree</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

17. I am comfortable presenting information to others.

<b>Definitely Not</b>	<b>Disagree Somewhat</b>	<b>Not Sure</b>	<b>Agree Usually</b>	<b>Absolutely Agree</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

18. I am comfortable presenting information to company leaders.

<b>Definitely Not</b>	<b>Disagree Somewhat</b>	<b>Not Sure</b>	<b>Agree Usually</b>	<b>Absolutely Agree</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

19. I prefer communicating with **friends** using

- a. Texting
- b. E-mail
- c. Phone calls
- d. Face to face conversations

20. I prefer communicating with **family** using

- a. Texting

- b. E-mail
- c. Phone calls
- d. Face to face conversations

21. I prefer communicating with **classmates** using

- a. Texting
- b. E-mail
- c. Phone calls
- d. Face to face conversations

22. I prefer communicating with **co-workers** using

- a. Texting
- b. E-mail
- c. Phone calls
- d. Face to face conversations

23. I prefer completing work tasks

- a. Individually
- b. In a group

24. I prefer turning in school assignments

- a. In written form
- b. Through verbal presentations
- c. By completing them electronically

25. What type of topics or information would you like to have offered to help prepare you for entering the construction industry?

## Appendix D- Industry Survey Tool

### Industry Survey- Fall 2012

The purpose of this survey is to collect information on the role of internship programs in the construction industry. Participation is voluntary and time needed to complete the survey is estimated not to exceed 10 minutes. Information collected will be used in a dissertation and possible future publication.

Please respond to all of the questions with the answer that best describes you or your company. Thank you for your participation.

1. Which of the following BEST describes the type of industry you associate with your company? (select one option)
  - a. Construction Management
  - b. Commercial Builder
  - c. Residential Builder
  - d. Specialty Builder
  - e. Subcontractor
  - f. Vendor
  - g. Supplier
  - h. Other (please identify): \_\_\_\_\_
  
2. How many employees work at your company? (select one option)
  - a. 1-10
  - b. 11-50
  - c. 50- 100
  - d. More than 100
  
3. What is your job title? \_\_\_\_\_
  
4. How many years have you worked in the construction industry? \_\_\_\_\_
  
5. When hiring new employees, which do you consider the MOST important qualification? (select one option)
  - a. Education
  - b. Experience
  - c. Communication skills
  - d. Previously worked with your company

6. Do you consider participation in an internship as work experience? (select one option)
- a. Yes
  - b. No
7. For new employee hires at your company, would someone with a college degree be offered a higher starting salary than someone without a college degree? (select one option)
- a. Yes
  - b. No
  - c. It would depend on (please specify)  
\_\_\_\_\_
8. For new employee hires at your company, would someone with industry experience be offered a higher starting salary than someone without industry experience? (select one option)
- a. Yes
  - b. No
  - c. It would depend on (please specify)  
\_\_\_\_\_
9. How many interns has your company worked with in the past? (select one option)
- a. More than 10
  - b. 4 to 9
  - c. 1 to 3
  - d. None
10. Do interns fill the same position the entire time they are with your company or are they moved into different positions during the internship? (select one option)
- a. Interns stay in the same position for the duration of the internship.
  - b. We move interns around into different positions during the internship.
  - c. Some interns stay in the same position while others move around to different positions, depending on where they are placed.

11. Do you consider participation in an internship program to be the same experience as participation in a co-operative program? (select one option)

- a. Yes
- b. No
- c. I am not sure

12. What functions or roles do interns fulfill at your company?

13. What are the top five characteristics that you feel students need to be successful in the construction industry?

- a.
- b.
- c.
- d.
- e.

14. Do you believe it is important for industry to play a role in determining student academic requirements? (select one option)

- a. Yes
- b. No
- c. Sometimes (please clarify) \_\_\_\_\_

## Appendix E- Sample of Themes with Associated Codes

### Themes with Associated Free Codes

Work Ethic	Written and Verbal Communication	Personality	Leadership	Learning New Skills	Construction Knowledge
hard worker	can't sell my point	calm demeanor	delegation	ask too many questions	building materials
pride in work	communication	can easily fade into background	leadership	asks questions	careful (safety)
takes incentive	giving appropriate feedback	good socializer	over supervising	quick learner	knowledge of terminology
responsible	listening	likeable personality	takes control of group and not a team player	reading comprehension	point out safety violations
dedicated	public speaking	people skills		slow learner	building system knowledge
loyal	southern drawl	respectful		slow reader	construction knowledge
goal oriented	talks fast	personable		understand new concepts	contract administration
career focused	talks too much	assertive		visual learner	financial budgeting
determined	editing	competitive		ability to adapt and navigate new duty	knowing construction terms
motivated	revising written work	over achiever		learn new skills easily	knowing industry and business terms
get it done attitude	spelling and grammer	perfectionist		need more time	knowledge of construction practices
getting things done on site	writing skills	persistent		adaptable	vocabulary not strong
long hours	ability to argue or push my point	optimistic			
work ethic	giving presentations	being taken advantage of			
works until job is done	too upfront	calm and quiet around people I don't know			
driven		friendly			
<b>con't.</b>		<b>con't.</b>			

## **Work Ethic**

driven

initiative

can do

detail oriented

professionalism

self-starter

follow directions

task

accomplishment

## **Personality**

funny

home sickness

personality

polite

respectful

sociable

sometimes cocky

well liked by many

competitive

eager

## Appendix F- LISA Data Sheet

The following pages contains the data sent to the LISA laboratory for the statistical analysis. Due to the size of the spreadsheet, it was necessary to divide the screen shots of the sheet by categories. The Top 6 Themes are listed first followed by the student responses for the Top 6 Themes divided by strengths and deficiencies.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1						Type of Survey (E, N, L, S)	Work Ethic Top 1	Written and Verbal Communication Top 2	Personality Top 3	Learning New Skills Top 4	Leadership Top 5	Work Experience Top 4	Top Total Score
2	Case No.	Survey No.	Gender	Year in Program	No. of Internships		Work Ethic	Communication	Personality	Learning New Skills	Leadership	Work Exp	Score
46	46	46	X	X	X	E	0	1	0	1	0	0	3
47	47	47	X	X	X	E	1	1	0	0	0	0	3
48	48	48	X	X	X	E	0	1	1	0	1	1	4
49	49	49	X	X	X	E	0	1	1	0	1	1	4
50	50	50	X	X	X	E	1	1	0	0	0	0	3
51	51	51	X	X	X	E	1	1	1	1	0	0	3
52	52	52	X	X	X	E	1	1	0	0	1	0	3
53	53	53	X	X	X	E	0	1	0	1	1	1	3
54	54	54	X	X	X	E	0	1	0	0	0	0	1
55	55	55	X	X	X	E	0	1	0	0	0	0	1
56	56	56	X	X	X	E	0	1	0	0	0	0	1
57	57	57	X	X	X	E	0	1	0	0	1	1	3
58	58	58	X	X	X	E	0	0	0	0	0	0	0
59	59	59	X	X	X	E	1	1	0	0	0	1	3
60	60	60	X	X	X	E	1	1	1	0	0	1	4
61	61	61	X	X	X	E	1	1	0	0	0	1	3
62	62	62	X	X	X	E	1	1	1	0	0	1	4
63	63	63	X	X	X	E	1	1	0	0	0	0	2
64	64	64	X	X	X	E	1	1	0	0	0	0	2
65	65	65	X	X	X	E	1	0	0	0	0	0	1
66	66	66	X	X	X	E	1	1	1	0	0	1	4
67	67	67	X	X	X	E	1	1	0	0	1	1	4
68	68	68	X	X	X	E	1	1	0	1	1	0	4
69	69	69	X	X	X	E	0	1	0	0	0	0	2
70	70	70	X	X	X	E	0	1	1	0	0	1	3
71	71	71	X	X	X	E	1	1	1	0	0	0	3
72	72	72	X	X	X	E	1	0	0	1	0	0	2
73	73	73	X	X	X	E	0	0	1	1	0	0	2
74	74	74	X	X	X	E	0	1	1	0	0	0	2
75	75	75	X	X	X	E	1	0	0	0	0	0	1
76	76	76	X	X	X	E	1	0	0	0	1	1	3
77	77	77	X	X	X	E	1	0	0	1	0	0	2
78	78	78	X	X	X	E	0	1	0	1	1	1	4
79	79	79	X	X	X	E	0	0	1	0	0	0	1
80	80	80	X	X	X	E	1	1	0	0	1	0	3
81	81	81	X	X	X	E	1	1	0	0	0	0	2
82	82	82	X	X	X	E	0	1	0	0	0	0	1
83	83	83	X	X	X	E	0	0	1	0	0	0	1
84	84	84	X	X	X	E	1	1	0	1	0	0	3
85	85	85	X	X	X	E	1	0	0	0	0	0	1
86	86	86	X	X	X	E	1	1	0	0	0	0	2
87	87	87	X	X	X	E	0	0	0	1	0	0	1
88	88	88	X	X	X	E	1	1	0	0	0	0	2
89	89	89	X	X	X	E	0	0	1	0	0	0	1
90	90	90	X	X	X	E	1	1	0	1	0	0	3
91	91	91	X	X	X	E	1	0	1	0	1	0	3
92	92	92	X	X	X	E	1	0	1	0	1	1	4

	A	B	C	D	E	F	G	H	I	J	K	L	M
1						Typeof Survey(E, N, S)	Work Ethic Top1	Written and Verbal Communication Top2 Communication	Personality Top3 Personality	Learning New Skill Top4 Learning New Skill	Leadership Top5 Leadership	Work Experience Top6 WorkExp	Top Total Score
2	Case No.	Survey No.	Gender	Yearin Program	No. of Internship								
93	91	92	x	x	x	E	1	1	0	0	1	0	3
94	92	93	x	x	x	E	1	1	1	0	0	0	3
95	93	94	x	x	x	E	0	1	0	0	0	0	1
96	94	95	x	x	x	E	0	1	0	1	0	0	2
97	95	96	x	x	x	E	0	1	0	1	0	0	2
98	96	97	x	x	x	E	1	1	0	1	1	1	5
99	97	98	x	x	x	E	1	0	0	0	0	0	1
100	98	99	x	x	x	E	1	0	1	1	0	0	2
101	99	100	x	x	x	E	1	1	0	0	0	0	2
102	100	101	x	x	x	E	1	0	1	1	0	0	2
103	101	102	x	x	x	E	0	0	1	1	0	0	2
104	102	103	x	x	x	E	1	1	0	1	0	0	3
105	103	104	x	x	x	E	1	1	1	0	0	1	4
106	104	105	x	x	x	E	1	1	0	1	0	1	4
107	105	106	x	x	x	E	1	1	1	0	0	0	2
108	106	107	x	x	x	E	0	0	1	0	0	0	1
109	107	108	x	x	x	E	1	0	1	0	0	0	2
110	108	109	x	x	x	E	1	1	1	0	1	0	4
111	109	110	x	x	x	E	1	1	1	0	1	0	4
112	110	111	x	x	x	E	1	1	1	0	0	0	2
113	111	1	x	x	x	N	0	1	0	1	1	0	3
114	112	3	x	x	x	N	1	1	0	1	0	1	4
115	113	5	b	x	x	N	0	0	1	0	0	0	1
116	114	9	x	x	x	N	0	0	1	0	0	0	2
117	115	11	x	x	x	N	0	1	0	1	0	0	2
118	116	12	x	x	x	N	1	0	1	0	0	0	2
119	117	16	x	x	x	N	0	0	1	0	0	0	1
120	118	24	x	x	x	N	1	1	1	1	0	0	4
121	119	30	x	x	x	N	0	0	1	0	0	0	1
122	120	37	x	x	x	N	0	1	0	0	0	0	1
123	121	40	x	x	x	N	0	0	0	0	1	0	1
124	122	43	x	x	x	N	1	1	1	0	0	0	2
125	123	44	x	x	x	N	0	0	0	0	0	0	0
126	124	49	x	x	x	N	0	1	0	0	1	1	3
127	125	54	x	x	x	N	0	1	1	0	0	1	3
128	126	55	x	x	x	N	1	1	1	0	0	0	3
129	127	60	x	x	x	N	1	0	0	0	0	0	1
130	128	62	x	x	x	N	0	0	1	1	0	0	2
131	129	65	x	x	x	N	0	0	0	1	0	1	2
132	130	67	x	x	x	N	1	1	0	0	0	0	2
133	131	68	x	x	x	N	0	1	0	0	0	0	1
134	132	69	x	x	x	N	1	0	0	0	0	1	2
135	133	71	x	x	x	N	0	1	0	1	0	0	2
136	134	73	x	x	x	N	0	0	0	0	0	0	0
137	135	75	x	x	x	N	1	0	0	1	1	0	3

	A	B	C	D	E	F	G	H	I	J	K	L	M
1							Mark Ethic	Written and Oral Communication	Personality	Learning New Skills	Leadership	Mark Top 5 WorkExp	Top Level Score
2	Que.No.	Survey No.	Gender	Year in Program	No. of Internship	Type of Survey (E, N, I, S)	Top 1 WorkEthic	Top 2 Communication	Top 3 Personality	Top 4 Learning New Skills	Top 5 Leadership	Top 5 WorkExp	Top Level Score
138	136	76	♀	♀	♀	N	0	1	1	0	1	0	2
139	137	80	♀	♀	♀	N	0	0	0	0	1	0	2
140	138	87	♀	♀	♀	N	0	1	0	0	0	0	2
141	139	91	♀	♀	♀	N	1	1	0	0	0	0	2
142	140	92	♀	♀	♀	N	0	1	1	1	0	1	4
143	141	100	♀	♀	♀	N	1	1	0	0	0	1	3
144	142	115	♀	♀	♀	N	0	0	0	0	0	0	0
145	143	120	♀	♀	♀	N	0	0	0	1	0	0	2
146	144	126	♀	♀	♀	N	0	1	0	0	1	1	2
147	145	131	♀	♀	♀	N	1	0	0	1	0	0	2
148	146	144	♀	♀	♀	N	0	0	0	0	0	1	2
149	147	145	♀	♀	♀	N	0	1	0	1	0	1	3
150	148	2	♀	♀	♀	I	0	0	1	1	0	1	3
151	149	4	♀	♀	♀	I	1	1	1	0	0	0	3
152	150	6	♀	♀	♀	I	0	1	1	0	0	0	2
153	151	8	♀	♀	♀	I	0	1	0	1	1	0	3
154	152	13	♀	♀	♀	I	0	1	1	1	0	0	3
155	153	14	♀	♀	♀	I	0	1	1	1	0	0	3
156	154	15	♀	♀	♀	I	1	0	0	1	1	0	3
157	155	17	♀	♀	♀	I	0	0	0	0	1	0	2
158	156	19	♀	♀	♀	I	1	1	0	0	1	0	2
159	157	20	♀	♀	♀	I	0	1	0	0	0	1	2
160	158	21	♀	♀	♀	I	0	1	0	0	1	0	2
161	159	23	♀	♀	♀	I	0	1	1	1	0	0	2
162	160	26	♀	♀	♀	I	0	1	1	0	0	0	2
163	161	27	♀	♀	♀	I	0	1	0	0	0	0	1
164	162	29	♀	♀	♀	I	1	0	1	0	1	0	2
165	163	32	♀	♀	♀	I	1	0	1	1	0	1	4
166	164	33	♀	♀	♀	I	1	0	1	0	0	2	1
167	165	34	♀	♀	♀	I	0	1	0	0	0	0	1
168	166	38	♀	♀	♀	I	0	1	0	0	0	0	1
169	167	42	♀	♀	♀	I	0	1	1	0	0	0	2
170	168	46	♀	♀	♀	I	1	1	0	1	1	0	4
171	169	47	♀	♀	♀	I	1	0	1	0	0	0	2
172	170	48	♀	♀	♀	I	0	0	0	0	1	0	2
173	171	50	♀	♀	♀	I	1	1	1	0	0	0	2
174	172	51	♀	♀	♀	I	1	1	0	0	0	0	2
175	173	52	♀	♀	♀	I	0	1	0	0	1	0	2
176	174	53	♀	♀	♀	I	1	0	0	0	0	0	1
177	175	56	♀	♀	♀	I	0	0	0	0	0	1	2
178	176	57	♀	♀	♀	I	1	1	1	0	1	0	3
179	177	58	♀	♀	♀	I	0	0	1	0	1	0	2
180	178	59	♀	♀	♀	I	1	0	1	0	1	0	3
181	179	61	♀	♀	♀	I	0	0	1	0	0	0	1
182	180	64	♀	♀	♀	I	1	1	1	0	0	0	3

	A	B	C	D	E	F	G	H	I	J	K	L	M
1							Mark Ethic	Written and Verbal Communication	Personality	Learning New Skill	Leadership	Work Experience	Top Total Top Score
2	Case No.	Survey No.	Gender	Year in Program	No. of Internship	Type of Survey (E, N,LS)	Top 1 Mark Ethic	Top 2 Communication	Top 3 Personality	Top 4 Learning New Skill	Top 5 Leadership	Top 6 Work Exp	Top Total Top Score
182	181	66	a	b	b	1	0	1	1	0	0	1	3
184	182	70	a	b	<	1	0	1	1	0	0	1	3
185	183	72	a	<	<	1	0	1	1	0	1	0	3
186	184	74	a	<	b	1	0	1	1	0	1	1	4
187	185	77	a	<	b	1	0	0	0	0	1	0	2
188	186	78	b	d	<	1	1	0	0	0	0	0	2
189	187	79	a	<	<	1	0	1	0	0	0	0	2
190	188	81	a	a	b	1	1	0	1	1	1	1	5
191	189	85	a	a	b	1	1	0	0	0	0	0	2
192	190	88	a	d	b	1	0	0	0	0	0	1	1
193	191	89	a	<	b	1	0	1	1	0	0	0	3
194	192	90	a	<	b	1	1	0	0	1	1	0	3
195	193	93	a	<	b	1	1	0	0	1	1	1	4
196	194	94	a	<	b	1	1	1	1	0	1	0	4
197	195	95	a	d	<	1	1	1	1	0	0	0	4
198	196	96	a	d	<	1	1	0	0	1	0	0	2
199	197	97	a	<	d	1	1	0	0	0	0	0	1
200	198	98	a	<	b	1	0	0	0	0	0	1	2
201	199	99	a	a	<	1	0	1	1	0	0	0	2
202	200	101	a	<	b	1	0	0	0	0	0	0	0
203	201	110	a	<	b	1	0	0	0	0	1	0	2
204	202	116	a	<	b	1	0	1	0	0	0	0	1
205	203	117	a	<	<	1	0	0	0	0	0	0	1
206	204	118	b	a	b	1	1	1	0	0	0	0	2
207	205	119	a	<	<	1	0	0	0	0	0	0	0
208	206	121	a	<	d	1	0	1	1	0	0	0	2
209	207	122	a	<	b	1	0	1	0	1	1	0	2
210	208	123	a	<	d	1	0	1	0	0	0	1	2
211	209	124	a	<	d	1	0	0	0	0	0	0	2
212	210	125	a	a	b	1	1	1	0	0	0	0	2
213	211	127	a	a	d	1	0	1	1	1	1	1	3
214	212	128	a	a	<	1	0	1	0	1	1	0	2
215	213	129	a	d	b	1	1	0	0	1	1	0	2
216	214	130	a	<	<	1	0	1	0	1	1	0	2
217	215	132	a	d	<	1	0	0	0	0	0	0	2
218	216	133	a	b	b	1	1	0	1	1	1	1	4
219	217	134	a	<	b	1	1	0	0	1	1	0	2
220	218	135	a	a	b	1	1	0	0	1	1	1	3
221	219	136	a	d	b	1	0	0	0	1	1	0	2
222	220	137	a	b	b	1	1	1	0	0	0	1	3
223	221	138	a	<	<	1	1	1	1	1	1	1	5
224	222	143	a	b	b	1	0	1	0	0	0	0	1
225	223	148	a	<	b	1	1	0	0	1	0	1	2
226	224	149	a	b	b	1	1	1	0	1	1	0	2
227	225	150	a	d	b	1	1	0	0	0	0	0	1

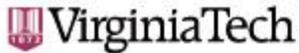
	A	B	C	D	E	F	G	H	I	J	K	L	M
1							Work Ethic	Written and Oral Communication	Personality	Learning New Skills	Leadership	Work Experience	Top Total Score
2	Ques.No.	Survey No.	Gender	Year in Program	No. of Internships	Type of Survey (E, N, I, S)	Top 1 Work Ethic	Top 2 Communication	Top 3 Personality	Top 4 Learning New Skills	Top 5 Leadership	Top 6 Work Exp	Top Total Score
228	226	151	a	d	b	1	1	1	0	0	1	0	3
229	227	153	a	e	b	1	1	0	0	0	0	0	1
230	228	155	a	e	b	1	0	1	0	0	0	0	2
231	229	156	a	c	c	1	0	0	0	0	1	1	3
232	230	158	a	b	b	1	1	1	0	0	0	0	3
233	231	160	b	b	d	1	0	1	0	1	1	0	2
234	232	7	a	c	c	S	0	1	1	0	0	1	3
235	233	22	b	c	c	S	0	0	0	1	0	0	2
236	234	25	a	d	c	S	0	1	0	0	0	0	1
237	235	31	a	c	c	S	0	1	0	0	1	1	3
238	236	35	a	c	b	S	1	1	0	0	0	1	3
239	237	36	a	c	d	S	0	1	0	0	0	1	2
240													
241													
242													
243					Industry Count		74	82	52	35	27	27	
244					Student Count		50	84	48	31	41	34	

1	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE																								
2	Grade	Semester	Grade	Year	Head	Staff	Work	Written and Verbal	Personality	Leadership	Work																																												
3	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155
1	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE							
1																																						
2	Genie	Smoyth	Gender	Years	Half	Travel	Wk	Writers	0	Perennial	Leading	Leadership	Wk	Deficiency	Wk	Writers	1	2	3	4	5	6	7	8														
	110	112					110	Communication	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						
205	205	205	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
206	206	206	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
207	207	207	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
208	208	208	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
209	209	209	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
210	210	210	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
211	211	211	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
212	212	212	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
213	213	213	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
214	214	214	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
215	215	215	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
216	216	216	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
217	217	217	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
218	218	218	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
219	219	219	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
220	220	220	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
221	221	221	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
222	222	222	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
223	223	223	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
224	224	224	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
225	225	225	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
226	226	226	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
227	227	227	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
228	228	228	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
229	229	229	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
230	230	230	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
231	231	231	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
232	232	232	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
233	233	233	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
234	234	234	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
235	235	235	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
236	236	236	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
237	237	237	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
238	238	238	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
239	239	239	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
240	240	240	1	<	<	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

## Appendix G- Institutional Review Board Approval Form



Office of Research Compliance  
Institutional Review Board  
2000 Kraft Drive, Suite 2000 (0497)  
Blacksburg, VA 24060  
540/231-4606 Fax 540/231-0959  
email [irb@vt.edu](mailto:irb@vt.edu)  
website <http://www.irb.vt.edu>

### MEMORANDUM

**DATE:** May 21, 2012  
**TO:** Christine M Fiori, Kathleen M Short  
**FROM:** Virginia Tech Institutional Review Board (FWA00000572, expires May 31, 2014)  
**PROTOCOL TITLE:** Synergistic Learning and Inquiry through Conceptualizing the Environment for Students (SLICES): Assessing the Outcomes of Internship Experiences Utilizing the SLICES model for Students Entering the Construction Industry  
**IRB NUMBER:** 12-453

Effective May 21, 2012, the Virginia Tech Institutional Review Board (IRB) Administrator, Carmen T Green, approved the New Application request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

### PROTOCOL INFORMATION:

Approved As: Exempt, under 45 CFR 46.110 category(ies) 2  
Protocol Approval Date: May 21, 2012  
Protocol Expiration Date: N/A  
Continuing Review Due Date\*: N/A

\*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

### FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

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