



Guiding Student Engineers in the Co-op Obtainment Process: Exploring Methods of Motivation

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Abstract

This work-in-progress paper aims to explore how various methods of motivation might be combined with the art of job search in a student-learning coach relationship to increase the student engineer's confidence and ability to attain a co-op. The job search process requires confidence, persistence, and practice. Various motivational methods will be explored through application in the Bell Program, a new program offering students the ability to earn a Bachelor of Science in Engineering degree while working full-time as engineering co-ops.

This race/gender-inclusive co-op-based model, geared toward community college students, takes place over five semesters: one campus-based semester and four co-op-based semesters. Because the Bell program requires at least sixteen months of engineering co-op experience, it is critical that the students attain a co-op as soon as they are able. Rather than pre-arranging co-op positions, this program aims to develop the student's abilities by utilizing learning coaches, who work along-side the student in the process of attaining their co-op. Ensuring that each student obtains a co-op presents a challenge, yet it also opens the opportunity to create novel solutions.

The first group of student engineers began this program in 2019. This WIP seeks to answer the question, "How can we maximize the student engineer's confidence, persistence, and ability to attain a co-op?" It will document the various methods utilized to motivate the first cohort as they work to attain their first co-op. It will also attempt to categorize these methods. Future work may include researching the effectiveness of each method and whether students respond differently to various methods.

Introduction

This research seeks to identify the most effective methods of assisting a student in building confidence, being persistent, and attaining a co-op [1]. However, the job search process requires confidence, persistence, and practice, much like any sport or skill [2,3]. As practitioners, we want to support our students in obtaining co-ops and job experiences. It takes effort to find a co-op position. If the student is placing effort in the wrong areas, the results may not be as fruitful as if the student were to place effort in the right areas. What are the right areas? Our goal in this paper is to identify areas to support students in the co-op job search. This paper seeks to use the students' perspective to categorize the effect of various actions on their confidence and persistence while performing job search functions. The research question being asked is "How can we maximize the student engineer's confidence, persistence, and ability to attain a co-op?"

Background

The data in this paper is being derived from the students' perspective in a new program called the Bell program. The Bell program, a Bachelor of Science in Engineering program, was established in 2019 with an aim to increase student success, decrease student debt, and allow students to gain up to two years of on-the-job experience prior to graduation. In the process of program development, the Bell program has been identified, in a study by MIT, as an "emerging global leader in engineering education" [4].

This engineering education model featuring project-based learning is based off an existing program, Iron Range Engineering, which has been around for over ten years. Iron Range Engineering continues to successfully serve the student engineers looking to earn their 4-year engineering degree in a specific rural region. Throughout the years of delivering this model, many industries have continued to partner with Iron Range Engineering in delivering an innovative learning experience. Working engineers at many different companies offer engineering projects for the student engineers in the program to work on throughout their final four semesters. These 14 to 16-week projects allow student engineers to gain the industry experience they need before graduating to make a successful transition into the workplace. The student engineers work on teams and complete one industry design project during each of the four semesters in the program allowing them to gain experience of four projects before graduation. Many of the student engineers also work on internship or co-op throughout their final four semesters as it is highly encouraged.

The structure of the new Bell program stems from this same idea of gaining industry experience as a working engineer while earning full-time credits as a student in the process of earning their 4-year engineering degree. The curriculum is the same, yet the delivery modality is a bit different. The aim is to make this program accessible to students all over the country. Instead of four semesters in length like Iron Range Engineering, the Bell program is spread across five semesters. The first semester, "Bell Academy," takes place on a community college campus while the final four semesters can be completed anywhere in the world. The program is built for student engineers to work on internships and co-ops in their final 24 months while completing their remaining interactive courses remotely. This educational model of learning is very similar to the apprenticeship model used by the many trades industries.

One of the main goals in the Bell Academy is to prepare student engineers for working in industry. Industry partners provide engineering project opportunities for the student engineers as they learn what it is like to work in teams and solve open-ended problems by working through their own design process. Another main goal in the Bell Academy is for student engineers to obtain an internship or co-op, and this is done in parallel to the project work. The success of this learning model stems from the support student engineers receive in the program. One of the many support networks they have are facilitators. Facilitators are university faculty/staff members that come directly from engineering industry to guide student engineers along their journey to becoming the engineers they want to be. Facilitators assist in job search by helping student engineers develop their cover letters and resumes, conduct mock interviews, provide thorough feedback, search for job opportunities, and network with industry professionals. In the role of job search assistance with students, facilitators are referred to as learning coaches; this

term will be used henceforth. This paper focuses on the job search aspect of the program, specifically how learning coaches can assist students in the process.

Methods

This research draws from the grounded theory approach, because the goal of the larger study is to develop a theory based on existing literature in motivation, specifically aimed at increasing sophomore and junior engineering students' confidence in attaining an engineering co-op [5]. The question, "How can we maximize the student engineer's confidence, persistence, and ability to attain a co-op," will be answered as more data is collected. This study focuses on presenting the preliminary findings an initial survey of the first nineteen students in Bell.

Participant Description

The first cohort of nineteen students are beginning their second semester of the program, which is their first semester of the co-op phase, as this research is taking place. The first student engineer to accept a co-op position was in the second month of the Bell Academy. This student was the only student to obtain an engineering co-op in the first half of the semester. By the end of the first semester, 9 of the 19 student engineers in the first cohort secured their first co-op positions. Within one month of the semester ending, two more student engineers secured a co-op position. Of the remaining eight students, all of them continue to receive job interviews for co-op and internship positions. As the remaining eight students continue their job search to secure their first co-op position, they are working in parallel on an industry project for one of the program's industry partners. Every student engineer is in a unique situation as they are putting in a range of 10-25 hours per week on job search.

Data Collection

With a focus on continuous improvement and increasing efficiency in assisting students to attain co-op positions, a survey was given to each of the nineteen students in the Bell program's first cohort. The data were collected in the month following the end of the Bell Academy (or the first month of the student's second semester in the Bell program.)

A survey distributed to the first cohort of nineteen students contained eleven questions/prompts. The questions/prompts were:

1. Rate your confidence in your job search skills before attending the Bell Academy. (On a scale of 1-5, where 1 is no confidence and five is the highest confidence)
2. Rate your confidence in your job search skills after attending the Bell Academy. (On a scale of 1-5, where 1 is no confidence and five is the highest confidence)
3. If there was a change, what do you think caused this change?
4. Describe the role your learning coach or any other Bell faculty/staff had in your confidence pertaining to job search.
5. Rate your persistence in your job search in the first half of the Bell Academy. (On a scale of one to five, one being no persistence and five being extremely persistent)

6. Rate your persistence in your job search in the second half of the Bell Academy. (On a scale of one to five, one being no persistence and five being extremely persistent)
7. If there was a change, what do you think caused this change?
8. Describe the role your learning coach or any other Bell faculty/staff had in your persistence pertaining to job search.
9. What did your learning coach or any other Bell faculty/staff do that increased your job search abilities?
10. Looking back, what do you wish you would have had more help with?
11. List any additional comments relating to your job search growth/abilities that you would like to share.

Data Analysis

Seventeen of nineteen students completed the survey. Descriptive statistics were then qualitatively analyzed for initial themes. These initial themes will allow us to develop an initial interview protocol, in keeping with a grounded theory approach moving forward.

Findings

1. Confidence

On a scale of one to five, one being no confidence and five being the highest confidence, students reported an average value of 2 in confidence in job search skills prior to the Bell Academy. This rating increased by an average of 2.1, resulting in an average of 4.1 by the end of the Bell Academy. Figure 1 depicts the students' confidence change over the course of the Bell Academy.

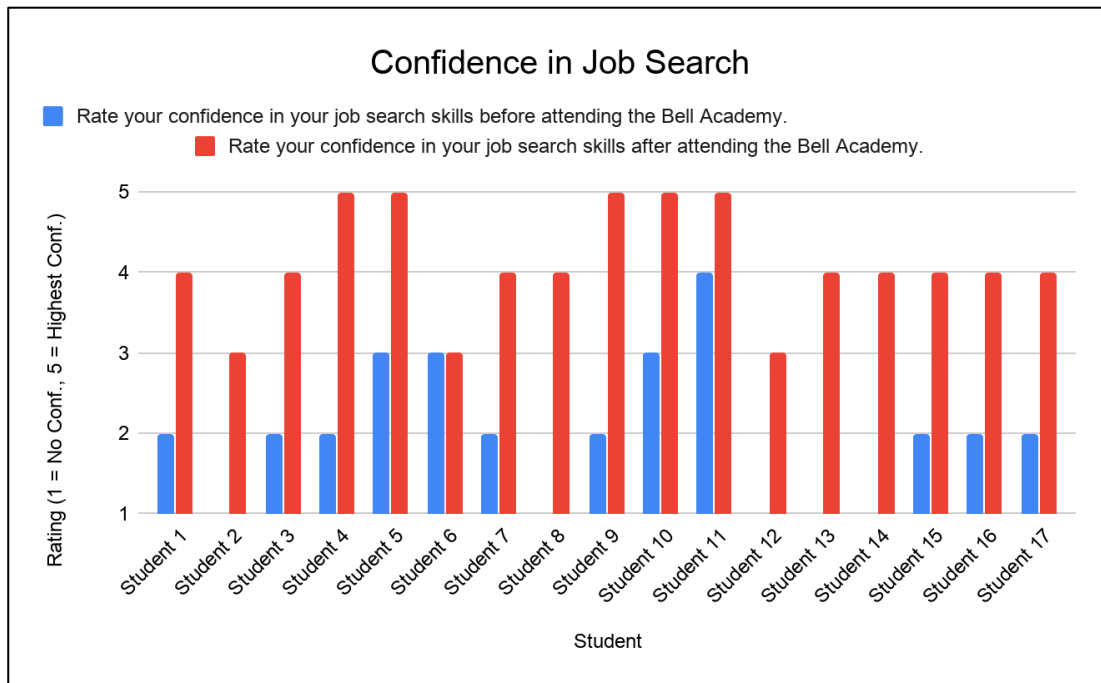


Figure 1: confidence in job search

Students attributed the increase to four general types of experiences: learning job search skills, overcoming imposter syndrome, regular interaction with professionals, doing work relevant to engineering. Other actions were reported as assisting the student to increase confidence that did not fit into the four general categories were grouped in to an “other” category.

1a. Job Search Skills

The most prevalent attribution by students of increased confidence in job search was learning job search skills. These skills included marketing oneself through activities such as: writing a cover letter and resume, understanding what skills are relevant, understanding how to interview and answer different types of questions, understand how to search for jobs, dressing professionally, sending thank-you letters, developing a LinkedIn profile, being an active participant in career fairs, and networking. One student stated that “career fairs helped as well, since they were my first attempts at networking/socializing with industry professionals/hiring representatives in person and helped get rid of some of the fear of the unknown.”

1b. Imposter Syndrome

Overcoming imposter syndrome was the second most prevalent attribution by students of increased confidence in job search. Students were able to combat imposter syndrome by successfully completing engineering work, participating in various workshops and training sessions. One student stated that they reduced imposter syndrome by “accepting that almost everyone else is applying in the same situation.” Another student stated, “Getting out of that

1c. Regular Interaction with Professionals

Students reported that talking regularly with professionals also increased their confidence. The Bell staff, composed of eleven engineers--five professors and seven facilitators with industry experience, work closely with the students; each student obtains personalized attention. The students also interacted with engineers from industry throughout their two design projects. This professional interaction allowed the students to be more confident when talking with prospective employers and job recruiters.

1d. Engineering Work

Doing work relevant to engineering was also reported as a source of increased confidence. Some examples given were working on real design projects and the students gained experience through four design reviews. One student commented, “Most of the content on my current resumes and cover letters are from the Bell Academy.”

1e. Various Other Experiences that Increased Confidence

Finally, students attributed numerous other tasks or experiences to their increased confidence. One student felt that understanding the general process of job attainment was helpful. Another notable comment from a student was, “Failing in a vacuum is demoralizing, so seeing the success of others helps.” Another student discussed the ease of finding jobs before getting into

the engineering field. Once that same student attempted to find a job as a student engineer, they realized “that the process takes hard work and dedication.” Another student stated the “accountability from learning coach” helped to increase their confidence.

One student of the seventeen reported no increase in confidence. The student admitted that their skills grew during the Bell Academy, yet the fact that so much effort was put into the job search and the result was no job attainment by the end, the student felt the confidence level remained the same.

2. Faculty/Staff Role in Students’ Confidence

When students were specifically asked to “describe the role your learning coach or any other Bell faculty/staff had in your confidence pertaining to job search,” their answers were somewhat different. The students’ most frequent response was that their learning coach helped to increase their confidence by “pushing” them. The word “push” was used in 5/17 comments to this question. The second most frequent response was the learning coach held them accountable. The third most frequent response was assistance in the development of resumes and cover letters along with interview preparation.

The activities described by students have been grouped into four categories: preparation to interface with companies, applications, regular communication with a learning coach, and groundwork.

2a. Preparation to Interface with Companies

Students frequently attributed preparation to interface with companies, such as resume and cover letter development, interview preparation, and understanding how and when to talk to companies, as a confidence booster.

The fact that “real engineers” are reviewing resumes and cover letters, conducting mock interviews, and giving feedback throughout the entire process seems to be a highlight of the program. Once the student schedules an interview with a company, extra attention is given to that student in their preparation; this has been stated to boost confidence as well. One specific aspect of the interview preparation that was pointed out was the ability to improve interview results through creating and continuous improvement of STAR stories. STAR stories, a term coined by Louise Kursmark and Jan Melnik in Executive’s Pocket Guide to ROI Resumes and Job Search, are short stories used to explain a specific situation, task, action, and result [6].

One comment, which is partially an outlier from the previous comments, discusses how mock interviews were helpful in the beginning, but lost relevance as the Academy went on. “I also enjoyed the mock interviews. It was very useful for the first several times. I would have protested if the Bell Academy continued the mock interviews longer than we did. We, the students, felt we gained less from the interview as time progressed, which is probably a good sign.”

2b. Applications

Students commented that they appreciated the assistance of learning coaches in job applications. This assistance includes where to look for jobs, finding positions that capture the student's interest, and most often stated, the "push" to continue to submit applications. One student stated that "the push to get our resumes out showed that the staff had confidence in us and our abilities."

One outlying comment stated that confidence decreased when the number of applications was the main focus. "There was an emphasis from the faculty on quantity of applications, which, when I put out 50 applications and did not get a job, hurt my confidence."

2c. Regular Communication with a Learning Coach

Learning coach and student interactions were regularly scheduled in two ways. The students met with their assigned learning group and learning coach for an hour each Wednesday morning to work on job search-related items. After the first half of the Bell Academy had passed, an evaluation of the students' co-op attainment revealed a need for more action. By the ninth week, only one student had secured a co-op. It was then decided that each student would receive at least two hours of one-on-one interaction, specifically focused on job search, with their learning coach.

Students seemed to appreciate that learning coaches were available to answer questions and give feedback regularly. One student specifically stated, "My learning coach helped answer questions I had about standards when communicating with companies, which helped me feel less awkward when doing so." The regular interaction that learning coaches have with students is to drive them to keep moving toward their goals. One student remarked, "He pushed me to keep going when I got complacent, and I feel that's the kind of energy I need at this point." Another student noted, "There will be no complacency here."

Students also stated their confidence was boosted by interaction with their facilitator. Through the interaction, they received reassurance and encouragement in their abilities. One student stated they were "shown that [they] actually do fit most of the job descriptions out there." Another stated, "Bell faculty helped me prepare for each big interview I had, which was also very reassuring knowing that I had so many people ready to help me when I needed it."

Other aspects of the regular learning coach interaction with the students were goal setting, monitoring, and focus. Students stated that it was helpful for the learning coach to help the student identify areas of improvement and set goals. Students also appreciated that the learning coaches held the students accountable for these goals. Assisting in focusing on goals was another aspect the students found helpful.

One student stated that learning coaches "were my mentor/friend." Another student stated, "hearing their stories helped out a lot too." One student connected all the dots by stating, "[The learning coaches] also provided accountability, which helped motivate me in my job search; that in turn allowed me to get more experience applying to jobs, and I got more confident once I got

used to applying.”

2d. Groundwork

In the last month of the Bell Academy, only eight students had attained a co-op for the spring. This revealed that even more action must be taken by the learning coaches. Learning coaches began reaching out to companies to form relationships. As of the first month of the second semester, networking with companies has resulted in three companies interviewing seven students-- one student has been hired and the other six are waiting to hear back after the interview.

Students remarked that they greatly appreciated the work that learning coaches put into assisting them in attaining an interview. After putting in months of work, just having the interview seemed to bolster the students’ confidence.

3. Persistence

Students were asked to “rate your persistence in your job search in the first half of the Bell Academy,” and again to “rate your persistence in your job search in the second half of the Bell Academy.” On a scale of one to five, one being no persistence and five being extremely persistent, students reported an average persistence value of 2.6 during the first half of the Bell Academy which increased an average of 1 point to 3.6 during the second half of the Bell Academy. Figure 2 depicts the students’ change in persistence from the first half of the Bell Academy to the second half of the Bell Academy. Three students reported no change in persistence. Two students reported a decrease in persistence. Twelve students reported an increase in persistence.

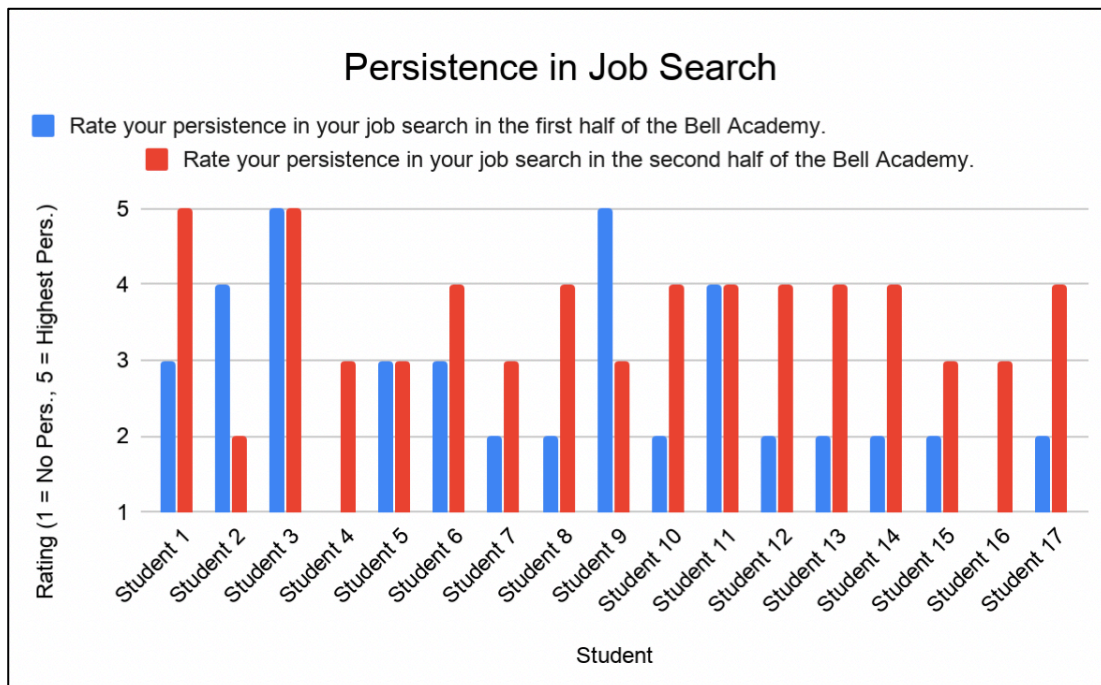


Figure 2: persistence in job search

Students were asked, “If there was a change, what do you think caused this change?” The following section depicts the students’ reasons for a lack of change in persistence, decreased persistence, and increased persistence.

3a. No Change in Persistence

Three of the students reported no change in persistence. These students all reported similar actions of holding a steady and consistent behavior of applying for jobs. One student went as far as to remark, “If you want [me] to stop you will have to kill me.” Another student acknowledged the co-op attainment as a key factor in the program by stating, “Without the job, there was no point in doing this program or this route.”

3b. Decreased Persistence

The two students who reported that their persistence decreased from the first half of the Bell Academy to the second half had differing reasons. One student stated, “The intensity of work increased. I couldn’t keep up as much with job search.” The other students stated, “[I] already had a co-op at the beginning of the program so didn’t focus much for the rest of the Academy.”

3c. Increased Persistence

The majority of the students found that their persistence increased from the first half of the Bell Academy to the second half. Some of the students admit they did not see or realize the importance of applying for positions when they were first prompted. Some claim to have been distracted by other events in their life. Laziness was stated to be the contributing factor to a lack of effort in the first portion of the Bell Academy. Initially, applying to jobs was a time-consuming task for some students. Finally, some students admit that a lack of confidence and imposter syndrome held them back.

What made the students increase their persistence? Some students claim that as their stress increased near the end of the academy due to the lack of a job, they increased their sense of urgency and therefore persistence in finding a job. One stated that it wasn’t until interaction with companies caused a realization of the timeline of the hiring process that they started to put more effort into job search. One student thought they would have more time and they put off the job search, until they realized with less than a month left, that there was not much time left. Some students attribute increased confidence to an increase in persistence in their job search. One student stated, “I also did not take rejections from jobs as hard as I did in the first half.” The act of applying, such as writing cover letters and resumes, became easier tasks over time allowing some students to apply for more jobs in less time than they spent at the beginning of the Academy.

One student admitted that although they increased their persistence in the job search, “I still wasn’t as persistent as I should have been during the academy because I didn’t realize the extent of the ‘numbers game’.”

4. Faculty/Staff Role in Students' Persistence

Students were also asked to “Describe the role your learning coach or any other Bell faculty/staff had in your persistence pertaining to job search.”

A few themes stand out in the students' view of the learning coaches' role in their persistence: a weekly meeting, setting and/or adjusting goals, and being held accountable. One student noted that learning coaches “kept pushing us to keep going even when we didn't want to!” Some other attributes include: being encouraging, regularly sending job opportunities and resources, keeping the students motivated, prompting the student to keep track of jobs applied for, driving the student to create and stick to a schedule for job search, maintaining optimism, give direction in job search, answered questions, and being accessible.

Programmatic Adjustments

The students gave numerous answers to the question, “Looking back, what do you wish you would have had more help with?” The results have only been documented here if more than one student made the suggestion. These responses were grouped into three categories: networking, groundwork, and personal changes. Three students stated that no change was necessary.

The most frequent response was that the students would have liked to have more assistance with networking and making personal connections. One student stated, “I wish there was a lot more emphasis on the things that I eventually found to be the most fruitful job search method – finding personal connections.”

The next most frequent response was that the students would have liked if the Bell program had already established relationships with companies before they began their job search process. Students seemed to feel that they could only do so much in the process according to one student. “There are so many applications that students can send out. I also think that some engineering companies may respond more quickly to facilitators.”

Three of the students identified personal changes they would like to have changed. These are not things about the program structure or learning coach interaction, rather these were changes of a student's own understanding. One student wished they would have practiced more for individual interview questions. Another student wished they would have realized the importance of submitting numerous applications. One comment stated, “I also needed to realize that I would be learning the same skills for my first co-op regardless of industry.”

Conclusions and Implications for Practice

The preliminary data provide insight into what types of support practitioners can provide for students during their job search. Some areas, such as providing mock interviews, interview prep, resume and cover letter review, goal setting, and being held accountable for those goals the students found to be beneficial to their confidence during the job search. Areas for improvement include having the learning coaches do more groundwork, like forming relationships with more

companies to pave the way for interviews, driving students to do more networking, and assisting students with goal setting earlier.

Future Work

This is a work-in-progress paper which is in the early stage of data collection. One round of data has been collected which is represented in this paper. Our future work plan consists of three steps: 1) increase the survey frequency to three times: the first week, the ninth week, and the eighteenth week and include the faculty, 2) continue to refine the categorization of the results, and 3) utilize the refined categories in future surveys and interviews to rate various methods in building confidence and maintaining persistence within the students.

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