Optimizing Heavy Civil Internships Based on Student Interest

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Many Cal Poly Construction Management students are expected to have at least one internship prior to graduating. With that being said, the construction industry has many sectors of work that one may enter. Internships are a good way for students to determine what kind of work they would like to go into whether it is commercial, heavy civil, residential, etc. The purpose of this research paper is to analyze what can be done to optimize a heavy civil internship based on student interest and experiences. Research was conducted via survey that was sent out to all Cal Poly Construction Management and Heavy Civil Minor students which includes both Construction Management and Civil Engineering students. Only responses from students who have participated in at least one heavy civil internship were used for this research. This paper aims to provide insight on what students find most important during their summer internship experiences and what could have been improved to provide a better experience. Industry partners mainly pertaining to the heavy civil industry can refer to the results to see key aspects of what students find important during summer internships to further promote their learning in the heavy civil industry.

Key Words: Heavy Civil, Internships, Student Interest, Optimization, Structure

Introduction

Summer internships are important for all students as a means of understanding what the workforce entails. For students who are unsure of what sector of work they are interested in, these summer internships give them a chance to try it out before graduating and working full-time. With many informational sessions and meet-and-greets being from commercial or residential companies at Cal Poly, students may not be as familiar with heavy civil. As for Cal Poly curriculum, there is only one class that is dedicated to heavy civil. Students should have the chance to try out various sectors of work prior to graduation to determine their best fit. The goals of this research paper are:

- To determine if there is an “ideal” structure for heavy civil internships
- To determine what elements of the internship promoted the most learning and the elements that did not promote as much learning
Internships are important for students to participate in to get a hands-on experience. Because internships are usually only during the summer, the duration is quite short in comparison to the abundance of information that one can learn on a job site. There are many factors that may result in the students not being interested in the industry or returning to the same company. With a Heavy Civil minor being recently introduced, more students are now exploring what heavy civil is. To promote heavy civil as a potential path, this research paper will focus on what students find important during their heavy civil internships that can lead to a more effective internship. Analyzing the results from the survey sent out to all Construction Management and Heavy Civil minor students who have participated in a heavy civil internship will aid in determining an optimal internship for students. This survey will revolve around determining an internship structure and the elements that will lead to an efficient and effective summer internship. The information found from this research can be beneficial to industry partners in possibly reconstructing or including more of the elements that students found to be most beneficial. By doing so, students may have a more successful internship that blends both learning and student interest in heavy civil. Other students can also benefit from the student feedback as well as determining what elements they should be focusing on during their internship program.

Literature Review

With summer internships being roughly only three months long, students must adapt in order to optimize their experience. Companies also must be ready for the new intern in order to aid in optimizing their internship. This could include something like a workplan. There are many factors that can affect whether an internship experience is deemed beneficial for the intern as well as the company. For the intern, it could mean that a lot was learned and even possibly another opportunity to intern or a full-time offer. For the company, they could be gaining another member to their team or having to let the intern go.

For the heavy civil sector where work is abundant, retaining interns to then be brought on as full-time hires can be beneficial from the company’s point of view as this may mean less training. There have been global studies that have indicated that students graduating with a civil engineering or construction management degree may not be fully prepared to meet the needs their future employers. The result of a survey shows that 23% of companies were dissatisfied with the knowledge and skills associated with engineering skills (Zaharim et al., 2009). To create a bridge between curricula and practical experience, internships can be that link that creates a win-win-win situation for the students, the industry, and the educational institution (Wandahl et al., 2010). However, just having an internship is not enough. Due to its short duration in nature, internships should be designed to be effective (Narayanan et al., 2017).

The survey conducted will be to overall view the structure of the internship as well as the elements that worked well and what did not. Companies may use this information to identify determinants of internship effectiveness that can be incorporated into the three-month long internship.
Methodology

The research strategy utilized for this paper is qualitative research. In order to compile data, a survey was sent out to Cal Poly Construction Management students as well as those participating in the Heavy Civil Minor. Participants of the Heavy Civil Minor include both a mix of Cal Poly Construction Management and Civil Engineering students. The data will help form conclusions about what students find important during internships which can vary from the structure of the internship, amount of responsibility, and interest in the industry or sector of work.

The procedure is survey based and consists of 11 questions. After receiving 50 respondents from Construction Management and Heavy Civil Minor students, the survey was closed. The questions were as follows:

1. What is your Cal Poly Email?
2. What is your current class level?
3. Have you completed a heavy civil internship?
4. Was there a set structure during the duration of your internship? (I.e., field for 6 weeks, office for 6 weeks, etc.)
5. What positions were you interested in during the duration of your internship?
6. Do you believe you had enough responsibilities as an intern?
7. Please rate (scale of 1 to 5 where 1 is no learning and 5 is more than adequate) of the following areas based on your internship and how well you believed it promoted your learning:
   a. Document Control
   b. Field Management
   c. Project Scheduling
   d. Plan Reading
   e. Subcontractor Coordination
   f. Preconstruction
   g. Punchlist/Closure
8. What do you think is the “ideal structure” for a summer internship?
9. What is something you would have hoped was implemented during your internship to promote your learning?
10. Will you be working in the heavy civil sector again?
11. Please leave any additional comments or reviews about your internship that could serve as advice for future students regarding heavy civil internships.

Research Results

The following information exhibits the results of the survey that was sent out to all Construction Management and Heavy Civil Minor students.

The first question asked for each respondent’s Cal Poly e-mail. The purpose was to ensure that respondents were in either the Construction Management and/or Heavy Civil Minor program. Each respondents’ emails will not be disclosed.

The second question asks for the respondent’s current class level. This information was used to gauge what group of students responded to the survey as well as having completed a heavy civil internship. As shown in Figure 1, a majority of respondents were fourth years and third years with 46% being
fourth years and 38% being third years. 14% of respondents were second years. There were no responses from first years and only one response from a student that was in their fifth year or beyond.

The third question asks if the respondent has completed a heavy civil internship. This was used as confirmation of whether or not their responses would be applicable to this research paper. If the respondent answered with, “No”, their response was filtered out and not included in the analysis. All 50 respondents completed a heavy civil internship, and the results are analyzed off those responses. No graph will be included as 100% of responses have completed a heavy civil internship.

The fourth question asks if there was a set structure during the duration of the respondent’s internship. A set structure for example could have been anything like six weeks in the field and then six weeks in the office. An internship with no structure could have an intern in one position with random field visits. The purpose behind this question was to analyze the connection between students returning to work for the same field of work or not based on their internship experience. Students may have wanted to work as a different position but were stuck in just the office or the field. In Figure 2, 80% of respondents said their summer internship did not have a structure that allowed them to rotate positions. Only 20% of respondents had some sort of structure that allowed them to explore the various positions that were offered by their employer.
The fifth question asks about what positions the respondent was interested in during the duration of their internship. Respondents were allowed to choose as many options as possible as well as listing any others that were not included in the given choices. The purpose of this question was to gauge student interest during their internship. 42 to 43 responses were interested in being a field engineer as well as a project engineer. There were 18 students interested in estimating as well as 16 that were interesting in BIM/VDC. Additionally, 7 students were also interested in safety, and there was an additional response from a respondent of being part of the fleet department.

![Figure 3. Positions that respondents were interested in](image)

The sixth question asks a subjective question of whether the respondent believed they had enough responsibilities. This allows for a better understanding of the respondents’ opinions towards their experience. Of the 50 respondents, 26 felt that they had a fair amount and 12 felt that they had more than adequate amount of responsibility. There are 7 respondents that felt that there was not enough responsibility and 1 feeling that they definitely did not have enough responsibility.

![Figure 4. Respondents’ rating of their amount of responsibility](image)

The seventh question asks respondents to rate each area and how well they believe it promoted their learning during the duration of their internship. This is a rating questions of 1 to 5 where 1 indicates that no learning occurred and 5 being that students felt quite comfortable with the topic. An average for each area was calculated. Document control and plan reading scored the highest with respective values of 4.24 and 4.18. Field management, subcontractor coordination, and safety scored closest to neutral with respective values of 3.84, 3.34, and 3.32. The areas with the lowest average were project scheduling, preconstruction, and punch list/closeout with respective scores of 2.66, 2.38, and 2.18.
Figure 5. Respondents rating each element based on amount of learning during internship

<table>
<thead>
<tr>
<th>Value</th>
<th>Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.24</td>
<td>Document Control (RFI’s, Submittals, etc.)</td>
</tr>
<tr>
<td>3.84</td>
<td>Field Management</td>
</tr>
<tr>
<td>3.32</td>
<td>Safety</td>
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<tr>
<td>2.66</td>
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<td>Punchlist/Closeout</td>
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The eighth question asks respondents to answer with what they believe is the “ideal structure” for a summer internship. Given that summer internships are short in duration but are meant to pack in lots of learning experiences, analyzing the results of this question can aid companies in setting up their internship to accommodate student learning and interest. Additionally, with this short duration, students typically want to optimize what they are learning which can be dependent on the structure of their internship. 62% of respondents believe that summer internships should include the option to partake in various positions to optimize the learning experience. 30% of students believe that there should be a structure that focuses only on one role. 8% of students put other which included a structure that mirrors a full-time employee as much as possible rather than as an intern to allow for more independency.
The ninth question asks what other elements could have been implemented during the duration of the internship to promote learning. Respondents are allowed to choose as many options as desired as well as adding other options that were not listed. This question once again gauges student interest that could be possible ideas for companies to implement more into their summer internships. In Figure 7, 27 students believe that touring other projects and 23 students believe that more implementation of BIM or construction technology would have promoted more learning during their short internship. Additionally, 22 students responded with more independent work and 17 responded with more participation in meetings. Few responded with learning more about company culture, more field work, or that there was nothing else that they felt could have been further implemented.
The tenth question asks whether or not the respondent will be working in the heavy civil sector again. This question is included to gauge how many respondents will be returning back into the sector of work. The majority of the pool of respondents are going to work for the heavy civil sector again with 40% working for another internship and 20% working full-time after graduating. 40% will not be returning to work in the heavy civil industry.

![Pie chart showing percentage of students returning to heavy civil sector](image)

- Yes - for another internship
- Yes - full-time after graduating
- No

Figure 8. Sample percentage of students returning to heavy civil sector

The final question was optional and allowed respondents to leave additional comments or reviews about their internship that could serve as advice for future students interested in heavy civil internships. Being that this question was optional, there were only a few comments left out of the 50 respondents. Some feedback left from this final question included:

- More reach out from heavy civil companies
- Ask about what positions are offered by that company to understand the responsibilities of them to determine whether or not they match your interest
- Seek out new challenges and tasks rather than waiting to be given work
- Take CM 314 – Heavy Civil Construction Management prior to your heavy civil internship

**Analysis**

After receiving all 50 responses from Construction Management and Heavy Civil minor students, the results were compiled into the figures shown above and further analyzed.

Comparing Figure 2 to Figure 6, there are clear discrepancies between what students experienced during the duration of their heavy civil summer internship in comparison to the structure that they believe would have been ideal for a summer internship. With an overwhelming majority (80%) not having a set structure during their internship (Figure 2) but 62% believing that the ideal structure would be one that allows for various positions during an internship (Figure 6), it may be more beneficial for companies to start implementing a structure that can relate to that. Along with that, many students mentioned that a structure that is flexible based on their interest would promote their learning more as some are interested in very certain positions but not the others.

To further explore the topics of allowing students to take on different positions, Figure 3 shows the different positions that students were interested in. Students were allowed to choose as many positions as desired as well as adding other options. Figure 3 includes a total of 127 answers from the 50
respondents indicating that a majority of the respondents were interested in having an internship that allowed for flexibility. By allowing students to learn about the different positions, this promotes learning as students can be more engaged. It could lead to a more effective internship if students were able to understand the roles and responsibilities of each position within that company.

Moving onto which elements promoted student learning during the internship, an average was taken for each category rated in which document control (4.24 – fair amount of learning to more than adequate) and plan reading (4.18 – fair amount of learning to more than adequate) ranked the highest amongst the eight different categories (Figure 5 and Table 1). Many student responses left a comment about being in the office for a majority of the time with occasional site visits. Although document control and plan reading are beneficial, many students would also benefit from being in the field to form the connection between what is on the screen versus what is being built. This ties back into allowing students to try new positions.

The lowest ranked categories included project scheduling, preconstruction, and punch list/closeout. These categories are extremely important in the construction industry, yet students are not getting enough exposure. Because student internships can start during a certain phase of a project, exposure to preconstruction as well as punch list/closeout may be difficult to always incorporate.

Other factors that students believe could have promoting their learning varied from company culture, touring projects, independent work, etc. From Figure 7, a majority believed that touring other projects and implementation of BIM or construction technology would have done so. This is because the short duration of a summer internship can leave a student cause tunnel vision for some. Students may want to explore the variety of projects a company may offer. Many also believed that having more independent work, participation in meetings, and field work would have promoted their learning. More independent work, participation in meetings, and field work all tie back into some not having enough responsibilities as well as those who preferred a structure that allows them to act more as a full-time employee. Independent work and active participation in meetings also challenge the students to ensure that they understand their task in order to present it.

A majority of students are returning to the heavy civil sector for an internship or full-time after graduation. To further increase that percentage, many factors can be incorporated based off student feedback. Incorporating any new elements during an internship can also be difficult for companies; therefore, figuring a structure that can best encompass that can promote more learning for students.

**Conclusion**

This information received from both Construction Management and Heavy Civil minor students will benefit heavy civil industry partners in offering a structured program that can promote as much learning for student interns. Once again, completely revamping a company’s internship program may be difficult to do. Therefore, companies should try their best to incorporate as many elements as possible that students found to promote their learning the most which would lead to an effective experience. There are several takeaways from the results of the survey. Research has found that students are interested in a variety of positions. Most also believe that a set structure that allows them to understand different positions would be favorable. Students would like to learn more about the company whether it is the culture or through the different projects as well as taking on more responsibilities such as independent work or actively participating in meetings. Overall, more heavy civil companies can incorporate a structure that includes various positions, so that students can learn about the different aspects of construction from different point of views. This overall can benefit the company as well as they have taught a student about what a full-time job with them may entail.
References

