

Students' Ease, Time, and Coping with Transitions from Co-op to the University*

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Cooperative educational programs are becoming increasingly popular at engineering schools. Many research studies have reported numerous benefits of students that go on co-op assignments. This research used Wendlandt and Rochlen's framework, combining Stage Theory and transitional theories for students' transition back to the institution after co-op assignments. Students' were surveyed and interviewed after summer, fall, and spring co-op experiences. The study's results are based off 353 responses from surveys. This research shows students' ease of transition, time of transition, and coping mechanisms for transitioning back to the institution after going on co-op assignments. It was found that 33% of students reported they had difficulty transitioning to the institution after co-op assignments. Students' engineering major was significant with ease and time of transition. Sex was significant for ease of transition. Students' engineering program and sex were predictive factors for students' ease of transition. Many students' coping skills were not adequate to deal with the transition back to the institution.

Keywords: co-op programs; transitions; engineering

1. Introduction

Industry leaders have criticized university degree programs for not preparing their students for the workforce. Studies show less than 50% of college educated employees remain with their first employer two years after graduation, with the average tenure at only 11 months [1–3]. Some graduates may change jobs for advancement or other reasons, but more often than not, new graduates have a difficult time adjusting to a new job. Research shows a direct relationship between new employee adjustment and turnover [3–5]. This new employee adjustment is called transitioning. There is a lot of research on a new employee's transition from college to a first job, including engineering.

Cooperative educational programs (co-ops) are being embraced in engineering programs around the country to help prepare students for the workforce and to help graduating students with new employee adjustment. Co-op programs in the university setting are usually arrangements between companies and higher education institutions to hire students for a given time period, usually between 12–16 weeks. There are many benefits for students to go on a co-op assignment. For example, students in co-op programs generally experience higher rates of retention and graduation than other students [6]. Some institutions and engineering programs are starting to *require* their students go on co-op assignments before they graduate. But there are some negative aspects to co-op programs that are starting to be understood, like students' transition from co-op assignments back to the institution can be

difficult for some students. The transition from work to higher education institutions may also apply to students that go on summer internships. Some researchers have reported 30% of their students' report difficulty transitioning back to campus after going on co-op assignment [7]. This difficulty can lead to not attending classes, not doing homework, depression, anxiety, and added stress. Academic institutions and industry partners that use co-op programs need to know how these transitions affect students so they can adequately address the problem.

This research explores students' transition from co-op assignments to higher education institutions. A survey was sent out to students after 8 weeks of being back at the institution for fall, spring, and summer semesters. The three semesters of co-op assignments captured one academic year at the study institution. Students reported on their ease of transition, time of transition, and how they coped with the transition.

2. Literature review

Co-op programs started at the University of Cincinnati in 1906 [8]. Co-op assignments have many benefits, like connecting industry and educational programs, exposing students to real-world problems, and day-to-day life as an engineer. The overall quality of students' education is increased by going on co-op assignments and co-op students have higher starting salaries after graduation [6, 9–11]. Ramirez, Main, Fletcher, and Ohland showed that students who participate in co-op assignments

earn higher grades in their courses but take more time to graduate [6]. One institution surveyed their students and responses showed that 98% said they were at the institution because of the co-op program [12]. Students are aware and interested in universities that offer co-op programs. Another study compared students that go on co-op assignments to students that do not go on co-op assignments and found that those students who do go on co-op assignments have higher earning potential, higher level positions, and move up the ladder within the company at faster paces [13].

Raelin, Bailey, Hamann, Pendleton, Reisberg, and Whitman showed that academic achievement and academic self-efficacy, and number of co-op assignments were high predictors of retention in engineering programs [14]. They also showed that work self-efficacy was strongly tied to students' co-op participation. Other researchers have tied student co-op assignments to increased self-efficacy, self-concept, and career identity [15].

In another study, researchers interviewed students after a co-op assignment and found that 30% commented on how difficult it was to come back to the institution after their co-op assignment, even though students were not asked about their transition back to school during the interviews [7]. The researchers concluded that students' transitions back to the institution after a co-op assignment needs further investigation.

Mann wrote a theoretical exploration on student experiences and shows 7 different ways students may feel alienated in higher education [16]. Students go experience the 'real world' while on a co-op assignment and then come back to the institution disillusioned with their professors and courses. Another author from the United Kingdom researched students that take a placement year (one year employment before finishing their degree) and found these students felt alienated after returning to the institution [17]. Auburn found that students had shifting social identities after returning to the institution, one was as a professional, full-time employee and the other was a separation between academic and practical arenas [17].

2.1 Models within transitional research

Leibowitz and Schossberg found that any transition that results in a change will alter a person's roles, relationships, routines, and assumptions [18–21]. Schlossberg's theory refers to 4 types of transitions: (a) anticipated, (b) unanticipated, (c) chronic hassles, (hassles are defined as small disruptions from planned activities) and (d) nonevents [22]. All of the students going on co-op assignments and coming back to the institution have anticipated transitions.

An anticipated transition is usually easier to deal with because students can mentally prepare themselves before the transition starts. Students know that they will be on their co-op assignment for one semester and then coming back to the institution. Even though it is an anticipated transition, students may have mixed feelings about coming back to the institution, which will be discussed below. Another aspect of transitional research is how people cope with transitions.

There are 4 main categories of coping with transitions: (a) situation, (b) self, (c) supports, and (d) strategies [21, 23]. Situation means an individual's assessment of the entire context of the transition. The situation takes into account whether the transition was expected, unexpected, desired or dreaded. This category also takes into account whether the transition was voluntary or something forced upon them (required co-op assignments). Self refers to an individual's experience, attitude, and awareness of the transition. Self refers to whether someone feels like they can master the transition or aren't sure. This category takes into account the individual's attitude and confidence about the transition. Supports are emotional and financial support sources and networks. Supports can include family, friends, colleagues, professors, and managers. Also, this category takes into account whether these people are supportive or not. Strategies includes the way the individual navigates the transition. They could have multiple strategies for coping with the transition, such as managing stress well, actively changing the situation through assertiveness, and negotiating a better situation.

2.2 Transitions from co-op to employment

Research highlights three themes emerging from the transition from college graduation to full time employment: "(a) a change in culture associated with the transition between two different environments, (b) the lack of experience and skills required by employers, and (c) inaccurate expectations about work life" [1, 24–26, p. 152].

Students that go on co-op assignments have a much lower "reality shock" when going to their first full-time job after graduation [27]. Students' co-op assignments afforded them more success adjusting to work at the beginning of employment [28], were shown to be more self-reliant in adapting to the organization and work teams, and rated their knowledge of what is expected of them (tasks to be performed) more highly than students who did not go on co-op assignments [29].

School and work have been shown as very different communities through longitudinal studies following employees for the first few years at their jobs after graduating [1, 30]. Graham and McKenzie

show 4 stages of commitment during the transition to a new job: uninformed optimism, informed pessimism, hopeful realism, and informed optimism [24]. All new employees seem to go through the first two stages when they start a new job after college: uninformed optimism and informed pessimism. Newcomers that stay at their employers go through all 4 stages. All new employees have an uninformed optimism about their new job. Most new employees start with high hopes and within a few weeks realize the reality of their situation in informed pessimism. Informed pessimism lowers their commitment to the organization. Some new employees have a small dip in their informed pessimism stage, while others change their commitment to the organization. For the newcomers that leave, it is because of underutilization, a steady decline in commitment because of unmet expectations, or their professional goals had been met.

Transitional research in engineering has shown that socialization is one of the most important factors for satisfaction and retention [31]. Korte explored key factors in socialization of 30 newly hired engineers at a large manufacturing company [31]. The findings included relationship building as the primary driver of socialization, and the work group was the primary context for socialization.

3. Theoretical frameworks

The authors found literature that describes the experience of students transitioning from co-op assignments in organizational socialization. Organizational socialization addresses new employees' adjustment to their new surroundings, including how they learn the behaviors, attitudes, and skills necessary to fulfill their roles and function effectively as a member of an organization [5, 32, 33]. The socialization process is related to employee satisfaction, attitude, stress, and turnover [5, 34–37].

Socialization in an organization includes six different domains: (1) performance of tasks, (2) development of working relationships, (3) adoption of the organization's culture, (4) mastering the special language, (5) operating within the formal and informal power structure, and (6) appreciating the organization's history [36, 38]. Van Maanen and Schein's transitions model has one of the best developed socialization tactics [37]. They define socialization tactics as "the ways in which the experiences of individuals in transition from one role to another are structured for them by others in the organization" [37, p. 230]. This theory is used and expanded on in Wendlandt and Rochlen's combined organizational socialization and stage framework [26].

Wendlandt and Rochlen combined organiza-

tional socialization theories into a framework that was used for this study [26]. This framework fit best because it combined organizational socialization and stage theories into one cohesive framework. This framework has three stages of the process of socialization, although these three stages are not defined, limited stages, but should be viewed as flexible and continuous stages that individuals can go through many times in their life. Although this framework does not fit the research study explicitly, it will be able to highlight the adjustment stage that students go through when transitioning from co-op assignments to the institution.

1. Anticipation: This stage happens before an individual starts their new job. The new employee gathers information about employment, start formulating expectations about their new job and the organization, and determine what they might need or want to do their job [39–41]. This stage can also be considered as stopping something else because the new employee will have to stop whatever they are currently doing to start the new position, which may lead to feelings of losing something familiar [21, 22].
2. Adjustment: This stage starts when the new employee starts their job [26]. They start learning about the workplace culture. The new employee learns skills and tasks important for their job, build relationships with other employees, clarify their role within the company, and evaluate their performance [22, 39, 42]. The new employee's evaluation of the company is an essential part of the adjustment stage, where they reconcile their expectations and the reality of their employment [40–42].
3. Achievement: The new employee will work to acclimate to the culture and environment [43]. The new employee may be faced with changing their values, self-image, and behaviors [41, 42]. An employee that successfully passes through this stage will be satisfied, there will be mutual acceptance between the employee and the employer, the employee will have high commitment to the organization, and will maintain motivation for the work [26, 39, 42].

This research focuses on stage 2 (adjustment) because students are going back to the institution from co-op assignments. This research will expand our understanding of adjustment, specifically the experience of students' coming back to the institution from co-op assignments. This work may have some benefit to understanding the experience students' transitioning back to the institution from other experiences, like going on summer break, taking a semester off, or an extended break.

4. Research questions

This study addresses the general question of *how many students find it difficult to transition back to the institution after going on co-op assignments* as they continue forward to graduation. This study was an investigation into students' transition from their co-op assignments to the institution. The framework from Wendlandt and Rochlen is used to interpret the data collected from fall, spring, and summer surveys [26]. This research also investigates the coping mechanisms that students reported after returning to the institution from their co-op assignments. The research questions for this study were:

1. What percentage of students have difficulty transitioning from co-op assignments to the institution?
2. How long were students' time of transition from co-op assignments to the institution?
3. How are students coping with the transition from co-op assignments to the institution?

Gunderson, Bailey, Raelin, and Garrick found that 30% of their students were reporting difficulty going from co-op assignments to the institution without asking students specifically about their transition experience [7]. This research study asks students about their experience with the transition from co-op assignments to the institution. The other two research questions ask about the details of the transition back to the institution. There were no other studies found that ask research questions about students' transitions back to the institution after co-op assignments.

5. Methods

The institution participating in this study is a large, southeastern public institution. The College of Engineering has a mandatory 'three co-op assignments' requirement for graduation. The College has a three semester year-round program to keep students on track to graduate within four years. The students that participated in this research came from the College of Engineering and represented all engineering majors at the institution: bioengineering, chemical, civil, computer science and computer engineering, electrical, industrial, and mechanical. Students go on co-op assignments during the spring semester of their sophomore year, fall semester of their junior year, and summer semester of their senior year. They complete three co-op assignments during that time.

There were 441, 362, and 339 students invited to take the survey from co-op assignments during summer 2016, fall 2016, and spring 2017. The authors collected 105 completed survey responses

from students on summer 2016 co-op assignments (data collected during fall 2016), 111 completed responses from fall 2016 (data collected during spring 2017), and 137 completed responses from spring 2017 (data collected during summer 2017). The response rate was 24% for the students' summer 2016 co-op assignments, 31% for the students' fall 2016 co-op assignments, and 40% for the students' spring 2017 co-op assignments. The average response rate for all three semesters was 31%. There were 47 survey responses that were not complete, and were not used in this study.

This research study used an investigation design using qualitative and quantitative methods. The first draft of the survey was written by the first author and co-op program director, based on anecdotal evidence from students' reports after co-op assignments. The survey was reviewed and re-written though feedback from colleagues, graduate and undergraduate students. The institution's Institutional Review Board approved the final draft of survey questions and the overall study. Each survey was followed by 4-6 individual interviews with students about their experience transitioning to the institution after co-op assignments.

The interviews and survey responses were compared for validity and reliability of the study. The interview questions were similar to the survey questions. The results of the surveys were compared to interviewees answers and were very similar. There were a couple small changes between semester surveys, updates for a new semester and elimination of redundant questions, changes are described in Appendix A. The interview questions changed with surveys, and were still found to have the same results as the survey responses.

The survey responses collected had 163 sophomores, 111 juniors, and 79 seniors. There were 93 females, 248 males, and 12 students chose "Do not want to disclose" for the combined surveys, which is an overrepresentation of females by about 2%. The study institution has a slightly higher rate (2%) than the national average of females in engineering and the results could be affected by this overrepresentation. The surveys from the different semesters did not overlap with students' co-op assignments, which was verified by the co-op director.

A large majority of students that enroll in the College of Engineering at this institution are traditional, first-time freshman, and domestic. Students that did not complete the survey or missed answering any survey questions were not included in the results.

Table 1 shows the percentages of each major represented for each semester survey and the three surveys combined (total, avg.). Some majors are over represented in one survey and underrepresented in

Table 1. Students representation of each major by survey and average total

	First Survey	Second Survey	Third Survey	Total (Avg.)
Bioengineering	12 (11%)	14 (13%)	4 (3%)	30 (9%)
Chemical Engineering	12 (11%)	17 (15%)	28 (21%)	57 (16%)
Civil Engineering	10 (10%)	9 (8%)	11 (8%)	30 (9%)
Computer Engineering and Computer Science	19 (18%)	16 (14%)	25 (18%)	61 (17%)
Electrical and Computer Engineering	16 (15%)	15 (14%)	22 (16%)	53 (15%)
Industrial Engineering	12 (11%)	9 (8%)	4 (3%)	25 (7%)
Mechanical Engineering	24 (23%)	31 (28%)	42 (31%)	97 (27%)
Total:	105 (100%)	111 (100%)	136 (100%)	353 (100%)

another, but the total average is representative of students in engineering programs at this institution.

Each survey was deployed 8 weeks after students came back from co-op assignments. This was done so students could report their transition time from their co-op assignments to the institution.

Students answered an open-response question (Question 8 from Appendix A) about how they coped with the transition. These responses were coded based on Sargent and Schlossberg's research on coping with transitions [23]. The major themes are categorized as: (a) situation, (b) self, (c) supports, and (d) strategies. The two authors coded the students' open responses of coping into these four categories using a sample of 123 responses. The coding was tested using an interrater reliability, which was 0.92, and was satisfactory. There were a total of 258 open responses to the survey question.

6. Results

Results are shown for the quantitative analysis of ease and time of transition in section 6.1 and qualitative analysis of coping with the transition in section 6.2.

6.1 Ease and time of transition

Survey 1 had a majority of students on their third co-op assignment, and also has the lowest overall rating of *somewhat difficult* and *difficult* transition back to campus. These students are either getting used to the transitions or they are focused on graduating, or it could be a combination of both. But even with survey 1 being a majority of seniors, there is still 24% of students reporting having a *somewhat difficult* and *difficult* time transitioning back to campus, where over half of those are students on their third co-op assignment. The second survey, from fall 2016 students on co-op assignments shows that 38% of students are reporting having some difficulty (*somewhat difficult* and *difficult* combined) coming back to campus after co-op assignments. Note that the majority of these students are on their second co-op assignment, which means they have experienced a transition already with the first co-op assignment, but are

still reporting difficulty in high numbers. The authors thought students going on their first co-op assignment would have the highest difficulty coming back to the institution, but it was a little less than students' second co-op assignment, at 36%.

The surveys were tested for normality with ease of transition, Survey 1 had $M = 1.98$, $SD = 0.877$, Survey 2 had $M = 2.27$, $SD = 0.904$, and Survey 3 had $M = 2.23$, $SD = 0.834$. Type I error threshold was set at 0.05 for statistical significance. An analysis of variance showed that there was no effect of ease of transition by survey, $F(3,349) = 2.545$, $p > 0.05$. This shows that students' experience with transitioning back to the institution is not significantly different from summer, fall, or spring co-op assignments.

Figure 1 shows students' ease of transition and number of co-op assignments. Students' number of co-op assignments were tested for normality with ease of transition, co-op assignment 1 had $M = 2.17$, $SD = 0.836$, co-op assignment 2 had $M = 2.23$, $SD = 0.914$, and co-op assignment 3 had $M = 2.08$, $SD = 0.903$. Type I error threshold was set at 0.05 for statistical significance. An analysis of variance showed that there was no effect of ease of transition by number of co-op assignments, $F(3,349) = 0.785$, $p > 0.05$. As shown in Fig. 1, students' have a slightly easier time transitioning back to the institution after their 1st and 3rd co-op assignment, but it is not significant.

Students' self-reported transition time after coming back to the institution was analyzed. Most students transition time was one to two weeks, but there was a higher-than-expected percentage of students that took three to four weeks. There were a few students that took five to six weeks to feel comfortable back at the institution.

Each survey is shown to represent the similarities of different semesters of co-op assignments. Survey 1 consists of students on summer co-op assignments, which could be representative for many college students in the United States. Students going on a summer co-op assignment did not report less time transitioning back to campus. An analysis of variance showed that there was no effect of time of transition by survey, $F(4,348) = 0.514$,

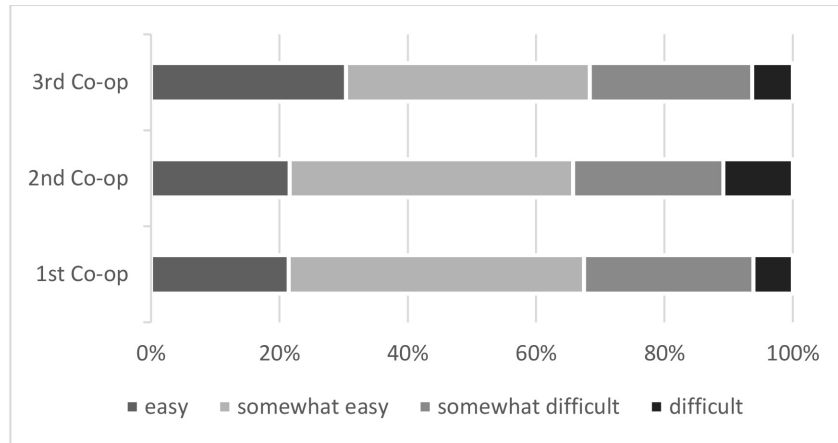


Fig. 1. Number of students' co-op assignments and ease of transition.

$p > 0.05$, (Survey 1: $M = 2.13$, $SD = 0.981$; Survey 2: $M = 2.23$, $SD = 0.960$; Survey 3: $M = 2.03$, $SD = 0.923$). Type I error threshold was set at 0.05 for statistical significance and the data was checked for normality.

The time of transition with students' number co-op assignments were checked for normality. Each co-op assignment number had normality with time of transition. Students with 1 co-op assignment had $M = 2.07$, $SD = 0.92$, 2 co-op assignments had $M = 2.15$, $SD = 1.002$, and 3 co-op assignments had $M = 2.18$, $SD = 0.958$. Type I error threshold was set at 0.05 for statistical significance. A one-way analysis of variance test compared students' number of co-op assignments by time of transition and was found to be not significant, $F(4,348) = 1.957$, $p > 0.05$, meaning that it did not matter if students were on co-op assignment 1, 2, or 3 because students had similar time of transitions.

Next, we looked at students' reported ease of

transition by major. Fig. 2 shows that civil engineering does not have any students' reporting a *difficult* transition to come back to the institution. Most majors have less than 10% of their students' reporting *difficult* to transition back to the institution, except computer engineering and computer science, which had 13%. A chi-squared test of independence was performed to examine the relation between ease of transition and major. The relation between majors and ease of transition was significant, $\chi^2(21, N = 766) = 56.45$, $p = 0.00$.

Students reported how long they felt the time of transition and how long until they felt comfortable being back at the institution. The majority of students report 1 to 2 weeks' transition time. Students in civil or industrial engineering majors had zero students with 5 to 6 weeks' transition time. Bioengineering and electrical engineers reported having 20% and 13% transition time of 5–6 weeks. Since semesters are 15 weeks long, these students'

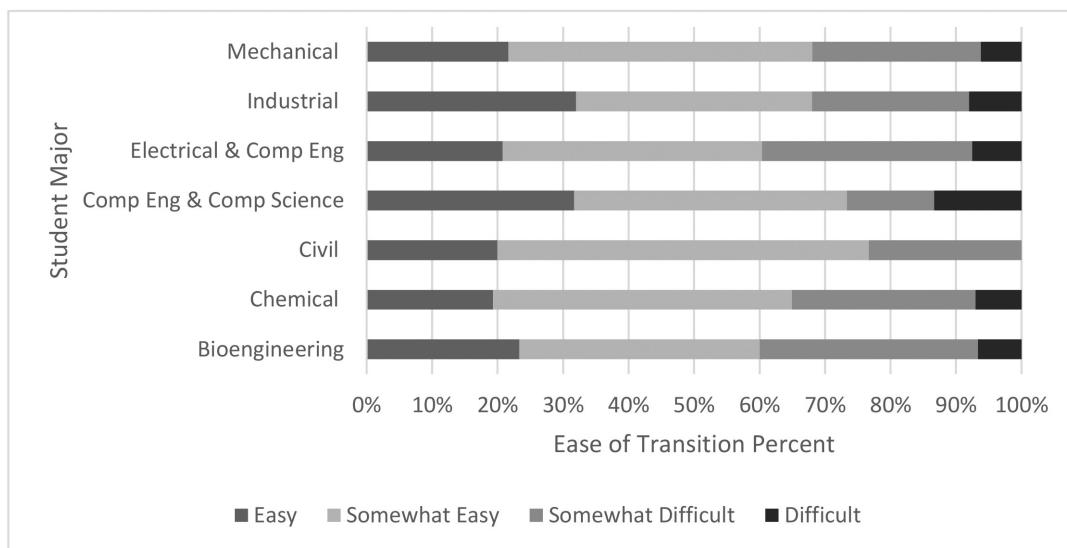


Fig. 2. Students reported ease of transition by major.

transitions are taking one-third of the semester to feel comfortable at the institution. 3 to 4 weeks' transition time was consistently high, between 23% and 40% for all majors. A chi-squared test showed there were significant differences found by major and time of transition, $\chi^2(21, N = 749) = 80.69, p = 0.00$.

The ease of transition by sex was evaluated. Both females and males report the transition being *easy*, at 23%. *Somewhat easy* was the most popular reported ease of transition for both females and males. Females report the ease of transition being *somewhat easy* at 50%, which is 8% higher than males. Males report *somewhat difficult* and *difficult* at higher frequencies than females, a difference of 2% and 5%. A chi-squared test of independence showed significant differences in ease of transition and sex, $\chi^2(3, N = 749) = 14.46, p = 0.002$.

Time of transition by sex found some small differences between the two groups. The most frequently reported time of transition is 1 to 2 weeks, it being about 40% of females and males. More males are reporting transition time being 1 week or less, at about 5% higher rate than females. 3 to 4 weeks had a higher rate of females reporting, roughly 6% higher than males. 8% of males and 7% of females report 5 to 6 weeks of transition time. A chi-squared statistical test showed no significant difference between the male and female students' time of transition distributions, $\chi^2(3, N = 749) = 3.21, p > 0.05$.

The ease of transition by time is represented in Fig. 3. Students rated their transition as *easy*, also rated 1 week or less by over 60%. Students' that reported *somewhat easy* had 1 to 2 weeks also rated as the highest percentage (58%). Students' reported *somewhat difficult* had a larger percentage of 3 to 4 weeks, 54%. Students that rated a *difficult* transition also rated the highest time of transition, 5 to 6 weeks at 42%.

The authors tested the correlation of ease of

transition and time of transition by calculating Spearman's rank correlation coefficient ($N = 353, \rho = 0.630, p = 0.000$). Ease of transition and time of transition are correlated.

A statistical test of nominal regression tested if sex and major were predictors of ease of transition. The overall model of ease of transition was not significant with sex and major. The nominal regression analysis showed civil engineering ($\beta = 17.74, p = 0.000$) was significant predictor for *easy* ($\beta = 2.11, p = 0.028$) within ease of transition. *Somewhat easy* ($\beta = 2.40, p = 0.011$) had two predictors: female ($\beta = 1.314, p = 0.048$) and civil engineering ($\beta = 18.72, p = 0.000$) were significant.

Time of transition was tested for predictors using nominal regression analysis. The overall model of time of transition was not significant with sex or major. There were no significant predictors of sex and major for any segments of time of transition.

6.2 Coping with the transition

The researchers asked students "What coping skills did you use to help you transition back to the institution?" There were 258 responses to this question. Each response was coded from categories (major themes) defined by Sargent and Schlossberg and Schlossberg, Lynch, and Chickering [21, 23]. The categories of coping through transitions are: (a) Situation, (b) Self, (c) Supports, and (d) Strategies. These were previously discussed in section 2.1. Sub-themes were created within each category.

The survey question that asked students about coping had 47% of students respond with the major theme Strategy, 29% of students responded within the major theme Situation, and 13% and 10% responded with Self and Supports. Each quote from students has a unique identifier, (example: SME99), to distinguish one student from another.

6.2.1 Strategies

Strategies had the highest percentage of students,

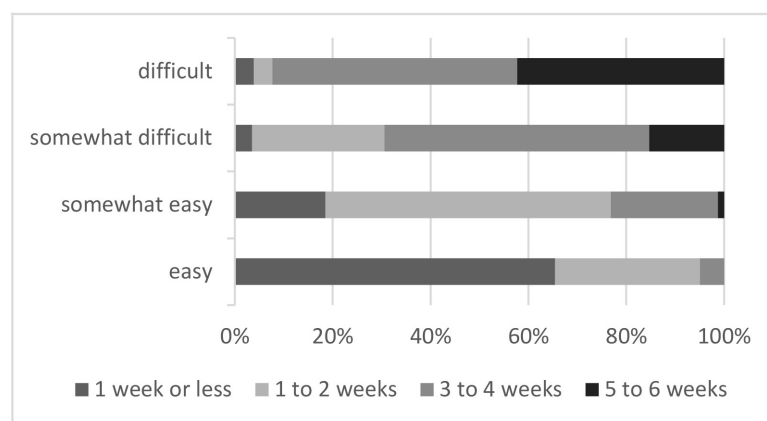


Fig. 3. Students' ease of transition by time of transition.

47%. Sub-themes within Strategies included healthy and unhealthy habits, expressing feelings, and organization. Many students wrote statements within Strategies about organization and planning as their main coping skill to deal with the transition.

Healthy and unhealthy habits: Strategies that students describe varied from unhealthy habits to healthy coping strategies. Some students reported that they drank alcohol to cope with the transition. Here is one student's comment, one word: "Drinking" (SCE34). Other students shared about doing exercise or eating healthy: "Coffee and exercise" (SCE27).

Expressing feelings: Some students' strategies for dealing with the transition was to express their feelings. One student reported: "Crying myself to sleep" (SCC57) which highlights that transitions can be difficult and overwhelming.

Organization: Many students wrote about organization and planning. They shared about transferring skills they learned on co-op, like how to organize their time. Student SCE133 shared "My biggest coping skills were probably improved time management and organization that I picked up and developed while on co-op." (SCE133); "I used reminders and a schedule on my phone, as well as working with friends on homework to help me stay better motivated." (SCE123); "I started using a memo pad to remember what I need to get done." (SEE104); and "I tried to set up a routine that included class, study time, working out, and spending time with friends. I set up a lunch date with my friend for every Friday in order to make sure to keep up with friendship when life got hectic. It wasn't that difficult to stay motivated for classes. My routine and planned schedule really helped because once I had that locked down it was basically just momentum." (SBE172). These students explained that going on co-op assignments helped them develop organization skills they will need as professionals and how they utilized these new skills at the institution.

Students found strategies to cope with the transition to come back to the institution and finish their degree, but their comments highlight that these transitions can be difficult.

6.2.2 Situation

Situation comments were 29% of the coping statements. Some common sub-themes were that students seemed more stressed due to a break in coursework, had a hard time getting into a school and study routine, and were changing their priorities. One student talked about a different mindset required for school vs. their co-op assignment: "Just reminded myself that taking full class loads in college requires almost a 12 hour a day mentality" (SME35).

The student's quote speaks to how these different environments affect students during the transition.

Stressful: A consistent theme was stress. One student said they did not cope with the transition and just felt a lot of stress. They did seem to understand their situation: "I didn't have time to reasonably discern a way to cope with the transition. I had so much schoolwork to do that I just had to do it and feel extremely stressed. I didn't cope in many ways. I would lose my scholarship if I didn't go to class so that motivated me to go to class and do my work" (SCE215).

Routines: Students reported that their school and study routines were harder to maintain after going on co-op assignments. Some students wrote about how difficult it was to get back into a routine: "I would remind myself that the summer semester is only 10 weeks. I still have a hard time studying the same amount as I did pre-co-op" (SEE332).

Priorities: Students changed their priorities due to their experience on co-op assignments. Some students were not focused on grades anymore, or didn't see the relationship between what they were learning in the classroom and how it might pertain to their future jobs as engineers. One student talked about shifting priorities: "Remembering that I was most of the way through classes (I am in my 2nd to last semester) was a big motivator to keep going to class and keep up with work. At the same time, it was slightly hard to get motivated because after being on co-op I realized what skills are beneficial to me and realize that there is a huge amount of "on the job training" that is specific to the job. This training seems more beneficial than some of the class room training received. After having some engineering experience under my belt, I have found that I care a little less about GPA than before and am more concerned with learning everything I can while co-oping." (SBE137).

Another quote from the major theme Situation shows that there can be a cumulative effect of stress and priorities on students in these situations: "I care less now about GPA than before—not because of co-op placement but due to being burned out. The curriculum is intense. I just kept—and am currently—reminding myself that it's almost over, to hang in there/don't quit now" (SBE188).

6.2.3 Self

Self had 13% of students in the coping categories. Some of the sub-themes within Self were absenteeism, brute force, and enjoying school. The theme of absenteeism showed students lack motivation to attend classes after going on co-op assignments. The theme of brute force expressed the stress of students lack of motivation to attend classes and do homework, but students forced themselves to

attend class. And there was a group of students that miss the campus environment, enjoy school, and were motivated to attend class and do homework.

Absentee: Students wrote about not being able to motivate themselves to go to classes. One student's statement showed how they dealt with the transition without coping skills by missing class: "Honestly have been missing class a lot. Haven't really found coping skills" (SCE113).

Brute force: Students had comments about forcing themselves to attend class whether they felt like going or not. Some students talked about forcing themselves to go to classes and do coursework: "Knowing that I needed to whether I wanted to or not" (SCE147), and one student did not see themselves as having any choices: "I have no other choice" (SME150).

Enjoy school: A few students wrote about enjoying courses and the university environment more than their co-op assignments. Many female students seemed to enjoy the university environment more than their co-op assignment environment. This could be due to a hostile work environment, but no written comments showed *why* females liked the university more than their co-op assignment. Female students talked about liking school more than co-op assignments: "Didn't like my previous co-ops, so school was nice" (SBE226) and "I very much enjoy my time in classes as compared to spending a semester on co-op. Because of this, my motivation was mostly intrinsic." (SBE229) and "I went to every class. I was excited to be back because I really missed being on campus. Went to every class. I was excited to do homework" (SCE156).

6.2.4 Supports

Supports was the least written about major theme among engineering students returning from co-op assignments, at 10%. Sub-themes found in Supports were friends, counseling, and religion. Friends were the most common theme within Supports mentioned. Some students talked about counseling and a few students wrote about their religious faith as a Support to help them cope with the transition to the institution from co-op assignments.

Friends: Friends had the highest frequency in this category. Many students within Supports wrote about connecting with friends: "I made sure to spend a lot of time with friends/classmates to get myself acclimated to the university environment" (SBE48), and "I ate ice cream and hung out with friends" (SME261).

Counseling: Some students wrote about counseling and psychiatry as a way to cope with the transition. One student wrote: "I use the counseling center. In addition, I listen to music and make time for breaks to eat. These times relax me in between

study periods. I stay motivated by the fact that I will soon be back on co-op, then soon will graduate" (SEE127), and another student wrote: "Went to see a psychiatrist and took medication" (SCCE163).

Religion: Students also rely on their faith and religion to cope with the transition. Some students relied on their faith: "Faith and support of Christian community." (SME309) and "While it was obvious that immediate financial compensation was lost for the amount of work I was putting in, I still found motivation to do coursework. Part of it was telling myself that I wouldn't be able to go back to co-op if I did not do my classwork. Another part of my motivation was my Christian worldview. I realized that I should seek to be content in whatever situation God has placed me in. Not because of anything I had done, God gave me the gift of eternal life through Christ's death and resurrection. Out of that love and grace that was shown to me, I seek to give God glory in all that I do. I see every aspect of my life as an opportunity to worship God. Thus, I see completing my schoolwork as another opportunity to give glory to God, acknowledging and thanking God for giving me the mental fortitude and problem solving skills to be able to complete this work." (SBE171)

7. Discussion

Below, the discussion will cover the answers to the research questions from the results.

RQ1: What percentage of students have difficulty transitioning from co-op assignments to the institution?

The percentage of students that reported *difficult* transitions from co-op assignments to the institution was an average of 8% from the sample. Students reported *somewhat difficult* transitions at an average of 25%. *Somewhat difficult* and *difficult* transitions together were 33% of the sample, which represented over 100 students in the sample.

The engineering program matters in how easy the transition is for students. No civil engineering students reported having *difficult* transitions between co-op and the institution. Computer Engineering and Computer Science students had the highest percentage of students report the transition as *difficult*. Civil engineering was a predictor for *easy* in ease of transition. Civil engineering and female were significant predictors for *somewhat easy* in ease of transition.

Males are reporting the transition more difficult than females. Females report *somewhat easy* more than males, and males report *somewhat difficult* and *difficult* more than females. There could be many explanations as to why there is a difference, but

there is not much literature on the topic of transitioning back to the institution after co-op assignments. Some antidotal evidence suggests females may experience hostile work environments while on co-op and feel more comfortable at the institution.

RQ2: How long did students feel the time of transition from co-op assignments to the institution?

The most popular reported transition time was 1 to 2 weeks overall (39%). Students reporting 1 week or less and 3 to 4 weeks were pretty even (24%, 27%), and a small percentage of students reported 5 to 6 weeks' transition time (7.4%). There were no civil or industrial engineering majors that experienced the transition for 5 to 6 weeks. 20% of bioengineering students report 5 to 6 weeks' transition time. Electrical and computer engineering also had a high rate of students reporting 5 to 6 weeks' transition, at 13%. This might suggest that certain engineering programs are more equipped to deal with students on co-op assignments or have better planned courses to deal with students returning after co-op assignments.

RQ3: How are students coping with the transition from co-op assignments to the institution?

Students are coping with the transition through using *strategies*, talking about their *situation*, focusing on themselves (*self*), or using *supports*. Within the category of *strategies*, most students wrote about organization and planning. *Situation* had comments about stress, routines, and priorities. *Self* contained themes about not being able to attend courses, forcing themselves to attend class and do homework, and others commented on how much they enjoy school. *Supports* had many quotes about friends, and some students used counseling and religious faith.

Very few students are using supports to cope with the transition. Korte has shown that engineering graduates transition to their first job are successfully retained when they utilize social support [31]. Korte's research on engineering graduates shows how important socialization can be when going through transitions. There isn't a specific study on the transitions of students on co-op assignments, but Korte's research on *transitions* of engineering graduates is insightful.

Many students mentioned a strategy of some sort, some wrote about applying what they learned on their co-op assignment about planning and organization skills that was utilized to cope with the transition experience.

Overall, this work supports the findings from Gunderson, Bailey, Raelin, and Garrick, where they found 30% of their students were reporting difficulty going from co-op to the institution [7]. We

found that 33% of our sample reported *somewhat difficult* to *difficult* transitions from their co-op assignment to the institution.

Raelin et al. found that females used contextual support more than males when looking at predictive factors for retention [14]. Lichtenstein, Chen, Smith, and Maldonado found that female engineering undergraduate students took advantage of mentors more than male students [44]. This work suggests that female students transitioning may have support systems or took advantage of institutional support systems to help them cope with the transition more than male students.

The institution's co-op office does not currently offer any transitional programming for students coming back after their co-op assignments. Since the data was collected at a mandatory co-op program institution, there was a lot of feedback to the co-op director about what kind of programming would be helpful to students and how to offer it. There has not been any implementation of transitional coping programming at the institution as of the printing of this paper.

8. Limitations

This was an exploratory study, thus there were many limitations. A more thorough analysis using population data would be insightful. This study was done at a mandatory co-op assignments school, where every student is expected to do three co-op assignments before graduation. The results from this study are limited to this institution or institutions that are very similar. This study relied on volunteer survey responses and interviews, thus the results may be biased towards students that did not like their co-op assignment or had a difficult time during the transition to the institution. The survey was launched 8 weeks after students returned to the institution, and the results are based on students' memory from the beginning of the semester, which could either minimize or maximize the ease and time of transition.

9. Conclusions and future research

This study showed that many students have varying degrees of difficulty with transitioning back to campus after going on co-op assignments. This study answered a few broad questions about the transition from co-op assignments to the institution which no other study in engineering education had yet explored. This research advances the knowledge of students transitioning from co-op assignments to the institution by answering some fundamental questions about whether transitioning is something that students are having difficulty with and how they are coping with the transition.

Many students reported the transition being *easy* and *somewhat easy*, but 33% of students reported the transition *somewhat difficult* or *difficult*. The ease and time of transition was significant to students' engineering major. Ease of transition was significant to sex. Ease and time of transition were correlated. One engineering program, civil engineering, and sex (females) were predictors for a *somewhat easy* transition from co-op assignments to the institution. Civil engineering was also a predictor for *easy* transitions from co-op assignments to the institution.

Students do not have adequate coping skills for the transition to the institution. The majority of students are not relying on supports to help them. Many students are relying on a strategy but their strategies are not well planned or organized. Some students' strategies for coping with the transition could be harmful or even dangerous. Universities and cooperative educational offices should consider teaching some coping strategies and offer supports for students when they come back to campus or offer some additional resources for students that are having a difficult time.

More research is needed to find out why there is such a big difference between students' ease of transition and time of transition. There are certain programs that are easier for students to transition back to the institution. More research is needed on how and why one engineering major is easier for students' transition to the institution compared to other engineering majors, why females have an easier transition than males, why the time of transition is so variable for students, to investigate coping mechanisms for transitions, and within coping, to understand why students aren't using supports.

Acknowledgements—The authors would like to thank Mrs. Mary Andrade, Dr. Michael Loui, and IJEE reviewers. Thanks to Mrs. Andrade for her efforts and insight of students coming back from co-op assignments, helping collect data, and dedicated time to help investigate if students were really having transition issues from co-op assignments to the institution. Dr. Loui helped shape this manuscript with offering insight at the beginning with the first conference paper, reviewing the manuscript, and editing suggestions. Thank you to the anonymous reviewers for IJEE, for the insightful and helpful comments.

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Appendix A. Description of changes made in multiple iterations of surveys

	Survey 1–Fall 2016	Survey 2–Spring 2017	Survey 3–Summer 2017
Q3	Rate your ease of transition back into classes after the most recent co-op experience:	Describe how you felt during the transition between co-op and the University.	Describe how you felt during the transition after going on co-op and coming back to the University.
Q4	Why was it somewhat difficult/difficult to transition back to classes at the University?	How was your transition to classes after your most recent co-op experience?	No Change from Survey 2
Q4B-Added		Why was it somewhat difficult or difficult to transition back to classes at the University? Added a text option.	No Change from Survey 2
Q6	How long does the transitional experience last, meaning how long until you feel comfortable in the routine of classes at the University from doing the co-op?	How long until you felt comfortable in the routine of classes at the University after doing a co-op?	No Change from Survey 2
Q8	What coping skills did you use to help you transition back to the University?	What coping skills did you use to help you transition back to the University? Describe what you did to get yourself motivated to complete coursework, go to class, etc.	No Change from Survey 2

	Survey 1–Fall 2016	Survey 2–Spring 2017	Survey 3–Summer 2017
Q9	What resources did you use to help you transition back to the University?	What resources did you use to help you transition back to the University? Describe any school or outside help you used to get yourself motivated to attend classes and do homework.	No Change from Survey 2

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