

Analysis of the Construction Management Co-op Program at California Polytechnic State University

Daniel S. Leavens
California Polytechnic State University
San Luis Obispo, CA

Work integrated learning (WIL) programs such as internships or co-operative education programs are a common way of providing practical experience to students while they are completing their degree. This paper will examine the benefits of WIL programs for the students, companies, and universities that actively participate in them. In addition, this analysis researches the findings of other studies on student's success as a result of WIL programs, how companies are improved with higher quality employees, and the networking connections that universities receive due to students creating great relationships with companies. In an attempt to improve the Construction Management co-op program at California Polytechnic State University, A survey was created to analyze student's experiences with regular 10-12 week internships, determine why students are not participating in the co-op program, and finally make a recommendation to the department on how to increase the participation in the program. As a result of the survey, 84.1% of the 59 students had not completed the Co-op program, 64.1% of the students felt their time was cut short in a regular 10-12 week internship, and 51.2% of the students did not consider the co-op program because it will extend their graduation date.

Key Words: Work integrated learning (WIL), co-operative education, practical training, construction education.

Introduction

Construction has always been one of the largest industries in the United States. According the United States Bureau of Labor Statistics, the construction industry employees over 6.8 million people (US Bureau of Labor Statistics, 2017). In addition to an already large industry, the US Bureau of Labor Statistics is expecting the industry to grow another 4.5 percent in the next five years (Henderson, 2013). With the expected growth in the construction industry, the demand for quality employees is increasing. In an industry where a large percentage of the workforce is built from people without degrees who have learned through the trades, there is an obvious learning curve for students who have little to no practical experience. Work Integrated Learning (WIL) programs strive to flatten that learning curve by allowing students to work in the industry and take classes at the same time. WIL programs are "A natural method of arriving at a suitable type of work, an opportunity to gain a maximum of educational content from his industrial environment, an understanding of human factor in industry, acquisition of certain disciplinary values as a result of his shop experience, and acquisition of certain economic values" (Haddara and Skanes, 2007).

California Polytechnic State Universities "Learn by Doing" mentality is a large part of the Construction Management department's goals in the curriculum. Students are given real world learning opportunities paired with their education to help with the transition into the working world. With that mentality in mind, internships have become an important part of Construction Management Department at Cal Poly. Students are expected to take full advantage of the connections the department has with top construction companies throughout the United States. With the help of internships and co-ops, students can apply their knowledge from Cal Poly to the real world and vice versa. This analysis, with the hope of improving the curriculum, was done to analyze student's experiences with regular 10-12 week internships and determine why students are not taking full advantage of the co-op program offered. After analyzing the results of a survey sent out to all CM students, a proposal was made to help improve the co-op program and increase participation.

Benefits to Students

According to Mahmoud Haddara and Heather Skanes, "reports suggest that students face many difficulties transitioning from higher education to full time employment. This may be the result of fewer jobs and fewer marketable skills for new graduates" (Haddara and Skanes, 2007). WIL Programs help counteract the difficulties of

finding jobs for students because it prepares them more for the workplace. Common WIL's are summer internships, Co-op programs, or part time employment in the industry while taking classes. "During a co-op program, the student often has a chance to leverage relationships with corporate contacts, fellow co-op students working in the same company and other potentially useful contacts encountered in the course of the work experience. This helps to promote knowledge of job opportunities inside or outside the participating company. In addition to greater information access, the co-op student (compared with the non-co-op student) may have greater access to professional guidance, job referrals, job recommendations and, potentially, job offers" (Tobias, 1996). According to a case study published on ASC regarding WIL programs, "The course grades students earn are higher for Co-op students than regular stream students. Over the last four years, the percentage of Co-op students that earned grades of A or A- was 37% compared to only 31% for regular stream students. The rationale for this variance could be attributed to the additional experiential learning students receive in the workplace" (Mah, Arian, and Sharma, 2014). See the diagram below for the results of the study.

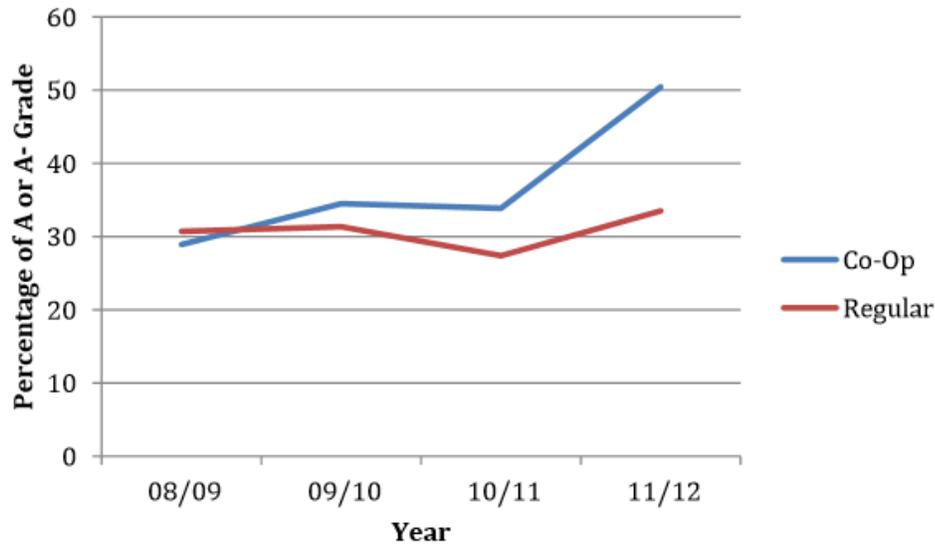


Figure 1: Increased Grades Due to Co-op Program (Mah, Arian, and Sharma, 2014)

In addition to the knowledge gained from WIL programs, research finds that co-operative education resulted in a stronger labor market and a better chance of employment for students (Downey, Kalbfleisch, and Truman, 2002). "Noted benefits to the co-op students include reduced student debt-load, higher rates of employment, and higher rates of permanent employment" (Siddiqi and Ozcan, 2004). According to a study by Khalid Siddiqi and Said Ozcan, "Most of the students who gained industry experience through a co-op or internship found that construction companies tend to pay higher salaries to BS (Construction) graduates with some practical or internship experience than those without it. Consequently, a majority of the construction students prefer to work and study together, if they can, to improve their prospects for a higher compensation in a full time position" (Siddiqi and Ozcan, 2004). In their study, they found 50% of the 148 students they surveyed received higher salaries because of their internship or co-op experiences (Siddiqi and Ozcan, 2004).

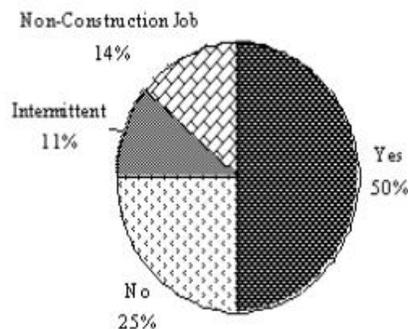


Figure 2: Higher Salaries Due to Co-op Program (Siddiqi and Ozcan, 2004)

Benefits to Participating Companies

In addition to the students, participating companies of a co-op program benefit as well. “The participating company gains the advantage of being able to select at relatively low cost and risk the most promising candidates for potential full-time recruitment” (Tobias, 1996). A co-op program can be an efficient, cost-saving method for establishing future work relationships with candidates whose academic work and professional interests already qualify them for the job. Companies can see firsthand the students’ performance and if they have demonstrated compatibility with the corporate culture. Employment of a co-op student is seen as a way to acquire a tested resource already accustomed to the business, employees, and simply how the company operates. As a result, the co-op student has a greater chance of success and helps the company to reduce the costs of recruitment. (Tobias, 1996).

Khalid and Said in a similar case study found that employers also benefit from students participating in a co-op or internship program. Their survey of 16 companies found that “A majority (88%) of the construction companies prefer to hire graduates who have had some practical experience through internships or co-op programs. Most of the construction companies (75%) approach institutions for internships through the university career centers or construction programs. However, 25% of the companies do not have a formal contact with the institutions offering the Construction Management programs. Seventy five percent (75%) of the companies agree that a graduate in Construction Management discipline who has completed an internship is better or significantly better than the one who has not been involved in such a program. A majority of the construction companies indicated that the amount of time required to train a fresh graduate, who has not undergone an internship, is significantly higher than the one who has internship experience. Half of the construction companies recommended graduates to complete an internship prior to degree completion. Additionally, about half of the companies suggested doing an internship either in junior or senior year of study” (Siddiqi and Ozcan, 2004).

WIL programs such as internships over the summer are a great way for students to take their academic learning into the industry. That being said, a more integrated approach, like a co-op, is shown to be more effective. Students that take classes at the same time they are working can apply their learning from school to the industry and vice versa. The key difference is that both types of learning are happening at the same time, rather than finishing school and starting an internship. For most schools “Co-op programs are typically Semester-long paid work placements that are an integral part of an academic degree program based on alternating academic and work terms. As per Canadian Association for Co-Operative Education, a co-op education program formally integrates a student's academic studies with work experience to engaged in productive work, rather than merely observing, for which remuneration is paid to the student” (Mah, Arian, and Sharma, 2014). On the same topic, Groenewald also states that co-operative education has “four core dimensions: developing an integrated curriculum; designing work components to support experiential learning; cultivating supportive employers; and creating a structure to administer, monitor, and evaluate the learning experience” (Groenewald, 2004). Don Mah, Faisal Arian, and Vishal Sharma also state that “Internships are less structured form of co-op program. Internship program involves the placement in the work environment but does not rotate academic and work periods as co-op program does” (Mah, Arian, and Sharma, 2014). The structure that these two sources are describing is the reason why co-ops are proven to be more successful for all parties involved, more so than less structured internships.

Benefits to Participating Universities

In a case study done by Jennifer Villeneuve and Norton Grub, the benefits of co-op programs are also positive to the universities that promote and offer them. In their study, they found that “for the colleges involved, the principal benefit of a co-op education is that it strengthens their institutional links to employers” (Villeneuve and Grub, 1996). In their study, they researched schools in Cincinnati and found that “employers are quite familiar with the variety of education providers, and generally supportive of education in contrast to other communities where their attitudes range from indifference to hostility. Colleges also benefit from having what they consider to be higher-quality education, guided by the participation of employers and complemented by work-based placements, and they also enjoy higher placement rates for their graduates than would be true in the absence of co-op education” (Villeneuve and Grub, 1996). In other words, the stronger the relationship colleges have with the industry, the more likely a student is to get a job due to that extra exposure. This strong relationship also attracts students to attend a University with a strong co-op program. According the Villeneuve and Grub, Colleges “are able to recruit students who

understand that they'll get a job at the end of their college experience versus how many college students are out there" (Villeneuve and Grub, 1996). This idea is especially true when the economy is not in favor of the construction industry, and jobs are hard to come by.

Methodology

The objectives of this analysis are as follows:

- Research the benefits of Work Integrated Learning.
- Research how many students know about or have participated in the Co-op Learning Program offered to all Construction Management students.
- Discover why so many students are not taking advantage of the Co-op Learning Program.
- Discover if students feel regular 10-12 week internships are too short in length and not allowing students to truly get a grasp of the industry.
- Provide a recommendation to the Construction Management Department on how the program could be more successful based off of my results.

The methodology chosen for this analysis is a quantitative survey that was sent to all of the Construction Management Students at California Polytechnic State University. Survey Monkey was used as a platform to quickly and efficiently send out a mass survey to the students as well as view the results in a generated bar diagram.

Questions asked of all CM students:

1. What year are you in school?
2. Have you completed a regular (10-12 week) internship in the construction field?
3. Did you feel your time as an intern was cut short? If so, Why?
4. Have you heard of the CM Co-op Program?
5. Have you participated in the CM Co-op program or completed an internship longer than 10-12 weeks.
6. If you haven't, why not?

Results and Discussion

After sending out the Survey to the entire CM department, I received 59 responses that all showed a pattern to why students are not participating in Co-op program and if they are satisfied with their experience at a regular 10-12 week internship.

Of the 59 people surveyed, 42 had successfully completed a regular 10-12 week internship. Six of the students that had not completed it were freshmen, so they will not be included in this study because they probably haven't had the opportunity to complete a regular internship. Of those 42 students that have completed a regular internship, 47.6% of them felt that once they got the hang of everything, it was already time to leave. This was by far the most common answer selected. The third most popular answer was selected by 8 students, and that was that they weren't there long enough to get any real responsibilities. I chose to group these two answer selections together because they both point out a common issue with 10-12 week internships –they are simply too short. The results are shown in Figure 3 below.

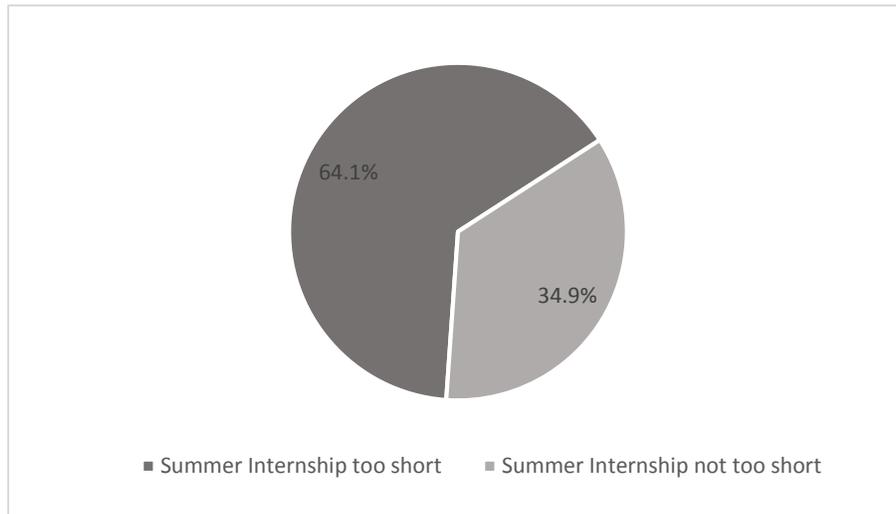


Figure 3: Do you feel your time as an intern was cut short?

As you can see in Figure 3 above, nearly 2/3 of the students felt that their time was cut short in a regular internship. This leads to my next question of why students are not pursuing a longer internship or Co-op experience, given that it may solve this issue.

In order to understand why students are not pursuing a longer internship or Co-op program, I asked students if they have even heard of the program. Of the 59 students who answered the question, only five had not heard of the program. Clearly, a lack promoting the program is not the problem. That being said, only eleven of the 59 students had actually completed the Co-op Program or an internship longer than 10-12 weeks. Results of this question are shown in Figure 4 below.

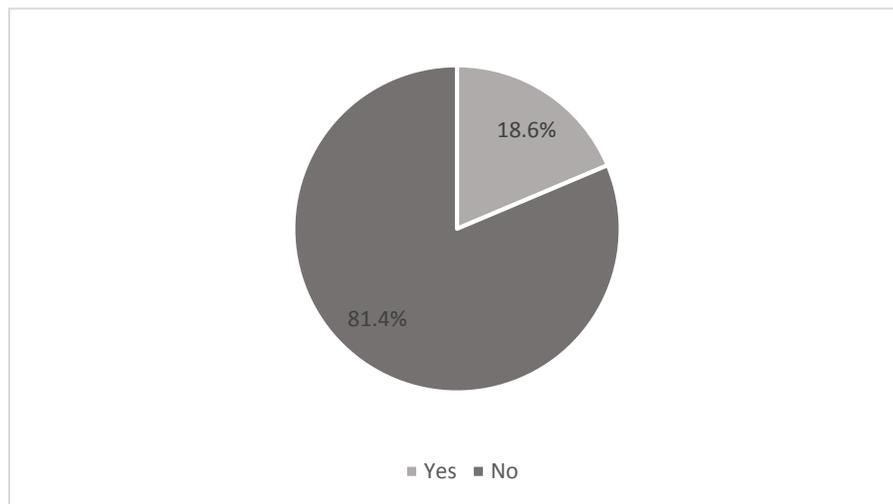


Figure 4: Have you Participated in the CM Co-op Program or an Internship Longer than 10-12 Weeks?

After analyzing who had participated in the Co-op program, I wanted to understand why such a large percentage of students had not. For the last survey question, students were asked why they haven't participated in the program. Of the 49 students that answered this question, 25 of them said that they fear it would extend their graduation date, 11 have participated in the program, 6 didn't know it was an option, and 7 stated that it simply doesn't interest them. Results from this question can be seen in Figure 5 below.

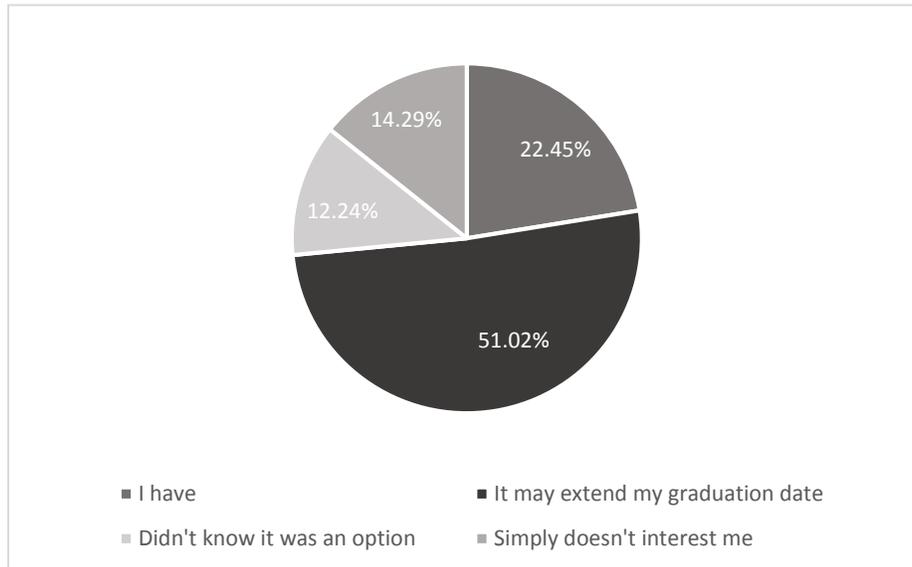


Figure 5: Why Haven't you Participated in the CM Co-op Program?

Conclusion

The results from this case study clearly point out that students feel a 10-12 week internship is too short, but that it is too hard to take time off from school to complete a six month long co-op or extended internship. Work integrated learning is a crucial part of construction management student's education, and students need to have access to any opportunities that could help them succeed without extending their graduation. In this case, the co-op program is clearly a great opportunity to eliminate the problem with 10-12 week internships, but a plan needs to be put in place to ensure that students will graduate on time if they participate in the program. After analyzing the current CM curriculum and flowchart, the critical path of a student's course load is clearly the four to six unit lab courses. Labs cannot be taken together, and since there is a total of seven lab classes, students must plan around them and allow a quarter per lab. Assuming students take CM 115 in the spring of their freshman year, this leaves six labs to be taken over the remaining nine quarters. That leaves three potential quarters where a student could take off either a fall or spring quarter and work through the summer. In Figure 6 below, one example is shown of how students could change their schedule to fit in a co-op and still graduate on time.

Potential Co-op
quarter.

FRESHMAN			SOPHOMORE			JUNIOR			SENIOR		
Fall	Winter	Spring	Fall	Winter	Spring	Fall	Winter	Spring	Fall	Winter	Spring
Introduction to Construction Management CM 102 (2)	Construction Materials and Assemblies CM 112 (2)	Fundamentals of Construction Management CM 116 (6)	Residential Construction Management CM 214 (5)	Construction Law CM 334 (2)	Sustainability and the Built Environment CM 317 (4)	Job-site Construction Management CM 413 (5)	Commercial Construction Management CM 333 (5)	Heavy Civil Construction Management CM 314 (5)	Specialty Construction Management CM 411 (5)	Technical Electives (2) ²	Integrated Project Delivery CM 415 (4)
Principles of Environmental Design EDS 123 (4)	Construction Materials and Assemblies Lab CM 114 (2)	Surveying ENAE 230 (4)	Evaluation of Cost Alternatives CM 232 (3)	Microeconomics ECON 221 (4)	Technical Electives (6) ²	Construction Accounting CM 335 (2)	Management Accounting CM 400 (2)	Senior Project Methodology CM 460 (2)	Preconstruction Integration and Planning CM 480 (2)	Management of the Construction Firm CM 443 (3)	Senior Project 1 CM 461 (1)*
Calculus I MATH 141 (4)*	Calculus for Architecture and Construction Management MATH 182 (4)	Physics I PHYS 132, or CHEM 124, or CHEM 127 (4)	Building Information Modeling CM 280 (2)	Financial Accounting for Non-Business Majors BUS 212 (4)	GE (4) ¹	Introduction to Structural Systems ARCE 226 (3)	Physical Geology GEOL 201 (3)	Corporate Communication ENGL 310 (4)	GE (4) ¹	Economics ECON 302 (4)	Senior Project 2 CM 462 (1)*
General Physics I PHYS 141 (4)	General Physics I PHYS 141 (4)	Structures I ARCE 213 (3)*	Structures II ARCE 212 (3)*	Structures II ARCE 212 (3)*	GE (4) ¹	Statistics STAT 251 (4)	Introduction to Structural Design ARCE 315 (4)	GE (4) ¹	GE (4) ¹	Steel Mechanics ARCE 421 (3)	GE (4) ¹
Expository Writing ENGL 133 or 134 (4)**	Oral Communication COMS 181 or 182 (4)**	English Composition & Writing (ECW) COMS 126, COMS/ENGL 145, ENGL 146, or PHL 126 (4)**	Legal Responsibilities of Business BUS 287 (4)	GE (4) ¹	GE (4) ¹	Graduation Writing Requirement - GWR ³	Graduation Writing Requirement - GWR ³	Graduation Writing Requirement - GWR ³	Graduation Writing Requirement - GWR ³	Graduation Writing Requirement - GWR ³	Graduation Writing Requirement - GWR ³
14	15	16	17	17	16	14	15	15	15	17	18
											TOTAL: 189

Notes:
HIGH GENERAL EDUCATION COURSES CAN BE TAKEN IN ANY ORDER AS LONG AS PREREQUISITES ARE MET
 * Refer to current catalog for prerequisites.
 ** One course from each of the following GE areas must be completed: A1, A2, A3, B2, C1, C2, C3, C4, C1-C3 elective, D1, and D2.
 C4, D5 and F should be taken only after junior standing is reached (90 units).
 Refer to online catalog for GE course selection and Graduation Writing Requirement (GWR).
 Quarterly advisor meetings are required prior to registration.
 * MATH 142 Calculus II substitution for MATH 182.
 * May take ARCE 213 and ARCE 212, or ME 211 and CE 204.
 * Technical Electives: Select 7 units from CM Topic Courses: CM 400, 421, 422, 423, 424, 425, and 426.
 * Department requirements that CM 460 be taken prior.
 * Course completes GWR requirement with at least a C grade and by passing the in-class essay assignment.

Legend:

Major (70)	Yellow
Support (75)	Orange
General Ed. (44)	Green

GE Area

Figure 6: Classes Students Could Take with a Co-op to ensure They Will Graduate on Time.

In Figure 6 above, you'll see that spring quarter of a student's sophomore year is an option to take a quarter off and work through the summer to complete a 6 month long co-op. Students receive six units of tech elective credit during the six month long Co-op but will need to take more classes to remain on track. Given that CM 317 is already an online course, it can be taken from any location with internet. In addition to those two courses, students can also enroll in an online general education course. Cal Poly now allows you to take certain general education courses at other Cal State Universities that are online. In fact, students can enroll in them through the Cal Poly portal and still receive their financial aid since they will be enrolled in more than 12 units. Another option that some students have taken advantage of is taking a community college general education course online or in person at the location of their internship. Students can research what community college courses transfer to Cal Poly with the help of Assist.org which is a website designed for that purpose.

References

- Downey, J., Kalbfleisch, J.G., & Truman, R.D. (2002) Co-operative Education Greater Benefits Greater Costs. A submission prepared for the Minister of Training, Colleges, and Universities of Ontario. Waterloo, Ontario, Canada: Waterloo Centre for the Advancement of Co-operative Education, University of Waterloo. <
<http://uwaterloo.ca/centre-advancement-co-operative-education/sites/ca.centre-advancement-co-operativeeducation/files/uploads/files/CostBenefitCo-opStudyFinal.pdf>>
- Groenewald, T. (2004) Towards a Definition of Cooperative Education. In R. Coll & C. Eames (Eds.), *International handbook for co-operative education: An international perspective of the theory, research and practice of work-integrated-learning*. Boston: World Association for Co-operative Education.
- Haddara, M., & Skanes, H. (2007). A reflection on cooperative education: From experience to experiential learning. *Asia-Pacific Journal of Cooperative Education*, 8(1), 67-76.
- Henderson, R. (2013). Industry employment and output projections to 2022: Monthly Labor Review. Retrieved June 02, 2017, from <https://www.bls.gov/opub/mlr/2013/article/industry-employment-and-output-projections-to-2022.htm>
- Mah, D., Arain, F., & Sharma, V. (2014). Work Integrated Learning as an Effective Pedagogy for Enhancing Employability of Young Professionals in the Construction Industry. Retrieved March 19, 2017, from <http://ascpro0.ascweb.org/archives/2014/CEUE161002014.pdf>
- Siddiqi, K., & Ozcan, S. (2004). Construction Management Internship and Co-op Programs: Stakeholder Needs Assessment. Retrieved March 16, 2017, from <http://ascpro0.ascweb.org/archives/2004/Siddiqi04.htm>
- Tobias, A. J. (1996). Co-op programs a good deal all around. *Electronic Engineering Times*, (921), 142. Retrieved from <https://searchproquestcom.ezproxy.lib.calpoly.edu/docview/208119607?accountid=10362>
- US Bureau of Labor Statistics. (2017). About the Construction sector. Retrieved June 11, 2017, from <https://www.bls.gov/iag/tgs/iag23.htm>
- Villeneuve, J. C., & Grubb, W. N. (1996). *Indigenous School-to-Work Programs: Lessons from Cincinnati's Co-op Education*.