

Impact of an Industrial Internship on Construction Students' Sense of Belonging

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Abstract

All students in the Department of Engineering Technology at Texas State University take an internship as a part of their degree program. The internship is a 400-hour work experience wherein the students learn more about their chosen field, as well as the practical applications of their course work. As a part of their internship class, students and their supervisors complete surveys at the start, mid-point, and conclusion of the internship contributing both qualitative and quantitative data. Further, the research team embedded Cohen and Watson's Social Fit instrument into the pre- and post-internship survey to measure the impact of this industrial work experience on the students' sense of belonging to their construction majors. This paper reports the change of students' sense of belonging of this study.

Introduction

Since the summer of 2015, all students in Texas State University's Department of Engineering Technology, of which Construction Science and Management is the largest major, have been required to complete an industrial internship in the Sophomore year. While the internship course can be taken during a long semester, most students enroll during the summer. Prior to 2015, the department's internship requirement was in the senior year, but was moved earlier in the curriculum upon the request of the department's industrial advisory boards and based upon literature supporting this timing [1]. Part of the reasoning behind the change was to engage students in the profession at an earlier age, which was expected to help improve retention rates. One measure of student engagement is sense of belonging, which is also tied to student retention [2].

Background

According to the 2022 Associated General Contractors of America (AGC) national survey, 91% of 1,266 construction company's responses are having difficulty finding enough skilled workforce to meet their needs [3]. While academia and industry are partnering to increase educational and training opportunities to quickly increase the numbers, the quality of output still needs to meet the industry standards. Higher education is training students in these standards and uses early internships to assist students in identifying their preference of industry and their role in it. Further, an internship offers the industry eager workers to fill in the gap of the workforce shortage. As interns are exposed to the needed skills, both technical and soft, that the industry and their future position requires, students come back to class inspired and driven to complete their studies. The graduate, thus, has acquired the necessary work readiness of skills, confidence, and self-efficacy to become a contributing member of the organization in a shorter timeframe [4]. This ease of transition into the career parallels the paradigm shift of employees looking beyond pay and wanting "learning opportunities, a sense of belonging and work-life balance" [5].

Belonging is a fundamental human desire to be part of a group [6]. Studies have shown that students with a higher sense of belonging to their university or major are more likely to overcome challenges and persist in their college studies [7-9]. Walton and Cohen [7] also found

that a one-hour intervention to boost minority students' sense of belonging significantly closed the academic achievement gap between white and minority students.

This study sought to investigate the relationship between early internship experiences and students' senses of belonging to their professions. It was hypothesized that students would have increased senses of belonging following their internships because they would have just spent at least 400 working hours integrated into their chosen profession. Analogous to how there is greater internalization of statements that are spoken than are written [7 and 10], it was expected that there would be an internalization in ideas that are done rather than learned about in class. By participating in their profession, it was expected that these students could then better associate themselves

Method

To gather data on the internship's impact on their senses of belonging to their chosen profession, the Social Fit instrument used in Walton & Cohen's studies on student belonging [7,8 & 11] was inserted into the student's preliminary and final internship survey assignments. This measure was adapted to the student's profession by inserting the word "career" in place of "major" and "career/company" in place "major department." Each student's responses were paired in a spreadsheet and then anonymized by removing personal identifiers prior to analysis. To create the composite score, negatively worded items were reverse scored and then all items were average [11].

In the summer of 2023, 105 construction majors completed their internship, and their survey responses were compiled for analysis here. As it was expected that the internship would increase agreement to positively worded items and decrease agreement to negatively worded items, the paired scores were assessed using a one-tailed paired t-test.

Results & Discussion

The mean responses to the seventeen items in the Social Fit measure are presented in Figure 1, along with the mean Composite score. Further, the text of the items are presented in Table 1. Those items marked with an asterisk are negatively worded and were reverse scored when compiling the composite score. As expected, the positively worded items tended to have an increased agreement from pre- to post-internship and the negatively worded items tended to have a decreased agreement over that period. While the trends showed the expected movement that would reflect an increased sense of belonging to the construction industry, only two showed statistical difference between pre- and post-internship scores. Item 8, "I am similar to the kind of people who succeed in my career" was statistically significant at the 95% level ($t(104) = -1.70, p = .046$) and Item 13, "I do NOT know what I need to do to make a supervisor in my company like me" was statistically significant at the 90% level ($t(104) = 1.49, p = .070$).

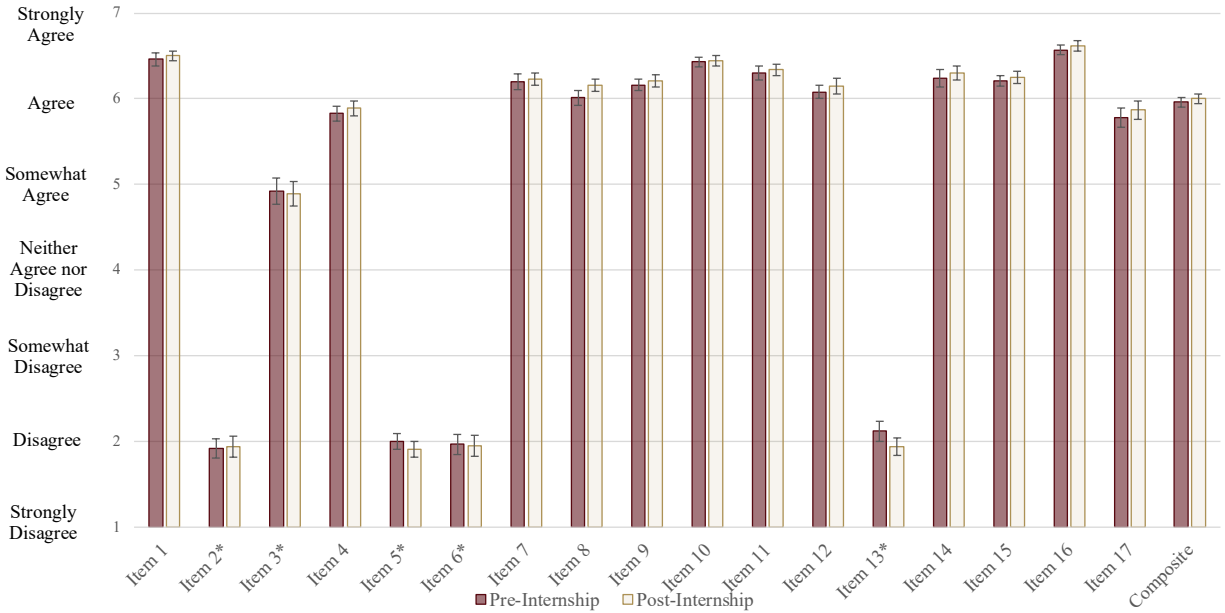


Figure 1: Pre- to Post-Internship Average Responses to Social Fit Items
(Note: Items with * were reverse scored for creation of the Composite Score)

Table 1: Social Fit Items

Item	Text
1	People in my career accept me.
2	I feel like an outsider in my career.*
3	Other people understand more than I do about what is going on in my career / company.*
4	I think in the same way as do people who do well in my career.
5	It is a mystery to me how my career / company works.*
6	I feel alienated from others in my career.*
7	I fit in well in my career / company.
8	I am similar to the kind of people who succeed in my career.
9	I know what kind of people my company supervisors are.
10	I get along well with people in my career.
11	I belong in my career / company.
12	I know how to do well in my career.
13	I do NOT know what I would need to do to make a supervisor in my company like me.*
14	I feel comfortable in my career / company.
15	People in my career / company like me.
16	If I wanted to, I could potentially do very well in my career.
17	People in my career / company are a lot like me.

Table 2 presents the frequency of student responses to the seventeen items of the Social Fit instrument with the pre- and post-internship responses paired. As seen in the average responses presented in Figure 1, there is limited change from pre- to post-internship. What is notable is that the overall number of positive responses to the positively worded items typically is higher in the post-internship survey, including in item 11, “I belong in my career/company”. For the items that had statistically significant differences in their averages, Items 8 and 13, Table 2 sheds light

on the source of these differences. Item 8, which asks the students about their similarity to others in their field showed a large increase in the number of people who agree with that statement and a shrinking of those who are neutral. It can also be seen that one student felt less similar after their internship.

Table 2: Pre- to Post-Internship Responses to Social Fit Items

	Strongly Agree	Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Disagree	Strongly Disagree
1. People in my career accept me.							
Pre	54%	41%	4%	0%	0%	0%	1%
Post	52%	47%	0%	1%	0%	0%	0%
2. I feel like an outsider in my career.							
Pre	0%	2%	3%	5%	10%	36%	44%
Post	2%	1%	2%	8%	2%	44%	42%
3. Other people understand more than I do about what is going on in my career / company.							
Pre	11%	35%	23%	13%	10%	7%	3%
Post	10%	29%	26%	20%	9%	3%	4%
4. I think in the same way as do people who do well in my career.							
Pre	24%	43%	27%	6%	1%	0%	0%
Post	22%	52%	20%	5%	0%	1%	0%
5. It is a mystery to me how my career / company works.							
Pre	0%	0%	1%	9%	11%	48%	31%
Post	0%	1%	1%	5%	13%	42%	38%
6. I feel alienated from others in my career.							
Pre	1%	2%	0%	10%	6%	39%	42%
Post	1%	2%	1%	10%	4%	40%	43%
7. I fit in well in my career / company.							
Pre	45%	38%	13%	1%	2%	1%	0%
Post	38%	50%	8%	4%	0%	0%	0%
8. I am similar to the kind of people who succeed in my career.							
Pre	32%	43%	18%	7%	0%	0%	0%
Post	31%	58%	7%	3%	1%	0%	0%
9. I know what kind of people my company supervisors are.							
Pre	32%	52%	14%	1%	0%	0%	0%
Post	37%	50%	10%	3%	0%	0%	0%
10. I get along well with people in my career.							
Pre	49%	46%	6%	0%	0%	0%	0%
Post	50%	46%	4%	1%	0%	0%	0%
11. I belong in my career / company.							
Pre	49%	38%	10%	3%	1%	0%	0%
Post	44%	49%	6%	2%	0%	0%	0%
12. I know how to do well in my career.							
Pre	33%	43%	22%	2%	0%	0%	0%
Post	35%	52%	10%	1%	0%	1%	1%
13. I do NOT know what I would need to do to make a supervisor in my company like me.							
Pre	1%	2%	1%	9%	13%	41%	33%

Post	0%	2%	0%	8%	11%	39%	40%
14. I feel comfortable in my career / company.							
Pre	45%	43%	10%	1%	0%	0%	2%
Post	44%	47%	8%	1%	0%	0%	1%
15. People in my career / company like me.							
Pre	32%	58%	8%	2%	0%	0%	0%
Post	39%	50%	9%	3%	0%	0%	0%
16. If I wanted to, I could potentially do very well in my career.							
Pre	62%	34%	3%	1%	0%	0%	0%
Post	67%	28%	4%	1%	0%	0%	0%
17. People in my career / company are a lot like me.							
Pre	30%	39%	18%	10%	0%	2%	1%
Post	30%	43%	18%	6%	2%	2%	0%

Figure 3 presents the amount of change in students composite belongingness scores from pre- to post-internship. The majority (67%) of students were within one standard deviation of their original scores. While some students had negative results from their internship, there were more that had positive results. Very few students had more than a two standard deviation change either way (there were two each, positive and negative, with a greater than two standard deviation change).

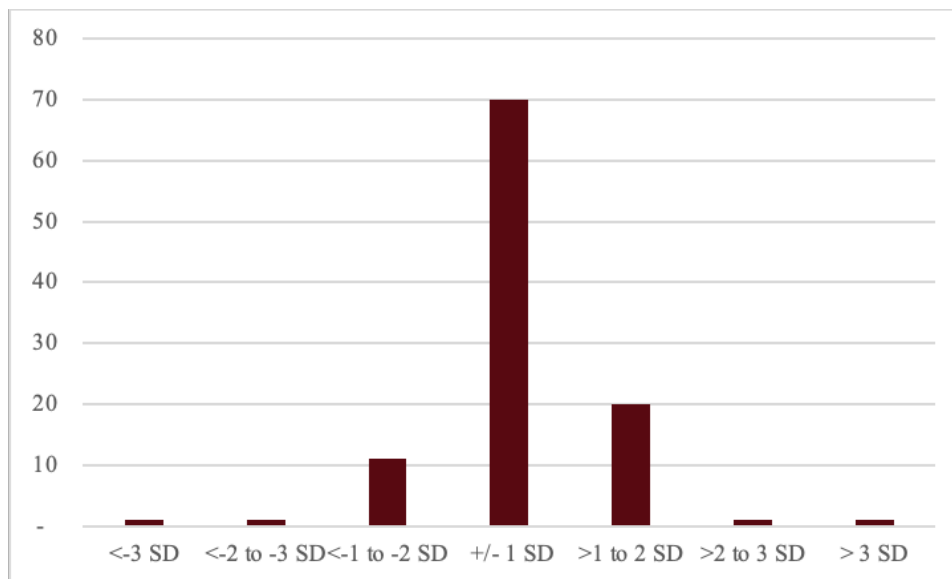


Figure 3: Pre- to Post-Internship Change in Composite Scores Distribution – Count of Students Within One to Over Three Standard Deviations from the Mean

Qualitative Comments

Qualitative responses of participants capture their experience and allow researchers a glimpse beyond the statistics into the participant's personal perspectives. The wording or phrasing used can identify common threads between experiences. The examples below are student responses to the prompts given in their final, post-internship, evaluation. Note the impact that the internship

had on their sense of belonging and the motivation to graduate. The prompts are noted in italics, followed by a recap of findings and the exemplar responses.

Do you feel that your internship experiences relate to your major? Please describe.

Findings: A running thread through the student responses are that they were able to assimilate into the internship quicker as their prior classwork had laid the foundation of understanding of construction terminology and practices. This prior knowledge enhanced their self-confidence which, in turn, increased their motivation. As they worked, they were able to connect real-life scenarios to class topics and appreciate the correlation of academic and practical experience both before and after.

“This has been very helpful as although I didn't have any prior experience in construction, I had the technical knowledge needed to succeed within the construction industry. With this basis of knowledge, I was able to learn things much quicker than I would have been able to, allowing me to take on new challenges faster than I would have otherwise.”

“I feel that my internship experience with Streetlights Residential has greatly reflected the Construction Science and management program at Texas State University. Both experiences relate to one another in terms of technology used, software used, construction processes taught, as well as similar stances on risk management. For instance, I started this internship already familiar with software such as Bluebeam, Revit, Procore, and Smartsheet because of the CSM program. On top of that, I walked into this internship with a comfortable amount of knowledge on materials, processes, plan reading and risk management that I used nearly everyday.”

“I found the practical application of my knowledge to be incredibly rewarding. This internship played a crucial role in enhancing my skills and knowledge as I enter the next academic year and prepare for my future career in the field of construction management.”

What, if any, were the insights into the industry that the internship provided per the following topics? Corporate culture.

Findings: Many students expressed that the core values of the company where they interned were of vital importance and evident in the daily actions of all employees. Where some used the term family, the majority shared the value that impacted them the most was being considered a part of the team even though they knew they were temporary. Their work was valued and that helped to increase their motivation and confidence further.

“The culture as SpawGlass is like a family, from day one I was welcomed with open arms and felt valued. I truly felt like I was a part of the team and not just an "Intern".”

“ANDRES has also showed me its core values which is respect, community, conviction, collaboration, and integrity. I feel like I have seen a great example of these values which has made coming to work enjoyable.”

“This experience helped me understand the importance of corporate culture in shaping the dynamics and effectiveness of a workplace, and it provided a strong foundation for my future interactions in the industry.”

“The company I worked for had a very supportive culture. From the beginning, everybody treated me with respect, and we all worked as a team. Everyone was open to criticism and allowed us to express ourselves and our ideas. There were never times where arguments or problems had been caused. This company also encouraged ways to provide personal growth and development opportunities.”

Did the internship provide you with a team or community of practice (ie. your work team consisted of your supervisor or other personnel such as managers, engineers, technicians, etc.)?

Findings: Teamwork brought the interns into the fold and allowed them to see the inter-relationships of the team and how all eyes were on the same goal. The core values of professionalism and respect were visible in all interactions which strengthened the team's bond. Students felt at ease asking questions and all team members participated in teaching each other to reach the team goal.

“I had a great team to work with to help me figure out what needed to be done from me. Everyone helped out when I asked a lot of questions and showed me things that I could do to help improve myself.”

“The teamwork that our work community has is what makes the jobsite run smoothly and effectively.”

“All of these guys have been so much help for me and have made me feel like a part of the team not an intern.”

“The internship provided me with an amazing team and gave me an active position in their community. I learned so much about how each team member served a purpose in propelling the job forward and how team members are to work together for the progress of construction. I spent time with each team member and was able to see details of each person's responsibilities.”

If so, how did this community help with your learning at work?

Findings: Teams consisted of different roles in the construction field which enabled students to learn of the different requirements of each role. This variety enabled them to identify their preference of role for themselves and try on the role for their future career. This experience helps the student see the qualities needed for that role while watching a role model in action. Some students reflected on themselves in that role and were able to see areas needed for improvement when they went back to school. Further, having a team to work in stressed the importance of good communication.

“Having the different role on the project allowed for me to have exposure to the different types of jobs and roles there are within construction as well as their perspective job requirements.”

“Helped me see what I really need to work on before I get out of college”

“Being surrounded by individuals that I trusted gave me peace of mind and kept me from being shy to ask questions or ask for advice. I have learned that forming a community with those who I work alongside is one of the most important parts of beginning a new work opportunity.”

“I learned that it takes the whole team to be open and communicate with each other constantly in order to achieve success on projects.”

Did the internship better prepare you for continued learning at Texas State University? Please describe.

Findings: Having been immersed in the industry, students were able to see how their prior studies had better prepared them for their internship, but now, more importantly, how their future studies would be applied and enhance their skillsets for their future career. Many students expressed the increase in confidence from working in the field that they can now apply to their studies. Students expressed the desire to complete their studies as they saw the value it contributed to their experience and self-confidence. The experiential and academic learning worked hand in hand to prepare them for the lifelong learning required of the industry.

“I do believe that I will be more prepared for my more difficult classes that are upcoming. I think I learned about as much in the field as I did in the class. Just like how my classes gave me a head start in the field, I feel the vice versa will also be true. It is a double layer of two different kinds of learning.”

“I can proudly say that the internship prepared me to get back into the classroom at Texas State, as I now have more knowledge of the things we learn at the university where I can start making the connections between the two environments. I believe the internship experience has given me more exposure to what goes on at a project, in order for me to better understand the material in the classroom.”

“Yes! Before this I was super nervous for the capstone as I felt I wouldn't be able to contribute but now I feel as I can lead! This internship has not only given me experience but confidence as I have a better understanding of how things work. Being able to see things firsthand has been extremely helpful and I believe it will be a huge help with all my classes.”

“Absolutely, the internship significantly better prepared me for continued learning at Texas State. Through practical exposure and hands on experience during the internship, I gained a deeper understanding of the concepts taught in previous classes. This real-world experience provided context and relevance to the course material, making it easier to grasp and apply in academic settings. The confidence I gained from successfully managing responsibilities in the internship has positively influenced my approach to coursework. Now, I feel better equipped to tackle complex topics and challenges, knowing that I have practical experience to draw upon and a clearer understanding of how classroom knowledge translates into real-world applications. This

newfound confidence has undoubtedly enhanced my readiness for continued learning at the university and I am excited for that!!”

“Before this internship, I always felt that I was behind everyone in my classes due to my lack of field knowledge or real-world experience. However, after this internship, I feel that the gap has closed and that I am more confident in my knowledge in the industry. I feel that I can walk into future classes confident in my knowledge and confident in where it came from. Therefore, I do believe that the internship is helping me prepare for continuing learning at Texas State University.”

“Yes, it has taught me to pay more attention in class like I said before. Now that I have a basis of what it is like in the field and have real-life experiences to relate back to I think learning moving forward may be easier. It has also helped me learn what I need to focus more on and what comes easier to me when learning. I definitely have some work to do in this next semester but this internship has opened my eyes a lot even just towards myself.”

“Yes, it reinvigorated me and made me more motivated and enthusiastic to continue my education.”

Did your industrial supervisor provide good mentoring? Please describe.

Findings: The students having a mentor during the internship established a sense of comfort and support when they didn't understand something and needed to ask questions. The mentor was able to gauge understanding, helped the student identify areas needing improvement, and encourage growth as they worked together.

“Yes, he allowed me to pursue the things that had my interest as well as guiding me in the right direction to be in a better place of learning and in a way making sure I stay busy and was able to continuously learn over the summer.”

“Throughout the experience I was encouraged and supported, this made me feel comfortable with asking questions and as result helped me learn a lot over the summer.”

“Whenever I had questions, he was approachable and supportive, guiding me in the right direction without making me feel inadequate. His encouragement to seek his assistance whenever needed was reassuring and allowed me to feel confident in seeking guidance. His mentorship was instrumental in fostering a positive learning environment, which significantly contributed to my growth and development during the internship.”

*Did the internship provide an opportunity to establish the link between industrial practice and academic learning at the university? Has it shown that academic studies are relevant to being successful in the industry? Please describe.**

“The more basic knowledge I acquired at university definitely helped on a daily basis. It helped me be more grounded in an unfamiliar place where I would otherwise be completely lost. I found

myself constantly looking back to times in the classroom, trying to make connections. I do feel that I have a sort of head start.”

“Yes, a lot of the coursework that I learned in university was actually implemented into a real life scenario with actual purposes. It has definitely shown that the academic studies are relevant to being successful in the industry. Nearly everything that I studied in class was used in my project over the internship.”

“Yes a lot of material I learned in school was used this summer but I am excited for my future classes to cross reference material I learned this summer from my internship to the class room.”

“Yes, it has showed that being in school I have been able to set a foundation and a better understanding of the industry. Although I lacked experience it was my education that helped me when I lacked. Many of my managers are still taking classes till this day and I have learned that you will never stop learning in this industry.”

Conclusions & Future Work

While the quantitative results showed very little change pre- to post-internship, the qualitative results showed the students greatly valued their internship experiences. Overall, these students show high levels of belonging to the construction industry. After being immersed in the culture of the companies, students were grateful for the team atmosphere that embraced them and considered them a part of the project goals. Their confidence level going in was enhanced by their prior studies, but greatly impacted by the success of their role on the team and the impact they saw themselves contribute to the team’s goal. The professional culture of the industry resonated in the student’s professional identity creation as they were exposed to the roles associated with their future career.

While the internship course is intended to be completed in the Sophomore year, students with higher classifications routinely enroll in the course. Many of these students expressed regret for not taking the internship sooner as they saw the correlation between academic and industry learning. As such, future work should be conducted to examine to what extent does student classification impact their change in belonging from participation in a summer internship.

Acknowledgements

The authors would like to thank Laura Jones for her help with ePortfolio.

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