

## **Co-ops are Great! but What are the Numbers Telling Us?**

### **Paul John Ackerman (Dr. Paul Ackerman)**

Dr. Paul J. Ackerman, Jr., Ph.D., P.E., R.R.O. Paul Ackerman is an Associate Professor of Civil Engineering at York College of Pennsylvania. He received a BS in civil engineering from Virginia Military Institute, an MS in civil engineering from West Virginia University, and a PhD specializing in construction engineering and management from Virginia Tech in 2014. A registered professional engineer, Paul has over 18 years of engineering and project management experience with a large variety of local, state, and federal projects and facilities. Paul is a Registered Roofing Observer (RRO) through the International Institute of Building Envelope Consultants. Paul is also a member of ASCE and currently serves as a faculty advisor for York College's ASCE student chapter and engineering co-op program. In addition Paul has assisted with student engineering service projects in Uganda, Bolivia, & Guatemala.

### **Kelly Ann Arcieri (Co-op/Internship Advisor)**

Kelly Arcieri has served as the Co-op/Internship Advisor for the Civil Engineering and Computer Science programs at York College of Pennsylvania since 2017. She teaches a career training class to prepare civil engineering and computer science sophomores for their first co-op or internship. Kelly has helped 167 students to find nearly 200 co-ops or internships. With over 30 years of experience in education, Kelly previously worked in Advancement at York Country Day School, Franklin & Marshall College, and Allegheny College, where she developed working relationships with many industry partners. She has continued to build connections with hundreds of industry partners to benefit York College students. Kelly has a BA in English from Allegheny College, and recently earned a Master of Arts in Strategic Leadership & Management from York College of Pennsylvania.

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### **Abstract**

This work in progress paper will discuss the benchmark results of an engineering cooperative (co-op) program for a fairly new college civil engineering program. Students at York College of Pennsylvania are required to pursue three co-op opportunities over the course of a four-year academic schedule. Many faculty and industry personnel are familiar with the benefits that engineering co-ops provide to both students and employers. One of the most significant benefits for the students is the opportunity to gain hands-on engineering work experience. On the other hand, one of the most significant benefits for employers is utilizing co-op as a recruitment tool to hire entry level engineers. However, if that is the case then engineering programs and employers could easily quantify the benefit from the co-op program by tracking the co-op and full time employment opportunities students accept. Do co-ops increase a student's probability of receiving a full time employment offer from their co-op employer? Do co-op employers have a higher probability of recruiting students for full time employment? The answers seem obvious, based on the premise that more opportunities increase probability but can it be quantified? The benchmarking results in this paper will quantify the benefit of a co-op experience by simply compare the percentage of students who were hired by companies they previously participated in a co-op with those students who pursued employment with a company that they had no co-op experience with.

### **Background**

Cooperative work experience, also commonly referred to as co-op, is not a novel program for academic and industry partners. Co-ops have been integral parts of engineering programs for the past 100 years. The first formally documented cooperative program started at the University of Cincinnati in 1906 [1]. As the word implies, co-ops are a partnership between academia and industry. Academia relies on industry for graduate employment and feedback for accreditation and industry requires students for future employees [2]. Today, a co-op is not just considered summer employment. Many programs allow students to participate in a co-op during a spring and/or fall semester in addition to summer break. At the authors' institution, the engineering co-op experience has developed into a program where a student is immersed full-time with an industry partner for three to five months at a time per co-op opportunity with students participating in two or three opportunities prior to graduation [3].

### **Student Benefits**

The benefits of co-op participation have been well researched and discussed in the past, not just in scholarly academia publications but also in popular industry publications. Co-op education provides students with work experience between academic semesters at schools and follows a

variety of participation schedules. While it may be argued that students gain knowledge in the fundamentals of engineering by completing the program objectives of their various academic programs they also gain additional engineering knowledge while learning to apply these fundamentals in an actual work setting. In addition, the co-op experience is just that and allows students to not only gain skill in applying such knowledge but they also gain knowledge in the application of “soft”, or non-cognitive, skills in communication, professionalism, and ethics. One could classify all these benefits as experiential learning opportunities. This real world engineering work opportunity allows students to integrate their newly acquired work experience knowledge and skill with academic classes [1] [3].

Research has shown that the most significant perceived benefit to students participating in a co-op is gaining work experience. Other perceived benefits include developing a competitive edge in the job market, networking, and career exploration. Not surprisingly, due to the constraints of student budgets and tuition costs, earning money during the co-op was also a significant perceived benefit. Studies also found the primary student reason for participating in a co-op was to improve future employment opportunities. In addition to these perceived benefits, students who did participate in co-op opportunities earned a higher grade point average and had a higher graduation rate when compared to students who did not participate in a co-op experience [1] [4].

### **Industry Benefits**

Recruitment appears to be the overall reason that industry partners participate in co-op programs. A significant part of this recruitment process includes evaluating the students in both terms of the quality of a potential new full-time employee but also to understand if the student is interested or gaining interest in the type of engineering discipline(s) that a particular company performs in the industry [4]. Since recruitment is a significant expense, employers are very concerned with yields from the expense and effort devoted to recruitment. Studies from 1984 and 2015, both show that employers were satisfied with recruitment goals resulting from co-op programs [5] [1].

Other significant factors that employers want to reduce are employee training costs and turnover rates. Employer surveys revealed that co-op hires had less training costs than non co-op employees. Employers also rated employee retention as higher with co-op hires when compared to non-cop hires [5].

## York College of Pennsylvania Cooperative Program

The York College of Pennsylvania (YCP) program requires all engineering students to participate in three cooperative work experiences within the engineering industry. These three co-ops will provide each student with nearly a year of work experience before graduation. The co-ops occur during the course of a four-year academic course schedule. However, unlike the majority of universities and colleges across the nation who typically have eight semesters over a typical fall/spring annual semester sequence, the students at YCP complete two semesters annually on a rotating summer, spring, fall co-op schedule. As a result of this sequence, the students who stay on track with the academic and co-op course schedule will graduate in August compared to the typical May graduation at the majority of higher educational institutions. The typical academic/co-op schedule that students follow is shown in the following table [6].

**Table 1: 4-year Academic and Co-Op Schedule**

<b>Year</b>	<b>Fall</b>	<b>Spring</b>	<b>Summer</b>
1st Year	Full Academic Term	Full Academic Term	Break
2nd Year	Full Academic Term	Full Academic Term	CO-OP I
3rd Year	Full Academic Term	CO-OP II	Full Academic Term
4th Year	CO-OP III	Full Academic Term	Full Academic Term

### Co-op Requirements

Prior to registering for a co-op, students are required to complete a one-credit-hour course on engineer career training during the spring semester of their sophomore year. The learning objectives of the course cover topics on communication, professionalism, and ethics. Students also create resumes and cover letters, participate in mock interviews, and network with industry leaders from the various disciplines in civil engineering. While on co-op, students are assigned a faculty advisor who visits the student and the student's co-op supervisor sometime during the middle of the co-op duration. The faculty advisor meets with the student and supervisor to discuss the student's progress and performance during the co-op. After the completion of the co-op, an online evaluation survey is emailed to the co-op supervisor to document the student's performance and provide comments about the civil engineering co-op program. Returning students also create a poster showcasing their co-op experience. The posters serve as a reflection on the co-op experience as well as advertisements to future students looking for co-op opportunities [6].

### Civil Engineering Co-op Program

The civil engineering program at York College is fairly new. The inaugural civil engineering student cohort were members of the class of 2020 and participated in their first co-op opportunities in the summer of 2018, after the completion of the sophomore year. In 2020, the inaugural civil engineering class had 14 graduates. The Class of 2021 followed with 17 graduates. The Class of 2022 will graduate 25 students, with department totals near 100 students as of spring 2022.

### Employment Results

Completed co-op opportunities for each student are tracked and documented. Just prior to graduation, students also participate in a survey which documents where they will be working full-time after graduation. These results were recently reviewed to determine what percentage of the graduates are employed with companies at which they completed at least one co-op. . Although more research is needed, preliminary results from the York College civil engineering program show that students are more likely to accept full-time employment with one of their co-op companies. The results, shown in Figure 1, show that roughly 65% of graduates from the Classes of 2020 and 2021 are now employed full-time with one of their co-op employers versus 35% of graduates employed at a company where they did not co-op.

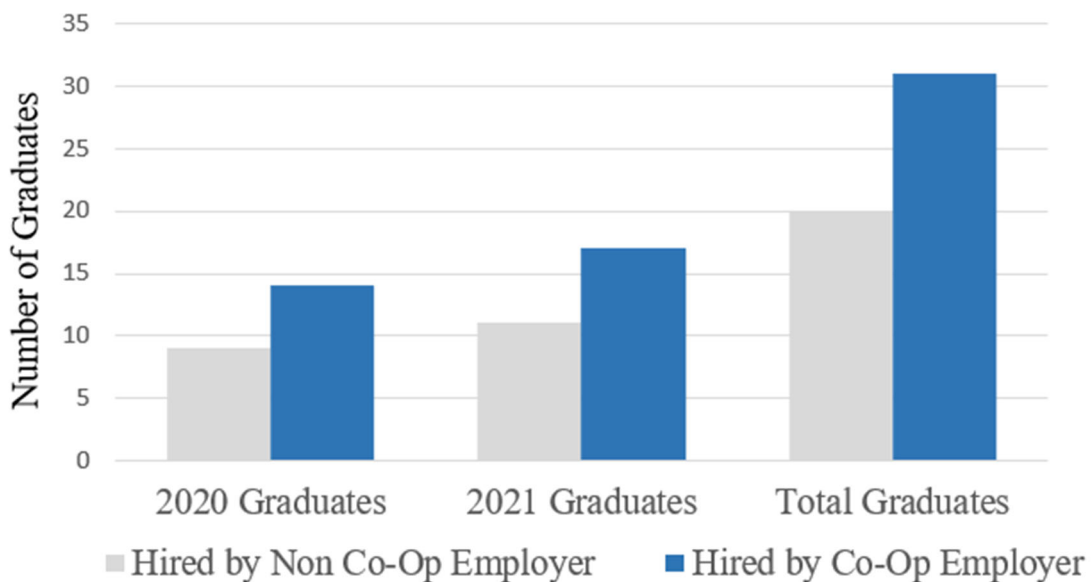


Figure 1: Students hired full time by co-op employer

While roughly 65% of graduates accepted an offer from a company that they completed a co-op with, the data shown in Table 2 suggests that students who completed more co-ops with the same company were more likely to be offered and accept a position with that company. Although this is an obvious trend it does show that students who are interested in a company they completed a co-op with are likely to pursue additional co-op and full-time employment opportunities with that company.

**Table 2: Number of co-ops with same company and hire rate**

<b>Number of co-ops</b>	<b>Number of Students</b>	<b>Graduates Hired</b>	<b>Hire Rate (%)</b>
1+ co-op with company	31	20	65
2+ co-ops with company	19	14	74
3+ co-ops with company	4	4	100

### **Need for Further Research**

Although the data is limited to the small sampling size of two graduating classes of a new engineering program, preliminary results show that students were more likely to work full time with a co-op employer. This result tends to follow trends documented by the National Association of Colleges and Employers (NACE) Internship & Co-op Survey Report, which shows that employers have had success in converting internship and co-op students into full time employees. However, the NACE data also analyzes a conversion rate, which is a product of the percentage of employer offers and student acceptance rates. For example, if a company makes full-time employment offers to 80% of the co-op students and 80% of those students accept the offer, then the conversion rate would be 64%. Such a statistic would be useful in marketing the benefits of developing a partnership with York College and future employers [7].

To understand and market the benefits of a co-op program, similar co-op data will need to be collected from future student cohort classes. In addition, the Senior Survey needs to be expanded to include documenting how many offers students received from employers that they participated in a co-op with in addition to what offer they accepted.

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