

A Systems Approach to Examining Co-operative Education:  
A Case Study

by

Tracey Judene Pretti

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## **Examining Committee Membership**

The following served on the Examining Committee for this thesis. The decision of the Examining Committee is by majority vote.

External Examiner	Dr. Denise Jackson Associate Professor, School of Business and Law Director, Work-Integrated Learning
Supervisor	Dr. Frank Safayeni Professor, Management Sciences
Internal Member	Dr. Elizabeth Jewkes Professor, Management Sciences
Internal Member	Dr. Rob Duimering Associate Professor, Management Sciences
Internal-external Member	Dr. Nada Basir Assistant Professor, Conrad Centre for Business and Entrepreneurship

## **Author's Declaration**

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

## **Abstract**

Co-operative education (co-op) is a model of learning where students alternate between academic and work terms. Co-op offers potential benefits for three key stakeholder groups: students, employers and academic institutions. While the literature reveals a number of outcomes of co-op for each of the stakeholder groups, it has not examined how outcomes for multiple stakeholders are achieved simultaneously. That is, can students' and employers' goals for participation be balanced in such a way that they both benefit, and if so, how?

This research was based primarily on two theoretical contributions: Ashby's Law of Requisite Variety (1957) and Katz and Kahn's role-taking model (1978). The goal of this research was to examine the two key phases of co-op, the recruitment phase and the work term phase, to understand how variety is managed by students, employers and academic institutions. A mixed methods case study approach was used to examine a co-op system in depth using both qualitative and quantitative analysis. Data was captured from multiple sources and analyzed using thematic analysis as well as statistical techniques to understand how the objectives and actions of each of the stakeholder groups affected the others.

The findings revealed numerous ways that variety is managed in the co-op system. In the recruitment phase, variety was reduced for students and employers by providing an opportunity to assess one another for 'fit' and to set expectations for the role and the organization. In the work term phase, variety was balanced through the 1) assignment of tasks whose difficulty level matched the students' capabilities and 2) the provision of support to students aligned with the difficulty and importance of the task. The difficulty level of the task and the support provided to the student were found to be positively associated with students' reports of learning.

The use of a systems approach in examining co-operative education revealed a task classification model which can be leveraged by employers and academic institutions in balancing task assignment with

intended outcomes. Through this research, a systems model for co-operative education was developed which captures the key processes within the co-op system and the association between those processes outcomes for both students and employers.

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## **Dedication**

This thesis is dedicated to JJJJ,

Thank you for being part of this journey with me. Your steadfast love and support has meant the world to me. In the words of one of my favourite songs, “...I know I’ve grown, but I can’t wait to go home.....I’m on my way.” -E. Sheeran



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# Chapter 1 Introduction

Co-operative education is a model of learning that enables students to connect academic learning with workplace experiences. For students, co-operative education offers possibilities for enhancing learning and developing key employability outcomes. For employers, co-operative education offers benefits such as access to short-term labour supply and the ability to create a talent pipeline for their organizations. However, it is not clear under what circumstances these benefits for students and employers can be achieved simultaneously. The focus of this dissertation was to explore the processes in the co-operative education system that enable the collective achievement of goals for the three key stakeholder groups: students, employers and academic institutions.

## 1.1 Context for Research

Co-operative Education (co-op) students alternate time spent in an academic environment with time in paid employment in a relevant workplace setting during the completion of their academic program or degree (Cooperative Education and Work-Integrated Learning Canada, 2018). Co-op is one example of work-integrated learning (WIL) where WIL is an umbrella term for educational models where there is a partnership between an academic institution and a community or industry partner (Cooper, Orrell, Bowden, 2010). Examples of WIL include practicums, internships, apprenticeships, service learning, and co-op. A few of the defining characteristics of co-op as compared to other forms of WIL, based on the accreditation requirements of Co-operative Education and Work-Integrated Learning (CEWIL) Canada, include the student being paid for the work, the work being full-time, and the work and academic terms alternating such that the work terms represent at least 30% of the time for the degree completion (Co-operative Education and Work-Integrated Learning Canada, 2018).

The University of Cincinnati, in the United States, was the first post-secondary institution in North America to offer a co-operative education program. Started in 1906 by Herman Schneider, the primary

purpose of the program was to enhance student learning. Schneider felt that the best way for students to appreciate theory was through exposure to its practical application (Cates & Jones, 1999).

In 1957, the University of Waterloo was the first university in Canada to offer a co-operative education program. At that time, business leaders in the Waterloo region were concerned about the lack of engineering expertise and were intrigued by the co-operative education model that had been implemented in the United States. They felt that this kind of program was what was needed in the Kitchener-Waterloo area (Crichton, 2009). One of the key differences between Waterloo and its American counterparts was that the university itself was founded on the basis of the co-operative education model.

The successes at Waterloo and at various places in the United States led other universities to start co-op programs. In the late 1960s, early 1970s, with the rise of co-op in post-secondary education, a body of research emerged investigating a number of aspects of co-op from various stakeholder perspectives: the students, the employers and the institutions. Most research has focused on one of those three stakeholders.

Not too surprisingly, the majority of research that exists in this field is centred around outcomes for students. Theory referenced in the co-op literature is primarily drawn from the education field such as social learning theory (Bandura, 1977), situated learning theory (Lave & Wenger, 1991), and experiential learning theory (Kolb, 1984). Research in this area explores outcomes students derive from co-op, often in terms of academic, professional, and personal benefits. Findings include the fact that co-op promotes student engagement and enhances students' satisfaction with their post-secondary experience (Freudenberg, Brimble, & English, 2011; Harvey, Moon, Geall, & Bower, 1997; Patrick et al., 2008). Other findings indicate that co-op graduates develop career clarity by knowing what they do or do not want to pursue (Callanan & Benzing, 2004).

Research on labour market outcomes for co-op students has attracted the interest of post-secondary institutions and governments. Articles in the media about the unemployment rates of young people in Canada have been frequent in the past few years (Kolm, 2013; Ng, Lyons, & Schweitzer, 2017) drawing the attention of high school students considering post-secondary education and their parents. Those students and parents are looking to post-secondary institutions for assurances that the investment they make in higher education will reap the benefits they expect in post-graduation employment. Labour market outcomes research shows that students who participate in co-op programs find permanent employment faster (Darch, 1995; Downey, Kalbfleisch, & Truman, 2002; Goho & Rew, 2009; Walters & Zarifa, 2008) in a program related to their study (Peters, Sattler, & Kelland, 2014) and with higher earnings (Drysdale, Goyder, & Cardy 2009; Gault, Redington, & Schlager, 2000; Walters & Zarifa, 2008). Because of this, from an institutional perspective, co-op can be seen as a way to maintain or increase enrolment rates in a declining demographic group by appealing to the expectations of parents and students.

In Canada, there is currently a great deal of attention from government and industry towards the expansion of co-op and WIL opportunities for post-secondary students (Business Higher Education Roundtable, 2016; Royal Bank of Canada, 2018; The Premier's Highly Skilled Workforce Expert Panel, 2016). The Federal government has made work-integrated learning a key priority and with its 2019 budget announced an investment of almost \$800 million over the next five years. The government's goal is to develop capacity so that within 10 years all young Canadians who wish to pursue a WIL opportunity will be able to do so (Canadian House of Commons, 2019).

As interest in co-op and WIL programs grows, there is increasing pressure to find suitable work opportunities for students. In order to do so, additional employer partners need to be engaged. Handling growth is the one of the most significant challenges most co-op programs face. As such, understanding



the perspectives of organizations and why they do and do not participate in WIL programs is critical, and yet, there is very little research in this area.

The methodologies employed in studies with organizations typically involve surveys or interviews conducted with human resource professionals in large organizations who hire co-op students or with senior managers in smaller companies. Consequently, the findings tended to focus on cost-benefit outcomes of co-op at the organizational level. An example of the findings in these studies includes the connection between hiring co-op students and cost savings for full-time recruitment (Callanan & Benzing, 2004; Weisz, 2001). Pre-screening potential hires was the most common response by employers as to why they participate in university co-op programs (Sattler & Peters, 2012).

Few studies examine the perspectives of employers who are not currently active with co-op programs, as most of the research uses the current set of co-op employers as the population. One 2012 study used a purchased database of Ontario employers to survey organizations on their participation with WIL. Within their sample of 3,369 employers, 2,122 did not currently participate in any forms of WIL with post-secondary institutions. Those employers were asked whether they planned to offer WIL opportunities within the next two years and 31% answered in the affirmative. The top reason they planned to participate with WIL programs was to pre-screen potential new hires. For those who were not planning to offer WIL opportunities in their workplaces, the main reasons they cited was not having suitable work available (Sattler & Peters, 2012).

A study in Australia (Jackson, Rowbottom, Ferns, & McLaren, 2017), by four publicly-funded universities and their local chamber of commerce, investigated the perspectives of employers in relation to work-integrated learning and found similar results to the Ontario study. One of the biggest challenges for employers in taking WIL students was identifying suitable projects with 60% of the respondents indicating this was a challenge for them. Different than the Ontario study, however, one of the other

challenges that 60% of employers reported was locating a suitable student. The other two top reasons why the employers in the Australian study did not engage in WIL programs included not being approached by universities and concerns about their capacity to mentor/supervisor.

Studies that investigate the outcomes of co-op for students and employers separately do not sufficiently answer the questions posed for this dissertation. There is no research that sheds light on the question of *how* these potential student *and* employer outcomes are achieved simultaneously. Notably, when one examines the reasons why students and employers participate in co-op, the potential conflicts between their goals emerge. For example, there is a possible conflict between students who want work that will enable them to learn and develop new skills and employers who have specific labour needs and are hiring students to meet those needs. If too much time is required to train the students (e.g., to meet the students' goal of learning), then the efficiency of hiring students to meet labour needs may be lost. However, if students are only given tasks that they are already able to do (which minimizes the cost of training for the organization), then the students will not feel that they have the opportunity to learn. So the question is, can students' and employers' goals for participation in WIL be balanced such that they both benefit, and if so, how?

## **1.2 Focus and Scope**

Answering these research questions requires an in-depth exploration of the complete system of co-operative education including the roles played by students, employers, and post-secondary institutions. In co-operative education, there are two key phases, the recruitment phase and the work term phase. For students, the recruitment phase typically includes a job search process which may involve reviewing job postings, applying, and interviewing for jobs. For employers the recruitment phase includes submitting job postings, screening application packages, interviewing, and making offers of employment to students. At a high level, the main activity for the students during the work term is to accomplish the tasks they

have been given. During the work term phase, the main activities for the employer are assigning tasks and providing support to the students in the completion of those tasks. For the post-secondary institution, its role in both the recruitment and the work term phase is to facilitate the process and to support the students and employers in successful work terms.

For this research, a mixed-methods case study design was used to explore a co-operative education system of one academic institution and one employer organization. A mixed-methods case study approach was selected to enable the researcher to explore in depth the ways in which the stakeholders interact and the pressures they exert on one another. Case studies are useful because they enable the investigation of phenomenon within one context (Yin, 2003). Within the case study, a mixed-methods approach was taken to collect and analyze both qualitative and quantitative data as the two forms of data complement one another in providing a more complete description of the phenomenon being studied (Creswell, 2013).

The academic institution, University of Waterloo (UW), was selected because it is the school where the researcher works and studies, and also because it is considered a global leader in co-operative education. UW runs the largest co-op program of its kind in the world, supporting 21,000 full-time, paid work terms per year. The organization which will be referred to as Company A, was selected for three main reasons. One, it hires more than 100 co-op students per year from UW and has been hiring students for more than 10 years. Two, the ratings of student performance by supervisors at Company A are consistently strong, and the ratings provided by students of their experience at Company A are also consistently strong, which would suggest that the processes that Company A has developed to operate its co-op program are meeting the goals of both the organization and the students. Three, an interesting feature of Company A is that it has a reputation for a culture of continuous improvement and a focus on productivity. This provides a unique opportunity to explore how that culture influences the way it runs its

co-op program. All of these factors together made this organization particularly interesting to explore for this dissertation.

### **1.3 Terminologies**

The focus for this research will be on the co-operative education model as defined by CEWIL Canada. The words “work term” will be used to describe the period of full-time employment that a student undertakes, rather than “placement” which is commonly used in WIL literature because this is the term used by UW’s co-op program and the students and employers who participate in the co-op program. UW does not use the word ‘placement’ because it implies that that the students are passively ‘placed’ in an organization. UW feels it is important to convey to students the active role that they play in securing employment for their work terms through a competitive screening process. The term “employer” will be used rather than partner or host organization to acknowledge that, in this model of WIL, students are being paid for their time in the organization.

### **1.4 Research Questions**

The overriding research question for this dissertation is, what processes exist within the post-secondary institution and the employer organization that enable the collective achievement of student and employer goals through participation in co-operative education? More specifically, given there are two key phases of co-operative education, the recruitment phase and the work term itself, the research questions can be stated as:

1. How does the activity during the recruitment phase contribute to the achievement of goals for students and employers?
2. How do the key processes of the work term (task allocation and completion) contribute to the achievement of student and employer goals?

## **1.5 Relevance and Importance**

This research is expected to make a valuable contribution to the literature. One of the goals of this dissertation is to solve a theoretical problem and build on existing literature. Using a systems approach, this research examines how the, possibly competing, objectives of students and employers are balanced to result in benefit for both. While there is research that investigates the perspectives of students and employers separately, there is very little research that incorporates multiple stakeholder perspectives in WIL and even less that looks at how their perspectives interact. While research exists that describes the idea and importance of creating a ‘win-win’ for students and organizations, none examine the processes involved in achieving it. Another goal for this research is to propose a new understanding or way of thinking about how to balance the goals of students and organizations so that both perspectives are always considered. Developing a thorough understanding of how an organization has structured its co-op program to find the balance of meeting its own goals as well as the goals of its students will make a significant contribution to the ongoing discussion about how to increase the opportunities available to post-secondary students. The insights gained through this research may help organizations who currently offer co-op programs to identify ways that they can increase the benefit for students or themselves. The findings from this research may also help post-secondary institutions in working with organizations to provide a roadmap of how to establish co-op opportunities within their companies.

## **1.6 Overview of Dissertation**

This dissertation is organized in the following way. Chapter 1 introduces the problem being investigated, the research approach that has been taken, the organizations included in the case and the outline for the rest of the dissertation. Chapter 2 contains the literature review of relevant research areas including screening, selection and work task allocation, and support. The theoretical foundations for this dissertation are presented in Chapter 3 and centre on Ashby’s (1957) work with the concept of variety,

and Katz and Kahn's (1978) role-taking model. Chapter 4 presents the methodological approach for this research which is followed by Chapter 5 and 6 which include a description and analysis of the findings. Chapter 7 presents the theoretical model which synthesizes the findings from Chapter 5 and 6. The final chapter, Chapter 8, describes the conclusions and limitations of this dissertation as well as areas for future research.

## **Chapter 2 Literature Review**

The main research question, as described in Chapter 1, is what are the processes related to co-operative education and how do they enable the collective achievement of student and employer goals? This chapter will explore the existing theories and studies related to the two main phases of the co-operative education: the recruiting phase and the work term phase. The research referenced in this chapter will include work-integrated learning (WIL) related studies as well as studies from outside the WIL literature which shed light on key co-op processes for students, employers, and post-secondary institutions.

### **2.1 Scope for Literature Review**

Co-operative education is one form of work-integrated learning (WIL), an umbrella term that captures a variety of educational models that combine classroom and workplace learning (Cooper, Orrell, & Bowden, 2010). McRae and Johnston (2016) describe a framework for WIL that captures the commonalities and the distinguishing features of various models of WIL according to the goals, structural criteria, and primary outcomes of the model. The attributes that all models of work-integrated include are: experience in meaningful work, curricular integration, student outcomes and reflection. Examples of the structural criteria where variation exists between different models of WIL include whether the work is paid, full-time, and academic credit bearing.

The scope of this literature review was examining research on ‘work-integrated learning’ broadly, as well as two specific models of WIL: ‘cooperative education’ and ‘internships’. Other types of WIL, such as apprenticeships, practicums, and service learning were considered enough of a deviation from co-op on their structural criteria so not to be directly relevant for this research. For example, the full-time, paid nature of co-op has a significant impact on the processes in place and the goals of the students and employers (Jackson & Collings, 2018).

Henderson and Trede (2017) proposed a collaborative governance framework for WIL and highlighted the importance of engagement across stakeholder groups (academia, industry, and students) in offering WIL programs that lead to the desired learning outcomes for students. With respect to the processes that should be examined, the work of Khampirat and McRae (2016) and McRae, Pretti, and Church (2018) identify key phases for each work experience in the WIL/Co-op model. While the core of the WIL/Co-op activity occurs during the work experience where the student is located at an organization, the authors also describe a ‘pre-work term phase’ and a ‘post-work term phase’. A high-level description of what happens in each of those phases follows.

*Pre-work term:* student and employer preparation for work experience which may include job search activities for the students, and recruitment activities for the employer

*During work term:* student located with employer and assigned tasks to complete

*Post-work term:* evaluation of experience, positioning for next experience

For the purposes of this research, the activity before and during the work term are the main areas of interest. The evaluation of the experience will be considered in the context of how the experience was viewed by both the student and the employer. Research from outside the WIL literature was also examined where it related to specific processes involved in co-operative education. For example, literature was reviewed from the fields of organizational theory and industrial/organizational psychology as they describe theories and findings related to recruitment, newcomers and tasks.

## **2.2 Pre-Work Term – Preparation, Screening and Selection Phase**

There were three questions related to the pre-work term phase that provided focus for this section of the literature review which included:

1. What are the key activities or processes involved in the pre-work term phase?
2. What are the goals of this phase for the stakeholders?



3. How has activity in the pre-work term phase been measured or analyzed in the existing research?

### **2.2.1 Key Processes in Pre-Work Term Phase**

Literature that was identified in this area reveals three key activities occurring for students, employers, and universities during the pre-work term phase. Those include the ways that students are matched with employers, as well as student and employer preparation for the matching process and the work term.

### **2.2.2 Matching Students and Employers**

A review of the literature related to WIL programs and their processes captured a wide variety of ways that students and employers are matched for the work term/placement/internship.

A study in Australia, conducted through interviews and focus groups with 74 employers, reported a variety of ways that students and employers are matched depending on the organization and the different forms of WIL (Atkinson, Misko, & Stanwick, 2015). One of the findings from the research was that employers could benefit from a more structured screening and selection process.

Some WIL programs include a formal application and interviewing phase. Sandström and Johansson (2016) describe the matching process used in a Swedish co-op program as being “as close as possible to a regular recruitment process” (p. 89). Many Canadian co-op programs include a university-coordinated application and interview process which connects students with opportunities that organizations have to offer (Cormier & Drewery, 2017; Jones, 2013).

There are also several examples of WIL programs where the university determines the match of the student to a specific organization. This is the case in a co-operative education scholarship program in Australia where students are interviewed by an academic and an employer partner to be accepted into the WIL program, but the selection for placements is handled by the university (Neil-Smith, 2001). Williams

(2004) describes the recruitment process for a Sport Management internship and emphasizes the importance of understanding the goals of individual students and organizations in order to make the best match. In a U.S. study on internships, the argument was made that for internship programs where the match is done by the school, the organizations save money on recruitment efforts (Hayes & Travis, 1976).

### **2.2.3 Student Preparation**

As the matching process across different types of WIL and different institutions varies, the preparation of students going into a WIL experience also varies. The literature on student preparation describes programs and supports that institutions provide as well as the challenges that students face during this pre-work term phase.

Examples are given in the literature of ways that academic institutions work with students to prepare them for their work experiences. Those include preparation for the job search as well as preparation for the actual work term. For students who are going to be participating in a competitive job search process, many schools provide optional or mandatory programs which may include résumé and interview preparation. Research done by Coll, Lay and Zegwaard (2002) examined a mock interview intervention with students and found that the activity increased students' confidence and employment outcomes.

In another study, students' attributions for interview failure were examined. An experiment was conducted with co-op students where one group of participants was given attributional re-training (AR) and compared to a control group who were exposed to a generic communication workshop (Jackson, Hall, Rowe, & Daniels, 2009). The main idea of the study was to see if the attributions that students make about their interview failure could be reframed so to increase students' motivation to do better next time. The attitudes, behaviours and work term performance of the two groups was examined and the findings gave support for a number of the proposed hypotheses including increased interview success particularly for students with maladaptive baseline results.

#### **2.2.4 Challenges for Students**

The research identifies that the recruitment phase of co-op can be a stressful experience for students. Jones (2013) explored the experience of students undergoing their first co-op job search. Using Goffman's presentation of self in everyday life (1959) as the theoretical framework, Jones engaged with six co-op students in one-on-one interviews multiple times during their work term search. In these interviews, Jones explored various topics with them and encouraged them to take and share pictures that were meaningful to them and captured how they were feeling at various stages in the search process. Through this research she was able to identify examples in the words of the students of the anxiety, struggle, and moments of failure and success the participants shared with her.

Cormier and Drewery (2017) conducted a study that investigated co-op students' subjective well-being. Surveys were administered to 82 students before and after job match results were released and the study found that students' subjective well-being was affected by whether or not students had been matched with a co-op role. The connection between subjective well-being and employment outcome was moderated by students' sensitivity to rejection. A subsequent study examined two different interventions for the non-matched students to determine if short-term interventions could improve the students' subjective well-being. One intervention was a positive psychology writing task, the second was the use of a toolkit for coping with stress. Measures of subjective well-being were taken before and after the week-long treatment period. Students assigned to the writing task reported a statistically significant increase in their subjective well-being on the second survey as compared to those in the toolkit or control group (Drewery, Cormier, Pretti, & Church, 2019).

#### **2.2.5 Employer Preparation**

There are a few studies in literature that relate to the importance of employer preparation for the work term. Narayanan, Olk, & Fukami (2010) found that when employers defined the roles and the

projects for the internship and then identified students who had the necessary skill set, the internship was more effective. A study by Hite and Belizzi (1986) found that advance planning was critical to whether the internship led to positive results for students. Students reported a disappointing experience when standards were unclear and the expectations between the student and the organization were not understood. In another study, a number of past interns reported that providing structure (training, orientation, and expectations) was a specific area for improvement for employers (Rothman, 2007). The importance of the pre-work term phase in setting expectations for students and employers will be described further in section 2.2.6.1.

## **2.2.6 Goals of the Pre-Work Term Phase**

There are two key goals that emerge from the literature related to the purpose of the pre-work term phase. Those included setting expectations for students and employers and ensuring fit or alignment between the students and employers.

### *2.2.6.1 Setting Expectations*

Within the WIL literature there are a few studies that examine the role of setting expectations, particularly in the pre-work term phase and the impact that doing so has on outcomes of the work term. That said, a 2015 article reviewing the current state of WIL research suggests that there is need for more research in the area of understanding the impacts of clear expectations for all WIL stakeholders (Zegwaard, 2015).

Garavan and Murphy (2001), whose study will be described in more detail in section 2.3.1 of the literature review, identified the recruitment process as playing an important part in setting initial job expectations and reported that the main sources of information that students have for setting expectations are annual reports, brochures, and reports from other students who have worked in the company.

Plouff (2006) described two dimensions that were related to students' expectations prior to a co-op work experience and those were the how defined the expectations were, and how accurate they were. A study done by Waters and Gilstrap (2010) investigated the role that peers play in the pre-work term phase for interns. They found that the expectations of interns were shaped by conversations that they had with their peers and that the most commonly discussed topics were work-related issues, site opportunities, logistics, compensation, and the opportunity for career advancement. Work-related issues included general tasks, the importance of the assigned work and the positive and negative aspects of the work. The conversations students had about site opportunities were more general. Students asked each other about what companies were hiring, who their peers had worked for, or who they would be applying to. On the topic of compensation, often peers would discuss whether or not compensation was being offered for a particular internship. Career advancement was discussed with respect to whether they believed the internship would lead to future job opportunities. Interestingly, the researchers did not find that the peer-to-peer conversations included discussions of the interpersonal or social aspects of the internship.

A number of studies have found a connection between the expectations of students and the outcomes of the internship experience or post-graduation employment. Frederickson (2000) found that internships were more likely to be viewed as successful if the interns had realistic perceptions of the organizational culture. Similarly, Feldman and Weitz (1990) found that interns were more likely to have positive internship experiences if they had realistic and positive expectations going into the organization. Lastly a study conducted by Brown (1985) found that past participation in co-op led to more realistic expectations when they were hired by other organizations after graduation.

#### *2.2.6.2 Ensuring Fit and Alignment*

There are also several studies that examined the importance of ensuring fit, or alignment, between students and employers. Fit refers to the employer assessing the student based on the skills they possess

and the requirements of the role. Fit also refers to the employer assessing the student's behaviours or attitudes as they relate to the culture and philosophy of the organization. Furthermore, fit also refers to whether the students believe that they will be able to achieve their goals in a work term with this organization.

Narayanan et al. (2010) found that internships were more successful when the employer matched the skills needed for the job with the skills the student has. Another study found that employers were frustrated if the students that the university had assigned to them did not have the requisite technical skills (Atkinson, Misko & Stanwick, 2015).

Other studies identified the importance of the recruitment phase in being able to "screen-out" candidates whose values or attitudes are not seen as being compatible with the culture of the organization (Garavan & Murphy, 2001). In the literature this is often referred to as "Person-Organization Fit". Chatman (2011) describes person-organization fit from an interactionist perspective noting that to examine a fit one should not focus solely on the characteristics of the individual, nor solely the characteristics of the situation (organization), one needs to look at the interactional effect of the two together. In a study investigating supervisors' views on factors that contribute to a positive work term experience for them, Pretti, Drewery, and Nevison (2016) found that person-organization fit was a key factor related to the successful outcomes of the work term. In the case of a good fit, positive outcomes were more likely. In the case of a poor fit, it was more likely to result in a negative experience for the supervisor.

Ensuring a good fit of skills and attitudes was one of the findings of a study by Fleming and Pretti (in press) who investigated the impact that students have on the workplace. Employers reported that students changed the way that the team functioned, in most cases in a positive way, through contributions to both a team's workload but also to the workplace environment with their energy, enthusiasm, and new

ideas. The suggestions by supervisors to achieve positive outcomes included careful recruitment of students and planning tasks that are at the right level for the student.

No literature was found that examined the students' perspective on assessing the fit or making decisions about compatibility of goals. However, a study by Swider, Zimmerman, and Barrick (2015) examined the person-organization (PO) fit perceptions of applicants over the full recruitment phase while they were exploring multiple options for employment to understand the development of perceptions of fit over time and how much their perceptions of fit affected their employment decisions. They found that the stronger and more differentiated the candidate's perception of PO fit over the course of the recruitment phase, the stronger the connection to their final job choice.

### **2.2.7 Analysis and Measurement**

Two studies provide insight on analysis and measurement of the recruitment process. Three key stages, and opportunities for measurement were identified in a study by Swider et al. (2015). Those stages were one, generating suitable applicants; two, maintaining interest of applicants through the recruitment process; and three, influencing the job choice decisions. A study analyzing the cost-benefit of hiring was conducted by Hayes and Travis (1976) who used three different measures to examine the recruitment process: efficiency ratio (job offers per number of candidates interviewed), acceptance ratio (job offers accepted as related to job offers made), recruiting yield (persons hired as related to the number of candidates interviewed). While the study is from some time ago, the measures used are still relevant as a way of describing the effectiveness of the hiring process.

## **2.3 Work Term Phase**

In this section, research that relates to the activities during the work term will be examined. The literature highlights a number of areas to consider with respect to what happens during the work term. Those areas include the socialization/orientation process, task allocation processes (for supervisors), and

task completion processes (for students). Students accomplish tasks using a task-related social structure, which includes the individuals within the organization that the student relies on to complete their tasks. While this is not an exhaustive list of activities that may occur during a work term, these will be the areas of focus for this literature review.

### 2.3.1 Socialization

Socialization is described as the “process by which an individual comes to appreciate the values, abilities, expected behaviors, and social knowledge essential for assuming an organizational role and for participating as an organizational member” (Louis, 1980, p. 229-230). Research undertaken in this area highlights both the processes of the organization and the behaviours of the newcomer during the socialization process. Research also explores what the newcomer learns during his/her socialization into the organization. Process-related research includes Van Mannen and Schein’s (1979) six dimensions that together describe the approach an organization takes to the socialization process for newcomers as shown in Table 2.1.

<b>Dimensions for the Structure of Organizational Socialization</b>	<b>Brief Description of Dimension</b>
Collective vs Individual	Whether the initial training/socialization exercises are set up for a group of newcomers or individually
Formal vs Informal	Whether there is a structure for the socialization activities for the newcomer
Sequential vs Random	Whether there is a series of identifiable steps leading to the target role
Fixed vs Variable	Whether there is a specific time frame for the socialization process
Serial vs Disjunctive	Whether there are experienced employees in similar roles to the one that the newcomer will assume, who are available to support/mentor the newcomer during socialization
Investiture vs Divestiture	Whether the organization accepts and encourages the uniqueness of the newcomer (investiture) or whether the organization, through the socialization process strips away individual characteristics in favour of a desired state of being.

*Table 2.1: Structure of Organizational Socialization Process*

Other research has explored the actions of the newcomer themselves in the socialization process. In contrast to the studies that look at what organizations do to socialize the newcomer, other researchers have



investigated the proactive socialization tactics that newcomers use to adapt to their new workplaces which include proactive behaviours such as seeking feedback and information (Ashford & Black, 1996; Gruman, Saks, & Zweig, 2006; Morrison, 2002).

A number of studies have examined what is learned by the newcomer during the socialization process and how it is connected to work-related outcomes. For example, Ostroff and Kozlowski (1992) studied the role of information acquisition in a study on socialization of newcomers. They found that there were differences in the ways that information was acquired and the specific outcomes that were achieved. For example, observation and experimentation were more important methods of information acquisition related to task and role mastery, while getting information from supervisors and co-workers was more closely linked with positive outcomes such as satisfaction, commitment, and feelings of adjustment.

Co-op students are not typical newcomers to an organization. Students will be a part of the company for a relatively short period of time and there is a pre-established end date for their employment. That said, their socialization into the organization is an important part of the experience for the students and the organization, and there have been a few studies done within the WIL literature that demonstrate similar patterns and relationships to the socialization process and experiences of full-time employees.

Two qualitative studies, one done by Garavan and Murphy (2001), and another by Plouff (2006) examined the work term socialization process for Engineering co-op students. In Garavan and Murphy's study they found that the closer the expectations of the newcomer to reality, in particular when the newcomer anticipates the norms of the organization, the easier the socialization process. Through their research they identified a number of themes that were related to a positive socialization process for the students which included systematic orientation, initial job assignments, role of the supervisor, and degree of social support available. Plouff developed a five-stage model of the socialization process for co-op students which describes the socialization activities as well as their long-term impacts. The five stages

include: pre-entry, match-making for co-op, entry for the co-op position, match-making for post-graduation, and accelerated entry for post-graduation.

A quantitative study related to the socialization processes of co-op students investigated how the proactive socialization behaviours of co-op students was connected to socialization within the team (team socialization) and performance towards the goals of the team (team performance). Through multiple linear regression with a sample of 2,905 co-op students, it was found that team socialization mediated the relationship between proactive behaviours and team performance (Pennaforde, 2016). The researcher notes that, as with previous research that used work-performance and socialization scales, the reliability of the scales is relatively low. Pennaforde suggests that a qualitative investigation of these concepts within WIL studies would be useful to further the theoretical understanding of the connection between these concepts.

The connection of mentorship to the socialization process for newcomers appears in multiple studies. A study by Clutterbuck and Devine (1987) found that there was a positive impact of mentorship in the socialization process for students. Porter, Lawler & Hackman (1975) describe the value of organizations delegating responsibility for socialization of the newcomer to specific individuals. The importance of mentorship in the socialization of co-op students was also one of the themes identified in research done by Nevison and Pretti (2016).

Narayanan, Olk, and Fukami (2010) point out in their research that the contextual factors, such as the size and resources of the employer play a significant part in many aspects of the set-up of an internship. For example, larger organizations may have centralized processes and clear procedures for managing the internship which smaller organizations may not have.

### **2.3.2 Tasks**

Given the short-term nature of co-op work terms, any formal socialization processes tend to be relatively brief and soon after the student arrives, they are given tasks to complete. The work that students

are given is a core aspect of the work term experience for both students and organizations. While there are many references to students completing ‘work’ during their work terms, the literature provides little description of what those tasks are. In this section, key theories and studies from organizational behaviour and industrial/organizational psychology related to tasks will be described, as well as a few studies that were found in the WIL literature.

### **2.3.3 Task Characteristics**

An important contribution in the study of the characteristics of jobs and their relation to employee outcomes such as satisfaction, productivity and reduced absenteeism is the Hackman and Oldham’s Job Characteristics Model (1976). The job characteristics model stemmed from earlier work undertaken by Hackman and Lawler (1971) and Turner and Lawrence (1965), and includes five job characteristics that are expected to contribute to employee motivation and subsequent work-related outcomes. The characteristics include: skill variety, task identity, task significance, autonomy, and job-based feedback. Skill variety is defined as the degree to which the job involves a number of different activities that use a number of different skills. Their job characteristics theory claims that a higher levels of these dimensions within a job lead to positive psychological states for employees such as meaningfulness, sense of responsibility and knowledge of the results which then lead to outcomes such as job satisfaction, increased productivity and lower absenteeism. Numerous studies have tested the job characteristics theory and while some have found support for some of the relationships proposed by the theory, others have not (Fried & Ferris, 1987; Humphrey, Nahrgang, & Morgeson 2007; Kiggundu, 1983; Kopelman, 1985, Taber & Taylor, 1990).

In a study conducted by Rothman (2003), Hackman and Oldham’s job characteristics model (1976) was applied in research on internships where the researcher found that several factors affected the satisfaction of interns and those included: clear and challenging tasks, ongoing feedback, and exposure to

different parts of the business. They also found that the results of the study with interns were consistent to results from studies with permanent employees.

Within the contingency theory of organizations, Perrow proposed concepts of task analyzability and task variability (1967). For Perrow, the way in which tasks or work was completed is considered its technology. He proposes two dimensions of the task, its analyzability and its variability. Analyzability is the degree to which the steps involved in the task can be described whereas the variability is the number of exceptions that are experienced in doing the work. These two independent constructs create four different categories for tasks that Perrow labels: routine technology (high analyzability, low variability), engineering technology (high analyzability, high variability), craft technology (low analyzability, low variability), and non-routine technology (low analyzability, high variability). Studies that have investigated the ways in which the structure of the organization must match its classification of technology according to its analyzability and variability and found that the greater the number of exceptions, the more flexible the structure needs to be whereas analyzable technologies are best suited to centralized structures (Perrow, 1967) such as the mechanistic structure (Burns & Stalker, 1961).

Rowe (2017) synthesized job characteristics research from industrial/organization psychology, and, in particular, the work of Tesluk and Jacobs (1998) and Quiñones, Ford, and Teachout (1995). Rowe's synthesis led to the development of a 3-dimensional model to classify the work that WIL students do during work terms and its connection to immediate and secondary outcomes. The model includes a number of the dimensions proposed by Quinones and colleagues and Tesluk and Jacobs, removes some characteristics that are not as relevant for non-permanent employees and adds a new dimension related to the type of WIL being examined. The dimensions in the Rowe model include level of specificity (task, job, organization, and career), measurement (number, time, relation to program, timing, and type), and version (co-op, practicum, internship, etc.). The dimension of specificity, describes the level with which

one is examining the experience and how the work, at that level, contributes to outcomes such as performance. Rowe notes that in the Quinones et al. study “experience at the task level is a better predictor of future performance than at the job level, and therefore, more likely to predict outcomes” (p. 9). Rowe goes further to comment that research at the task level is not something that is typically undertaken by WIL researchers. On the dimension of measurement, the level of specificity can be described in various measurement terms as listed above, for example, outcomes might be related to how many different tasks were performed (number), or may be related to the length of time to complete a task. Rowe suggests that this model may be useful in classifying the work experience of WIL students so that research results linking different types of WIL to specific outcomes can be interpreted on the basis of the various dimensions of the work that the student experienced.

A couple of the studies discuss the level of initial tasks assigned to students. Edleson (1991) found that a challenging first task appeared to better prepare students for subsequent tasks. Whereas, in a study conducted by Plouff (2006) he found that one tactic of employers was to initially assign simple projects which served to test the students’ skills or fill time until more significant tasks could be assigned.

The National Association of Colleges and Employers in the United States produces an annual report on internships and co-ops based on a survey with their employer members. The 2017 study investigated employers’ practices with co-op and internships where on the topic of tasks given to students, employers reported three main categories of work: project management and problem solving/analytics tasks, communication and logistics tasks, and administrative/clerical work. Over the past nine years, employers have reported that students have spent over 50% of their time on the project management/problem solving tasks, 33% of their time on communication/logistics tasks, and approximately 10% of their time on administrative/clerical work with minimal time spent on non-essential tasks (NACE, 2017). While it is useful to know what portion of time was spent on various types of tasks, there are a number of problems

with this research. One, the specific questions that employers are asked are not shared, how the categories are described or defined, or whether the person completing the survey knows what tasks were assigned to students. Another challenge in interpreting the data is understanding how the participants accounted for the fact that they may hire multiple students in multiple departments, and presumably, the tasks assigned would vary from one role and one department to the next.

#### **2.3.4 Student Perspectives on Tasks**

Students' perspectives related to tasks are highlighted in a few studies. Garavan and Murphy (2001), found that matching initial tasks to the skills of the student was important to build their confidence. In exploring students expectations compared to their experience, they found the biggest gap between students' expectations and reality was the job responsibilities.

A study investigating students' favourite and least favourite aspects of their internship revealed both positive and negative perspectives of the work they were given. Of the positive findings, 38.5% were associated with tasks given where students appreciated being able to use their skills, having a variety of tasks, having flexibility or autonomy in their job, and the work itself being enjoyable. On the negative side, about 32% of the students' responses related to the work they were given with 21% reporting low quality of tasks, 6% reporting not having enough work to do, and 5% reporting no authentic and challenging projects (Rothman, 2003).

Another study by Rothman (2007) investigated students' responses to suggestions that they would give their past internship employer for improvements. There were a number of ways that students felt internships could be improved, but related to tasks specifically, students reported wanting tasks that would challenge them, give them opportunities to learn, and enable them to contribute to the organization.

There were only a few studies that investigated the direct connection between the tasks given to students and the outcomes of the experience for students, but one study found that a number of

characteristics of the work experience, including job characteristics, contributed to the satisfaction of the intern (D'abate, Youndt & Wenzel, 2009). In a study by Jackson (2017), students reported a number of work-related characteristics that were connected to their development of pre-professional identity including exposure to challenging situations, and having tasks that enabled autonomy and accountability, but also team-based tasks where students could interact with co-workers and customers.

### **2.3.5 Employer Perspectives on Tasks**

A number of studies examined the employer's perspective on tasks given to students and the added value for their organization.

While tasks given to WIL students was not the focus of the study by Jackson et al (2017), it was one of the themes that emerged through the analysis of surveys and focus groups with employers. Employers noted that identifying suitable projects for WIL students was both a challenge for those who participated in WIL, and a barrier for employers who did not participate in WIL. One of the recommendations that arose from employer focus groups was that universities could highlight to potential employers the value of WIL students in completing delayed or shelved projects. This finding is consistent with a WIL study undertaken in Ontario that found that the top reason for employers not participating in WIL was the absence of suitable work (Sattler & Peters, 2012).

In a couple of studies, employers shared their thoughts on student expectations regarding the tasks they are given. In one study, employers indicated that it is important for students to realize that it is not likely that every aspect of a co-op position will be ideal (Laycock, Herman, & Lactz, 1990). Another study suggested that "students should be prepared to undertake a balance of both meaningful and routine tasks with equal enthusiasm." (Williams, 2004, p. 31).

### **2.3.6 Task-Related Social Structure**

In addition to the research that sheds light on aspects related to the tasks that are assigned to students, there are also a number of theories and studies related to the social structure that newcomers become a part of in the workplace. For the purposes of this study and literature review, the focus will be on the social networks that students use to accomplish the tasks they are given. An effective task-related social structure is dynamic in that the student adapts to the social structure and the social structure adapts to the student. In the research on organizations, there are a number of theories, theoretical concepts, and research studies that shed light on the ways that tasks are accomplished through interactions. This section will describe relevant theories and studies found within the WIL literature that focus on the interactions of students with others in the workplace in order to complete their tasks.

Task interdependence is one way to think about how the students' tasks are connected to others in the workplace. Thompson (1967) classified the interactions between units within organizations, or task interdependence, in three main types: pooled, sequential, and reciprocal interdependence. In pooled interdependence there is no direct connection between the units but they are both affected through the actions and decisions of a central unit. If the interdependence is sequential it means that input for one unit is dependent on the output of another unit. With reciprocal interdependence, the units are mutually dependent on one another. The organizational structures that best align with different types of interdependence have been studied. The low degree of interdependence in pooled interdependence is most effectively supported with rules and procedures. Sequential interdependence is most effectively supported in a structure with planned coordination, whereas reciprocal interdependence is most effectively supported by mutual adjustment, where the units adapt to one another in the processes of moving towards their respective goals.

Kiggundu (1981) presents an analysis of studies in the management literature that describe and measure task interdependence and, based on that synthesis, he proposes task interdependence as a



multidimensional concept consisting of scope, resources, and criticality. For scope, Kiggundu identifies three ways that the studies quantified the scope of task interdependence: number of contacts with others, the percentage of tasks that are dependent on others doing their job, and the time spent with the interdependent contacts. Kiggundu describes the resources dimension as the degree to which the interdependence between roles was based on giving and receiving resources and Kiggundu further describes criticality as the degree to which the interdependence of one person's role with other people's roles is critical for their performance.

Hackman and Oldham's Job Characteristics Model (JCM) does not include the notion of task interdependence while Kiggundu (1981) argues that it should. In particular, Kiggundu differentiates between initiated task interdependence and received task interdependence. In the case of initiated task interdependence, employees are connected to others because they have delegated partial or complete responsibility as opposed to received task interdependence where someone else has delegated partial or complete responsibility to the employee. Kiggundu proposes the inclusion of initiated task interdependence in the JCM and suggests that, along with job autonomy, it will positively contribute to the employee's psychological state of "experienced responsibility" (p. 503). He also proposes that received task interdependence will be negatively related to personal outcomes. Like some of the studies on Hackman and Oldham's original JCM mentioned earlier, the results of Kiggundu's study were mixed. Support was found for the positive contribution of initiated task interdependence, but received task interdependence was not linked to negative outcomes for the employee (Kiggundu, 1983).

Morgenson and Humphrey (2006) built on the work of Hackman and Oldham, Kiggundu and others, to develop a Work Design Questionnaire. They define four main categories of motivational characteristics of work which include task characteristics, knowledge characteristics, social characteristics, and contextual characteristics. Each of those categories has a number of sub-dimensions. The five task

characteristics align with the Hackman and Oldham (1976) job characteristics: autonomy, task variety, task significance, task identity, and feedback from the job. Within the knowledge characteristics category are five sub-dimensions: job complexity, information processing, problem solving, skill variety, and specialization. The four sub-dimensions of the social characteristics include: social support, interdependence, interaction outside the organization, and feedback from others. Lastly, the category of contextual characteristics includes the sub-dimensions: ergonomics, physical demands, work conditions, and equipment use.

Lave and Wenger (1991) proposed a theory of situated learning that suggests that to understand learning, one must look at the situational context where the learning occurs. The theory identifies roles within a social system including newcomers, experienced members and old-timers, and labels the full group of participants a *community of practice*. They propose that learning for the newcomer occurs through *legitimate peripheral participation*. *Legitimate* is used to describe the work that newcomers are involved with that directly contributes to the goals and overall objectives of the community of practice. *Peripheral* highlights that the work of the newcomers is lower risk, less critical work than the work done by the experienced members. *Participation* indicates that the newcomers are actively involved, not simply observing. As learning occurs, the newcomer moves from peripheral to more central, fuller participation. This theory has been used in a number of co-op studies, as a way to describe the experience of the student's socialization and learning in the workplace (Fleming, 2015; Marchioro, Ryan, & Perkins, 2014; Nevison & Pretti, 2016; Richmond, Richards, & Britt, 2015).

Another example of the use of situated learning theory in the WIL literature is a study which investigated the impact of co-op students on the workplaces they join (Fleming & Pretti, in press). In this study, there were several ways that the authors' results were consistent with situated learning theory such as the student being given legitimate tasks, the student having a sense of belonging to a community of

practice, and over time the student feeling more confident about their ability to contribute. The researchers also identified an area not addressed by situated learning theory. The theory focuses on how the newcomer adapts to and becomes part of the existing workplace while not recognizing that the newcomer may, in fact, change or influence the community of practice. This study revealed three key ways that students' presence changed the community of practice including 1) supervisors or co-workers thought differently about their practice as a result of explaining it to the student, 2) students suggested ideas for doing things differently and, 3) a positive change in the workplace culture or dynamics because of the student's energy and enthusiasm, as well as the teams feeling a certain degree of pressure to create a positive environment for the student.

Another theory that has been referenced within co-op and WIL literature is activity theory. The ideas originated with Soviet psychologists, Vygotsky and Leont'ev, but it is the Western extension of the ideas by Engeström (2001) that has been applied by WIL researchers. The concepts in activity theory are quite broad and general, as depicted in Figure 2.1, is a descriptive framework rather than a predictive theory. The activity, as depicted, shows the interplay between the various parts of a system. As an example, the co-op student could be considered the *subject* of the activity and their role could be considered the *object*. The *rules* could be the constraints within the workplace, where the *community* is the set of individuals within the workplace who interact with the student in relation to their role. The *division of labour* could be the ways that the tasks are divided between the community and the student. The *activity system* then describes how these various components interact to achieve the outcome of a successful work term. While it is possible to describe the work term according to these labels, it becomes increasingly complicated to think about what the many double-directed arrows represent (Figure 2.1).

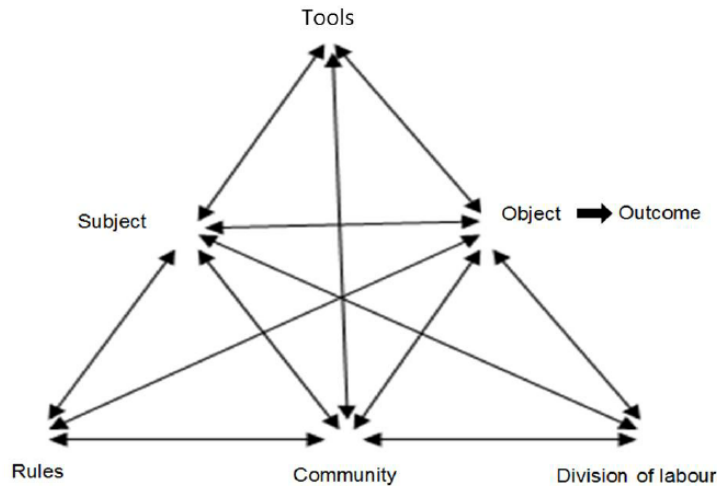


Figure 2.1: Activity System, Engeström, 1987

McRae (2014) applied the activity theory framework in her exploration of students' learning through co-op work terms. She used the concept of an activity to examine the characteristics or conditions that were associated with descriptions of transformative learning that students reported experiencing during their work terms. In examining the transcripts of interviews with students, supervisors, and co-op advisors, McRae mapped the conditions that occurred when examples of transformative learning were ascribed to the various components of an activity system (e.g., community, tools, rules, and division of labour). Through the use of the activity theory framework, McRae was able to identify and label conditions for transformative learning for students in co-op which included opportunities for learning, a supportive environment, student capabilities, and assessment and reflection practices. Additionally, McRae was able to identify conditions that did not fit in the activity model and suggested an extension of the framework to include an element of time and emotion related to the activity.

A number of WIL studies examined various aspects of the student/supervisor or student/co-worker relationship. A study with interns working in legislative offices in New York found that interns with a wider range of activities were more satisfied with their experiences. However, the most significant factor

that affected the experience of the intern was the way they were treated by their co-workers (Stonecash, Pecorella, & Winegar, 1988).

Jackson (2015) conducted a study to investigate students' perceptions of the ways that skill development occurs through WIL opportunities. Students were asked a range of questions which included the types of activities and location (classroom, workplace) that supported skill development during WIL as well as the people who assisted the student in skill development. Students, using a constant-sum rating, reported supervisors were the most important source of support with an average of 37.8%, followed by 'other employees' in the workplace at 25.7%. This highlights the value students place on the members in the workplace as contributing towards their development.

A study conducted by Major and Kozlowski (1997) investigated the proactive information seeking behaviour of co-op students as it related to task interdependence, accessibility of co-workers, and self-efficacy. They found that students with low self-efficacy had higher reports of proactive behaviour when tasks were high in interdependence and the accessibility of co-workers was also high. The researchers suggested that a possible explanation for the results was that students with low-self efficacy are anxious that they may not be successful, so when co-workers are available, they are more likely to seek out those interactions.

A longitudinal study on recent graduates done by Major, Kozlowski, Chao, and Gardner (1995) examined the effects of role development on the connection between socialization and unmet expectations. The researchers found that higher quality relationships with supervisors and team members, measured through the constructs of leader-member exchange (LMX) and team-member exchange (TMX), could moderate the negative impact of unmet expectations of the newcomers.

## 2.4 Summary

In this chapter a wide range of literature within and outside the study of work-integrated learning has been reviewed as it pertains to the research questions of interest: what processes exist within the recruitment and work term phase of co-op and how might those processes enable students and employers to collectively achieve positive results?

Within the recruitment phase there was not much research that described the processes involved in matching students with employers. However, it was suggested that across different forms of WIL there are several different ways that students are matched with employers including: both competitive and non-competitive processes, university-coordinated matching, and the student being responsible for securing their own employment. With respect to the key goals of the recruitment phase, two key aspects were identified: 1) the importance of setting expectations and, 2) assessing fit for both the student and employer. Studies showed that a mismatch in expectations or fit can have negative consequences for both students and employers. Lastly, studies revealed ways that measures have been applied to the activity during the recruitment phase including the use of ratios, for example, applications to interviewees to offers to positions filled.

Research related to the work term phase was considered in three main areas: socialization, task allocation, and task completion through a social structure. A significant amount of research has been undertaken around organizational behaviour related to the socialization of newcomers that spans both the activities that the organization undertakes to bring a new employee 'on board' as well as the behaviours of the newcomer as he/she proactively seeks to be integrated into the workplace. A number of the studies reviewed in this chapter, both within and outside the context of WIL, point towards the importance of the socialization process in ensuring key outcomes of performance and satisfaction are achieved.

The type of work assigned to the co-op student is a key component of whether students and employers achieve positive outcomes through the work term and a number of theories and studies within

and outside the WIL literature were useful for understanding more about tasks. Two different models of task characteristics were described, the Job Characteristics Model (Hackman & Oldham, 1976) and the Model of Work Experience for WIL (Rowe, 2017). Both models highlight the importance of task dimensions when conducting research related to the work students are doing. In the studies that investigated tasks and their relation to student outcomes such as learning and satisfaction, a number of dimensions were identified including the degree of challenge having a number of different tasks, the level of autonomy or flexibility in their job, and the opportunity to learn and contribute. From the employer perspective, studies reported that one of the challenges to participating in WIL was identifying suitable projects, with employers noting that it is important for students to expect a mix of meaningful as well as routine tasks.

In the workplace, students are part of a dynamic task-related social structure that enables them to accomplish the tasks they have been given. A number of theories and studies were presented in this chapter that describe the ways that these social structures work and how they can be studied. Whether the social structure was explained by task interdependence, a community of practice, or as part of the activity system, all the studies described in this chapter highlight the importance of the social structure for the newcomer, in terms of supervisor support as well as the support of co-workers and mentors.

There are a few conclusions to draw from the literature reviewed in this chapter. Firstly, within the WIL literature there is little research that investigates the perspectives of employers and students during the recruitment phase and the impact it has on outcomes. There is also little research that specifically examines WIL from the employer perspective, where the research that has been undertaken tends to examine WIL from a fairly high-level. While a few studies were found within the WIL literature that examined how the tasks that were assigned to students were associated with outcomes for students, no studies were found that examined how the nature of the assigned tasks affected WIL outcomes for both

students and employers. The theories, models, and studies examined from the fields of organizational behaviour and industrial/organizational psychology propose a number of characteristics of work and their associated outcomes. The studies that have tested these theories have been mostly quantitative in nature and have had mixed results as to whether they found support for the theory. Lastly, with respect to the social structure within organizations that students use to complete their tasks, the theories and studies presented in this chapter provide some ideas about how to examine those relationships.



## **Chapter 3 Theoretical Foundation and Proposed Conceptual Model**

The previous two chapters have laid the groundwork for this dissertation. In Chapter 1, the research problem was identified along with a brief background on co-operative education (co-op) as an educational model of work-integrated learning. In Chapter 2, the existing literature related to the two phases of co-op (recruitment and the work term) was presented. This literature review identified key concepts that are relevant to understanding what processes exist within co-op, and how those processes might contribute to the collective achievement of goals for students and employers. Main ideas related to the recruitment phase included assessing fit and setting expectations in the recruitment phase. With respect to the work term phase, the literature highlighted particular characteristics of tasks assigned, the interdependency of students' tasks, and the support network that students use to complete those tasks.

This chapter will explore how the individual concepts related to specific aspects of the two phases might be connected by examining co-operative education using a systems approach. Following the description of two specific contributions of systems theory, this chapter will use those theories as a lens through which the research questions for this dissertation are examined and to develop a set of propositions and a conceptual model for describing co-operative education as a dynamic system.

### **3.1 Systems Theory**

Systems theory emerged as an interdisciplinary theory in the 1940s when a number of theorists from a variety of backgrounds (e.g., biology, technology, sociology, ecology) observed the challenges facing society and recognized that new approaches were going to be required in the advancement of knowledge (Boulding, 1956). These theorists observed that as disciplines advanced and became more specialized, there was less collaboration between fields. In part this was because each discipline had developed its own language of operation, not necessarily accessible to those outside the field. The viewpoint of those involved in establishing a general systems theory was that there were patterns that could be abstracted and

identified that were applicable across multiple fields/disciplines. By identifying and applying those patterns, one could gain a better understanding of the world around us. Theorists noted, however, in making a theory more generally applicable, it may lose its usefulness. That is, in the extreme, if something applies to everything, then it says nothing. Therefore, the goal for the development of systems theory was to strike a balance between being applicable across multiple domains and yet useful at the same time (Boulding, 1968).

### **3.1.1 Cybernetics and the Conceptual Notion of Variety**

One field within the study of systems that is important for this research is cybernetics. Theories within cybernetics are focused on control and communication, and demonstrate how controls within the system respond and adapt to environmental pressures while still producing the desired outcome (Wiener, 1954). While the application to co-op may not be immediately obvious, the goal of this research was to understand how the various stakeholders respond to the pressures from one another and how those pressures impact stakeholder outcomes. Cybernetics principles have been applied in many contexts including: biology (Kampis, 1991), organizational effectiveness (Beer, 1974; Head, 2001), engineering contexts including flexible manufacturing systems (Scala, 1995), and just-in-time manufacturing systems (Duimering & Safayeni, 1991; Tucker, 1992). Specifically, the field of cybernetics provides language that was useful to define the co-op work term conceptually, and was useful in the practical investigation of the two phases of co-op: the recruitment phase and the work term phase.

One of the theories referenced within the field of cybernetics is Ashby's Law of Requisite Variety (Ashby, 1957). A precise definition of Ashby's concept of variety is that it represents the total number of possible states of a system. Ashby's law states that a system can only be stable, that is, produce desirable results, if the number of states of its control system is greater than or equal to the number of states in the external environment of the control system. Ashby describes the system as having "requisite" variety if

the control system is able to handle, or absorb, the variety in its external environment. To remain stable, a system needs to either reduce the variety in its external environment or match the external variety with internal variety.

There are a couple of reasons why Ashby's concept of variety is somewhat confusing at first glance. One, variety is a commonly used English word and Ashby's definition of variety is related to, but somewhat different than, the typical use of the word. Another reason that Ashby's concept of variety is confusing is because the same term is used to describe both the disturbance from the environment and the response within the control system. To distinguish between those two types of variety, in this dissertation, they will be referenced as "disturbance variety" and "response variety". Examples will be presented to illustrate Ashby's concept of variety, followed by a description of its application to studying systems, and then, its usefulness for examining co-operative education as a system.

To illustrate Ashby's concept of variety, consider an adult teaching a child to catch a ball. In this example, the child is the 'system'. The ball being thrown by the adult towards the child represents disturbance variety to the child. If the child has the capability of catching the ball in the way it was thrown, then she possesses the requisite response variety within her control system to produce desirable results, that is, she will catch the ball. As the child gets better at catching the ball, the adult may adjust the way the ball is being thrown to increase the disturbance variety for the child. As the child learns how to catch the ball being thrown in multiple ways, the child develops additional response variety to handle the disturbance variety represented by the throwing of the ball.

Another example that illustrates Ashby's concept of variety is the difference between how customers are managed in different types of retail situations, for example, a grocery store versus a car dealership. In a grocery store, the store manages the disturbance variety that customers represent (i.e., the things they have come to buy) through the organization of its products. That is, the response variety of the grocery

store is to organize and label aisles and shelves in such a way that customers can find the products they are looking for. This is contrasted with how the customer's disturbance variety is handled in the case of buying a new car. When a customer walks into a dealership looking to buy a new car, typically, one specific person is immediately designated to help that customer, that is, to manage the disturbance variety of the person. That salesperson, if they are knowledgeable about the cars for sale, has the response variety to answer the questions of the customer about a range of cars and options available. In this situation, the disturbance variety of the customer is handled by the response variety of the salesperson who provides one-to-one support. In both cases, the system remains stable if the customer leaves satisfied, having found what they were looking for.

The applicability of Ashby's concept of variety is quite extensive and numerous examples exist of how variety has been used to describe what is happening within many different types of systems. Within an organization, one can think of variety at a macro level where the organization needs to develop response variety in order to match the disturbance variety in its external environment. For a mobile phone company, if the customer trend is to want phones with larger screens or longer battery life (disturbance variety), then the organization needs to respond to that by offering products (response variety) that meet the customers' needs. One can also consider variety at the level of individual employees and the requests (disturbance variety) that they might receive from others in the organization that need to be handled (response variety).

A study conducted in the field of new product development examined the concept of variety by applying a social network analysis of helpful and unhelpful behaviours between people and the departments/individuals with whom they interacted in their roles (Safayeni et. al, 2008). By calculating an interaction effectiveness ratio of helpful to unhelpful behaviours, the researchers were able to examine the disturbance and response variety that each of the units were creating and absorbing for one another. One of the findings was that the marketing team was seen as generating more variety than the engineering

team could absorb by regularly adding to the requirements for the new product based on consultations with potential customers (Safayeni et al., 2008).

While various theoretical laws exist in scientific and mathematical fields, there are very few laws that social scientists can draw on, and as such, Ashby's law, which has been applied in a number of fields, provides a strong conceptual foundation for this research.

There are a number of ways that the concept of variety is useful for the study of the co-op education system for this research. Variety provides a language to describe and examine the impact of the co-op student on the workplace as a system. Of interest are the control systems and response variety that organizations have developed to handle the disturbance variety generated through their participation with a co-op program as well as the response variety that students possess (in terms of skills and previous experiences) and apply in their work terms. Additionally, the concept of variety is useful in describing the experience of the co-op student. For many students, one of their goals in co-op is to be exposed to workplaces and tasks that offer them the opportunity to learn and develop new skills. Just as the child learning to catch the ball, the growth of the student can be described as their development of response variety. The student, who initially represents a degree of disturbance variety for the organization and the team, has the potential through the control systems of the organization to ultimately contribute to the response variety of the team and organization.

As mentioned previously, the term 'variety' to describe cybernetic systems can result in confusion because of its relation to the common use of the word 'variety' in the English and because of its use to describe both the disturbance to a system and the response from a system. However, it is a powerful concept when one wants to investigate the mechanisms within a system and how they respond to disturbance variety in pursuit of a stable system. For this particular research, many of the key concepts identified in the literature review can be described in terms of variety. For example, in the recruitment

phase, organizations select students based on perceived skill and fit with the culture of the organization. In doing so, the organization is reducing the disturbance variety of the student who will come to work with them. That is, the disturbance variety for the workplace supervisor will likely be much lower with a student who has been screened and selected than one who was randomly assigned. Another example of the application of variety to the co-op system is the level of the tasks assigned to students. Tasks represent disturbance variety to the students, but the question is whether they have the response variety to handle the tasks. The value of applying the concept of variety to study co-operative education as a system is that it takes the constructs (goals, expectations, learning, tasks, interactions) up to a level of abstraction where the terms can be examined using the same language. This gives a new view on how the entire system is operating and sheds light on how balance within the system might be achieved.

### **3.1.2 Role Taking as a Variety Control System**

A key activity that needs to be explored for this research is understanding how tasks are assigned to, and accomplished by, students during their work terms. A theoretical contribution which proves useful for that aspect of the research is the Role Taking Model provided by Katz and Kahn (1978). Katz and Kahn's Role Taking Model has two labels for members of the organization, the *role senders* and the *focal person*. In addition, there are three contextual elements: *organizational factors*, *attributes of the person* and *interpersonal factors* which impact the interactions between the role senders and the focal person. In terms of the discussion of variety within a system, the model of factors involved in role-taking illustrated in Figure 3.1 can be thought of as a way to regulate variety with the dynamic system (organization).

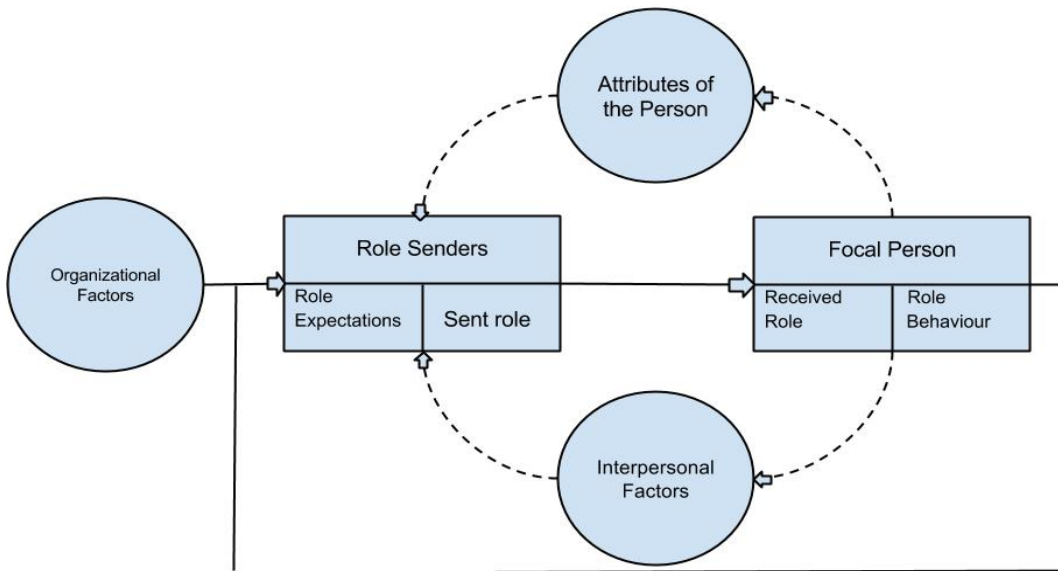


Figure 3.1: Theoretical Role Taking Model, Katz & Kahn, 1978

For each person in the organization (focal person), there exist others in the organization (at least one) who rely on the focal person, referred to by Katz and Kahn (1978) as the *role senders*. Because the performance of the focal person impacts the role sender in some way, the role senders have expectations and communicate those expectations to the focal person, through what Katz and Kahn call the *sent role*. Using the lens of variety, the sent role is an attempt by the role sender to reduce the variety for, and from, the focal person. An instance of an interaction between the role sender and focal person is referred to as a *role episode*.

The expectations of the role sender include specific responsibilities or tasks as well as expectations for certain attitudes. While there may be a common set of expectations that a role sender has for the role that the focal person occupies, their expectations are modified based on the individual that occupies the role. Specifically, Katz and Kahn (1978) propose that expectations are shaped through previous interactions with the individual focal person as represented by the arrows, and the attributes *of the person* and *interpersonal factors* circles, seen in Figure 3.1. As the role sender has more experience with the focal person, the variety the focal person represents to the role sender is reduced. Additionally, the model

suggests that expectations are shaped by organizational factors, such as size, structure, and policies. In terms of variety, those organizational factors reduce the disturbance variety for all members of the organization by providing constraints on decisions and behaviours.

As mentioned, the role senders communicate their expectations through a sent role. The communication skills of the role sender are a key element in whether there is a successful translation of expectations into a sent role. In addition to conveying information, the sent role also influences the focal person to behave in a way that would meet the role sender's expectations. The success of the communication between the role sender and the focal person will affect whether disturbance variety is reduced for the focal person, that is, they have a clear understanding of what is expected, or whether disturbance variety is increased and the focal person is more confused than clear on what needs to be done.

The focal person in Katz and Kahn's (1978) model receives the role from the role sender. Applying the idea of variety, the received role may reduce the variety of the focal person because the received role provides information about the expectations of the role sender with respect to the work to be done. On the other hand, disturbance variety might not be reduced if the focal person is not able to interpret the expectations in the sent role. It is important to note that the received role is what has been perceived to be sent by the role sender and does not necessarily match what was sent. A number of issues can take place between role sent and role received. The attributes of the focal person and their perception of the role sender, in combination with the organization setting itself, will affect how the message received and understood.

As a collective, the role senders, who rely on a focal person, represent the focal person's *role set*, according to Katz and Kahn (1978) and depicted as a star network in Figure 3.2. Given the fact that the focal person is receiving multiple sent roles, the combination of received role and role behaviour is complex. In fact, there are likely competing or conflicting messages, known as role conflict, from multiple



role senders (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964). Studies have shown that role conflict is negatively associated with organizational commitment and job satisfaction (Jackson & Schuler, 1985). Members of the role set may also be creating disturbance variety for the focal person by providing unclear instructions. Some individuals in the role set may also reduce disturbance variety for the focal person through instructions or assistance. The focal person exhibits *role behaviour* based on synthesizing and prioritizing a great deal of information including the organizational context, the relationships established with the various role senders, and their own preferences, motivations, and capabilities. In addition to studies that investigated the impact of role conflict, the Katz and Kahn model has been used to investigate role ambiguity. Role ambiguity occurs when the focal person is not certain what is and what is not a component of their role. Studies have shown that role ambiguity is negatively associated with workplace performance (Tubre & Collins, 2000).

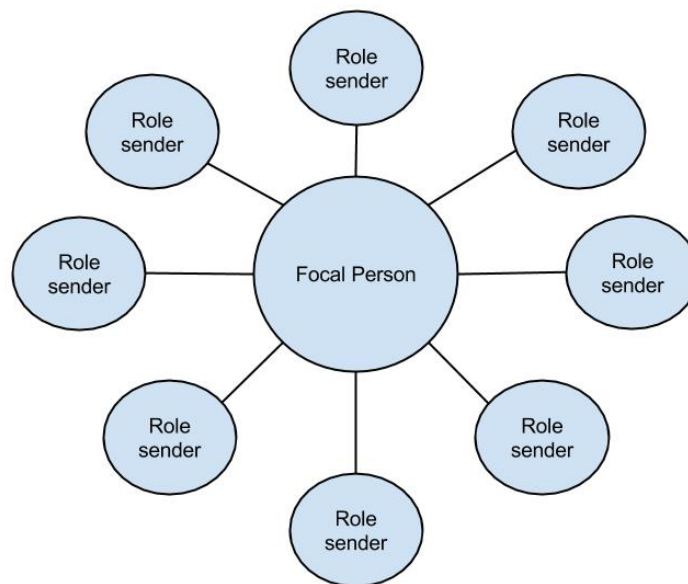


Figure 3.2: Star Network of Role Set for Focal Person

While not explicit in the Katz and Kahn (1978) description of the role set, another idea to examine within the context of role taking is the interdependence of roles. Building on the definitions of task

interdependence discussed in Section 2.3.6, role interdependence, for this dissertation, will be defined as the size of the focal person's role set, combined with the frequency and duration of those interactions. The role of the focal person could be described to be highly interdependent if they have a high number of people in their role set and a high number of interactions with those people. Conversely, the focal person's role would have low interdependence with a small role set and fewer interactions with them. Examining the interdependence of roles is useful in conjunction with the concept of variety, as each member of the role set is generating or handling variety for the focal person.

Learning is another concept that is not explicitly described by Katz and Kahn related to this model, but an examination of what is being portrayed in the dynamic role-taking model reveals that learning is a core part of the model. The feedback loop from the role performance of the focal person to the role sender who adjusts expectations is an example of learning. The role sender learns, through the performance of the focal person whether expectations have been met or whether expectations may need to be re-communicated or adjusted. The focal person is also learning by interpreting the sent-role and performing actions as a result. Fewer messages between the role sender and focal person might indicate that learning has occurred.

The role taking model as a regulator of variety provides a useful foundation to explore the relationship between the co-op student, their supervisor and others in the unit or workplace where the student is employed. The focus for this research centers around understanding the processes that develop in order to manage co-op programs. The concept of variety, role taking, and interdependence discussed here will provide a basic understanding and language for describing, and analyzing the co-op system for the three key stakeholder groups: students, employers, and the university.

### 3.2 Variety, Role Taking and the Dynamic System of Co-operative Education

Co-op as a model of workplace learning is a complex system of multiple interacting stakeholders, the three most significant stakeholders being post-secondary institutions, students, and employers, as shown in Figure 3.3. As was mentioned in Chapter 1, each of the three stakeholder groups has different goals for their participation in co-op. In this section, the theoretical contributions of variety and role-taking will be applied to the context of the two phases of co-op: recruitment and the work term.

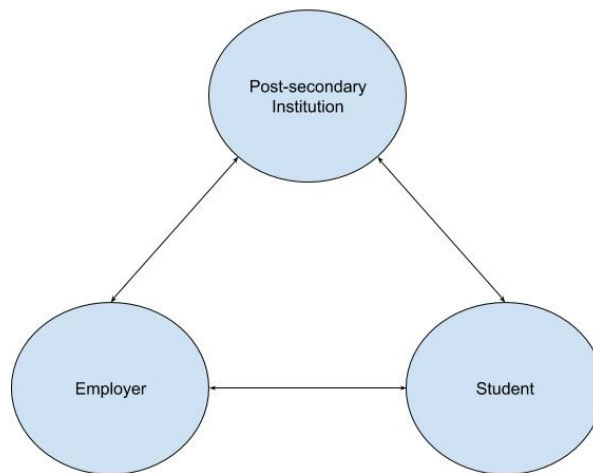


Figure 3.3: Interacting Systems in Co-op

#### 3.2.1 Variety During the Screening and Selection Phase

At the University of Waterloo (UW), the post-secondary institution co-op program that is the focus of this dissertation, the screening/selection phase starts approximately four months before the work term begins. During this time, job advertisements are submitted by employers and viewed by students. Students submit application packages for roles in which they are interested. Employers review applications and select candidates to interview. After the interview process, employers rank the students they wish to employ and students rank the roles for which they have been interviewed. An automated matching process occurs that takes, as input, the rankings of the employers and students, and produces a set of matches which represent employed students and filled roles. There is one main round of interviews that lasts

between four and five weeks which is followed by a number of shorter 1-week rounds that last until the exam period starts for students.

There is significant variety generated for each of these three stakeholders during the screening/selection process as shown in Figure 3.4. Interestingly, there is a desire by all three groups for a large amount of disturbance variety. Most employers are interested in accessing a large pool of candidates. Most students are interested in viewing a large number of potential roles from a wide range of organizations. As a result, the post-secondary institution is interested in recruiting a large number of students to the co-op program and a large number of employers with available positions.

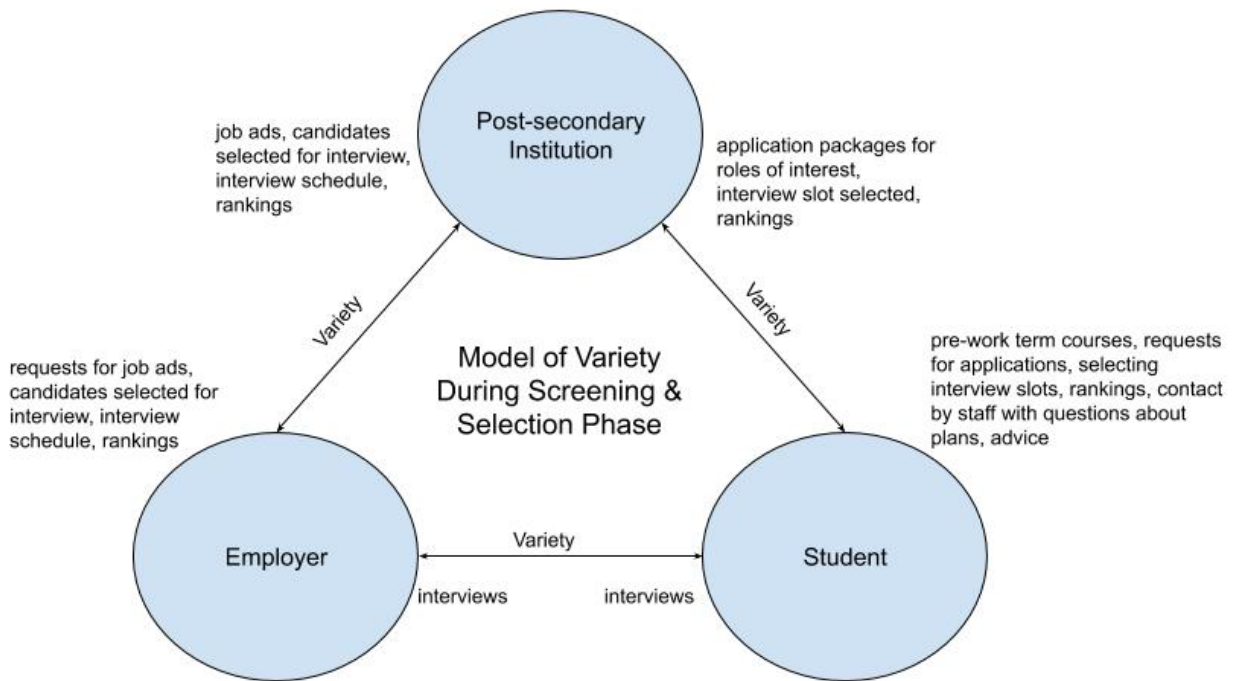


Figure 3.4: Model of Variety During Screening and Selection Process

While students would like to see a large number of positions and employers would like to see a large number of applicants, in actual fact, they also want control systems to handle the disturbance variety. They need information about one another and tools that enable them to filter job advertisements (in the case of students) and application packages (in the case of employers). This need for information generates

disturbance variety for each of the three stakeholders. The organizations need to provide information about themselves and the roles that they offer in a specific way so that it can be effectively searched/sorted. Similarly, students need to provide information about themselves and their suitability/interest in the roles offered by organizations so that those details can be effectively searched and sorted. The post-secondary institution needs to provide a system that allows for the submission of this information and the searching and filtering tools for the employers and the students.

### **3.2.2 Variety During the Work Term**

The work term itself is typically defined as the four-month period when the matched student is employed in an organization. Typically, the student relocates and works full-time with the employer. The disturbance and response variety for each of the three is depicted in Figure 3.5. The disturbance variety generated by the post-secondary institution for the employers and the students is relatively low during this phase. There are two main activities of the post-secondary institution during this time. One is to support the student and the supervisor if any issues arise on the work term (e.g., student reports issues in the workplace, supervisor reports student not meeting expectations, etc.). This should be viewed by the organization and student as response variety to help them manage any difficulties they are having in the term. The other main activity is to support and assess the learning of the student. Supervisors are required to complete a performance evaluation form at the end of the work term and students are required to complete professional development courses and work term reports. These requirements are designed to support the development of response variety for students in becoming increasingly effective in the workplace, however, these requirements may be seen by organizations and students as disturbance variety that needs to be handled. Contact is also made with employers and students at least once during the work term to monitor how the work term is progressing. Meetings are sometimes scheduled with students or employers to talk about issues relevant to that specific term or the co-op program in general.

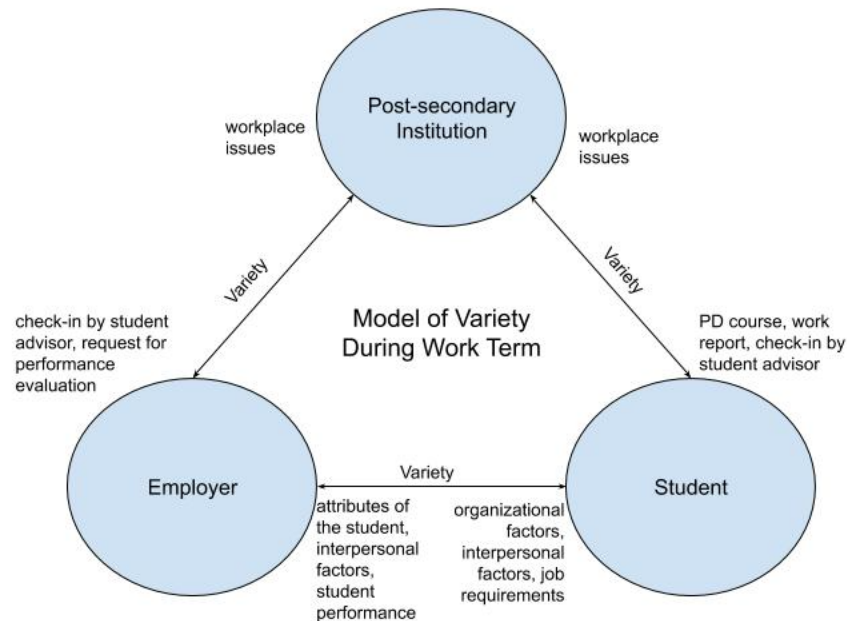


Figure 3.5: Model of Variety During Work Term

Examining the disturbance and response variety between students and employers during the work term was a key area of focus for this research. While many employers hope that they will find talented students who want to return to their organization for another work term and/or after graduation, they realize that for many of their co-op students, they will have only four months with them. It follows then that organizations who are looking for students to contribute in a meaningful way during the four month term need to determine how to balance what the student can contribute with the time involved in training and supporting them. In essence, the organization wants to minimize the disturbance variety of the student and maximize the response variety that the student contributes. Employers have taken one step towards minimizing the student's disturbance variety by participating in a screening and selection process through which they have identified a student that they believe possesses the skills and attitudes to be successful within their organization. When the work term begins the organization needs to identify a set of tasks that they believe the student can do. Through those tasks, they hope that the results achieved by the student will be greater than the investment of time in training/support, and money in salary for the student.

Students, on the other hand, typically want to be given tasks that stretch their existing abilities. That is, they want tasks that enable them to develop additional response variety. This conflict, between the assumed desire of organizations to minimize the disturbance variety the student represents and the students' desire to be challenged, generates an interesting situation for investigation.

### **3.3 Research Questions and Propositions**

Based on the theoretical foundations of variety and role taking and its application to co-operative education as a system, this section will present the research questions and propositions for this investigation. The research questions are:

***Research Question 1) How, if at all, does the recruitment phase contribute to the management of variety within the co-op system?***

***Research Question 2) How can variety be managed during the work term to enable both students and employers to benefit from the experience?***

For the recruitment phase, there are two aspects of variety management to be considered: 1) the balancing of variety between the hiring organization and the academic institution to manage the logistics of recruiting a student and, 2) the reduction of disturbance variety for supervisors and students through the recruitment phase.

Figure 3.4 shows the variety between the hiring organization and the academic institution during the recruitment phase. If the processes within and between these two stakeholder groups are not able to effectively manage the variety required to make the system work, then the relationship is unlikely to continue. That is, if the academic institution is not able to handle or adjust to the disturbance variety of the organization, then the organization will need to adapt its processes or discontinue its hiring of co-op students from this academic institution. On the other side, if the hiring organization is not able to handle or adjust to the disturbance variety of the academic institution, then academic institution will need to decide if they will continue to work with that hiring organization.

***Proposition 1) Disturbance variety needs to be effectively managed by the hiring organization and the academic institution during the recruitment phase so that the process is sustainable for both the organization and the academic institution.***

The literature describes two main ways that disturbance variety is reduced for students and supervisors during the recruitment phase: 1) assessing each other for fit, and 2) setting expectations. The participation of employers in reviewing applications and conducting interviews enables them to better assess candidates based on what they believe is needed to be successful in their organization. The more successful the employer is at determining the potential fit of a student related to the organizations' culture and skill-related needs, the less disturbance variety that will be generated for the organization during the student's term with the organization. If there is a mismatch of skills or attitudes between the needs of the organization and the student, it is possible that the disturbance variety generated for the organization will outweigh the potential benefits of hiring a student and also possible that the term will not result in positive outcomes for the organization or the student. The second area where disturbance variety is reduced through the recruitment phase is in setting expectations for what the matched student will be able to do. Having an idea of what the student will be able to do reduces the disturbance variety to the organization when the student arrives.

For students, participating in the recruitment phase involves reviewing job advertisements of various companies and participating in interviews. During those activities, students assess the potential fit of what the company has to offer to what they hope to gain and they make decisions about what companies to apply for and how they rank their preferences. Through this process students are reducing the disturbance variety of roles that they do not believe will enable them to achieve their goals. Also through this process, the students receive information from potential organizations, through job ads and information provided in the interview process, about what it will be like to work at a particular company. This activity helps students develop expectations about the work term which reduces the disturbance variety of the student when they arrive for the work term.



***Proposition 2) The reduction of student and employer disturbance variety during the recruitment phase increases the likelihood of positive outcomes for students and hiring organizations.***

Beyond the recruitment phase, the next question to examine is how variety can be balanced during the work term to enable students and employers to benefit? There are two areas that will be explored in answering this question. One, how do employers select tasks for students such that both the organization and the student can benefit? Two, how do support networks that students use in completing their tasks balance the variety in the system?

Of the possible characteristics of tasks identified in the literature review (Hackman & Oldham, 1976; Kiggundu, 1983; Rowe, 2017), two emerge as particularly relevant to the idea of minimizing students' disturbance variety and maximizing their response variety. Those are the complexity of the task and the urgency of the task. A third characteristic, interdependence, is also key to examining student tasks and is connected to both the complexity of the task and the urgency of the task.

### **3.3.1 Complexity**

The complexity of the task given to the student is particularly relevant in considering how to balance the student and employer perspective. Complexity, for the purposes of this research is defined as being relative to the students' capabilities. That is, a task of low complexity for one student, may be a high complexity task for another student. What is under investigation for this research with respect to tasks is the degree to which the task presents a challenge for the student to learn and grow and the degree to which there is a need for the organization to provide support to the student in completing the task. That means, the complexity of the task needs to be considered in relation to the student's existing capabilities.

Students want to be given tasks where they can apply the skills they have and continue to learn and develop. They do not want a role that only involves trivial tasks they can easily do. On the other hand, as the complexity of the task increases, the cost to the employer increases as they need to provide additional

training and support if they want to increase the likelihood that the student is successful. These ideas lead to three propositions for this research.

***Proposition 3) For the system to be balanced, in terms of variety handling, the majority of tasks assigned to the student need to be “at” the student’s level.***

***Proposition 4a) When the majority of tasks given to the student are “at” or “above” the student’s level, the work term is more likely to result in positive outcomes for the student.***

***Proposition 4b) When the majority of tasks given to the student are “below” or “at” the student’s level, the work term is more likely to result in positive outcomes for the supervisor.***

### **3.3.2 Interdependence**

The literature review in Section 2.3.6 highlighted different ways that the interdependence of tasks can be defined and measured. For the purposes of this study, interdependence will be defined as the key interactions and time spent with co-workers or supervisors in the completion of students’ tasks. The interdependence of students’ tasks, the degree to which students rely on others in order to complete their work, is connected to both the complexity of the tasks they are given and the urgency of those tasks as will be described below.

### **3.3.3 Main Activity Versus Peripheral Tasks**

Organizations may assign tasks to students that support to the day-to-day operation, which will be called ‘main activity’ tasks, or they may give students tasks related to past or future-oriented activities which will be called ‘peripheral’ tasks. Giving students tasks that contribute to the ongoing day-to-day operation of the team or organization means that the student is contributing response variety to tasks that need to be done, and need to be done in the current time frame. Students’ successful completion of main activity tasks is a positive outcome for students and employers. For the employer, the students are accomplishing work that needs to be done. For students, they are contributing to the main work of the organization. However, as the complexity of a main activity task assigned to a student increases, there is

a higher probability that students will need help or make mistakes which will increase the disturbance variety for those working with the student. The disturbance variety from the student needing help or making a mistake will exist for the students' co-workers because there will be pressure for the task to be done correctly since it is a task that needs to be completed, and needs to be completed in the current time frame.

In contrast to urgency of main activity tasks, peripheral tasks assigned to students may be related to the past (e.g., tasks that others in the organization just have not had a chance to start), or may be future-oriented (e.g., tasks that the organization needs to complete at some point in the future), or ideas that the organization would like the student to explore for future consideration. Just as with main activity tasks, as the complexity of these tasks increases, the student will likely need support, but the impact of a mistake and therefore, the pressure for co-workers to help the student will be less since the task is not a part of the day-to-day work.

***Proposition 5: For the variety in the system to be balanced, students require task-related support. The amount of support students need is relative to level of the task (Prop. 5a) and the type of the task (Prop. 5b).***

***Proposition 6a: When a student receives a moderate to high level of support, the work term is more likely to result in positive outcomes for the student.***

***Proposition 6b: When a student receives a low to moderate level of support, the work term is more likely to result in positive outcomes for the supervisor.***

***Proposition 6c: When the task-related support provided to students matches the needs of the student, based on the level and the type of the task, variety in the system is balanced and is more likely to produce positive outcomes for students and supervisors.***

### **3.4 Conceptual Model**

The model shown in Figure 3.6 captures the phases under examination and the propositions associated within the dynamic system of co-operative education.

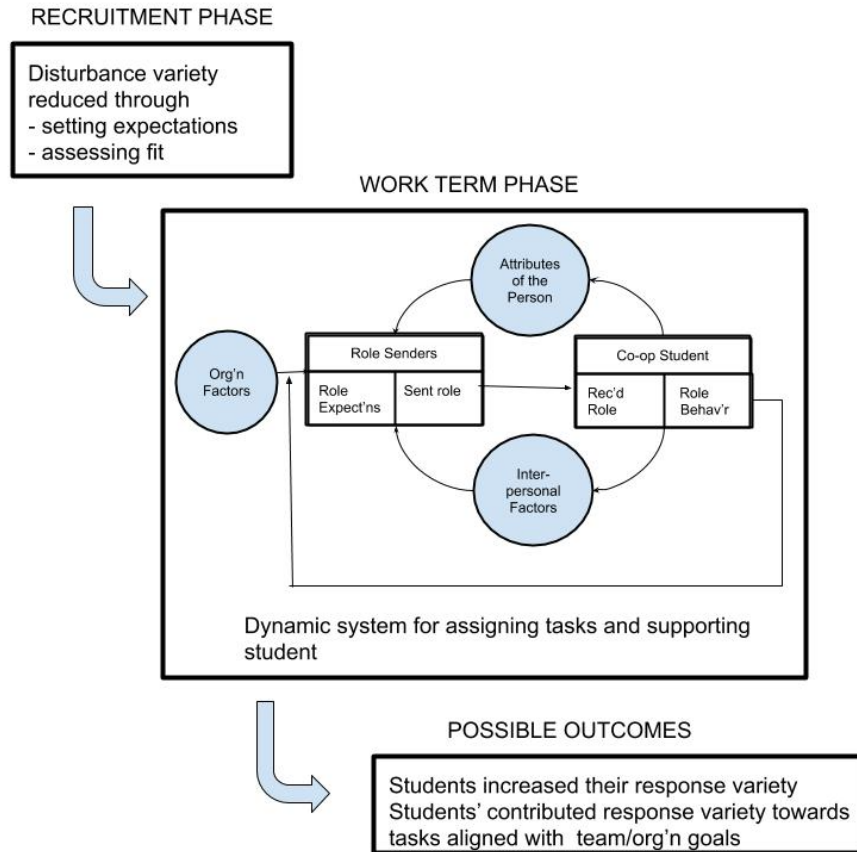


Figure 3.6: Dynamic System of Co-operative Education Model

### 3.5 Summary

In this chapter, two theoretical contributions from systems theory were presented and explored. The first was the concept of variety, as described by Ashby (1957) and the second was the role-taking model proposed by Katz and Kahn (1978). The combination of Ashby's concept of variety and Katz and Kahn's role-taking model provides a useful way of studying co-operative education as a dynamic but stable system potentially capable of producing positive outcomes for both students and employers. These outcomes are produced through three main processes:

1. the reduction of disturbance variety for both students and employers during the recruitment phase,
2. the level of the majority of tasks assigned to students matching their capabilities and,

3. the existence of a task-related social structure that reduces the disturbance variety of the student.

Chapter 4 will describe the research methodology used to investigate the research questions and propositions identified in this chapter.

## Chapter 4 Research Methods

This chapter describes the research methods used for this dissertation. It includes a description and rationale of the research approach taken, a description of the organizations at the centre of this research and why they were selected. Additionally, a description of the data that was collected, how it was collected, a description of the participants and the techniques used to analyze the data is provided. The final sections of this chapter present a description of the steps that were taken to increase the trustworthiness of the results. The background and perspective of the researcher is also shared.

### 4.1 Research Approach

The philosophical foundations for this research are based on a pragmatic worldview. This position “recognizes that research occurs in a social, historical and political context” (Creswell, 2013, p.11). In this case, the context is an organization and its many dimensions. Pragmatists are concerned with the application of methods to find solutions to problems (Creswell, 2013). The research for this dissertation arises from a desire to understand if and how students and organizations can simultaneously benefit from participating in a co-op program.

As presented in Chapter 3, the core research questions for this dissertation are,

***Research Question 1) How, if at all, does the recruitment phase contribute to the management of variety within the co-op system?***

***Research Question 2) How can variety be managed during the work term to enable both students and employers to benefit from the experience?***

A convergent mixed methods case study design was the approach for this research as the study applied a theoretical lens and involved both a qualitative and a quantitative approaches. As covered in the literature review, past co-op research with organizations has examined their reasons for participation, as well as the benefits and challenges the experience. However, no research has examined the processes, or response variety, that organizations develop to achieve positive outcomes for both the student and the

organization. As such, exploratory research is warranted to answer the research questions for this dissertation.

A case study approach was taken to enable a deep understanding within one context of the processes involved in co-operative education and how, if at all, those processes lead to positive outcomes for students and employers. There are a number of variables related to co-op within an organizational context. Those include, but are not limited to, the post-secondary institution the students are recruited from, the organization's size, age, industry, the regularity and volume of co-op hiring for the organization, the disciplines of the co-op students hired, the type of work to be done, the experience of the supervisors, the culture of the organization, and more. From a research design perspective, it would be difficult to adequately investigate and answer the research questions taking all of these variables into account. As such, a case study approach with one academic institution and one employer was chosen to allow a deep investigation into one set of contexts to understand how the phenomenon is being experienced.

In the context of co-operative education, some aspects of the processes that may lead to positive outcomes for students and employers could be quantified, such as "how much training was provided?". Other aspects require a richer description to fully understand, for example, "how are tasks selected for co-op students?". A mixed methods approach allowed for the collection of both quantitative and qualitative data which provided different, but complementary perspectives on the phenomenon being studied. Quantitative data may allow for generalization of results, while qualitative data may assist with a deeper understanding of what is happening. For this study, since an in-depth understanding was desired, the qualitative methods were be the primary focus, but the use of quantitative methods provided a way of reaching a larger number of participants within the organization.

## 4.2 Description of Case

As mentioned in Chapter 1, there are two organizations at the centre of this case study. One organization is the University of Waterloo (UW), an educational institution that runs a large co-operative education program. The other organization involved in this research is a manufacturing company in Canada that regularly hires more than 100 co-op students per year from the University of Waterloo.

The University of Waterloo (UW) was selected as the educational institution for this case study for a number of reasons. UW has the most experience in co-op in Canada, having established the first co-op program in Canada in 1957. UW has the largest co-op program of its kind in the world with more than 22,000 paid full-time four month co-op work terms per year with a track record for providing positive outcomes for students (DeClou, Sattler, & Peters, 2013). There are a few of implications of these facts. With respect to scale, UW has developed significant infrastructure or response variety in terms of people, processes, and systems to support the students and employers in their success with co-op. The second implication is that co-op is a signature program of Waterloo. Co-op is the reason that 70% of students come to Waterloo (Lewington, 2018). This means that the institution is highly committed to providing a quality program for students and employer partners and findings from research have the potential to benefit many employers and students who regularly participate in the program. A third implication of its reputation is that UW is seen as a global leader in co-op and is consulted and visited regularly by scholars around the world who want to know more about the co-op model. In answering the research questions it is important to understand the impact of the structure and services provided by the educational institution that may reduce or create variety for the organization hiring students and so examining an organization which operates successfully at such a large scale seems useful. From a practical perspective, the researcher works and studies at the University of Waterloo and through her experience as a student and an employee at UW has a deep understanding of the co-op model at Waterloo.



The manufacturing organization, Company A, has been hiring co-op students each term from the University of Waterloo for over 10 years. Over the past four years, it has hired approximately 35 students for each of the three terms per year (September-December, January-April, May-August). Data collected from the UW co-op database indicates that the company has experienced good success in recruiting students for its positions, reports strong performance ratings for the students it hires, and receives positive ratings from co-op students who work there (Appendix A).

This organization was selected for the case study for a number of reasons. Since the core of the research questions focused on understanding processes that organizations have developed to help them manage the four-month cycles of rotating co-op students, it was important to identify an organization that hires a number of co-op students each term and hires on an ongoing basis so that one can examine how the processes flow from one term to the next. Additionally, to answer the research questions, it was important to identify an organization who had been involved with a co-op program for at least a few years where processes have been developed to manage the program. From a practical perspective, having a large number of students who had worked for the organization made recruiting a reasonable number of participants more likely. Also from a practical perspective, the level of engagement of this organization with co-op meant that they were willing to give the researcher access to their employees and the employees were willing to dedicate a non-trivial amount of time to the interviews.

### **4.3 Ethical Considerations**

There are potential ethical issues associated with this research that were addressed in the design and conduct of this research. The issues considered were the confidentiality of the participants and the confidentiality of Company A, informed consent, and the potential for coercion.

Ethics approval for this study was received through the University of Waterloo's Office for Research Ethics. As part of that application process, the researcher provided details on how ethical issues would be

handled. Information consent letters were given to, and signed by the participants. Participants were able to indicate whether they approved the use of audio recording and the use of anonymized quotes. Details about how the researcher would protect the confidentiality of their data was included in the letter. The letter also outlines the process that the researcher followed in sending transcriptions of the interviews to participants for them to review and provide any corrections they would like. As it states in the letter, there were no known or anticipated risks to those participating in the study. The information consent letters can be found in Appendix B.

Students were remunerated for their participation in the interview and online survey at a rate of \$20/hr CAD. While there is an acknowledgment that if remuneration is too high in research studies, it might represent coercion, this amount was determined based on the average co-op salary rate for a third work term Engineering student, which is currently \$21.16/hr CAD. Given the researcher was asking for 1.5-2 hrs from the interview participants, the remuneration was set to compensate for the time they were investing in the interview. Students were assured that they could choose not to answer any question and they could discontinue their participation at any time and still be remunerated. The ethics committee approved this rationale and approach.

Supervisors and other staff were not compensated for their participation in the study. A policy of Company A did not allow employees to accept monetary gifts.

In addition to ethics approval through the University of Waterloo. The researcher submitted the UW ethics application materials to Company A for their review. The agreement reached with Company A was that when the research was complete, Company A would receive the full dissertation and have the option as to whether the company would be named in the dissertation, or if it would be referred to generically, as a manufacturing company in Ontario, Canada.

#### **4.4 Data Collection**

In case study research, it is important to examine multiple sources of data and, therefore, a mixed-methods approach was used for this dissertation involving the collection and analysis of both quantitative and qualitative data. In addition to the different types of data collected, multiple perspectives on co-op, based on role, were captured within an organizational context where the student is employed. Following two preliminary pilot studies that were part of other program evaluation projects led by the researcher, there were three formal phases involved in the collection of data for this dissertation which will be described in this section.

This research began with two pilot studies that gave the researcher the opportunity to test some of the questions and ideas related to tasks assigned to students and the ways in which those tasks were completed. In one project, the researcher and two research assistants interviewed students about the tasks they had completed during three rotations as part of a pilot project which was designed for students who had experienced difficulties in becoming employed for their first work term. Not only was it the first work term experience for the students, but most of the supervisors who worked with the students on their rotations had not previously supervised co-op students. In another project, the researcher conducted a focus group with four Chemical Engineering students, of different academic levels, and asked them to share the main tasks they were assigned during their work term and the ways in which co-workers and supervisors were helpful and not-so-helpful to them in completing their tasks.

There were three main lessons learned from these pilot studies. One, a focus group was not the most effective way of collecting the desired information from participants. The individual interviews were much more effective at gaining an in-depth understanding of the work term experience, including the tasks assigned and the task-related support provided to the student. The second outcome from the pilot studies was that the questions developed to elicit task and task-related support seemed to be effective in developing an understanding of the work term experience for the students. Differences emerged in the

descriptions students provided of tasks they were assigned and the support they were provided and the differences seemed to be related to the level of the student as well as the conditions of the organization (e.g., whether they were accustomed to hiring co-op students). The final key lesson from the pilot studies was that it would be critical to incorporate the perspective of the employer in order to answer the identified research questions.

The pilot studies highlighted some of the variables that contribute to the management of variety within the co-op system (e.g. level of student, length of time hiring co-op students). It also became clear that in-depth one-on-one interviews would be required to answer the research questions, and as a result, it was determined that the best approach for this dissertation would be a case study with one academic institution and one employer.

The data from the UW co-op database referenced in Section 4.2 and presented in Appendix A provides a snapshot of Company A's co-op activity with UW and provides some evidence that Company A is achieving positive outcomes for both the organization and its students. For example, students provide positive ratings of their experience on a number of dimensions related to the work experience including feelings of support, opportunity to make a contribution, and opportunity to develop new skills. From Company A's perspective, it submits high performance ratings of the students it hires which might imply that Company A is satisfied with the work of the students it hires. Its continued hiring of a large number of students each term might also imply that it is finding its involvement with the co-op program to be positive. While it seems that both students and Company A are simultaneously achieving positive outcomes, the data does not answer the questions of how are those outcomes achieved? Specifically, what are the processes that contribute towards the achievement of those outcomes? To gain an understanding of those questions, data needed to be collected directly from key stakeholders. There were three phases of

data collection which were approved by the University of Waterloo Research Ethics Committee and the Human Resources and Communications departments of Company A.

#### 4.4.1 Phase I – Interviews with Managers and Students

In the first phase, interviews were conducted with managers at Company A. The managers were selected by the Human Resources (HR) manager who oversees the co-op process. The managers were invited to participate in the research based on variation in their backgrounds and experience with UW co-op. As can be seen in Table 4.1, the amount of experience with co-op students and time at the organization varied. The four participants all worked in different departments at the organization, some involved directly in the manufacturing process and some in a supporting department. One of the supervisors was a UW co-op alumnus and the other three were not.

<b>Supervisor</b>	<b>Time at Org'n</b>	<b>Type of Dep't</b>	<b>Co-op Grad?</b>	<b>Time Supervising Co-op Students</b>	<b># Co-op Students Supervised</b>
S1	10 years	Manufacturing	No	8 years	~15
S2	12 years	Manufacturing	Yes	10 years	~20
S3	22 years	Manufacturing	No	20 years	~55
S4	20 years	Support Department	No	18 years	~50

*Table 4.1: Key Information about Manager Participants*

Each interview with the four supervisors was a 1.5-2 hr semi-structured interview and explored the areas identified in the conceptual model presented in Chapter 3. Some of the questions were open-ended and other questions asked the supervisors to provide a rating and then explain their rating. In some cases, the interviewer asked follow-up questions to get clarity or additional information on the response provided by the supervisor. The interview questions were designed to collect the supervisors' perspectives on a number of the aspects of the co-op process and the order of the questions followed the flow of the co-op work term cycle, starting with the recruiting term through to the evaluation of the students' performance on the work term. The goal of the questions was to collect both generalities related to co-op from the supervisors' perspectives and specific examples from the most recent co-op work term.

There were five sections of the interview with supervisors. The full set of questions can be found in Appendix C. The first section included background questions to understand the supervisor's role within the organization, their time in the organization and their involvement in co-op during that time. The second section of the interview involved questions about the recruiting term, such as "Are you or is anyone from your team involved in screening or interviewing potential candidates? If so, can you describe your involvement." Supervisors were also asked to list specific ways that the HR department at the organization and UW were helpful and not-so-helpful during the recruitment phase. The third section of the interview involved questions about the tasks that co-op students are assigned during their work terms. Supervisors were asked how they decided what tasks to give students and then were asked to think specifically of their most recent student and to answer a questions for each of the three main tasks that students were assigned. The fourth section of the interview asked the supervisor to rate and comment on some questions related to their overall experience with their most recent student. The questions were based on previous research that investigated the work term experience from the supervisors' perspective (Pretti, Drewery, & Nevison, 2016) The final section of the interview asked the supervisors some general questions about co-op and the involvement of their organization.

In the first phase of this research, students who had just completed a work term at the organization of interest were interviewed. All students (N=44) who had worked at the organization in the previous term were invited to participate in a 2-hour interview shortly after they had returned to campus. Only those students who had just completed a work term at the organization within the past month were invited to participate so that they could reasonably be expected to recall fairly specific details about the term. Ten students responded that they would be interested in participating. Details on the backgrounds of the students, as shown for the supervisors in Table 4.1, is not presented as it was felt that, given the relatively small population, doing so might reveal the identities of the students who participated in the research. The

students who participated were all Engineering students. They were from a number of different Engineering programs and at different levels in their education. Some students had worked at the organization for two work terms while others had completed only one work term. One of the students had completed an eight month work term. Two of the students had worked together in the same department, but the other eight all worked in different departments.

The interview with the students followed a similar structure to the interview with the supervisors. Questions that were used for the semi-structured interviews with students can be found in Appendix D. As was the case with the supervisors, some of the questions were intended to elicit general impressions or perspectives the students had about the organization or co-op. Other questions were very specific and targeted to the tasks that they were assigned while they were on their work term.

For the student interview, there were also five sections. The questions in the first section of the interview focused on the background of the participant. The second discussed the recruitment phase from the student's perspective.

The third section focused on the tasks that students were assigned and asked students to report on the three main tasks they had worked on during their term. One area of focus for the student interview, that deviated from the supervisor interview was a thorough investigation of the student's role-set for each of the three main tasks they were given. This line of questioning was based on an interviewing method developed by Bavelas (1942) called the "echo technique" which enables the researcher to draw out specific examples of the positive and negative behaviours in their interactions with others. For this research, the language that was used was "helpful" and "not-so-helpful" following the approach of Safayeni et. al. (2008) who used the technique in their examination of the effectiveness of interactions within organizations.

The final two sections of the interviews, students were asked about topics that related to their work term overall, and then to compare their most recent work term with their most recently completed academic term. The final sets of questions were based on previous research conducted by Drewery et al. (2016) which investigated students' perspectives on the quality of their work term experiences.

#### **4.4.2 Phase II – Surveys with Students and Day-to-Day Supervisors**

Following preliminary analysis of the supervisor and student interviews, a number of areas of interest emerged that the researcher felt could be better understood by collecting additional data. Over the course of the interviews, it became clear that there were two levels of supervision for the students at this organization. There were the managers, those who were listed as the official supervisors of the co-op students, some of whom had been interviewed during Phase I, and then there was a group of full-time engineers who reported to those managers who seemed to have the day-to-day responsibility of overseeing the co-op student. When the additional level of supervision emerged as part of the structure for managing co-op at Company A, it seemed important to include the day-to-day supervisors' perspectives on how the co-op system works. Also, the task-related that arose from the interviews suggested a classification for co-op tasks that required additional data to be validated. As a result of these two areas of need for additional information, surveys were developed and distributed to the day-to-day supervisors of the co-op students (Appendix E), as well as two additional cohorts of students who had worked at Company A in the Fall 2018 and Winter 2019 terms (Appendix F). The questions included in the surveys were similar to the questions asked during the interviews. One exception was that the surveys did not ask about the recruitment phase, but instead focused on the three main tasks given to the student as well as the questions asked related to the outcomes of the work experience from their specific perspective. Students were surveyed in January 2019 (based on their fall 2018 work term at Company A), and May 2019 (based on their winter 2019 work term at Company A). In January 2019, 41 students were invited to participate in



the survey and 12 students did so. In May 2019, 40 students were invited to participate in the survey and 10 students participated. The surveys were sent to supervisors who had recently supported a co-op student through the managers at Company A and 10 supervisors completed the survey. The information consent letter for the survey informed the participants that the survey would take 30-45 minutes and would require them to think carefully about the most recent work term. Student participants were remunerated \$15 for their participation in the survey. As was the case with the interviews conducted with managers, due to a policy of Company A, supervisors were not remunerated for their participation.

#### **4.4.3 Phase III – Interviews with HR at Company A and Co-op Staff at UW**

Through a preliminary analysis of the interview data collected in Phase I, there were two additional groups that emerged whose perspective seemed important to include. One group was the HR team at Company A responsible for managing the co-op processes. A number of references were made by participants to the work of this group which included some centralized processes for recruitment and work term support. Additionally, it was noted that there were functions of the UW co-op staff that were important in how the co-op system worked.

Two semi-structured interviews were conducted with HR staff at Company A (Appendix G), and two interviews were conducted with UW staff (Appendix H) whose roles include supporting Company A. The goal was to collect the perspectives of these stakeholders about the co-op process for Company A and their respective roles related to it. A brief description of the roles of the individuals interviewed is shown in Table 4.2.

Participant	Brief description of role with respect to co-op
HR – Oversight	Responsible for the strategic direction of co-op program at the organization; handles the hiring projections and coordinates budget approvals from senior admin
HR - Coordinator	Works with HR-Oversight to post job descriptions and request and schedule interview times. Works with employed students to ensure all necessary paperwork is completed.
UW – Account Manager	Works with the hiring organization (typically with the HR department and/or senior managers) to review past and current co-op involvement and make plans for future hiring
UW – Account Coordinator	Provides support as needed to employers in posting job advertisements, selecting candidates, and submitting ranking forms.

*Table 4.2: HR and UW Roles of Research Participants related to Co-op for Company A*

## 4.5 Data Analysis

The methods for analysis of the data collected from the three phases of this research varied according to the type of data collected.

### 4.5.1 Qualitative Data

The interviews provided a rich source of data for analyzing. All 18 interviews were transcribed. The transcriptions for the interviews of students, supervisors, HR at the organizations, and the key contacts for the organization at UW generated approximately 415 pages of single-spaced data. The transcriptions were loaded into MaxQDA, a coding software platform. which supports the process of coding the data. The first level of coding for each of the transcripts was to identify the participant’s response to each standard question. This allowed for side-by-side comparison at the question level across multiple participants. Each transcript was read and re-read to identify codes at the sentence level. Once codes were identified they were then examined as a collective, within and across stakeholder groups, to see what themes emerged.

Network interaction data was collected in both the interviews with students and managers as well as in the surveys with students. For each task that a student was assigned the participant was asked who the student needed to interact with to complete that task, how often and for how long the student would

have interacted with that person or group. This data was tabulated and analyzed to gain an understanding of the interaction network of one student, as well as understanding the interaction networks across multiple students. In the student interviews, they were also asked to comment on the helpful and not-so-helpful actions that that person or group did for them with respect to the specific task. Conversely, in the supervisor survey, participants were asked to comment on the helpful and not-so-helpful behaviours of the student. This data was analyzed by coding the responses of the students and identifying themes across all student interviews.

#### **4.5.2 Quantitative Data**

Quantitative data was collected both in the interviews with managers and students as well as in the surveys with supervisors and students. During the manager interviews there were 18 questions that asked them to provide a numeric rating. In the supervisor online survey there were 20 questions. The student interviews and online surveys included 30 questions that asked participants to provide a numeric rating. Appendix I lists the quantitative variables collected from students and supervisors through the interviews and online surveys.

Several statistical techniques were used to conduct the analysis with the quantitative data. For the task ratings and outcomes data, descriptive statistics such as means and standard deviations were calculated for supervisor data (e.g. see Appendix J) and student data (e.g., see Appendix K). Additionally, correlational analysis were done to test the relationships between the task and outcome dimensions of the student data (e.g., see Appendix L). The analysis of the data examined in relation to the propositions stated in Chapter 3, involved ANOVA tests, t-tests and Chi-Square tests depending on the specifics of the data to be tested. Details of the specific test used is described where the data is presented in Chapter 6.

## 4.6 Ensuring Trustworthiness of Results

An important area to be addressed in this proposal is how to ensure data reliability and validity. Much of the data was analyzed through coding the responses in the transcripts of the semi-structured interview questions. As such the notion of trustworthiness (Guba, 1981) from an interpretivist perspective is more useful than the reliability and validity constructs from the positivist perspective. This section will describe the ways in which the research was conducted and documented to strengthen its credibility, transferability, and confirmability.

Credibility, similar to the positivists' notion of internal validity, aims to ensure that the study is measuring what is actually intended (Lincoln & Guba, 1985). In this study, credibility was established in several ways. Approaches for establishing credibility include how the study was designed, conducted, and monitored. The methods used for this study are based on methods that have been established by other researchers in the field (e.g., semi-structured interviews and surveys). The questions asked in the survey were developed based on key dimensions that emerged from the literature and conceptual framework. Conducting interviews prior to the distribution of a survey allowed the researcher to review the descriptions of how the scales were being interpreted by participants to ensure that their interpretations of the items were as intended. Additionally, the design of this study allows for triangulation of the data increasing the study's credibility (Shenton, 2004).

Credibility during the execution of the study was addressed by developing a rapport with the participants. The rapport developed with participants allowed the researcher to ensure that participants knew they could discontinue their participation at any time and also contributed to participants feeling comfortable in providing honest and full answers.

During the analysis phase, credibility was strengthened in a few ways. The researcher participated in frequent debriefing sessions with her supervisor. Additionally, the researcher looked for opportunities to share preliminary results with other co-op researchers as well as those with jobs that connect to co-op,

asking for their feedback on conclusions and decisions being made. Member checks were done with participants. The researcher asked them to review transcripts of their interviews to ensure their words matched what was intended.

Credibility was enhanced through testing the inter-rater reliability of the transcript data in two phases with the support of two research assistants (RAs). In the first phase, the RAs were asked to review sets of statements identified from the transcripts and to group and label the statements. In total 1,211 statements were categorized across 11 themes. The results of the RAs' categorization were compared to the researcher's categorization and the overlap was found to be an average of 80.7% with a range of 75%-100% across the pairs of coders. In the second phase of reliability testing, a finalized set of categories was distributed to the RAs and they were asked to code each statement as one of the identified themes. The average reliability for the five themes that the students coded across the researcher and the two RAs was 82.3% with the lowest reliability percentage between one pair of coders on one theme being 76% and the highest reliability percentage between one pair of coders on one theme being 90%. The reliability rates for a given theme are included with the findings in Chapter 6.

While generalizability of results, from a positivist perspective is an unachievable objective in a study with one case and a small number of participants, transferability is something that can be considered and addressed. In this study, transferability was increased by providing a detailed description of the context in which the research is taking place. For this work, the researcher has provided a thorough description of the organizations involved (the academic institution and the hiring organization). Having details about the context for the study will allow the reader to make judgements about the transferability of the findings for their context.

The confirmability of the study is the extent to which the findings represent the views of the participants rather than the characteristics or preferences of the researcher (Shenton, 2004). In addition to

the ways listed above for assuring credibility, confirmability was increased in two ways. One, through the creation of an audit trail which will allow an observer to trace through the course of the research. The audit trail includes conceptual, procedural, and reflective memos. The conceptual memos include decisions made during the coding process. The procedural memos describe the process that was followed and the reflective memos acknowledge biases and beliefs of the researcher that may affect her treatment of the data.

Another way that the confirmability of the study was increased was through a focus group held near the completion of the research with three of the ten students who had participated in the initial interviews. Preliminary findings were presented to the students and they were asked to provide feedback on whether the research findings aligned with their experience at Company A.

#### **4.7 Lens of the Researcher**

When research is done from an interpretivist perspective, it is important to describe key areas of the researcher's background that may contribute to how he or she has designed, conducted, analyzed, and interpreted the findings of this research. My experience includes a long history of engagement with the co-op program at Waterloo as a student, as a supervisor, as a manager, and as a researcher. I was a student who participated in the co-op program at Waterloo as an undergraduate. Through the program I gained valuable work experience, made strong connections with peers, co-workers, and supervisors and shifted my thinking about what I wanted to pursue as a career. I attribute my current employment, 20 years after graduation, to the opportunities I had as a co-op student at Waterloo.

I was a direct supervisor for co-op students for ten years in two different roles. During that time I was responsible for assigning the day-to-day tasks for students as well as training and evaluating the students. During those years, I was the direct supervisor for over 50 co-op students. While I had a few

challenging students over the years, my experience with the process of hiring and employing co-op students was very positive.

For the last 11 years, in two different roles I have had management oversight for a unit where we employ co-op students. In one of those roles, I had the opportunity to design the support structure for a professional development program and based on my positive experience with co-op students, I designed the program to have the front-line support being provided by co-op students. As the program grew, the number of co-op students hired also grew and reached approximately 65 students per year being hired to work in our unit. For that unit, at that time, the ratio of full-time employees to co-op students was roughly 1:5 and so the culture of the group was strongly influenced by the presence of co-op students. In my current role, I lead a small team, but we routinely hire a co-op student each term to work with us.

My current role involves conducting and advancing research on co-op and work-integrated learning. In this role, I have led a number of research projects which have investigated co-op from the students, as well as the supervisors' perspectives, and through those projects have had the opportunity to speak to many people involved in co-op. Also, in my current role, I report to the Associate Provost for Co-operative and Experiential Education, who has oversight for the collection of units responsible for running the co-op program. Being part of the leadership team with the other Directors enables me to hear the real-time challenges that are faced with running the co-op program and identify areas where research could be valuable.

The personal and professional experiences that I have had contribute to the perspective that I bring to this research. Since I have had positive experiences as a student and as a supervisor, I have had to be careful about a positivity bias towards co-op in this research. The courses that I have taken during my PhD and coaching from my PhD supervisor have helped me develop discipline in checking the assumptions

that I am making to ensure that my perspective is not preventing me from examining the situations and data from a critical perspective.



## **Chapter 5 Findings: Recruitment Phase**

This chapter will present the findings related to the recruitment phase of co-operative education. Specifically, the questions that will be explored in this chapter are: 1) how is variety managed between the company and the university? and, 2) how is variety managed between the company and the students during the pre-work term phase? The chapter will begin with a description of the key activities of the recruitment phase for the university, the hiring organization, and the student. Following the descriptions of the process, data will be presented regarding the variety that is being generated and absorbed between the hiring organization and UW and then between the hiring organization and the students.

### **5.1 Process Overview**

This section will summarize key activities of the recruitment phase from the perspective of the University of Waterloo (UW), Company A and the co-op students.

#### **5.1.1 Recruitment Phase Description – UW Process**

The scale of UW's co-op program and the effort required to meet the needs of both students and employers leads to a very complex recruitment phase. The university operates year-round offering three four-month terms. Each co-op program at Waterloo has one or more study/work sequence which lay out the order of academic terms and work terms for students. The co-op programs at Waterloo vary based on discipline as to how many co-op term students will have (between four and six), but all programs will include eight academic terms in order to complete an Honours Undergraduate degree.

For staff involved in running the co-op program, there is ongoing activity related to bringing in new co-op employers, but from the student perspective, the formal recruitment process starts at the beginning of the academic term four months before their next work term. Co-op staff reach out to past co-op employers to ask them to submit their job postings for the term which will start in four months' time. UW staff work with students, particularly those preparing for their first work term, to ensure students know

how to use the online co-op system, that they have a résumé ready to submit, and that they are prepared for interviews.

In week two of the recruiting term, job postings for the ‘main’ round of interviews are made viewable for students on the system and students begin applying for jobs. Once the deadline(s) for main round applications passes, then the application packages the students have submitted for specific jobs become available to the respective employers.

Employers screen the application packages they have received and decide which students they would like to interview. Employers then confirm a date for interviewing, either on campus or via phone or an online platform, and indicate the candidates they would like to interview. Once the employer requests have been entered in the system, the students receive notification that they have been selected for an interview and they have the ability to go into the system and choose an interview slot during the day and time frame that the employer has indicated he/she will be interviewing.

During interview days, if the interviews are being conducted in person, employers arrive to the Tatham Centre building which is a building at UW dedicated to Co-operative Education and the Centre for Career Action. The employers are escorted to one of the more than 100 interview rooms in the building and, when ready, they push a button for the first candidate to be summoned. The students wait in a waiting area and their name will appear on a screen when the employer is ready for them and someone at the check-in desk will tell the students which room to go to for their interview. If the employer is interviewing online or via phone there are separate areas in the Tatham Centre where students will wait and then the staff direct them to the appropriate phone or computer station when it is their turn to be interviewed.

After conducting interviews with the selected candidates, employers will complete a ranking form on the system. Employers enter a rank of ‘1’ for their first choice– that is the student (or students if they have multiple job openings) they would like to offer the job(s) to. Then they will rank any other student

who they would also be happy to hire. Employers will rank as many students as '2's, '3's, ..etc as they like. They indicate "NR", or "No Rank" for any students that they do not wish to hire.

The main round of interviews operates daily for 4-5 weeks with an average of 175 employers interviewing per day. By the end of the main round in Fall 2018, 26,569 interviews were conducted by 3,428 employers. Students had an average of 4.7 interviews each during this time. For some students juggling co-op interviews with their classes, assignments and midterm exams can be quite difficult and time-consuming.

At the end of the main round, students also receive a ranking form. This form lists all the interviews they attended and whether they were 'offered' or 'ranked', or 'not ranked' for each job. The students fill in their preferences. They can rank as many jobs as they would like a '1', '2',...'9'. Students also have the option of using one 'not interested' if they feel that they really do not want to be matched with a specific company.

The input from the employer ranking form and the student ranking form are combined to generate matches. The score that each has provided are added together and the algorithm matches based on minimum score. For example, employers who offered a student a job, that is, a rank of '1', and students who ranked that job a 1, would be automatically matched. When there is a tie, for example, a 2-1 and a 1-2, the tie is randomly broken.

The main match occurs approximately half way through the recruitment term (8 weeks), and students and employers who have been matched are notified. Those students who have not been matched and the employers whose jobs are not filled move into a continuous employment round. Additionally, at this stage, new job postings that were submitted during the main round are now included in the continuous process.

The continuous phase moves much more quickly for students and employers. Each week there are three interview days per week and a weekly match. The first week of the continuous phase of Fall 2018, there were 3,472 job postings on the system, and an average of 330 job postings per week in the remaining weeks of the continuous phase. There were 480 students on average each week during the continuous phase. The continuous phase runs for four weeks from Week 8 to Week 12. Week 12 is the final week of classes and is followed by an exam period. Students who are still unmatched at the start of exams, will continue to work with UW staff to secure a work term position, and those efforts will continue into the beginning of the actual work term for some students. The requirement for the students to earn a co-op credit for their work term is 12 weeks of employment, so there is some flexibility on the start date for their work term.

In parallel to this full recruitment process, there is another process that students can pursue and that is to arrange their own jobs. If students secure employment outside the co-op system, they submit a request to the co-op office with key information about the job and relevant contact information for the employer. The work term will be vetted to ensure it meets the work term standards of the student's co-op program.

While complex and resource-intensive to operate, the system is designed to accommodate a high volume of students and employers. The existence of a main round of interviews means that students have the opportunity to be interviewed by multiple organizations before needing to submit preferences for one role over another. Additionally, the main round gives the hiring organizations an equal playing field for access to the full set of interested candidates. The processes within the recruitment phase typically result in an average 97% employment rate for co-op students.

### **5.1.2 Recruitment Phase Description – Company A Process**

The description in the previous section captures the main activities that a company hiring co-op students from the University of Waterloo generally undertakes. The four key steps for a company are 1)

submitting one or more job postings, 2) screening application packages, 3) selecting candidates they would like to interview, and then 4) ranking students according to which ones they would like to hire. During the interviews for this research, specific details were shared about how Company A handles the recruitment process for the 30-40 co-op students it hires every four months. This section will describe those details.

There are a few people/groups within Company A that have specific responsibilities with respect to the recruitment of co-op students. Those roles are going to be referred to as: Human Resources (HR) Manager, Human Resources (HR) Coordinator, Engineering Coordinator, and Engineering Supervisors. With respect to the recruitment phase, the HR manager facilitates the approval process for co-op headcounts with the senior leaders within the organization once a year. This involves going out to each of the departments and collecting requests for co-op positions and then combining those requests and sending it to the Vice-President for approval. Additionally, a few weeks before the job postings are due at the university, the HR Manager sends a message to the departments requesting that they submit a description of the main projects going on in their unit that the co-op students may be involved with. This information can be used during the interview phase to help students understand the projects the various departments are working on and to match students with units based on their interest and experience. Another responsibility of HR Manager is sending out a message to the current co-op students who are finishing their term at the organization and asking if they would like to return for another term, 4 months later. If the students do want to return, they indicate their top three preferences for department to work in. After the HR Manager checks that their current supervisor would support the students' interest in returning, the students are slotted into roles in various departments for their subsequent work term. Once the returning students are accounted for, job postings are sent by the HR coordinator to the university for the remaining open positions and the HR coordinator submits a request for the dates that Company A would like to conduct interviews on campus. There are a few departments at the organization who run the recruiting

process independently but the majority of roles are hired through a single “Engineering Co-op Student” posting.

Once the student applications are received, the departments who run their own recruiting process receive the job applications for their roles. The pool of positions covered by the single “Engineering Co-op Student” posting are handled by an Engineering Co-op Coordinator. The engineering teams that hire co-op students rotate assigning an engineer from their team to take on this additional co-op coordinating role. The engineering coordination role has the responsibility of screening the applications on behalf of all of the engineering departments. Those involved in screening the applications share the list of candidates to be interviewed with the HR coordinator and the HR coordinator reaches out to UW to set up the interviews.

Each term, there is a high volume of interviews conducted by Company A that spans several days. The interview process for all students who have been selected for an interview for Company A starts with a general presentation at the beginning of the day they will be interviewed, given by the person from Company A who provides oversight for the co-op program. This presentation covers general information about Company A as well as a description of the various departments and some of the perks of working at the company. By covering this information for all candidates in one session, the individual interview time can be spent asking the student questions and answering questions the student may have rather than conveying general information.

The interviews with individual students are 30 minutes each and conducted by two people. From Company A, either two engineers or an engineer and an HR person. The engineering co-op coordinator reaches out to the various departments to ask for engineers interested in participating in the interview process and the departments are encouraged to send engineers who will be working closely with the incoming students.

Once the interviews are complete, the engineering co-op coordinator collects the information from the various teams and makes decisions about the ranking of students for the general pool of departments. Those departments who run their own recruitment process submit their own ranking forms.

### **5.1.3 Recruitment Process - Students**

During the recruitment phase, co-op students often manage a full academic course load with a job search for their next work term. Often, the workload involved in the employment search is described by students and to students as being equivalent to taking a sixth course. This is particularly true for students' early work terms when they have less experience, and, therefore it often takes them longer to secure a position. Some students decide to return to a previous co-op employer, but the majority of students choose to find a new employer for each work term.

Once the job postings are made available on the UW co-op system, students search through them and decide what jobs they will apply for. They may use a generic résumé for all their applications, or they may customize application packages and include a cover letter with their application. Once they have submitted applications for the main round, they wait and see what interviews they will be selected for. When a company indicates they would like to interview the student, then the student receives a notification from the system to select an available interview slot on the day that the company indicates it will be interviewing. Sometimes this means students need to speak with professors to make alternate arrangements for tests, or in-class activities such as labs, if it turns out that there is a conflict between their interview time and a course commitment. Students can also contact each other to see if there is flexibility in switching interview slots with another candidate. On the day of the interview, the student comes to the Tatham Centre, waits in one of the waiting areas, depending on whether it is a face-to-face, skype or phone interview, and then when the employer is ready, the student goes to the appropriate room and participates

in the interview. Students often dress in business attire for interviews, so it is common to see students walking around campus in suits, or carrying garment bags.

When it comes time to indicate their preference for jobs, students receive a ranking form that lists all of the interviews that they have participated in and whether they have been ‘offered’, and ‘ranked’ or ‘not ranked’ for a job. If they are offered a job, and the student indicates that is their #1 choice, then the student will be matched with the job. Students may receive multiple offers and so the job that they rank 1, will be the job they are matched with. If students do not receive any offers, or prefer to rank a job a 1 that they have been ‘ranked for’ but not ‘offered’, then the algorithm which takes all the employer and student ranking forms as input will determine which job the student has been matched with. If a student is ‘not ranked’ for all jobs, or if, through the algorithm, students are not matched with a job, then they will continue to apply and be interviewed for jobs in the next phase of the recruitment process.

## **5.2 Recruitment Phase – Variety Between University of Waterloo and Company A**

This section presents data that describes the disturbance variety generated and handled by Company A and UW (Proposition 1). The data presented in this section was collected in interviews with UW and Company A staff and a survey distributed to supervisors within Company A.

### **5.2.1 Perspectives of University of Waterloo Co-op Staff**

The UW co-op staff that support Company A have been providing support for Company A for more than three years and have been working in the co-op department at UW for more than 10 years. In the interview, the UW staff were asked to describe their roles generally, the activities that they do for Company A specifically and then the helpful and not-so-helpful actions of Company A with respect to their role.

Within the current UW co-op structure, there is one role, Account Coordinator, that is mainly responsible for the interactions with companies related to the recruitment process. The role of the other



person interviewed for this research is an Account Manager and is responsible for managing the relationship with companies as a whole. Some tasks for the Account Manager include reviewing the hiring history and having discussions about hiring for the upcoming year and other possible ways that UW can support companies in their talent needs.

The Account Coordinator is responsible for monitoring the status of various activities within the system (e.g., deadlines for submitting job postings) and sending reminders to those organizations who have not yet submitted the required information. The system used for hiring co-op students has been set up to enable employers, as much as possible, to be self-serve in getting jobs posted, reviewing applications, scheduling interviews, and submitting rankings.

In analyzing the statements that UW staff made about the ‘helpful’ and ‘not-so-helpful’ behaviours that Company A, specifically does, related to co-op hiring, there were more helpful comments (response variety) than not-so-helpful (disturbance variety). The codebook in Appendix M.1 shows that from UW’s perspective, there were 14 statements about ‘helpful’ behaviours that Company A does and six statements about ‘not-so-helpful’ behaviours. An example of the helpful behaviours of Company A is that they “are really good about putting the jobs on the system themselves”, and the existence of the HR Coordinator role, “she’s my main go-to for everything”. The statements made by the UW staff describe how Company A’s practices have evolved to adapt to the new co-op system and to eliminate previous disturbance variety. The UW staff also report having developed response variety in relation to Company A’s needs, reporting 17 statements about ways they are helpful to Company A during the recruitment process and five ways they generate disturbance variety for Company A. The five statements about the disturbance variety UW creates for Company A all relate to the ways that the online system does not accommodate the way in which Company A’s job is set up in the system. For example, since there is one main posting for

engineering roles, there is a much larger than typical number of interviews to be scheduled and rankings to be done for that job and the system will timeout before Company A can enter in the information.

### **5.2.2 Perspective of Company A Human Resources Staff**

The two Human Resources (HR) staff at Company A who were interviewed for this research have longstanding affiliations with Company A and have been involved with the co-op recruitment process for at least a couple of years. One of the staff interviewed is responsible for many aspects of HR at Company A beyond co-op. His role with respect to co-op is to oversee the co-op program and to coordinate plans and approvals for co-op hiring on an annual basis. The other person interviewed for this research is responsible for the coordination between UW and Company A, primarily related to the recruitment process.

The analysis of the transcripts of the interviews with Company A recruitment staff demonstrate similar patterns to the UW staff. As can be seen in the codebook in Appendix M.2, Company A staff reported seven statements about the ways that UW is helpful in managing the recruitment process and only two statements about disturbance variety that UW creates for Company A. An example of response variety indicates that it is helpful to have one contact person from UW to help with the recruitment process, stating “[Account Coordinator] is my go-to-person for anything related to the system” and that “she is able to manipulate things in the system that I don’t have access to”. The UW disturbance variety reported by Company A was related to previous actions of students, not knowing certain expectations of the role/company and so response variety has developed to address that. The response variety includes additional language on the job postings and steps during the interview phase to ensure selected candidates are aware of the expectations. Reports of the response variety Company A has developed to manage the process included 14 statements of actions of the organization’s staff in supporting the recruitment process and one statement about disturbance variety that Company A believes it creates for UW.

### 5.2.3 Perspectives of Company A Supervisors

The interviews conducted with the supervisors began with a number of questions related to their thoughts and involvement in the co-op recruitment phase (Appendix C). In particular, supervisors were asked to comment on the helpful and not-so-helpful actions of HR within Company A and UW during the recruitment phase. Supervisors, through interviews and a survey (Appendix C, Appendix E) were asked about the logistics of the screening and selection process and their involvement and their team's involvement in that process. In terms of variety, the helpful behaviours or actions can be thought of as the ways that disturbance variety is handled whereas the not-so-helpful behaviours or actions can be viewed as the disturbance variety that is generated.

#### 5.2.3.1 *Human Resources Helpful/Not-So-Helpful Behaviours*

During the interviews, supervisors were asked to comment on the actions of those involved in the Human Resources (HR) functions related to co-op do that are perceived to be helpful and not-so-helpful to the supervisors. The codebook (Appendix M.3) shows that the four supervisors interviewed made 15 statements about the helpful and not-so-helpful actions of the HR unit related to co-op. The ratio of helpful to not helpful comments was 4:1.

There were a number of processes led by HR that were described as being helpful to the supervisors that were mentioned by more than one of them, and sometimes all of them. All supervisors reported that the relatively recent change to a streamlined request from HR to the company leadership for approval of annual co-op headcount per department was a significant improvement to the co-op process from their perspective. Supervisors reported that previously, they would need to make the budget requests for co-op students every four months and this seemed like an unnecessary amount of work since they regularly hire the same number of students in their departments. Three of the supervisors mentioned how they appreciate the Engineering Co-op Coordinator screening of the applications and scheduling of the interviews. The

fourth, whose department does the application screening on its own mentioned that she appreciates HR working with the school to get interviews set up with the candidates that are selected. Two of the supervisors specifically mentioned that they are grateful that the individual departments are invited to participate in the interviews and that the teams' candidate preferences based on the interviews are used as input for the submission of the ranking form. One of the supervisors in reference to what HR does that is helpful regarding co-op recruitment simply replied, "they basically run the program".

Though supervisors were easily able to describe the ways that HR was helpful, there were three comments made by two supervisors on areas they thought could be examined for potential improvements. One supervisor was concerned about top candidates being lost to other companies due to the way the process was run. His concerns centred on two issues. One was that with the hiring of a pool of candidates (between 20-30 per term) under one job description, he wondered if students might be less likely to accept an offer from this company when they do not know what department or location they will be working in. For this company, there are two locations in which co-op students are hired to work. The second issue raised by this supervisor was the way that rankings are done. Multiple teams from the various departments looking to hire a co-op student for the upcoming term come to interview students. Each student who is selected for an interview by this company is interviewed by only one team. The interviews occur concurrently for multiple teams. At the end of the set of interviews, the candidates are ranked by the interview team and recommendations are made to the Engineering Co-op Coordinator who compiles the rankings. For each interview team, they recommend one student to be given an offer, they identify another set of students to be ranked and identify any students who should not be ranked. The supervisor, interviewed for this research, made the observation that in the extreme, it could be that the two best candidates were interviewed in half the rooms and while the other half of the rooms had weaker candidates the result would be that the best candidate in the weaker rooms would receive an offer, while the second

strongest students in the stronger rooms did not. The supervisor observed that the way the process set up, it may mean that as a whole, the company is not making offers to the strongest candidates of the full pool of interviewed applicants. A second supervisor had a suggestion for a change to the process once the students were matched with jobs at the company. He suggested that it would be helpful to see the matched candidate's application package once specific students have been assigned to specific departments. His observation was that this would give the team time to potentially set or adjust which projects they have lined up for the student based on the student's background and experience.

#### *5.2.3.2 UW Co-op: Helpful and Not-So-Helpful*

The supervisors interviewed had a few different perspectives on the actions that UW does related to co-op that are helpful and not-so-helpful (Appendix M.3). Supervisors made 14 statements about actions that UW takes that are helpful and three statements about actions that are not-so-helpful. One of the supervisors interviewed did not feel he had enough involvement in the hiring of co-op students to comment on the helpful and not-so-helpful actions of UW during that process. The other three supervisors commented on helpful processes/logistics related to hiring co-op. Two made reference to the convenience of the interviews being set-up by UW so that they can conduct all their interviews in one day. One supervisor made a reference to the benefit of being able to see the evaluation rating the student has received from previous co-op employers and stated that "UW does co-op better than anybody else". Another supervisor stated that what UW does that is helpful is to provide good capable students to employers and stated that he believes that has a lot to do with Waterloo's ability to attract the best candidates as well as what the professors are teaching the students. Another way that one supervisor felt UW is helpful is in building relationships with companies. The supervisor recognized that Waterloo does a good job in trying to engage with a lot of employers and felt that, "Waterloo really knows who this company is and as a result, the students we bring in understand us and what we're all about." Two of the comments related to

not-so-helpful actions of UW were both related to the ranking process that Waterloo uses to match students and employers. Both supervisors indicated that they did not know how the ranking process worked and would like to understand it better so they can be confident they are making ranking choices to maximize the chances of getting top candidates. The last comment about not-so-helpful actions of UW had to do with the computer system that UW uses to administer the co-op process, however, this was based on second-hand information as the supervisor had not used the system himself but had heard complaints from others.

#### *5.2.3.3 Involvement in Interview and Selection Process*

As was described in 5.1.2, each of the teams hiring a co-op student provide a synopsis of the main project(s) that the next term's co-op student will be working on. All four supervisors reported that it is a challenge for them to know what projects the students will complete because either 1) they will match the project to the students' experience and ability, or 2) they do not yet know what projects their team will be working on in four months.

The supervisors differed in their perspectives on the role that they want their team to play in the selection of students. For one supervisor, her team runs their own process for screening applications and interviewing students. She felt that it was important that the engineer who will have the day-to-day responsibility of working with the student be involved in selecting the student and then they "live with the consequences of their decision". By running their selection process separately, it means that they can consider the specific projects that they want the student to work on and consider what skill set, academic discipline and level of student would best fit the work. Sometimes this group will hire for a specific skill set that they need for a project that they do not have within their full-time team.

Another supervisor felt that as long as the engineers who are conducting the interviews are familiar enough with the other engineering teams then it usually goes pretty well in terms of them getting a student

that they are happy with. The other two supervisors felt it was really important to have someone from their team conducting interviews because “They know what we are looking for in our shop. You can only put so much on paper”.

A survey was distributed to the engineers who are typically involved in the interview process and who end up overseeing the day-to-day work of the co-op student. They reported an average of 6.2 (out of 9) for the importance of being involved in the interview process and rated the importance of selecting the student they worked with as 6.4 (out of 9).

One of the supervisors interviewed made the observation that the engineers who are conducting the interviews have a true understanding of the organization and the challenges of working in it and therefore are ideally suited to conduct the interviews and make the decision on candidates. One of the other supervisors said that co-op interviewing was a great development opportunity for the engineers who are not managers within the organization and, therefore, do not normally have the opportunity to conduct interviews with potential candidates.

With respect to what the supervisors are looking for, they described their screening criteria as looking for students who will fit the culture of the organization, who have transferable, if not directly relevant experience and have a good attitude. One of the supervisors mentioned that he was looking for evidence that they will be able to solve problems in a fast-paced environment.

### **5.3 Recruitment Phase – Variety Between Company A and Co-op Students**

This section presents data that captures the disturbance variety generated and absorbed between Company A and the students who apply for its roles during the recruitment phase (Proposition 2). The data presented in this section was pulled from the UW co-op database and collected in interviews with students and Company A staff and supervisors.

### 5.3.1 Job Advertisement

As was mentioned in 5.1.2, the majority of the students hired by Company A are hired through a single job posting, “Engineering Co-op Student”. The job posting from two recent recruitment terms are included in Appendix N. The job advertisement represents the initial communication device for Company A to convey the role(s) available to co-op students. The information included in a job advertisement may reduce the variety of the potential applicants by conveying details that will help them decide if they want to apply for a particular role.

Company A’s job advertisement for the Engineering Co-op Role in Fall 2017 includes information about the responsibilities that students can expect to have in the role, the academic program areas that they are looking for, and some key skills they are looking for the students to have.

There are a two main differences between the older job advertisement (Fall 2017) and the newer job advertisement (Spring 2018). For one, there is a new introductory paragraph about the general responsibilities of the Engineering teams at Company A and the fact that the students will work with an engineering specialist from one of the teams. The second difference was that there is information included at the bottom of the job posting with notes about overtime, requirements for orientation, and the availability of accommodations for applicants with disabilities.

### 5.3.2 Applications, Interviews, Positions Filled

Due to the size of the candidate pool at the University of Waterloo, companies may receive a high volume of applicants. Table 5.1 shows the activity related to co-op hiring for Company A during the four co-op terms from Spring 2017 - Spring 2018.

<b>Term</b>	<b>Applications</b>	<b>Interviews</b>	<b>Filled</b>
Spring 2017	804	136	33
Fall 2017	548	166	34
Winter 2018	942	191	46
Spring 2018	718	103	34

*Table 5.1: Recruitment Activity for Company A by Term*



Another way to look at the recruitment activity is to calculate ratios among the three main activities as shown in Table 5.2. The three ratios are 1) the number of applications received to the number of interviews conducted, 2) the number of applications received to the number of filled positions, and 3) the number of interviews conducted to the number of positions filled.

<b>Screening &amp; Selection Ratios</b>	<b>Apps: Int</b>	<b>Apps:Filled</b>	<b>Int:Filled</b>
Spring 2017	5.9	24.4	4.1
Fall 2017	3.3	16.1	4.9
Winter 2018	4.9	20.5	4.2
Spring 2018	7.0	21.1	3.0

*Table 5.2: Screening and Selection Ratios for Company A by Term*

The data in Table 5.1 and Table 5.2 provides a picture of the amount of work involved in the recruiting process for Company A. Across the four terms being examined, there is a range of 3.3 to 7.0 applications for every candidate that is selected for an interview and a range of 3.0 to 4.9 interviews for every filled position. The individual interviews that company A conducts are 30 minutes each.

### **5.3.3 Rankings and Matches**

As was mentioned in section 5.1.2, after the interviews are complete, companies submit a ranking of the students they have interviewed and at the end of the interview period, students rank the companies that they have been interviewed by. Those rankings are then submitted to the system and an algorithm matches based on the ranking forms of both the student and the employer.

Analysis was conducted on the interview and ranking data for four terms Spring 2017 to Spring 2018 for Company A. Table 5.3 shows the percentage for each of the rankings by the students who were interviewed by Company A. Of the students who were interviewed by Company A during the four terms being examined, 61% of them ranked Company A as a ‘1’. Another observation is that 24% of students gave a rank of ‘10’, the lowest rank they can give, or gave a ‘Not interested’ rank, which is something that students are allowed to do only once during each recruitment term. Students theoretically could still

be matched with a job that they have ranked a ‘10’, but they would not be matched if they use the ‘not interested’ rank.

<b>Rankings by Interviewed Students</b>					
<b>Term</b>	<b>1</b>	<b>2</b>	<b>3-9</b>	<b>10</b>	<b>NI (Not Interested)</b>
Spring 2017	61%	11%	4%	18%	6%
Fall 2017	64%	8%	7%	16%	5%
Winter 2018	61%	6%	3%	20%	10%
Spring 2018	61%	11%	8%	17%	3%

Table 5.3: Percentage of Rankings by Interviewed Students

On the employer side, Table 5.4 shows the percentage of each ranking that Company A and its comparator group gave to the students they interviewed. For Company A, 26% were given top rank, ‘1’, which corresponds to an offer to the student and 35% of students were ranked as ‘NR’ or no rank, which means the company does not want to employ that student.

<b>Rankings by Employers of Students Interviewed</b>				
<b>Term</b>	<b>1</b>	<b>2</b>	<b>3-10</b>	<b>NR (No rank)</b>
Spring 2017	24%	27%	7%	42%
Fall 2017	22%	44%	1%	33%
Winter 2018	33%	31%	3%	33%
Spring 2018	25%	25%	18%	32%

Table 5.4: Percentage of Rankings by Employers for Students Interviewed

The two previous tables, Table 5.3 and Table 5.4 have presented the rankings data that was the input to the matching algorithm. It is also worth examining the rankings data that students and employers provided related to the students who end up matched with the company. The percentage of students who provided each rank for the company were matched to are provided in Table 5.5.

<b>Rankings by Students Who Ended Up Employed by Company</b>			
<b>Term</b>	<b>1</b>	<b>2</b>	<b>3-10</b>
Spring 2017	100%	0%	0%
Fall 2017	100%	0%	0%
Winter 2018	100%	0%	0%
Spring 2018	100%	0%	0%

Table 5.5: Percentage of Rankings by Employed Students

Table 5.6 shows the percentage of each ranking provided by employers for students who were employed at the organization.

<b>Rankings by Employers for Students Who Ended Up Employed by Company A</b>			
<b>Term</b>	<b>1</b>	<b>2</b>	<b>3-10</b>
Spring 2017	82%	12%	6%
Fall 2017	76%	24%	0%
Winter 2018	70%	30%	0%
Spring 2018	65%	32%	3%

*Table 5.6: Percentage of Rankings by Company for Employed Students*

A last set of data to examine is the combination of the student and the employer rankings. For example, for how many (or what percentage) of the students was it a 1-1 match? That is, how many students and employers rated each other as a ‘1’? Additionally, how many matches resulted from a student rating of ‘1’ and an employer rating of ‘2’ or the reverse situation, an employer rating of ‘1’ and a student rating of ‘2’. Lastly, how many matches were the result of a student or employer ratings greater than or equal to 3? These questions are all answered in Table 5.7. Since the rankings of all students who ended up employed at the company between Spring 2017 and Spring 2018 were ‘1’, the data in Table 5.7 matches the data in Table 5.6.

<b>Term</b>	<b>Type of Match Between Student and Company</b>				
	<b>1-1</b>	<b>emp-1; stu-2</b>	<b>emp-2; stu-1</b>	<b>stu&gt;=3</b>	<b>emp&gt;=3</b>
Spring 2017	82%	0%	12%	0%	6%
Fall 2017	76%	0%	24%	0%	0%
Winter 2018	70%	0%	30%	0%	0%
Spring 2018	65%	0%	32%	0%	3%

*Table 5.7: Percentage of Types of Matches for Company A*

The data in this section has provided a quantitative view of the activity of Company A during the recruitment phase based on the information from the UW co-op database. The next section will present data related to the experiences of the students who participated in Company A’s recruitment process.

### 5.3.4 Perspectives of Co-op Students

The recruitment phase was also explored during interviews with students which led to a number of themes in coded data. Students shared their reasons for applying to Company A, what they remembered about the job posting and interview, how they felt when they learned they had been matched with a job at Company A, and what expectations they had going into the work term.

#### 5.3.4.1 *Decision to Apply – Student Perspective*

The codebook (Appendix M.4) lists and describes the five codes that emerged from the transcripts of the interviews related to students' reasons for applying to Company A. There were a total 47 statements made by students that were coded as relating to this theme. The most frequently occurring reason students gave for applying to Company A (20 statements) was its reputation, in particular the company's reputation as a business and its popularity as a co-op employer. One student said she applied because Company A is "really famous and has a really good reputation among students in my program". Students also indicated (12 statements) that their decision to apply to Company A was based on their interest in the field. This interest was either connected to their academic program or an interest in manufacturing. A representative statement of this code was a student who said she "wanted that fulsome experience in a manufacturing company". Another reason students gave for wanting to apply to Company A was that they were looking for a new experience and the opportunity for personal and professional growth (10 statements). As an example, one student said, he was interested "because it seemed different than other co-ops I'd had" and another student said, "I thought that it would give me a lot of really good experience". Three statements related to why students applied for a role with Company A referenced their belief that they were qualified for the position, one student stating, "I applied because I had previous manufacturing experience." Lastly, students described applying to the job for practical reasons (2 statements) such as the location with one student stating "I wanted to try a co-op closer to the school".

#### 5.3.4.2 *Recruitment Process*

Students were asked to share what they remembered about the recruitment process and specifically the job advertisement that was posted on the co-op system for Company A and the interview process. The codebook (Appendix M.5) shows that there were 41 statements made about the recruitment process from the students' perspective. The most frequent type of statement students made about what they remember was that information was shared about the organization, the department or the specifics of the co-op roles (17 statements). For example, one student said that the representatives from Company A, "outlined what each department did and some potential projects". Another set of 10 statements made by students related to who interviewed them with most of the students reporting that they were interviewed by at least one engineer from one of the departments as well as someone from Human Resources. One student said, he was "interviewed by HR person and a person who ended up being his supervisor". Six statements made by students indicated that the format of Company A's interviews was typical with one student saying "it was pretty much like every other interview". There were six statements made by students which indicated that they did not receive enough information during the recruitment phase. One student said "the interviewers asked me about department preferences and I didn't feel like I knew enough to answer". Finally, there were two students who indicated that they did not remember anything about the job posting.

#### 5.3.4.3 *Pre-Arrival Information, Emotions and Expectations*

There were two other areas of inquiry in the student interviews related to the pre-work term phase. Those areas were how the students felt about being matched with Company A and what their expectations were going into the work term. Appendix M.6 contains the codes and occurrences identified in the transcripts related to this theme.

In the interviews, students were asked how they felt when they found out they were matched with Company A and what they were most and least excited about. There were 36 statements students made

related to how they felt when they found out they were matched with Company A. All the students interviewed reported feeling positive (27 statements) when they learned that they had been matched with Company A. Some reported, “feeling happy” and some as, “being excited” and one used the word, “thrilled”. One student described the day as eventful, another one reported calling her parents to tell them the news. One said this was a job that he wanted the most and another said it was a job that she had been wanting for a while. One student was pleasantly surprised to be matched having been ranked, but offered on the ranking form. Another student said that what she had learned about Company A during the interview had made her want the job more. Two students reported being eager for the school term to end and were looking forward to the start of their work term at Company A. One student said she immediately saw herself returning if the first work term went well.

There were nine statements made about what students were least excited about related to being matched with Company A. Four of those statements had to do with the location of Company A. The students who mentioned the location being what they were least excited about either because they needed to relocate, or because there was not a convenient public transportation route to reach Company A. Five of the students mentioned not being excited about the long hours and weekend work, with one of those students also mentioning the start and end dates for the work term not aligning with the official co-op start and end dates.

Students were also asked to comment on their expectations prior to their work term at Company A. Of the 41 statements that students made about what they expected, the most common response was that students expected the workload to be heavy, demanding, and challenging, and many reported expecting to work overtime (18 statements). One student described this as “I expected to always be on my feet, 12 hour days, that kind of environment”. Ten of the statements about expectations students had were about how they expected to learn or grow from the experience. For example, one student expected to “learn how

her role as an engineer works into the big picture”. A final set of statements (9 statements) related to the expectations students had about the work they would be given which some students expected to be demanding and more challenging than in past work term experiences. One student described this as expecting “less mundane, tedious tasks”. Three statements by students indicated that they had expectations about the people or atmosphere of company A. One student described this as hearing that “workers are really willing to help”. Lastly, one student stated that he had not known what to expect as this was his first time in a manufacturing environment.

Students described how their expectations were formed and fifteen statements referenced students’ expectations being set based on talking with other students who had worked at Company A while two students said that their expectations were based on what they had learned in the interview.

When students were asked the degree to which the experience matched their expectations, the mean score was 6.3 out of 9, with 50% reporting scores of 7 to 9 out of 9. A correlational analysis (Appendix L) identifies a positive relationship ( $p < 0.05$ ) between whether the experience matched students’ expectations and their ratings on four outcome variables: long-term return on investment, the amount of socializing, developing new skills and overall satisfaction.

## **5.4 Summary**

The findings presented in this chapter included the various perspectives and sources of data that shed light on the screening and selection process of Company A when hiring UW co-op students. Findings included the perspectives of the HR and UW Co-op staff who support the recruitment process, as well as the involvement and perspectives of the co-op supervisors. The data pulled from the UW co-op database highlights the amount of work involved in the recruitment process for Company A. Lastly, the findings describe the perspectives of students on Company A’s hiring process and their anticipation of the work term. The next chapter presents findings related to the work term phase of co-op which will be followed

by a chapter which connects the two findings chapters to the research propositions presented in Chapter 3.



## **Chapter 6 Findings: Co-op Work Term**

This chapter will begin with a general description of the work term processes for the University of Waterloo (UW) and Company A. Following that, Katz and Kahn's (1978) role-taking model will be used as the framework for presenting the findings that emerged from an analysis of the interviews and surveys with students and supervisors as well as with UW co-op staff, with Human Resource (HR) employees within Company A.

### **6.1 Work Term Phase Description**

Before presenting the findings of the work term phase as they relate to the research propositions, some background information about the work term processes for UW and Company A is warranted. The information presented here is based on the researcher's knowledge of the UW process and interviews with the UW co-op staff and the HR personnel from Company A.

#### **6.1.1 Work Term Phase Description – UW Process**

There are a few key processes involved in the work term phase for UW. The main processes include monitoring and supporting the workplace experience, supporting and assessing students' workplace learning, and end of term feedback/evaluation.

Within the first few weeks of the work term, through email, staff from UW reach out to students and supervisors to ensure that everything has started smoothly and there are not any issues that have arisen. Students are given the option of whether, and how quickly, they would like a student advisor from UW to contact them. Workplace supervisors are asked if the student is meeting, or not meeting their expectations. In the case of students not meeting the supervisor's expectations, a student advisor would reach out to offer assistance to the supervisor, or the student in an attempt to work with either or both of them to improve the situation.

In addition to the electronic check-in around the midpoint of the work term, UW co-op student advisors also reach out to students who are in their first work terms, or their second to last work terms, to schedule a site visit. The goal of the site visit for first work term students is to ensure that everything is progressing well, to review goals that the student has set for the term, and to discuss progress towards meeting their goals. The student advisor will also typically meet with the student's supervisor to ensure that there is consistency between the student's and the supervisor's report on how the work term is going. The goal for the site visit for students in their second to last work term is to have a strategic discussion about how the student's final work term can position them for what they are hoping to do after graduation.

UW supports and assesses student learning through online professional development (PD) courses that co-op students take while they are on their work terms. During students' four to six work terms (depending on the program they are in), they take one PD course per term from a set of required and elective courses. These courses are centred on topics such as Workplace Communication, Problem Solving, Project Management, and Conflict Resolution. The courses present the theoretical concepts related to the topic alongside examples related to a variety of workplaces and provide students with the opportunity to connect the course content to the experiences they are having in their specific workplaces and reflect on what they are learning through the work term. UW faculty and staff develop and run the courses and a team of teaching assistants answer student questions and mark assignments.

At the end of the term, UW requires that supervisors complete and submit a standard co-op performance evaluation. UW strongly encourages supervisors to have a conversation about performance and areas for improvement with the student before the student leaves at the end of the work term.

### **6.1.2 Work Term Phase Description – Company A Process**

In the interviews with HR personnel and the co-op supervisors at Company A, a description of their processes related to the work term were shared. Their processes include a co-op specific orientation

process, assignment of students to specific teams where students are given tasks to complete, issue management, and end of term wrap-up activities.

The work term begins with the co-op students, as a group, attending a two-day orientation. This session involves an introduction to the organization and its culture, and an overview and practice of the company-wide problem solving methodology that students will be expected to apply to at least one of their projects over the course of the work term. The students are also set up with permissions for the systems they will need to access so they are ready to start following orientation.

At the end of the second day of orientation, the supervisors arrive and introductions are made between the new students and their supervisors. From there, the students work with their team for the rest of the term. Each student works on a 'Highlight project' where they use company-wide problem solving methodology to develop a proposed solution for a problem. All students present their Highlight project to senior leaders of Company A near the end of the work term. Some centralized support is provided for students in completing their Highlight project. Milestones are set and communicated to the student and their teams, and the student needs to obtain their supervisor's sign-off that they have completed the milestones.

Supervisors at Company A typically conduct an informal midterm evaluation with their students. Some of the supervisors use the form that UW requires them to complete at the end of the term to guide the midterm discussion. They review the student's progress so far in the term and let them know where their overall rating currently sits and what they would need to do to go a level higher by the end of the term if the supervisor sees that as a possibility.

Any concerns that supervisors have with their co-op students over the term that cannot be resolved by themselves are directed to the HR personnel at Company A. If HR needs to reach out to UW for assistance, they do.

Near the end of the term, HR reaches out to the students to determine if they would like to return to Company A for their subsequent work term (4 months later) and if they do, the students indicate their top three choices for departments they would prefer to work in. HR checks with the student's current supervisor to determine if it is in Company A's best interest to have the student return. At the end of the term, students give a presentation to the senior leaders on their Highlight project and discuss the performance evaluation with their supervisor that will be completed and sent to UW.

## **6.2 Co-op at Company A and the Role-Taking Model**

Ashby's law states that if there is response variety within the system to absorb the disturbance variety, then the system will be stable (Ashby, 1957). For co-op, if the students and the organizations they work in possess response variety to absorb the disturbance variety they generate for each other, then the system will be stable and will produce desirable outcomes. In other words, the degree to which variety is balanced during the work term impacts the likelihood of the student and employer achieving their desired goals.

The goals of the student and employer for participating in co-op programs are a source of disturbance variety for each other. For example, a goal for students is the desire to learn and develop new skills and a goal for employers is for the student to contribute productively to the organization. These two goals suggest that a key area of variety management in the work term is the assignment and completion of tasks, as it is through the completion of tasks that students will have the opportunity to learn and develop new skills and it is through tasks that the students will contribute productively to the organization.

The way in which variety is balanced in the work term between the student and the organization can be viewed through the role-taking model proposed by Katz and Kahn (1978). This model provides an excellent framework for examining what is happening, at a task level, with the co-op work term for supervisors and UW students working at Company A. Applying the role-taking model as a framework

was useful because the main point of interest for this research in examining the work term was to understand how variety was handled by the organization and the student in the allocation and completion of tasks.

In this chapter, the data, collected through interviews and surveys with supervisors and students, is organized according to the various components of the role-taking model. Those components, as shown in Figure 6.1 are: organizational factors, the role expectations of the supervisor, the sent and received role, the role behaviour of the co-op student, and the attributes of the students and interpersonal factors.

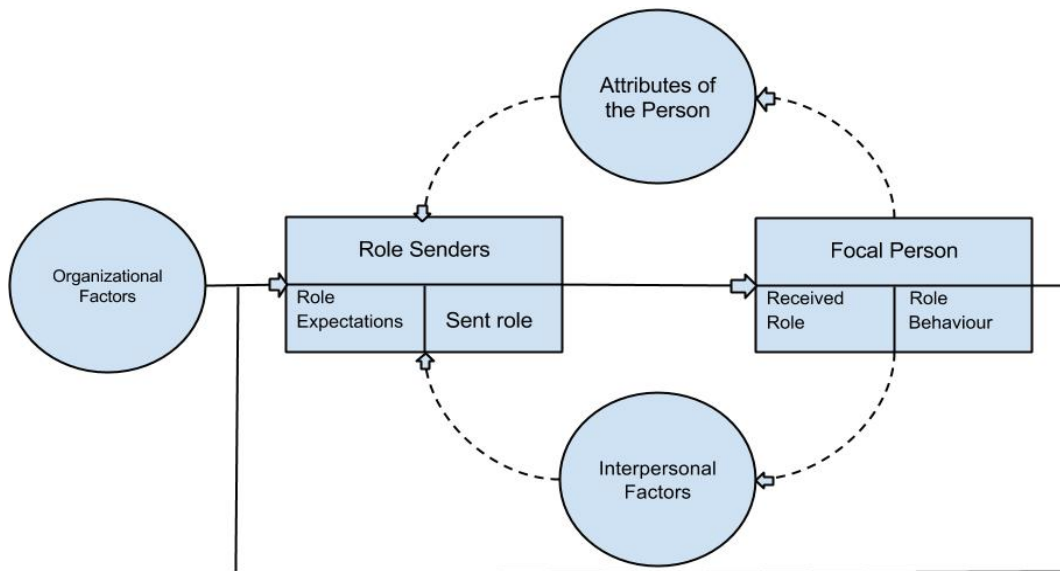


Figure 6.1: Theoretical Role Taking Model, Katz & Kahn, 1978

### 6.2.1 Organizational Factors

There are three main organizational factors for Company A related to the allocation of tasks for co-op students that emerged in this research. The organizational factors included Company A’s philosophy for hiring co-op students and Company A’s culture of LEAN manufacturing and continuous improvement.

### *6.2.1.1 Philosophy for Hiring Co-op Students*

Supervisors were mostly consistent in their responses about why Company A hires co-op students. The codebook (Appendix O.1) shows the categorization of the 26 statements supervisors made related to the philosophy for hiring. All four supervisors who were interviewed reported three main reasons why their organization participates in the co-op program. Those three reasons were 1) to be a good corporate citizen through connections with the local community, 2) as a way of pre-screening future hires, and 3) because there is an actual business need, that is, short-term work that needs to be done.

All supervisors interviewed identified that it is important for Company A to be giving back to the community through supporting local schools and their co-op programs. There were four statements related to this idea made on the philosophy for hiring. Supervisors referenced this as a way to build the reputation of their company and awareness of their work with the next generation of workers. They also indicated that participating in co-op programs was a way of showing their commitment to the local community.

Of the comments made by supervisors about their company's philosophy for hiring students, nine of the comments related to pre-screening future hires. Supervisors described hiring co-op students as a major recruitment tool, as being a four month first round interview, and indicated that they hope that participating the co-op program will give them better opportunities for hiring full-time staff. One supervisor noted that the best graduate hires have previously worked at Company A as a co-op student, and expressed the sentiment that knowing each other was a great advantage to ensuring a successful hire. Another supervisor connected the goal of increasing the quality of graduate hires with the tasks that he assigns the co-op student, saying "That is why it is important to give students meaningful work. If I do not give them meaningful work, then I will not have a meaningful measure of performance."

In the responses about why Company A hires co-op students, nine of the statements by the supervisors indicated that a significant factor in their co-op hiring was that there was real work that needs to be completed. Supervisors referenced the importance of co-op students in accomplishing tasks within

their teams. Three of the four supervisors described co-op students as a cheaper or easier alternative for getting extra support for their teams. The co-op salaries were less than that of contract services for the teams, and the fact that the co-op student headcount was approved annually at the company level makes it an easier process than requesting additional permanent or temporary headcount.

There were two other ideas expressed in four statements by two of the supervisors related to the philosophy of hiring co-op students by Company A. One supervisor raised the value of supervisory experience for the Engineering specialists as a reason for the Company's participation in co-op. She said that even though they were not officially 'management' or the supervisor on record for the co-op student, they benefited from supervisory experience through their involvement in the interviewing and selection process as well as assigning tasks and supporting the day-to-day activities of the co-op student. For another supervisor, he viewed co-op students as having current knowledge, and bringing fresh ideas and new ways of thinking about things to the workplace.

#### *6.2.1.2 Organizational Principles of LEAN manufacturing and Continuous Improvement*

The theme of LEAN manufacturing was an area that emerged related to the tasks given to co-op students, though it was not a specific area of questioning in the interviews with students or supervisors. Company A has a LEAN approach to manufacturing, which means it is continuously identifying and eliminating waste from the production process and includes a number inter-related practices such as just-in-time and total quality management (Shah & Ward, 2003). While a detailed examination of the LEAN practices is outside the scope of this dissertation, two areas related to LEAN practices emerged from the participants and directly relate to the tasks that are assigned to co-op students. One area is Company A's need for the students to contribute to the day-to-day work of the organization. The second area is the involvement of students with continuous improvement projects.

A consequence of a LEAN organization is that by reducing excess waste, for example, in the availability of human resources, there is no organizational slack to handle unexpected disturbance variety (Saurin, 2017). This idea is connected to one of the three main philosophies supervisors spoke about as to why they hire co-op students, that is, there is work that needs to be done. There were 8 statements made by supervisors and student related to this theme (Appendix O.1). One supervisor commented, “I consider the co-op program as an avenue to get through those peaks in the work” and went further to say, “co-ops perform at a suitable level or better level sometimes than even contracted services”. Another supervisor described the use of co-op students as needing an extra set of hands to help. The references that students made related to the LEAN approach of company A mostly centred on their reports of working overtime. Many of the students interviewed reported working 10-15 hours of overtime per week for at least some portion of the work term. This suggests that the students were involved in critical work if Company A was willing to pay overtime for students to complete the work. One student described the pace and volume of work at Company A, as compared to previous work terms. She said, “I had to work a lot faster [at Company A] than other companies and I got a lot of things [to work on] every day. I had to work a lot of hours, even weekends, a lot of overtime and big projects. It’s really challenging, but it’s fun.”

Company A’s culture of continuous improvement was not a specific focus of the interviews or surveys conducted with participants in this research study. Yet, in the interviews, both students and supervisors made references to the ways that Company A’s culture of continuous improvement affected the tasks that are given to students (Appendix O.1).

One supervisor described the culture of the organization in reference to the type of tasks given to co-op students as, “It’s our daily business. There’s a lot that we improve on the fly.” Another supervisor spoke about the characteristics of successful co-op students in an environment of continuous improvement environment saying, “They are always curious and they want to improve stuff. That’s typically all I’m



looking for at the end of the day.” On the question of whether supervisors encouraged their co-op students to propose new ways to do things, supervisors provided an average rating of 7.1 out of 9 (Appendix J).

Students were very aware of the culture of continuous improvement at Company A. When asked about whether they were encouraged to propose new ways to do things, one student said that he didn't feel there was explicit encouragement, but it was just the culture of the organization as a whole, that the company, “encourages people to try new things and constantly improve what they're doing.” Another student said, that the company's philosophy of continuous improvement was introduced during orientation and said that it was “emphasized that everyone in the organization can implement improvements, not just management”. Students provided an average rating of 7.6 out of 9 in response to the question of, “were you encouraged to propose new ways to do things?” (Appendix K).

### **6.2.2 Role Sender – Role Expectations**

The next component of the Katz and Kahn model (1978) to be explored is the expectations of the role senders, or in this case, the co-op supervisors at Company A. Co-op supervisors are influenced by the organizational factors stated in the previous section, and have specific expectations in mind, as well as processes for determining what tasks would be most appropriate to give to their co-op students as documented in the codebook (Appendix O.2). In the interviews, supervisors discussed the ways that they identify tasks for students which included specific start-of-term processes (9 statements) as well as other factors that they consider in the tasks that they assigned to co-op students (13 statements). While the question of how tasks were assigned was not explicitly asked of students, they shared a few observations on how tasks were identified (3 statements). In the following sections, examples of the statements participants provided for each of these categories will be provided.

#### *6.2.2.1 Start of Term Processes*

When discussing the tasks that were assigned to students, supervisors spoke about three main things that they do at the beginning of the term. Three of the four supervisors spoke about assigning simpler, more straightforward tasks at the start of the term. Two of the supervisors specifically mentioned the idea of monitoring the student's performance on those initial tasks as a way of assessing the student's capabilities and determining what subsequent tasks could be assigned with one supervisor reporting that he "sticks with the student closely the first time they're doing a task", and the other supervisor stating he "gives them a couple of tasks [at the beginning of the term] to test where they're at".

#### *6.2.2.2 Factors Affecting Tasks Assigned*

In addition to talking about some of the activities that supervisors do at the start of the term to determine what tasks to assign, supervisors also shared a number of factors that they consider when assigning tasks. The most common factor that supervisors shared was taking into account the students' previous experiences and skills when assigning tasks. One supervisor suggested that it would be useful to receive the résumé of the student they had been matched with in advance of the start of the work term so that the team could examine the plan for tasks in relation to the experience and background of the student. Another supervisor spoke about assigning tasks to returning students as being different because "you know what the student is capable of". In the case of a student returning to the same team, the supervisor explained that they have a list of tasks ready and provided to the student who was told to "go". One of the supervisors said that tasks may be assigned to the current student based on things that the previous student did not finish. That same supervisor also said that sometimes tasks are assigned through discussion with the student to determine their specific interests. Two of the supervisors explicitly mentioned the idea of tasks being assigned with the thought of how the student benefits from doing the task. One said, "it's about

getting stuff done and also providing an experience to the student”. The other said he tries to be “mindful that the student needs to get something out of the term.”

Students were not specifically asked about how tasks were assigned to them, but one student made statements about how the engineers she worked with knew what tasks were appropriate because the person assigning the tasks was an alumnus of the same program and he was familiar with what she was capable of. A second student made a comment that at the start of the term, her team switched her to a new supervisor because her previous experience aligned more closely with the projects the new supervisor was doing.

### **6.2.3 Sent-role/Received-role**

The role, or collection of tasks, sent by the supervisor and received by the student is a significant focus for this chapter. A sizeable portion of the interviews with supervisors and students, and the survey administered to another group of students and supervisors, centred on the tasks that students were given. In the interview with supervisors, they were asked to think of the three main tasks assigned to one of their most recent students. In the interviews with students, they were asked to recall the three main tasks they worked on during their most recent work term at Company A. Based on those three tasks, participants were asked a series of questions which can be found in Appendix C and Appendix D. Some questions asked participants to provide a rating on a scale and some questions asked them to describe aspects of the specific task. Additionally, the separate group of students who had worked at Company A and supervisors who were responsible for the day-to-day activities of co-op students were invited to complete an online survey which asked them to provide ratings on the three main tasks co-op students were assigned. The online survey questions for supervisors can be found in Appendix E, and the online survey questions for students can be found in Appendix F. This section presents the task-related findings from the interviews and surveys with students and supervisors.

Through an analysis of the transcripts of the interviews with students and employers, a general structure for the co-op role at Company A emerged as shown in Figure 6.2. Each co-op student is assigned one ‘Highlight project’ which related to an aspect of continuous improvement for the company. In addition to the Highlight project, students are assigned a number of ad hoc tasks over their work term. When examining the collection of those tasks across the supervisors and students interviewed, it seemed that those ad hoc tasks could be classified in one of two buckets: tasks that were assigned to the student to provide support to one of the full-time engineer’s projects, or side projects that were tasks that had been waiting to be completed or needed at some time in the future.

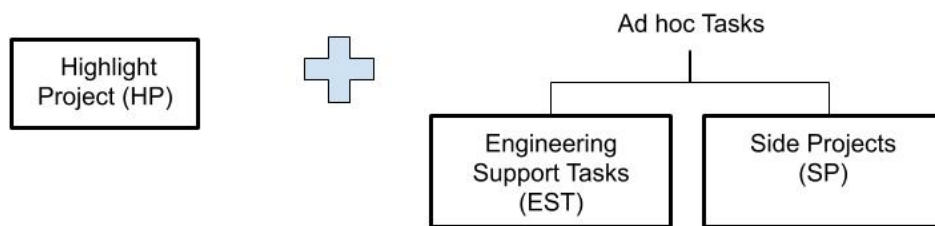


Figure 6.2: Task Classification Model for Co-op Role at Company A

### 6.2.3.1 Highlight Project

All co-op students who work at Company A are assigned a Highlight project to be completed over the course of their work term and the project culminates in an event near the end of the term where all co-op students from a given division give a presentation on their projects to the senior leaders. The projects are typically identified by the teams that the students are working with and often involve a problem that has existed for some time that the team would like solved. Sometimes there is a search for the problem by the student or the team once the student has arrived. The students apply a company-wide method for problem solving, a standardized way of thinking about problems that involves finding the root cause of a problem, evaluating possible solutions and identifying the preferred solution. There is also a set structure for presenting results which the students use. They are introduced to the problem solving approach and

given some preliminary training during their two-day company orientation. For most of the teams that students work with, there are established milestones and deadlines over the term that require sign-off by the student's supervisor. There are practice sessions among the co-op students near the end of the term for them to prepare and receive feedback on their presentations. At the end of term, with the senior leaders for the division, the students each have seven minutes to give their presentation which includes a description of the problem they investigated and the estimated cost savings for the organization as a result of the proposed, and in some cases implemented, solution.

#### 6.2.3.1.1 Highlight Project - Supervisor Perspective

The four supervisors interviewed offered a number of general comments about the Highlight projects that students work on (Appendix O.3). Two of the supervisors interviewed seemed to have a different perspective on the students' Highlight projects than the other two supervisors. Two supervisors did not mention any challenges regarding the Highlight project from their perspective, and the other two supervisors reported a number of challenges.

The two supervisors who reported challenges made 12 statements about challenges they face with co-op students and the Highlight projects. Five of the statements made by these supervisors identified a challenge being that the work of their units does not easily allow for the identification of a problem that can be solved using the company-wide problem solving method. In particular, neither of these supervisors were responsible for production groups, therefore, finding a problem which could be solved using the structure required for the Highlight project was more problematic. For one of the supervisors, the department does not have any equipment of its own which can be a common source of ideas for the students' Highlight projects, so students who work in their group sometimes partner with a production group to identify a relevant problem to be solved. In that case, the work being done by the student for their Highlight project was not directly benefiting the unit they were working in. This was reported as a

challenge by the supervisor because there were a number of projects within the department that could benefit from the student's time but the student had less time to devote to their home department because of their work on the Highlight project. There were two other challenges reported in six statements by one of these supervisors. One challenge was the amount of support that needed to be provided by the team to help the student with their Highlight project. He reported that not all students were ready for what was required in completing the Highlight project, but described that the team felt pressure to help the student be successful in their presentation to the senior leaders at the end of the term. This may involve significant support throughout the term as well as preparing the student for the presentation. The supervisor mentioned that there was some centralized support for the students, but that sometimes the people delivering those sessions were not experts on the process. This supervisor also mentioned that there was a challenge with completing the process for the Highlight project within the time frame of the four month co-op work term.

There were two statements made by the supervisors about the value of the Highlight project. One supervisor said that "the student, by going through the systematic problem solving process, was able to prove previous studies wrong." Another supervisor reported that for a particular student, the project was more about the student's learning than direct benefit to the supervisor's department.

#### 6.2.3.1.2 Highlight Project - Student Perspective

The students interviewed shared their perspectives on a number of aspects related to highlight projects at Company A in general and their highlight project specifically (Appendix O.4). Students commented on how they were supported in completing the project. They also shared details about the pressure they felt, mostly associated with the presentation and the feeling that their team's reputation was tied to the success of their presentation. Students spoke about their perceptions of value to the organization

by having them complete highlight projects. There were also students who spoke about how the highlight project was handled differently in their team than most of the other teams at Company A.

When discussing their highlight project, six comments were made about how they were supported through the process of completing their highlight project. Two students referenced the training that they received for the highlight project. One student said that the training involved her Assistant Manager and her lead providing a lot of background information. Another commented that the format for the highlight project was covered in the early training sessions but that the training “could have been better”. Another student commented that even though it was his second term at Company A, the highlight project was still challenging. Two students spoke specifically about the preparation for the presentation, one saying that he was presenting, on his own initiative, five times a day near the end to various groups and people to get feedback. Another student said that her supervisor and the other engineers on her team helped prepare for the presentation. One student reported that one of the ways his team supported him in his highlight project was to reduce the number of daily tasks near the end of his term so he would have more time to finish his project.

Ten statements were made about the pressure students felt in completing their highlight project, particularly due to representing their team in their presentations to with senior leaders. The presentations of the highlight project were viewed by at least one student as being, “a pretty important day” and when finished reported saying “Yay we’re done. We did it. We survived.” One student saw the highlight project as an opportunity to help their team be viewed positively by senior leaders. One student said, “the project was low risk and high reward, because it shows upper management the value of co-op students” and said, “it looks good on the team if my project is good.” That same student also acknowledged the flip side of the coin, saying, “there could be a significant impact of the project if a poor job is done because it will reflect badly on the team.” Another student identified the risk of assigning the project he had to a co-op

student as a reputational risk since it was being presented to upper management. Four students talked about other pressures associated with their highlight project. One spoke about pressure resulting from having her name on the project, as opposed to being in a supporting role for her other projects. Another student spoke about how the final evaluation for his work term was largely based on his performance on the highlight project and so that increased the pressure for him. A third student spoke about feeling the need to put pressure on others for data because this was her highlight project. A fourth student described feeling pressure to do well on her final project because her supervisor was being evaluated by his boss on how well he had coached her.

There were nine statements made about the value or the outcome of the students' work on their highlight projects. One student commented generally on the value co-op students completing a highlight project by saying "the value of the highlight project is to show co-op is saving them money". As a specific example, one student reported that she was able to identify \$300,000 in waste through her project. She commented further to say that without her project, Company A would not be able to quantify the specific waste she was investigating and that her results enabled them to provide a rationale for an expensive system to address the problem. She also commented that the issue she had addressed in her highlight project was an issue that was likely occurring in multiple divisions across the multi-national company and so her project could lead the way for additional savings across the whole organization. Another student commented that his project was a "nice to have, not a need to have" project while a different student said his project would not have been done if not for the need to do a highlight project.

The last set of statements made by students about their highlight project came from three students who noted that there were variations between how teams handled the co-op students' highlight projects. One student commented that he found out that some of the managers were not as involved in the highlight project as his had been. Two other students, who were not in production departments found that their



highlight projects were handled separately from the main production co-op students. For one of those two students, she reported that she did not like being segregated from the process that the other students had. For example, she did not have standard deadlines like those students in the production teams. The other student also reported that the students working in his division were handled separately from the production teams, but he liked that. He felt that it was a more “laid back” process and that overall there was less emphasis on the highlight project for his division.

#### *6.2.3.2 Ad hoc Tasks*

Through an examination of the interviews with participants, it seems there were two main categories of ad hoc tasks that were assigned to co-op students. The categories are: 1) Engineering Support tasks, and 2) Side projects. The categories were identified through the participants’ answers to two questions: if the co-op student did not do the task, who would have done it, and would it have been done within the same time frame? These questions were important because an analysis of the responses to these questions was able to identify how time-sensitive, urgent, or critical the tasks were that students were assigned. That is, if the response was that the task probably would not have been done if the student did not complete it, then it is assumed not a critical task for the team or organization. The second question was important to understand the time sensitivity or level of priority of the task. If the response to the question about “who would do it”, was “one of the other engineers on the team”, then it is important to know the response to the question of time frame. If other engineers on the team would have to complete the task in the same time frame as the student, by pushing other projects down their priority list or by doing additional overtime, that indicates a higher urgency or priority than if the answer had been that the task would have been added to the other engineer’s list and they would have eventually gotten to it.

The Engineering Support tasks were tasks that would have been completed by a full-time employee if not completed by the student. Further, the Engineering Support tasks needed to be done in the same

time frame as the student did them in. The Engineering Support tasks were tasks that were part of a larger project currently being led by one of the full-time engineers in the department with specific parts of the project being delegated to the co-op student. If there was no co-op student available, then the full-time engineer would need to complete the tasks on their within the specified timelines for the project. Other Engineering Support tasks included more routine, ongoing tasks such as daily, or weekly reports that needed to be prepared and distributed. When a co-op student was not available, it was the responsibility of the full-time engineers to complete these tasks.

The other type of ad hoc tasks was Side projects. These were projects that the department had been wanting to investigate or complete but were not a high enough priority for a full-time engineer. For the tasks in the 'Side projects' category, on the question of 'would this have been done in the same time frame', participants would have answered 'no'. These are projects that may or may not have been completed if students had not been there, but the Side projects would not have been at the top of the priority list for the other engineers on the team. In some cases, tasks that students worked on as Side projects arose from problems that the students identified themselves and were given the green light to pursue as a task.

#### 6.2.3.2.1 Ad hoc Tasks – Supervisor Perspective

Comments were made by supervisors related to the ad hoc tasks that students were assigned (Appendix O.3). Three of the supervisors said that they employed co-op students to get work completed in their departments. One described using co-op students to address a resource gap. Another said that he used co-op students to resource peaks in the workload for his department. Two supervisors noted that there was different levels of work to be completed and if there were co-op students who could complete the more straightforward tasks, then the full-time engineers could focus on the higher level tasks.

Three of the four supervisors talked about tasks being assigned to students that support one or more of the projects of a full-time engineer on the team. One supervisor described that these tasks were for students who were not ready to take full responsibility of their own projects. He assigned them tasks that resulted from the daily working group meetings. He described one of the benefits of giving students these tasks as there being a “pre-existing system for support” with the working group members. He also noted there was more structure for students with these tasks, as “students do not need to show initiative to get additional resources to be successful in these tasks” and yet they provide “extra hands for a large project that’s a lot of work for the team”. Another supervisor described assigning tasks to students by looking for smaller components within a bigger project where support was needed and also noted that students may have specific skills that others on the team may not possess, in which case, the student can be assigned tasks to take advantage of that skill set. A third supervisor talked about the full-time engineering team members assigning tasks during the project.

Two of the supervisors described Engineering Support tasks that were routine responsibilities. One supervisor gave examples of specific tasks that can be added to a student’s plate “once project base [for the student] is established”. For example, students could be helpful with data gathering which she described as “running around getting information for the department”. She noted that sometimes students struggle with larger projects but were successful once the project was broken down into tasks. The other supervisor described the task for co-op students of preparing and issuing required daily reports, as well as regularly taking measurements for required quality checks.

There was only one statement from supervisors regarding Side projects. One supervisor identified that Side projects are “good for students” pointing to the value of students having tasks that that they can work on at their own pace.

#### 6.2.3.2.2 Ad hoc Tasks – Student Perspective

There were a number of general and specific comments made by students about the ad hoc tasks they were assigned (Appendix O.4). One student described being assigned day-to-day tasks which were trouble-shooting production problems. Another said that she would report daily on her activity from the previous day and be assigned tasks for the current day. Another student made the observation that she felt co-op students were there to do tasks that involved a lot of time. Statements student made specifically about tasks related to one of the two categories (Engineering Support task, Side projects) follow.

Five students talked about the Engineering Support tasks that they were assigned. Three of these students reported that someone would assign tasks to the full-time engineers, and subsequently the full-time engineers would assign these tasks to the students. Four students described being assigned tasks from multiple full-time engineers and one of those students said that the engineering team was “kind of my support with everything I did”. One student said that he had weekly meetings with one of the full-time engineers and she would review tasks and deadlines with him. One student described feeling less pressure with these tasks because it was not her name on the project, that is, she did not feel ultimate responsibility, instead she was acting in a support role for someone else. Another student described the project that she was working on “as something extra” that had arisen and the full-time engineers were “technically responsible for it but they already had full plates” and so she helped them with it.

Three students commented on Side projects they were assigned to work on. One said that one of the tasks he had been assigned “was simply a side project that needed to be done eventually”. Another student commented that her task was something her team had wanted to get done for a while. Another student talked about it being typical for students to do contractor management projects, “but the smaller ones”, as compared to the full-time engineers. Contractor management projects that were assigned to students tended to be projects that could be completed during one or two weekends. Students would coordinate the process by getting a contractor to do the work and then coordinate the time and space with the team to

ensure that the work would not physically conflict with other projects occurring in the same weekend. The projects that were described in the interviews included activities such as installing or moving electrical outlets, or bigger projects such as moving a washroom. The student would hire a contractor external to Company A, but who had completed similar projects before for Company A. The student would be responsible for supervising the weekend work and ensuring the work was done according to the specifications.

### 6.2.3.3 Ratings of Task Characteristics by Task Type

The data collected by answering questions on a scale rating in the interviews and through the online survey allow for an examination of the different characteristics of the three types of tasks. Table 6.1 shows the average ratings on different task dimensions presented by the type of the task. ANOVA tests were run using SPSS and significant differences ( $p < 0.05$ ) are marked with letter subscripts. Where the subscript letters match, there was a statistically significant difference between those values.

Task Dimension Scale (1-9)	Highlight Project (n=42)	Engineering Support Task (n=47)	Side Project (n=23)
Training	5.3 <sub>a</sub>	4.1 <sub>a</sub>	4.1
Flexibility	6.2 <sub>a</sub>	4.5 <sub>ab</sub>	5.9 <sub>b</sub>
Time to Comfort (weeks)	4.1 <sub>ab</sub>	2.7 <sub>a</sub>	2.1 <sub>b</sub>
Level (below...at...above)	5.7 <sub>ab</sub>	5.0 <sub>a</sub>	4.8 <sub>b</sub>
Pace	5.6	6.3	5.8
Pressure	6.9 <sub>a</sub>	6.3 <sub>b</sub>	4.2 <sub>ab</sub>
Impact of Mistake	5.3 <sub>ab</sub>	6.2 <sub>ac</sub>	4.1 <sub>bc</sub>
Risk	3.6 <sub>ab</sub>	4.5 <sub>ac</sub>	2.7 <sub>bc</sub>

Table 6.1: Ratings of Task Dimensions by Task Type

Note: where letter subscripts match, there is a statistically significant difference with  $p < 0.05$

As can be seen in Table 6.1 there were differences on the participants' ratings of task dimensions based on the type of task. Highlight projects were reported to be higher in term of complexity or disturbance variety when examining the dimensions of time to comfort, level (as it relates to the students' capabilities) and training. The Highlight projects and Side projects were reported to be more flexible than

the Engineering Support tasks. Students reported that the pressure associated with the Highlight projects and Engineering Support tasks was higher than for the Side projects. On the dimensions of risk and impact of mistake, the highest ratings were given for the Engineering Support tasks followed by the Highlight project and Side projects. Differences between the ratings for the dimension of pace across different types of tasks were not found to be statistically significant.

#### 6.2.3.3.1 Level of Tasks

One of the areas of focus for this research was how the level of the tasks (relative to the students' capabilities) assigned to students affected the balance of variety within the system (Proposition 3). As described in Chapter 3, students want to learn from the experience and, therefore, would like to be assigned tasks that enable them to learn and develop new skills. However, if the tasks given to students are beyond their capabilities, then they either will not be successful with the tasks, or they will require higher levels of support than what is potentially worthwhile for employers to provide to short-term employees. For each of the three main tasks assigned to students, both student and employer participants were asked whether they felt the task was below the student's level, at the student's level, or above the students' level on a nine-point scale. Table 6.2 shows a mapping of the reported task levels and the associated number of tasks of each type. Of tasks reported by those involved in this research, 10% were below the students' level, 73% were at the students' level and 17% were above their level.

Level of Task	Highlight Project	Engineering Support Task	Side Project
Low Level ("Below" students' level)	1	7	3
Moderate Level ("At" students' level)	30	34	18
High Level ("Above" students' level)	11	6	2

*Table 6.2: Number of Tasks by Type and Level as Reported by Students and Supervisors*

#### 6.2.3.3.2 Task Level and Student Outcomes

Students were asked a range of questions related to their overall experience at Company A. The mean scores and standard deviations associated with students' overall ratings of the experience can be found in Appendix K. Despite the generally positive outcomes for students and supervisors at Company A, as found in Appendix K, it was possible to identify comparison groups within the sample based on specific criteria that enabled the examination of differences in outcomes for differences in tasks and task-related support (Proposition 4a). In this section, the criteria for the comparison groups will be described and the outcomes data as it relates to the tasks that were assigned to students will be presented.

The ratings students provided for several aspects of their experience were examined using an exploratory factor analysis. The results identified a four-factor solution explaining 66.8% of the variance. The five items that loaded on the first factor were used as student outcome measures for this analysis. The items were: learning, developing new skills, overall satisfaction, long-term return on investment, and short-term return on investment. That grouping of five student outcomes was used to examine the impact of the assigned tasks and the support provided to students in completing their tasks.

The task data was examined across participants, not just across tasks, in order to consider potential connections between the work assigned to students and potential outcomes for the student. Student cases were identified as part of the "low level tasks" group when one or both of the following conditions was true. One condition was when at least one of the three main tasks assigned to students was rated as being 1 to 3 out of 9 for the level of the task. The second condition was that the average task level across the three tasks was less than 5 out of 9. The average task level was calculated as a weighted average based on the percentage of the work term that students spent on each task. The rest of the student cases were labelled as part of the "moderate-high level task" group. Descriptive statistics and independent-samples t-tests on the five student outcome variables were run using SPSS and are reported in Table 6.3.

<b>Student Outcome</b>	<b>Task Level Group</b>	<b>n</b>	<b>Mean (scale of 1-9)</b>	<b>Std. Dev.</b>
Learned	Mod-high	19	8.53*	0.772
	Low	11	7.18*	1.722
Developed new skills	Mod-high	19	7.79	1.548
	Low	11	7.18	1.601
Overall satisfaction	Mod-high	19	7.58	1.071
	Low	11	7.09	1.814
Long-term return on investment	Mod-high	19	7.11	1.150
	Low	11	6.64	1.912
Short-term return on investment	Mod-high	19	6.32	1.455
	Low	11	5.64	0.924

*Table 6.3: Task Level and Student Outcomes*

\*  $p < 0.05$

There were 19 students whose level of tasks meant they were in the “moderate-high level task” group and 11 students whose level of tasks put them in the “low level task” group. All five outcomes measures for students in the “moderate-high level task” group were higher, though the only difference that was statistically significant was the degree to which students reported learning from the experience.

In addition to examining the differences in the ratings the two groups of students gave on specific outcome variables, the type and frequency of outcome statements identified as codes in the transcripts were also compared as shown in Table 6.4. Descriptions of the categories can be found in Appendix O.5. As was described in Chapter 4, inter-rater reliability was tested and the percentage of overlap in matching statements to categories for this theme was 82.3%.



Categories of Overall Student Experience	Number of statements in category	Percentage of statements by students in Mod-High Level Task Group	Percentage of statements by students in “low level task” group
Development	26	58%	42%
Positive return on investment	14	71%	29%
Returning after graduation	11	73%	27%
Enjoyable environment & people	10	50%	50%
Busy/stressful/frustrating	9	89%	11%
Not returning for another work term	8	63%	38%
Met/exceeded expectations	7	71%	29%
Work-life balance	6	67%	33%
Did not match expectations	4	25%	75%
Pay - positive	3	33%	67%
Workload not balanced	3	67%	33%
Lower return on investment	2	0%	100%
Pay-negative	2	100%	0%
Workload reasonable	1	100%	0%

*Table 6.4: Student Outcome Categories Associated with Task Level*

The categories in Table 6.4 show the range of ways students spoke about their work term experience. The most frequently cited category related to students’ overall work term experience were statements about how they developed during the term. One student said, he “learned not just the technical skills but how to communicate”. Another said, she gained “lifelong skills that you get from working in such a fast-paced environment”. With respect to a positive return on investment, one said, “it’s tough when you get in, but rewarding when you get out”. One student who reported feeling stressed said it was “mostly due to long hours and a long commute”, while another reported feeling stress because she was “responsible to other people” not just herself. Seven of the eight students who spoke about not wanting to return for another work term indicated that they wanted to get different experiences for each of their work terms and felt they would have the opportunity to learn more at a different organization. One student said that he did not want to come back for another work term because “I don’t think I want to work there after graduation”.

Non-parametric Chi-square tests were run on categories where there was a frequency greater than 3 for the each of the buckets. Of the categories that did have a high enough frequency in each of the two groups, none of the differences in the frequencies between the two groups were found to be statistically significant.

#### 6.2.3.3.3 Task Level and Supervisor Outcomes

Supervisors were also asked a range of questions related to their overall experience with their most recent co-op student. The mean scores and standard deviations associated with supervisors’ overall ratings of the experience can be found in Appendix J. In this section, the supervisors’ outcomes data will be examined as it relates to the level of the tasks that were assigned to students (Proposition 4b).

The area of interest with respect to this data is whether high level tasks (i.e., tasks “above” students’ capabilities) negatively impacted the supervisors’ outcomes for the work term. To explore the connection between the level of the task assigned to students and the supervisors’ outcomes, the first set of data analyzed was the supervisor’s satisfaction with the work of the student on a specific task based on the level of the task as shown in Table 6.5.

<b>Task Level</b>	<b>n</b>	<b>Satisfaction</b>	
		<b>Mean (scale 1-9)</b>	<b>Std. Dev.</b>
Low-moderate level (1-6) “below” or “at” student level	31	7.10	1.620
High (7-9) “above” student level	6	6.17	2.317

*Table 6.5: Task Level and Supervisor Satisfaction*

There were a total of 31 tasks reported by supervisors as being “below” or “at” the student’s level and six reported as being “above” the student’s level. While the associated mean scores show that supervisors’ satisfaction was negatively associated with the level of the task, an independent-samples t-test was run in SPSS and the results indicated that the difference between supervisors’ satisfaction with students in the “high level” versus the “low-moderate level” group was not statistically significant.

The second area of analysis was to examine task level and outcomes at the participant level. Two task level groups were created for supervisors: a “high level task” group and a “low-moderate level” task group. Supervisors identified in the high level task group satisfied at least one of the following two conditions: one or more tasks assigned to their student was rated as 7 to 9 for the level of the task; two, the weighted average task level across the three assigned tasks was greater than five. There were three outcome variables that were examined for supervisors: an overall rating for the work-term, a rating for the contribution the student made during the work term, and an overall return on investment from the supervisor’s perspective. The results are shown in Table 6.6.

<b>Supervisor Outcome</b>	<b>Task Level Group</b>	<b>n</b>	<b>Mean (scale of 1-9)</b>	<b>Std. Deviation</b>
Overall rating for work term	Low-mod	8	7.13	1.458
	High	6	6.83	1.329
Rate students’ contribution	Low-mod	8	6.50	1.512
	High	6	6.50	0.837
Return on investment	Low-mod	8	6.25	1.389
	High	6	5.83	1.329

*Table 6.6: Supervisor Outcomes by Task Level*

There were eight supervisors who were included in the “low-moderate task” level grouping and six supervisors whose reported task levels meant they were in the “high level task” group. As can be seen in Table 6.6, with respect to overall rating for the work term and return on investment, the mean scores were higher for the “low-moderate level task” group than the “high level task” group. However, the results of an independent-samples t-test did not reveal any statistically significant differences in the mean scores on the rating of students’ contribution between the “low-moderate” and the “high” level task groups.

In addition to examining the differences in the ratings the two groups of supervisors gave on specific outcome variables, data coded from the transcripts was also examined. Supervisors were asked to list the helpful and not-so-helpful behaviours of students related to each of the tasks students were given. Descriptions of the categories of helpful and not-so-helpful behaviours of students can be found in

Appendix O.8 and Appendix O.9. The type and frequency of the ways in which students were helpful on “low-moderate level” tasks versus “high level” tasks is shown in Table 6.7 and Table 6.8. The inter-rater reliability for the categories reported in Table 6.7 and Table 6.8 were 81.0% and 81.7% respectively.

<b>Categories of Student Helpful Behaviours</b>	<b>Number of helpful statements in category</b>	<b>Percentage of statements by Employers in Low-Mod Level Task Group</b>	<b>Percentage of statements by Employers in High Level Task Group</b>
Investigation & problem solving	33	45%	55%
Coordination	32	53%	47%
Collected & organized data	14	50%	50%
Communicated results	6	67%	33%
Responsible for physical spaces	3	100%	0%

*Table 6.7: Helpful Student Behaviours Reported by Supervisors Associated with Task Level*

The two most commonly reported areas where supervisors reported students being helpful were 1) investigation and problem solving and, 2) coordination. Supervisors reported that students were helpful in conducting the analysis of a problem and proposing solutions for issues that needed to be addressed. One supervisor reported that the student “investigated an area of concern for future projects, using baseline analysis from current projects” and another said the student was helpful in “developing and verifying a new measurement technique”. Students were also helpful to supervisors in a coordination role. Students would organize meetings for key people involved in projects, reach out to various contacts for information, as well as coordinate work to be done with vendors or contractors. Based on the percentage of statements made by supervisors in each of the helpful categories, as shown in Table 6.7, supervisors reported a slightly higher number of helpful statements for the “high level” task group related to investigation and problem solving and the reverse for the “low-moderate level” task group, though a non-parametric Chi-square test did not reveal any statistically significant differences.

With respect to the not-so-helpful behaviours shown in Table 6.8, the most frequently reported categories were that 1) the students misunderstood the requirements or made incorrect assumptions, and

2) that they required too much support or oversight. One employer said his student, “planned activity with the client without first understanding the scope”. Another employer said the student “required consistent coaching and follow-up to ensure the work was done correctly”. In the highest frequency categories, supervisors reported more not-so-helpful behaviours for students whose tasks were in the higher-level groups. However, the frequency of statements in each group was too small to be able to test for statistical significance.

<b>Categories of Student Not-So-Helpful Behaviours</b>	<b>Number of not-so-helpful statements in category</b>	<b>Percentage of statements by Employers in Low-Mod Level Task Group</b>	<b>Percentage of statements by Employers in High Level Task Group</b>
Lack of experience/ confidence	7	29%	71%
Made assumptions or misunderstood requirements	7	29%	71%
Lack of attention to detail	6	33%	67%
Poor work ethic/work habits	6	50%	50%
Required too much oversight/support	5	40%	60%
Lack of communication with/buy-in from others	3	67%	33%
Did not finish or slow completing tasks	2	0%	100%

*Table 6.8: Not-so-helpful Student Behaviours Reported by Supervisors Associated with Task Level*

A final set of data that was examined to assess supervisor outcomes related to the level of the tasks assigned to the students was the ratios of helpful to not-so-helpful student behaviours reported by supervisors. Overall the frequency of statements supervisors made about the helpful versus the not-so-helpful behaviours was a ratio of 88:36, or 2.44. That is 2.44 examples of helpful behaviours for every one example of not-so-helpful behaviours. In examining the differences in the ratios of helpful to not-so-helpful statements by the task level grouping, there were 46:13 or 3.54 statements of helpful behaviours to not-so-helpful behaviours for the “low-moderate level” task group versus 42:23 or 1.83 statements of helpful to not-so-helpful behaviours for the “high level” task group. From this, one can see that there is a

similarity in the frequency of helpful statements for both groups of students reported by supervisors but a higher frequency of not-so-helpful behaviours in the “high level” task group.

#### **6.2.4 The Student’s Role Set and the Completion of Tasks**

The previous section examined the data from the perspective of the tasks that were assigned to students, or the sent/received role. This section will examine the student’s role set and the associated findings. The student’s role set consists of the groups or individuals that the student interacted with in the completion of their tasks. Data was collected from students and supervisors related to the student’s role set during interviews and in the online surveys. The findings in this section will examine differences between role sets based on the level and type of the task (Proposition 5). Additionally, data will be presented that examines the outcomes for students and supervisors based on the level and type of the task and the associated task-related support provided.

One of the significant areas of investigation during the interviews, particularly with the students, was asking them to describe their interactions with others related to the completion of their tasks. Specifically, the nature and frequency of the interactions they had with others inside and outside Company A to support the completion of their tasks. Interaction data, while less-detailed, was also collected through the survey with students who had worked at Company A. The student’s role set, the individuals or groups that students interacted with in the completion of their tasks, will be referred to as “co-workers” even though some were external contractors and some were in a supervisory role to the student.

In order to analyze potential differences in the tasks, task-related support and outcomes for students, the data was grouped according to whether students were in a “low support” group, or a “moderate-high support” group. Students were identified as being part of the “low support” group if they had three or more of eight possible measures of support. The eight measures of support were:

- 1) feedback quantity: students rated one or more tasks as 1 to 3 out of 9,
- 2) feedback quality: students rated one or more tasks as 1 to 3 out of 9,
- 3) feedback quantity: students had a weighted average of  $< 4$  across 3 tasks,
- 4) feedback quality: students had a weighted average of  $< 4$  across 3 tasks,
- 5) size of role set  $< 2$  for at least one task,
- 6) size of role set weighted average  $< 2$  across all tasks,
- 7) time with role set  $< 0.5$ /week for at least one task, and
- 8) weighted average time with role set  $< 1$  hr/week.

#### *6.2.4.1 Task-Related Support Provided to Student*

During the interviews, students were asked to comment on the ways that the individuals and groups within their role set were helpful and not-so-helpful in the completion of the students' tasks. The helpful and not-so-helpful behaviours reported by students were coded and resulted in six categories of helpful behaviours and four categories of not-so-helpful behaviours.

Analysis was done on the sets of helpful and not-so-helpful behaviours to examine the frequency of different types of task-related support based on whether students were in the "moderate-high support" group, or the "low support" group. Co-worker helpful behaviours by "low support" and "moderate-high support" groups are shown in Table 6.9. The inter-rater reliability for the categories reported in Table 6.9 was 83.7%. Descriptions of categories can be found in the codebook (Appendix O.6).

<b>Categories of Helpful Co-worker Behaviours</b>	<b>Number of statements in category</b>	<b>Percentage of statements by Students in Mod-High Support Group</b>	<b>Percentage of statements by Students in Low Support Group</b>
Providing information or resources - Proactive	94	61%*	39%*
Providing information or resources - Responsive	74	55%	45%
Stepping in to help	34	82%**	18%**
Being available	30	60%	40%
Being knowledgeable	46	50%	50%
Having positive attributes	24	83%**	17%**

*Table 6.9: Student Reported Categories of Co-worker Helpful Behaviours Shown By Support Level Groupings*

\*  $p < 0.05$ ; \*\*  $p < 0.01$

There were a number of ways that students reported co-workers being helpful. Many students reported multiple examples of co-workers providing information or resources that they needed to do their tasks, whether that was in advance of the tasks in the form of directions or instructions (i.e., proactive), or whether it was providing answers or feedback to students once they had started the task (i.e., responsive). Students also reported supervisors being helpful with stepping in to help complete the work, being available and being knowledgeable and having positive attributes, such as being approachable or flexible. A non-parametric Chi-square test revealed three statistically significant differences between the frequency of statements related to the categories of helpful behaviours were that students in the “moderate-high support” group versus the “low support” group which were more likely to report co-workers as proactively providing information or resources, “stepping in to help” and having positive attributes.

In addition to talking about the ways that co-workers were helpful in the completion of tasks, students also talked about the no-so-helpful things that co-workers did (Appendix O.7). The codes that resulted



from the analysis of the statements made by students and the associated frequencies for the students who were in the “moderate-high support” group versus the “low support” group can be seen in Table 6.10. The inter-rater reliability for the categories reported in Table 6.10 was 82.7%.

Categories of Not-So-Helpful Co-worker Behaviours	Number of statements in category	Percentage of statements by Students in Mod-High Support Group	Percentage of statements by Students in Low Support Group
Busy	60	47%	53%
Proactive Info – Negative	32	53%	47%
Responsiveness - Negative	30	77%*	23%*
Not as Knowledgeable	9	44%	56%

*Table 6.10: Student Reported Categories of Co-worker Not-So-Helpful Behaviours Shown By Support Level Groupings*

\*  $p < 0.05$

The most frequently reported way in which students reported co-workers being not-so-helpful were that they were “too busy” or inaccessible to the students to enable the student to receive help and this was reported with higher frequency for students in the “low support” group, though the difference was not statistically significant when a non-parametric Chi-square test was done. Students also reported that they would get incorrect, conflicting, or infeasible information from co-workers which made students’ tasks more difficult. Co-workers responsiveness to students’ questions or requests for feedback was also reported as a challenge and was reported more frequently by the students in the “moderate-high support” group and this was a statistically significant result ( $p < 0.05$ ).

The ratio of helpful to not-so-helpful statements students made about their co-workers was 302:131, or 2.31 examples of ways that co-workers were helpful for every one not-so-helpful statement. Differences in the ratios of helpful to not-so-helpful frequencies by the task level group were examined with the “low support task” group where the ratio was 115:59 helpful to not-so-helpful statements, or 1.95 statements about ways co-workers were helpful for every one statement of ways co-workers were not-so-helpful. This was compared to a ratio of 187:72 helpful to not-so-helpful statements from students in the “moderate-high support” task group, which is 2.60 statements of helpful behaviours for every one not-so-

helpful behaviour. It appears from this analysis that students in the “moderate-high support” group reported their co-workers to be more helpful and less not-so-helpful than the students in the “low support” group.

#### 6.2.4.2 Task-Related Support Based on Level and Type of Task

The theoretical framework presented in Chapter 3 suggested that the support students require in order to contribute response variety to the work of the team (i.e., accomplish tasks) is related to the level and type of tasks such that as the level (relative to the student’s capabilities) and the criticality or importance of the task increases, the support students need also increases. Within the data collected from students, there were four variables related to the task-related support they were given for each task: size of their role set (i.e., the number of co-workers/groups they interacted with for each task), time with their role set, feedback quantity, and feedback quality. Data presented in Table 6.11 shows the mean ratings on each of those four variables for different levels and types of task. ANOVA tests were run using SPSS and significant differences ( $p < 0.05$ ) are marked with letter subscripts. Where the subscript letters match, there was a statistically significant difference between those values.

Student Reported Dimensions Dimension of Support	Level of Task			Type of Task		
	low “below level”	mod “at level”	high “above level”	Side Project	Highlight Project	Engineering Support Tasks
	n=7	n=55	n=13	n=14	n=29	n=32
Avg. Size of Role Set	2.0 <sub>ab</sub>	3.8 <sub>a</sub>	3.9 <sub>b</sub>	3.6	3.9	3.4
Time with Role Set (in hrs/week)	1.0 <sub>a</sub>	2.3	3.3 <sub>a</sub>	1.4	2.3	2.7
Quantity of Feedback (1-9)	5.1	6.5	6.5	5.6	6.9	6.2
Quality of Feedback (1-9)	5.3 <sub>a</sub>	7.3 <sub>a</sub>	6.6	6.6	7.2	6.8

Table 6.11: Student Reported Measures of Support by Task Type and Level of Task  
 Note: where letter subscripts match, there is a statistically significant difference with  $p < 0.05$

There were not any statistically significant ( $p < 0.05$ ) differences in the task-related support provided to students based on the type of task, though the mean scores for three of the support variables of the Side projects were lower than the highlight and Engineering Support tasks. There were statistically significant results when examining the four dimensions of support and the level of the task relative to the students' capabilities. Low level tasks had a smaller role set, lower amount of time with the role set and a lower quality of feedback than moderate and high level tasks.

The perspective of supervisors on the amount of task-related support provided as related to the level and type of task was also investigated. The variable related to task-related support that was collected through supervisor interviews and surveys was the amount of training provided to a student for a given task. The average amount of training that supervisors reported is shown in Table 6.12 according to the type and level of task (relative to students' capabilities). ANOVA tests were run using SPSS and significant differences ( $p < 0.05$ ) are marked with letter subscripts. Where the subscript letters match, there was a statistically significant difference between those values.

Supervisor Dimensions of Support	Type of Task			Level of Task		
	Side Project n=9	Highlight Project n=13	Engineering Support Task n=15	“below” level n=4	“at” level n=27	“above” level n=6
Training	3.3 <sub>a</sub>	6.3 <sub>ab</sub>	3.7 <sub>b</sub>	1.8 <sub>a</sub>	4.4	6.8 <sub>a</sub>

Table 6.12: Supervisor Reported Measures of Support by Task Type and Level of Task  
 Note: where letter subscripts match, there is a statistically significant difference with  $p < 0.05$

The differences in the amount of training provided to students for the three types of tasks were statistically significant in that more training was provided to students for their Highlight project. With the level of the task, relative to the students' capabilities, there was a statistically significant difference between the training provided for low level tasks, as compared to a higher level of training for tasks “above” the student's level.

### 6.2.4.3 Task-Related Support – Student Outcomes

In sections 6.2.3.3.2 and 6.2.3.3.3 the association between the level of tasks assigned to students was examined in relation to outcomes for students and supervisors. In this section, data will be presented that examines the connection between the support provided to the student and how it relates to student (Proposition 6a) and supervisor outcomes (Proposition 6b).

Applying the criteria described earlier in this section led to 11 students being identified in a “low support” group and 19 students in a “moderate-high” support group. Table 6.13 shows the average ratings for five student outcomes based on the support category they were in.

<b>Student Outcome</b>	<b>Level of Support Provided</b>	<b>n</b>	<b>Mean (scale 1-9)</b>	<b>Std. Dev.</b>
Learned	Mod-high	19	8.42*	1.017
	Low	11	7.36*	1.629
Developed new skills	Mod-high	19	8.00*	1.599
	Low	11	6.82*	1.250
Overall satisfaction	Mod-high	19	7.68	1.376
	Low	11	6.91	1.300
Long term ROI	Mod-high	19	7.05	1.58
	Low	11	6.73	1.272
Short term ROI	Mod-high	19	6.05	1.580
	Low	11	6.09	0.701

Table 6.13: Student Outcome Measures Based on Level of Support Received

\*  $p < 0.05$

In all cases except the short term return on investment, the mean score for the student outcome was higher in the “moderate-high support” group as compared to the “low support” group. The results of an independent-samples t-test revealed two student outcome dimensions where the differences between the two groups were statistically significant ( $p < 0.05$ ) which were the student ratings of learning and developing new skills.

The codes generated by statements students made during the interviews as they reflected on the work term experience were examined from the perspective of students who were part of the “moderate-high support” group and the low support group as shown in Table 6.14. The inter-rater reliability was tested

and the percentage of overlap in matching statements to categories for this theme was 82.3%. Descriptions of the categories can be found in the codebook (Appendix O.5)

<b>Categories of Overall Student Experience</b>	<b>Number of statements per category</b>	<b>Percentage of statements by students in mod-high support group</b>	<b>Percentage of statements by students in low support group</b>
Development	26	50%	50%
Positive return on investment	14	64%	36%
Returning after graduation	11	55%	45%
Enjoyable environment & people	10	60%	40%
Busy/stressful/frustrating	9	11%	89%
Not returning for another work term	8	25%	75%
Met/ exceeded expectations	7	57%	43%
Work-life balance	6	33%	67%
Did not match expectations	4	0%	100%
Pay - positive	3	67%	33%
Workload not balanced	3	67%	33%
Lower return on investment	2	50%	50%
Pay-negative	2	50%	50%
Workload reasonable	1	0%	100%

*Table 6.14: Student Outcome Categories Associated with Support Level*

Non-parametric Chi-square tests were performed for categories where there were more than three statements in the group and no statistically significant results were found between the frequency of statements made by those in the “low support” versus the “moderate-high support” group.

#### *6.2.4.4 Task-Related Support – Supervisor Outcomes*

Supervisors were identified as part of the “high support” group if they reported the amount of training provided to students being 7 to 9 on the 1 to 9 scale, or if the weighted average of training provided across the three tasks assigned to students was greater than or equal to 7 out of 9. Based on this criteria, six supervisors were in the “high support” group and eight supervisors were in the “low-moderate support” group. Three supervisor outcomes are presented in Table 6.15 based on this grouping.

<b>Supervisor Outcome</b>	<b>Level of Support Provided</b>	<b>n</b>	<b>Mean scale (1-9)</b>	<b>Std. Deviation</b>
Overall rating for work term	Low-mod support task	8	7.00	1.414
	High support group	6	7.00	1.414
Student's contribution	Low-mod support task	8	6.25	1.488
	High support group	6	6.83	0.753
Supervisor's return on investment	Low-mod support task	8	5.75	0.707
	High support group	6	6.50	1.871

*Table 6.15: Supervisor Outcome Measures Based on Level of Support Provided*

For two of the outcome measures, there is a higher average rating for employers whose students were in the “high support” group, though an independent-samples t-test did not reveal any statistically significant differences between the outcome measures for employers on whether they provided a “high” level, or “low-moderate” amount of support. The difference in the mean scores for supervisors’ return on investment is higher for students in the “high support” group, which is counter to the proposition that supervisors will benefit to a greater degree when they provide less support to students. However, this difference was also not statistically significant.

The categories of helpful and not-so-helpful behaviours that emerged from the analysis of the interviews and surveys of supervisors were considered in light of the supervisors who provided a “high level” of task-related support to students than for a “low-moderate” level of support. The differences in frequencies between the groups are shown in Table 6.16. The inter-rater reliability for the categories reported in Table 6.16 was 81.0%. Descriptions of the categories of helpful and not-so-helpful behaviours of students can be found in Appendix O.8 and Appendix O.9.

Categories of Students' Helpful Behaviours	Number of statements per category	Percentage of statements by Employers in Low-Mod Support Group	Percentage of statements by Employers in High Support Group
Investigation & Problem Solving	33	48%	52%
Coordination	32	47%	53%
Collected & Organized Data	14	21%*	79%*
Communicated results	6	83%	17%
Responsible for Physical Spaces	3	100%	0%

Table 6.16: Helpful Student Behaviours Reported by Supervisors Associated with Level of Support

\*  $p < 0.05$

Using a non-parametric Chi-square test revealed a statistically significant difference in the frequency of helpful behaviours related to collecting and organizing data made by supervisors from the “high support” group as compared to the “low-moderate support” group.

The frequencies of statements made by supervisors about the not-so-helpful behaviours of students as grouped by those in the “high support” group as compared to “low-moderate” support group is shown in Table 6.17. The inter-rater reliability for the categories reported in Table 6.17 was 81.7%.

Categories of Students' Not-so-Helpful Behaviours	Number of statements per category	Percentage of statements by Employers in Low-Mod Support Group	Percentage of statements by Employers in High Support Group
Did not finish or slow completing tasks	2	50%	50%
Lack of attention to detail	6	33%	67%
Lack of communication with/buy-in from others	3	67%	33%
Lack of experience/ confidence	7	14%	86%
Made assumptions or misunderstood requirements	7	29%	71%
Poor work ethic/work habits	6	33%	67%
Required too much oversight/support	5	20%	80%

Table 6.17: Not-So-Helpful Student Behaviours Reported by Supervisors Associated with Level of Support

Overall, employers did not report a high number of ways in which students were not-so-helpful. While there are a number of categories in the not-so-helpful list of student behaviours where the frequency is

higher for those in the “high support” group, due to the small number of statements in each of the categories, it was not possible to test these differences statistically.

As identified in Section 6.2.3.3.3, the ratios of helpful to not-so-helpful statements made by supervisors with respect to student actions was 88:36, or 2.44 helpful statements for every one not-so-helpful statement. In examining the differences in the ratios of helpful to not-so-helpful frequencies by the support level grouping, there were 42:11 or 3.82 statements of helpful behaviours to not-so-helpful behaviours for the “low-moderate support level” group versus 46:25 or 1.84 statements of helpful to not-so-helpful statements for the “high support level” group. From this, one can see that there is a similarity in the frequency of helpful statements for both groups of students reported by supervisors but a higher frequency of not-so-helpful behaviours in the “high support level” group. That is, supervisors report a higher number of ways that the students in the “high support level” are not-so-helpful.

### **6.2.5 Balance in the Role-Taking Model**

In this final section of analysis, the dimensions of the level of the task, the type of the task and the task-related support provided will be examined together (Proposition 6c). In particular, the question of whether there was a mismatch between the level and type of task and the support provided will be investigated. Table 6.19 identifies the number of student tasks where there was a mismatch, that is, a high level of task relative to students’ capabilities, or a high criticality or profile of the task (e.g., Highlight project or Engineering Support task) and a low level of support.



<b>Task-Related Support Dimension</b>	<b>Number of Tasks with Level <math>\geq 7</math> (out of 9) n=13</b>	<b>Number of Highlight Projects n=29</b>	<b>Number of Engineering Support Tasks n=32</b>
Feedback Quantity ( $\leq 3$ )	1	1	8
Feedback Quality ( $\leq 3$ )	1	1	4
Small Role Set ( $< 2$ )	0	2	5
Time with Role Set $< 1$ hr/week	0	2	2

*Table 6.18: Task-Related Support Versus the Level and Type of Task*

The supervisor perspective on mismatch was whether a high amount of training was provided for a low level task, or a lower criticality/profile task (e.g., Side project). Out of the 37 student tasks that employers reported on, there were no tasks where there was a high level of training (i.e., rating  $\geq 7$ ) for a low level task (i.e. rating  $\leq 3$ ). There was one task, that was a Side project, and therefore a low profile, less critical task, where the training provided was  $\geq 7$ .

### 6.3 Summary

This chapter has presented the findings related to the work term phase of co-operative education. Katz and Kahn's role model was used as the framework to examine how, within the work term experience, variety was balanced with the allocation and completion of tasks. The level of the task given to students was one area of focus in examining how the level of the task assigned may be related to outcomes for students and supervisors. The second area investigated was the task-related support provided to students and its connection to outcomes for students and supervisors. The next chapter will synthesize the findings from Chapter 5 and 6 and discuss these findings in the context of the research questions, propositions and model presented in Chapter 3.

## Chapter 7 Discussion and Summary of Results

This chapter will discuss the findings from Chapter 5 and 6 as they pertain to the research questions and propositions stated in Chapter 3. The chapter will begin with a section that examines the first research question, the first two propositions, and their relation to the findings of the recruitment phase. The second section will discuss the second research question, the remaining four propositions, and their relation to the findings of the work term phase. The final two sections of this chapter will revisit the task classification model presented in Chapter 6 and the system model presented in Chapter 3 to describe the relationship between the propositions and the findings of this research in the context of co-operative education as a dynamic system.

### 7.1 Discussion of Recruitment Phase Findings

The research question related to the recruitment phase is: *how, if at all, does the recruitment phase contribute to the management of variety within the co-op system?* In this section, the two propositions related to this research question and the findings from Chapter 5 will be discussed.

#### 7.1.1 Proposition 1 – Balancing Variety During Recruitment Phase

Proposition 1 states, *disturbance variety needs to be effectively managed between the hiring organization and the academic institution during the recruitment phase so that the process is sustainable for both the organization and the academic institution.* This proposition suggests that for Company A to want to continue hiring co-op students, the recruitment process cannot generate an amount of disturbance variety (i.e., work) such that it offsets the benefits of hiring co-op students. This proposition connects to research done by the Higher Education Quality Council of Ontario, in which employers indicated that one of the ways that their participation in work-integrated learning (WIL) programs could be supported would be to simplify the process of recruiting and selecting students (Sattler & Peters, 2012). For the University of Waterloo (UW), if the disturbance variety from Company A, or other hiring organizations cannot be

handled by the academic institution, it calls into question whether the program can be sustainable (Fleming, McLachlan, & Pretti, 2018). There are two ways that disturbance variety is generated during the recruitment phase: within Company A and between Company A and the University.

Within Company A, the disturbance variety in the recruitment process for Company A that needed to be managed was getting approval for budget to hire co-op students, submitting job advertisements, reviewing applications, selecting candidates for interviews, and make ranking decisions. Based on the interviews with Human Resources (HR) and Engineering staff at Company A, and Co-op staff at the UW, it seems that role differentiation within Company A role was a key way that the disturbance variety was managed.

The interviews revealed that Company A designated three main roles with specific accountabilities for aspects of the co-op recruiting process. One role was responsible for coordinating with the departments about their co-op hiring requests to facilitate the approval process for funding. A second role was within the HR team and had responsibility for the interactions with UW. A third role, within the Engineering team responsible for the screening of the application packages. Role differentiation seemed to provide an effective way of managing the disturbance variety related to the co-op recruitment process so that each role could focus on an area within their expertise. Only one person needed to coordinate with the senior leaders about budgets for co-op hiring, only one person needed to learn the UW system for posting job advertisements, scheduling interviews, and reaching out directly to UW when needed, and only one person needed to know the engineering requirements of the various teams and what skill set on the application packages would be a good fit for the organizations and the work. The idea of role differentiation being a mechanism for handling disturbance variety in the environment is consistent with contingency theory which suggests that as organizations and their sub-units adapt to best meet the demands of their immediate environment (Lawrence & Lorsch, 1967).

The statements made by the supervisors suggested that they appreciated the roles of those involved in coordinating the co-op student recruitment process. From the supervisors' perspectives, co-op was seen as a simpler and less expensive alternative to hiring contract or temporary workers to get additional support. Further evidence that the co-op recruitment phase was being effectively managed within the organization was the ratio of 4:1 for the helpful to not-so-helpful actions of those in the HR roles at Company A as reported by the supervisors at Company A.

Between Company A and UW, the disturbance variety that each generated for the other also seemed to be well-balanced. One of the ways that variety was managed between the two organizations was that there was a key contact on each side, and as they reported in the interview, each saw the other as their "go to" person during the recruitment phase. The 1-1 mapping of roles for coordinating the recruitment process was an effective way of managing the disturbance variety. The ratios of helpful to not-so-helpful actions can be viewed as a measure of the effectiveness of a relationship (Safayeni, et al., 2008). That is, if it is perceived that the higher the ratio of helpful to not-so-helpful actions, the more effective the relationship for the person reporting the actions. The higher the ratio on both sides of the relationship, the more effective the relationship overall. In this research, the ratios of helpful to not-so-helpful statements made about the actions of UW as reported by Company A was 7:2. In the other direction, the ratio of helpful to not-so-helpful statements about the actions of Company A was reported by UW to be 7:3. These two ratios suggest that the relationship between Company A and UW was effective at managing the variety between them. This finding is considered in light of previous organizational research where the average interaction effectiveness ratio between six different groups was found to be 0.95. (Safayeni et. al., 2008).

A final indication from the findings that disturbance variety was balanced during the recruitment phase involved references to the improvements being made to how the process was handled. There were multiple references by participants within Company A and UW to things that Company A had changed in

their processes for better managing the co-op program and adapting to the new online co-op system. For example, Company A put their jobs on the system themselves and they compiled requests for co-op approvals within the organization on an annual rather than term-by-term basis. These examples of continuous improvement are indicators of the development of response variety to manage the process which leads to the ongoing sustainability of the relationship.

In Chapter 3, examples were presented that described two ways that variety was managed within a grocery store, versus a car dealership. The variety of the customer was handled either through setting up the system to allow customers to manage their own variety (i.e., the grocery store) or providing one-to-one support (i.e. car dealership). Based on the interviews with the employees at Company A and UW who are involved in the recruitment process, it seems that variety was managed in the recruitment phase of the co-op system in both ways. As one example, the UW online co-op system allowed the HR person at Company A to handle some of their own disturbance variety related to the co-op system such as submitting job postings. Limitations of the online system in handling the volume of the Company A's hiring activity, however, necessitated more personalized support in other aspects of the recruitment phase such as, scheduling interviews, that support was provided directly through the Account Coordinator role at UW. The role differentiation developed to support co-op recruitment at Company A and UW is an example of disturbance variety being handled through one-to-one support, as in the example of the car dealership.

The descriptions of how disturbance variety in the recruitment phase was handled both within Company A, and between Company A and UW and the ratios of helpful: not-so-helpful behaviours between each set of roles, provide support for Proposition 1. That is, during the recruitment phase, variety was balanced between the hiring organization and the institution.

### 7.1.2 Proposition 2 – Reducing Input Variety to the Work Term

Proposition 2 states, *the reduction of student and employer disturbance variety during the recruitment phase increases the likelihood of positive outcomes for students and hiring organizations.*

The reduction of disturbance variety in the recruitment phase occurs when students and employers have the opportunity to assess whether students have the required skills and attitudes and when there is an opportunity to set expectations about the work term experience. Without a selection and screening process, a random student would be assigned to an organization. That randomly assigned student may or may not feel that they can benefit from working in the organization, and the employer may not feel that the student has the skills needed to be successful. During the recruitment phase, disturbance variety is reduced for students as they learn about opportunities and expectations within specific organizations. Disturbance variety is reduced for employers by learning about the specific skills and experience of the candidates and deciding which students they would like to hire. This proposition suggests that the reduction of this disturbance variety between employers and students increases the likelihood of a successful work term for both the employer and the student.

In this case, disturbance variety can be thought of as what the employer knew about the potential candidates. Any information about the student the employer gained during the recruitment phase reduced the disturbance variety the students represented when they arrived for their work term. As a company who hired regularly from UW co-op, some disturbance variety had already been reduced for Company A in that previous experience with co-op students will have set expectations for those in the organization about what work the students will generally be able to handle. Variety was further reduced through reviewing applications, selecting students for interviews, and ranking suitable applicants. The data from Chapter 5 suggests that Company A, on average, over the terms between Spring 2017 and Spring 2018, received 753 applications, selected an average 149 candidates for interviews which has resulted in average of 37 filled positions. Of the candidates interviewed, 35% were not ranked, indicating that the interviewers did not

feel that these students would be a good match for the roles and their company. The importance of the interview as a screening mechanism was confirmed by the engineers who took part in the interviews. Of those surveyed, the average ratings for the importance of being involved in the recruitment process was 6.2 out of 9 and the average ratings for the opportunity to interview the student that would be matched to their specific team was 6.4 out of 9. The high ratings on these scales suggests that the supervisors felt the investment of their time in screening the students was important and related to the success of the work term for them. The managers, a level above the supervisors, and the students commented on the supervisors having a good understanding of what work to assign students which made them well-suited for screening applicants. At each of these stages, Company A made decisions based on the suitability of students for its roles and, thereby, reduced its disturbance variety. In research by Fleming and Pretti (in press) employers suggested careful recruitment as one of the ways to achieve positive results. The importance of understanding the needs for the role and identifying students who have the necessary skill set was consistent with the findings from the study by Narayanan et al. (2010) who found that identifying the students with the necessary skill set based on defining the student roles and projects led to a more effective internship. Additionally this finding was also consistent with the research of Pretti, Drewery, and Nevison (2016) who identified person-organization fit as a key factor in the outcome of the experience for supervisors.

For students, the disturbance variety was what they did not know about the organization and the co-op roles within it. The degree to which they learned about the organization during the recruitment phase reduced the organization's disturbance variety for the students when they began their work term. They learned about Company A and the roles within it mostly in three ways: through the job description, during the interviews, and in conversations with peers.

The generic “Engineering Co-op” job advertisement was not particularly effective at reducing variety for students. The description of the roles and the skills were quite broad, not specific, and largely listed the same responsibilities from one recruitment term to the next. This implied that Company A largely expected students to apply for jobs based on the company’s reputation rather than based on specifics of the role, and the required skill sets. The job posting does not effectively reduce disturbance variety for the applicants, in terms of them having a better understanding of what the role will be. In the case of the main “Engineering Co-op” role, the students would simply need to know that they wanted to work at Company A, since the job description does not differentiate between the specific roles on offer.

The reason job advertisements from two different hiring terms were included (Appendix N), is to show the evolution of the job description to include additional human resource related details. The details added to the job description between the Fall 2017 and Spring 2018 terms included additional information about overtime, mandatory orientation days at the beginning of the term, and the ability of Company A to make accommodations for applicants with disabilities. The details about overtime and mandatory orientation were areas that were identified in the interview with the HR coordinator that had caused issues with students in the past and, therefore, were added to the job advertisement to minimize challenges for HR after the work term offer had been made. Therefore there was evidence of the development of response variety by the organization, through challenges they experienced with previous students (i.e., disturbance variety), they realized that communicating earlier in the process the expectations of Company A of overtime and orientation days could reduce disturbance variety from subsequent groups of students.

Disturbance variety was reduced for students during the interview. Students identified a number of areas in which they learned about the organization from the general group interview as well as from the individual interview. Additional evidence as to the role of the interview process in reducing disturbance variety was found in the ranking decisions of students. 24% of students ranked Company A as a “10” or



used their “not interested ranking”. This implies that those students gained information through the process that helped them decide they were not interested in a role.

A third way that variety was reduced for students was through in conversations with their peers. As a result of Company A consistently hiring roughly 35 students each term, there are a number of UW students still on campus, often classmates, who have worked at Company A. It was evidenced through the students interviews that some information about what it would be like to work for Company A came from others who had worked there previously. This was consistent with previous research that identified students talking to peers as one of the key ways they learn about internship opportunities (Waters & Gilstrap, 2010).

Research suggests that the alignment between expectations and reality are more likely to lead to a positive experience (Martin, Rees, Fleming, Zegwaard, & Vaughan, in press) and consequently the information students gained through multiple sources during the recruitment phase helped them develop expectations about what it will be like to work there, and thus increased the likelihood of a positive experience. Additionally, in the data reviewed for Company A, over the four terms examined, all students who ended up employed at Company A had ranked it as a ‘1’ as input to the match process. This is an additional piece of evidence to suggest that the co-op students at Company A were satisfied with their match, which in turn increased the likelihood of positive outcomes. This evidence is consistent with the research findings of Feldman and Weitz (1990) who found that interns were more likely to have positive experiences if they had realistic and positive expectations prior to beginning the experience. Students reported a mean score of 6.4 (out of 9) on the degree to which the experience matched their expectations (Appendix K) and the outcome correlations presented in Appendix L show that whether the experience matched students’ expectations was positively correlated with students’ reports of the long-term return on

investment of the experience, the degree to which they socialized, their reports of developing new skills, and their overall satisfaction.

The findings provide support for Proposition 2. That is, the data discussed in this section provide support for the fact that during the recruitment phase, the reduction of student and employer disturbance variety increases the likelihood of positive outcomes for students and hiring organizations.

## **7.2 Discussion of Work Term Phase Findings**

The research question related to the work term phase is, *how can variety be managed during the work term to enable both students and employers to benefit from the experience?* In this section, the four propositions related to this research question and the findings from Chapter 6 will be explored.

### **7.2.1 Proposition 3 – Level of Tasks**

Proposition 3 states, *for the system to be balanced in terms of variety handling, the majority of tasks assigned to the student need to be “at” the student’s level.* Considering the level, or complexity, of the task was a key characteristic in multiple workplace-related studies and models (Hackman & Oldham, 1976, Perrow, 1967; Rothman, 2003; Rowe, 2017). This proposition is based on the premise that the system will not be balanced if the students are only given tasks below their level, because the students will not feel they have had the opportunity to learn and develop new skills during the work term and may feel that their skills were not effectively utilized. On the other hand, it is not likely for the system to be balanced if the tasks given to students are all above their level, as it likely means that the employer needs to invest resources for training the students, who then leave in four months. As a result of these opposing positions, it is presumed that for the system to be balanced, the majority of tasks given to students must represent moderate disturbance variety to the students.

The data presented in Table 6.2 show that from the student and the supervisor perspective, when asked to report on the level of the three main tasks the student was given, 73% of tasks were rated as “at

the student's level" as compared to 17% being "above the students' level" and 10% being "below the students' level".

It appears that variety in the system is balanced, relative to the level of the tasks assigned to the students, as the majority of tasks (73%) are reported as being "at" the student's level. The findings provide support for Proposition 3.

### **7.2.2 Proposition 4 – Level of Tasks and Outcomes**

Proposition 4a states that when the majority of tasks given to the student are "at" or "above" the student's level, the work term is more likely to result in positive outcomes for the student. Outcomes of the work term experience for students were examined in two ways. One, students in the interview and in the online survey rated learning, short-term and long-term return on investment, skill development, and overall satisfaction on a scale of 1 to 9 (Appendix K). The second way student outcomes were identified was through coding the statements students made throughout the interview (Appendix O.5).

One set of data examined in relation to this proposition was whether there were differences in the ratings students gave for various outcome measures whether they were in a "low level task" group or a "moderate-high level" task group. The data presented in Table 6.3 show a statistically significant difference ( $p < 0.05$ ) between the ratings students gave for how much they learned on the work term, with those in the "moderate-high level task" group reporting higher levels of learning than those in the "low level task" group. The differences on the other student-rated outcomes such as short-term and long-term return on investment, the degree to which students developed new skills and overall satisfaction were not statistically significant, possibly due to the small sample size.

This proposition was also investigated through the analysis of the frequency of the statements students made about their work term experiences (Table 6.4). For students in the "moderate-high level task" group, there was a higher frequency of statements from the categories of the experience meeting or

exceeding the student's expectations, positive return on investment, and returning after graduation than in the "low level task" group, however the differences were not statistically significant. The "moderate-high level task" group also had a higher frequency of statements than the "low level task" group in the category of busy, stressful, or frustrating, possibly indicating that they experienced more pressure related to their tasks than the low-level task group had, though again the differences were not statistically significant.

Given the ratings data for student learning, the findings provide support for Proposition 4a.

Proposition 4b states that, when the majority of tasks given to the student are "below" or "at" the student's level, the work term is more likely to result in positive outcomes for the supervisor. As was the case with students, a number of outcome statements were explored with supervisors. Supervisors were asked about levels of satisfaction with the student's work on a specific task, the return on investment for them in hiring their most recent student, a rating of the student's overall contribution, and supervisors' overall rating for the work term. The proposition states that if the level of the tasks are too high for the capability of the student that supervisors will be less likely to report positive outcomes from the work term, or conversely, if the level of tasks assigned to students are low-moderate range, then supervisors will be more likely to report positive outcomes. The rationale for this proposition was that if supervisors are required to invest too many resources in supporting the student on tasks that are above the student's capabilities, then supervisors may feel the value in hiring the student was lower, or potentially not worth the investment.

Data presented in Table 6.5 show that for "low level" tasks, supervisors reported a higher mean score for level of satisfaction than with assigned tasks that were above the student's level, however the difference was not statistically significantly, possibly due to the small sample size. As was noted in Proposition 3, the majority of tasks assigned to students at Company A were "at" the student's level and therefore there were too few tasks in the "below" and "above" the student's level groups to determine

statistical significance. The mean scores for the overall work term rating and the supervisors' return on investment was higher in the "low-moderate" task level than in the higher level tasks, but, again, differences were not statistically significant. There was also no statistical difference between the two task level groups for employers' ratings of the student's contribution.

The frequency of statements made by supervisors about the ways that students were "not-so-helpful" revealed differences between the "low-moderate level task" group and the high level task group with supervisors more frequently reporting that students in the "high level task" group lacked experience or confidence, made assumptions or misunderstood requirements, or lacked attention to detail (Table 6.7). This was in contrast to only one area where the frequency was higher for the "low-moderate level task" group which was that students were not-so-helpful in communicating or getting "buy-in" from others (Table 6.8). The differences in the frequencies of statements between these groups is not statistically significant. When the frequencies in the number of overall statements supervisors made about the ways that students in the "low-moderate level" task group were helpful versus not-so-helpful as compared to students who were in the "high level" task group, a higher frequency of not-so-helpful statements were made in regard to the students in the "high level" task group. This finding would suggest some support for Proposition 4b.

The findings in relation to Proposition 4b are mixed. There is some indication in the findings that Proposition 4b may be true, however, further research would be needed to confirm it. It is not clear from the findings that when the majority of tasks given to the student are "above" their level that it is less likely to result in positive outcomes for supervisors.

### **7.2.3 Proposition 5 – Level of Support**

Proposition 5 states that *for the variety in the system to be balanced, students require task-related support. The amount of support students need is relative to the level of the task (Prop 5a) and the type of*

*the task (Prop 5b)*. Proposition 5a claims that as the level of the task increases relative to the students' capabilities, additional support needs to be provided to the student in order for them to be successful in completing the task. That is, as the level of the task increases, it represents a higher level of disturbance variety to the student, and so additional response variety may be needed from within the student's role set to keep the system balanced. Similarly, proposition 5b claims that the amount of support required is related to the type of the task. For example, tasks that are higher in profile (i.e., Highlight projects) would be associated with a higher level of task-related support. Additionally, tasks which are more critical (i.e. Engineering Support tasks) would be associated with a higher level of task-related support than tasks such as Side projects which are not high profile nor critical. In essence, as tasks are more critical or high profile, they represent additional disturbance variety to the student, often in the form of pressure or risk of error, and so additional response variety may be needed to assist the student in handling the disturbance variety in order to keep the system balanced.

The data presented in Table 6.11 and Table 6.12 show both the student and the employer perspective on the connection between task-related support and the level of the task. The student reported data, as shown in Table 6.11, shows that there are statistically significant results on three of the four dimensions of task-related support with a higher level of task corresponding to a higher level of support. For the size of the role set, the difference was between low and "moderate-high" level tasks. That is, for low level tasks, the number of people in the role set was lower than in the case of moderate-high level tasks. In terms of the amount of time spent with the role set per week, the difference was between tasks that were below student's level tasks which had a lower amount of time with the role set as compared to the amount of time spent with the role set for students completing tasks that were above the student's level. With the quality of feedback, the difference in the support provided was that tasks that were below the student's

level were more likely to be associated with lower quality of feedback as compared to the feedback students received for the tasks that were “at” their level.

Based on the findings it appears there is support for Proposition 5a based on the student-reported data. That is, students report that the level of task-related support is associated with the level of the task given to students. The student’s role set provides a higher level of task-related support as the level of the task increases.

The data collected from employers related to Proposition 5a can be found in Table 6.12. The amount of training provided was the measure of support examined from the supervisor’s perspective, and the results showed that as the level of the task increased, the level of training provided also increased with a statistically significant result between the level of training provided for tasks below students’ level as compared to tasks above their level. There is support for Proposition 5a from the employer-reported data.

Combining the student and the employer-reported data provides overall support for Proposition 5a. That is, students and employers both report that increases in the level of the task are associated with increases in the task-related support provided to the students.

For Proposition 5b, the perspective of students and the support they received on their different types of tasks can be seen in Table 6.11. Across three of the four support dimensions, the means scores of students reports of support were highest for the Highlight project as compared to the other two types of tasks, though the differences were not statistically significant. Given the profile of the Highlight projects within the organization, a higher level of support was expected to correspond with the notion that more support is provided for more important tasks. The one dimension of support where the mean score was not highest for the Highlight project was the amount of time with the role set, whose mean score was highest for the Engineering Support tasks, though again, not statistically significant. Of the three types of tasks, if Proposition 5b was true, one would expect Side projects to have the lowest amount of support.

The mean scores for support on Side projects was the lowest mean score, as compared to Highlight projects and Engineering Support tasks, for three of the four support dimensions, though not statistically significant. The one dimension where Side projects had a higher mean score for support was the size of the role set, though again, this difference was not statistically significant. The fact that the mean size of the role set was smallest for the Engineering Support tasks, though not statistically significant, may be explained by the fact that, for the day-to-day tasks students are working with a small core set of engineers, versus the Side projects which, in some cases, were more of a fact-finding mission across a larger role set. Since the results were not statistically significant, support was not found for Proposition 5b in the student-reported data.

The supervisors' perspective on the support provided when examined by the type of task, as reported in Table 6.12 shows a statistically significant higher level of training provided to students in completing their Highlight project, as compared to the support provided for the Engineering Support tasks and the Side projects which would provide partial support for Proposition 5b from the employers' perspective. That is, from the supervisor data it seemed that the level of support was associated with the profile of the task, but the data does not show that there was additional training provided for the more critical Engineering Support tasks. It is possible that data collected from employers using 'training' as a proxy for support was not sufficient to capture the support that supervisors provided in the day-to-day, side-by-side nature of the Engineering Support tasks. Additionally, the role set for the students includes a set of co-workers beyond the direct supervisor and so it could be that the training role for the Highlight project stood out as the most significant area of support from the supervisor perspective, but that support for the Engineering Support tasks came from other co-workers, and has not, therefore, been captured in the supervisor perspective of this research. There is partial support for Proposition 5b from the supervisor-reported data.



The data collected and analyzed from both students and supervisors provides partial support for Proposition 5b. From the student perspective, the differences were not statistically significant. From the employer perspective, there was partial support for Proposition 5b. The importance of the Highlight project increased the level of support that was provided. However, there was not a statistically significant difference in the support provided for Engineering Support tasks, which the proposition would suggest should have a higher level of support due to the urgency of the tasks, as compared to the Side projects. To obtain a more complete picture of the task-related support provided as it relates to the type of task, additional measures of support could be collected, with the perspectives of supervisors and other co-workers being incorporated together.

#### **7.2.4 Proposition 6 –Level of Task-Related Support and Outcomes**

Proposition 6a states, *when a student receives a moderate to high level of support, the work term is more likely to result in positive outcomes for the student.* The data presented in Table 6.13 showed statistically significant differences ( $p < 0.05$ ) in student reported outcomes for learning and developing new skills depending on whether students were in a “low support” group or a “moderate-high support” group. The differences were that students in the “moderate-high support” group were more likely to provide higher ratings of learning and skill development. This provides evidence that the level of support provided to students was related to student outcomes. This was consistent with research where students identified supervisors and other co-workers as a key resource for support for skill development during WIL (Jackson, 2015). When examining the frequencies of statements students made about their overall experience in relation to which support group they were in (Table 6.14), there were differences, however due to the low frequency of statements within some of the categories the differences were not statistically significant.

Data in Chapter 6 presented results on the categories of students' reports of the ways that co-workers were helpful and not-so-helpful. Table 6.9 shows the number of statements made in the five categories of ways that co-workers were helpful. Students in the "moderate-high" support group more frequently reported that co-workers stepped in to help with tasks and had positive attributes such as flexibility and encouragement. Arguably, a group of co-workers who are positive and willing to help, increases the likelihood that the student experience is a positive one.

Given the ratings data for student learning and the categories where there were higher frequencies of statements made, the findings provide support for Proposition 6a.

Proposition 6b states, when a student receives a "low-moderate level" of support, the work term is more likely to result in positive outcomes for the supervisor. The results presented in Table 6.15 show the differences in the supervisor reported outcomes as compared to whether they were in the "high support" group or the "low-moderate support" group. There were no statistically significant differences in the outcomes based on the level of support groups. However, the mean scores on two outcome dimensions show that the rating of the student's contribution and the return on investment were higher in the "high support" group than the "low-moderate support" group which was the opposite to what Proposition 6b would suggest. The proposition would suggest that higher levels of support might lead to lower levels of positive outcomes for the employer.

Supervisors made statements about the helpful and not-so-helpful behaviours of their students, as reported in Table 6.16 and Table 6.17. Of note are the not-so-helpful behaviours of students reported more frequently by supervisors in the "high support" group, which included lacking experience or confidence, making assumptions or misunderstanding requirements, and requiring too much oversight/support. However, the low frequency of the statements in each of the categories did not allow for statistical significance to be tested. When the ratios of helpful to not-so-helpful statements made by supervisors were

examined by the level of support provided to students, the results showed that supervisors reported similar frequencies of ways that students were helpful between those that received a “low-moderate” level of support as compared to those who received a “high level” of support. However, there was a difference in the frequencies of not-so-helpful behaviours with a higher rate of not-so-helpful behaviours reported for students in the “high support” level category. With only six supervisors in the “low-moderate support” group and eight supervisors in the “high support” group, it makes it difficult to draw conclusions about the connection between the support provided and their overall experience with the student. The lack of clarity for the findings for this proposition could also mean that the single measure of training was not able to fully capture the support provided to the students and could be an area for future research.

The findings related to Proposition 6b are mixed. That is, it is not clear whether the level of support provided by supervisors is negatively related to the outcomes of the experience for supervisors. Further research is needed to investigate this relationship.

Proposition 6c states, when the task-related support provided to students matches the needs of the student based on the level and type of task, variety in the system is balanced and is more likely to produce positive outcomes for students and supervisors. The data presented in Section 6.2.5 aims to understand the degree to which there was a mismatch between the type of support needed, based on the level and type of the task, from both the perspective of the student and the employer. It is proposed that if there were large number of tasks that should be, based on the level and type of the task, associated with a higher level of task-related support, and students were not given the appropriate level of support, then the system would be out of balance and would not achieve the desired outcomes. Based on the data presented in Appendix A, Appendix J, Appendix K, it appears that Company A has been successful with its co-op program. That is, it has continued to hire a large number of students each term, the ratings of the students’ performance were high, the student ratings of their experience were also high, and the supervisor and student experience

measures collected in this study were also reported to be high. Therefore, if Proposition 6c is true, it would suggest that the number of tasks where the support required does not match the level and type of the task would be small. This is, in fact, what the data in Section 6.2.5 reports. For students, across the four support dimensions, there was one task out of 13 where the feedback quantity and quality was low, but the level of the task was high. There were no high level tasks where students reported a small size of role set or time with the role set. For Highlight projects, there was one project out of 29 where the feedback quality and quantity was low, and two Highlight projects with small size of role set or time with role set.

For the category of Engineering Support tasks, there were a few more tasks that met both the criteria of high level task and low level support. Eight Engineering Support tasks (out of 32) had low feedback quantity and were rated as high level tasks, and four Engineering Support tasks where the quality of the feedback was low. There were five Engineering Support tasks where the role set was small but the task level was high, and two Engineering Support tasks where the time with the role set was low and the task level was high. As was mentioned Section 6.2.3 the nature of feedback for the Engineering Support tasks may have been less formal because the students were, in many cases, working along-side other engineers and therefore, the reports on the quantity of feedback may be lower than expected because the supervisor and co-workers were monitoring the progress more closely and would have intervened quickly if there were problems to be addressed. The fact that the role set was small for five (out of the 32) Engineering Support tasks may not be an indication that the system was out of balance since some Engineering Support tasks were centred on a small number of people. In the case of Engineering Support tasks, the time with the role set may be the best indicator of level of support, and in this case there are only two tasks (out of 32) where there was a mismatch, that is, a low time with role set.

Of the 37 tasks that supervisors reported only one had a mismatch between the support provided and the level of the task. As reported in Section 6.2.5, where a high level of training was reported by

supervisors, there were no tasks that were at a low level. There was one Side project (out of 9), that is, a lower profile or less critical task where there was a high level of training provided. This suggests that when supervisors provided a higher level of support, it aligned with tasks that were moderate-high level, or high in importance or urgency.

The system may be imbalanced with respect to task-related support and the handling of disturbance variety in two possible ways. One, students are assigned high level or important or critical tasks and provided a low level of task related support. Two, students are assigned low level tasks or tasks that are not critical or important and yet provided a high level of task related support. If the first instance were to occur, then students' disturbance variety is likely not being handled. That is, they require higher levels of task-related support and they are not receiving it. This might mean that the student is frustrated in not receiving the support they need, and the supervisor may also be frustrated that the student is not completing an expected task. The data discussed in this section show that there are few tasks out of the 89 tasks where this imbalance of high level, critical, or important task was combined a low level of task-related support. So, the system appears to be balanced from the perspective of handling students' disturbance variety.

The second way that the system would be imbalanced with respect to task-related support is that supervisor disturbance variety is not being handled. This would occur if supervisors are assigning low level tasks or tasks that are not critical or important and yet providing a high level of support. If this were the case, employers would likely feel frustrated that students are not handling the disturbance variety, in terms of completing tasks that should require less support. Based on the data from supervisors discussed in this section, it appears that the imbalance between level, importance and criticality and task-related support occurs in few of the tasks assigned students. Consequently, it seems that with respect to task-related support, from the employers' perspective, variety in the system is balanced. Thus, support is found for Proposition 6c from both the student and employer perspective. That is, when the task-related support

provided to students matches the level of the task and the type of the task, variety in the system is balanced and is more likely to produce positive outcomes for students and supervisors.

### 7.3 Classification of Co-op Tasks

This research identified and validated a task classification model that describes the tasks of the co-op student at Company A. The distinct characteristics for each of the types of tasks are shown in Figure 7.1.

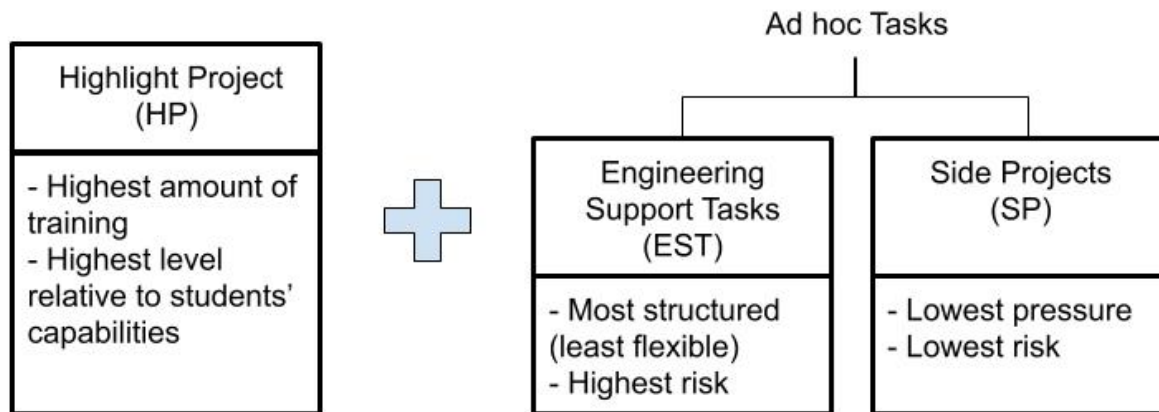


Figure 7.1: Task Classification Model for the Co-op Student Role at Company A

Highlight projects were associated with a higher level of training and the level of the task was higher (more likely to be “above” the students’ level) than the other two types of tasks. These projects represented an issue that students investigated. They were existing problems that the team identified as needing to be solved. Additionally, the Highlight project included an end of term presentation, where it was important the problem being solved was seen as non-trivial. As such, both the level of the task, and the amount of training were higher than with the Engineering Support tasks or the Side projects.

Engineering Support tasks were the most structured tasks, as compared to the other two types of tasks, in terms of there being a set way to do the task, or less flexibility in the way the task is completed. These were less likely to be open-ended problems to solve, as the case with the Highlight project, and

more likely to be specific tasks where the other Engineers could provide directions for what needed to be done. More risk for Company A was associated with the Engineering Support tasks than with the Highlight projects or Side projects. The higher level of risk corresponds to the fact that Engineering Support tasks are critical tasks that someone else on the team would need to undertake in the same time frame if the student was not there to do it. As a consequence, if the student made a mistake or did not do a good job, it would create disturbance variety that someone else needed to deal within the present time.

Side projects were reported to be lower pressure than the Highlight project and Engineering Support tasks. This is consistent with the description of the tasks as less critical, in terms of the timeline, and less important, relative to the profile given to the Highlight projects.

#### **7.4 System Model of Co-operative Education**

This research has led to the development of a model to describe the dynamic system of co-operative education. Figure 7.2 is an adapted version of the Figure 3.6 presented in Chapter 3 to reflect the findings of this research. The co-operative education system consists of two key phases: the recruitment phase and the work term phase.

Related to the recruitment phase, support was found for the two stated propositions.

*Proposition 1) Disturbance variety needs to be effectively managed between the hiring organization and the university during the recruitment phase so that the process is sustainable for both the organization and the university.*

*Proposition 2) The reduction of student and employer disturbance variety during the recruitment phase increases the likelihood of positive outcomes for students and hiring organizations.*

In order to operate co-op programs in an sustainable manner, disturbance variety needs to be balanced during the recruitment phase so that neither the hiring organization, nor the academic institution

feel that their participation cannot be sustained. In terms of the students and the employers, the key aspect to the management of variety in the recruitment phase is the reduction of variety through the ability of students and organizations to assess fit, which was handled in a competitive employment process for this case, and for students and employers to set expectations for one another for the work term.

In the work term phase, there are organizational factors that affect how variety is managed, specifically the assignment and completion of tasks. For Company A these organizational factors include their philosophy for hiring co-op students and their organizational culture which is based on LEAN manufacturing principles and continuous improvement. Supervisors assign tasks of various types (Engineering Support tasks, Highlight projects, and Side projects) and students complete tasks using a task-related social structure. Task allocation and completion occurs within a dynamic system where the information that supervisors and co-workers acquire about the student and their capabilities leads to adjustments in their expectations and the ad hoc tasks they assign. Based on the findings of this research, support was found for the following propositions:

***Proposition 3) For the system to be balanced in terms of variety handling, the majority of tasks assigned to the student needs to be ‘at’ the student’s level.***

***Proposition 5a) For the variety in the system to be balanced, students require task-related support. The amount of support students need is relative to the level of the task***

This research has identified connections between the management of variety within the system and outcomes for students and supervisors. Specifically, support was found for Proposition 6c.

***Proposition 6c) When the task-related support provided to students matches the needs of the student, based on the level and type of task, variety in the system is balanced and is more likely to produce positive outcomes for students and supervisors.***

Additionally, the findings of this research have provided support for Proposition 4a) and 6a)



*Proposition 4a) When the majority of tasks given to the student are “at” or “above” the student’s level, the work term is more likely to result in positive outcomes for the student.*

*Proposition 6a) When a student receives a moderate to high level of task-related support, the work term is more likely to result in positive outcomes for the student.*

Support was not found for three parts of the six propositions stated in Chapter 3. In examining the results for Proposition 5b, a connection was found between the amount of task-related support provided to students and the level and profile of task. However, the findings were inconclusive on the connection between the amount of task-related support and how critical or time-sensitive the task is.

The other two propositions with inconclusive findings were related to the outcomes for supervisors as a result of tasks assigned. It was not clear from the findings that Proposition 4b was true, that is, when the majority of tasks given to the student are “above” the student’s level, the work term is less likely to result in positive outcomes for the supervisor. There was not a statistically significant difference in supervisors’ reported outcomes based on the level of the task assigned to students, nor was there a statistically significant difference in the frequency of certain categories of statements related to the ways that students were helpful and not-so-helpful. However, the ratio of helpful to not-so-helpful statements reported by supervisors showed a higher frequency of not-so-helpful behaviours for students who were given tasks that were “above” their level.

Proposition 6b is the other proposition where the findings did not confirm the statement to be true. Supervisors did not report statistically significant differences in their outcomes from the work term based on the level of support they provided the student. It was expected that if the supervisors needed to provide a high level of task-related support, it would be more likely that they would report less positive outcomes from the work term than the cases where they provided a low to moderate amount of task-related support. Again, the examination of the ratios of supervisors’ reports of students helpful to not-so-helpful

behaviours showed a differences between the frequency of “not-so-helpful” behaviours. That is, supervisors reported a higher frequency of ‘not-so-helpful’ behaviours for students who received higher amounts of support than those who received a low to moderate amount of support. Additional research is needed to more fully understand the ways that the task-related support provided by the supervisors may affect the supervisors’ outcomes, positively or negatively.

In addition to the findings related to the stated propositions, there was another outcome for students and supervisors identified in this research. The organization has increased response variety related to the co-op system, which was evident in reports of ways the system changes from term to term, and in the development of supervisory capabilities in the Engineers who provide day-to-day support for the students. The day-to-day supervisors assigned tasks that were “at” the student’s level and provided appropriate levels of support based on the level and type of task. The positive outcomes that students reported (Appendix O.5, Appendix K), while contributing to the productivity and continuous improvement of the organization, is further evidence that the day-to-day supervisors have developed response variety for managing co-op students.

This dissertation began with the statement that co-operative education is a model of learning. It is important to revisit that statement. While learning is not explicitly labelled in Figure 7.2 it is embedded at the core of the model for both students and the hiring organizations. The role-taking model is a dynamic system that adapts as more information is gained about the situation. That is, as student understand the requirements of the task, and engage with their role-set in the completion of their tasks, they are learning. Supervisors adjust the tasks given to students as a result of learning the students’ capabilities. Other examples of learning arose from the participants in this research. The highest frequency category when students talked about how they had benefited from the experience was a “Development/Growth”. This category was defined by examples of ways students described what they had learned and the ways they

had grown. Participants also noted that learning is occurring for the day-to-day supervisors, for whom supervising co-op students may be their first experience with supervision. The examples of continuous improvement, both in terms of how the recruitment phase has evolved, but also in terms of the continuous improvement projects that students were involved with, highlights organizational learning. In summary, within a dynamic system, such as co-operative education, adapting through learning is central feature.

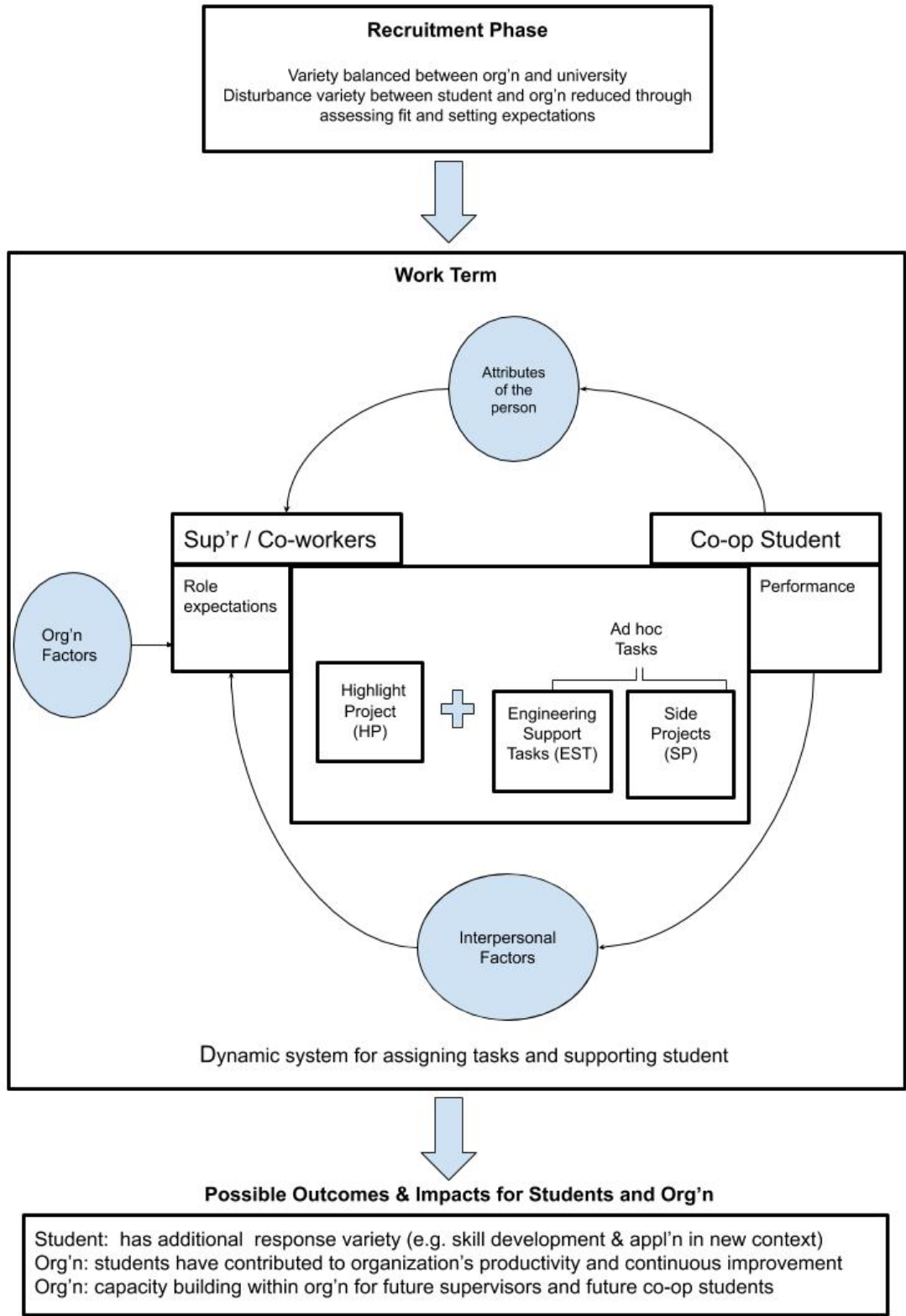


Figure 7.2: A model for the dynamic system of co-operative education

## **7.5 Summary**

This chapter has presented a discussion of the findings related to the recruitment and work term phase of co-operative education from the student, employer and university perspectives. A review of the findings as they relate to the propositions stated in Chapter 3 has found support for many of the propositions, with a few propositions requiring further investigation. The next, and final chapter, will discuss the implications of this research from a theoretical and practical perspective, the limitations of the research and identify areas for future research.

## **Chapter 8 Implications, Limitations and Future Research**

The concluding chapter of this dissertation will discuss the implications, limitations, and areas for future research that stem from this work. The first section presents the way in which this work contributes both theoretically and practically to the field of work-integrated learning (WIL). The second section will describe the limitations of the research. The final section will list a number of proposed areas for future research.

### **8.1 Implications of Research**

This research contributes to the field of WIL in a number of important ways. It contributes theoretically to the understanding of how co-operative education as a model of learning can be examined as a dynamic system of competing or conflicting goals among the stakeholders. It also addresses gaps in the WIL literature by providing a deeper understanding key processes within the recruitment phase, investigating the tasks that are assigned to students, the processes that enable tasks to be accomplished, and the associated outcomes for students and employers. There are also a number of practical implications of this work for key WIL stakeholders: employers, students, and academic institutions.

#### **8.1.1 Theoretical Contributions and Addressing Gaps in the WIL Literature**

A theoretical contribution of this research was studying co-operative education from a systems perspective using the concept of variety from the field of cybernetics. This research has demonstrated that variety is a useful way to examine what was occurring during the full co-operative education process from the recruitment phase through to the work term experience. Variety provides a way of thinking about and describing the pressures or potential conflicts between the desired outcomes of the three key stakeholders in a way that allows one to consider

how the system adjusts to disturbance variety to maintain stability. This research has also demonstrated how the role-taking model (Katz & Kahn, 1978), can be applied to examine the dynamic process of assigning and completing tasks, which has not been previously referenced in the WIL literature. From a theoretical perspective, another contribution is in identifying the connection between the concept of variety and the role-taking model where within a workplace setting, one can consider the role-taking model a control mechanism for variety handling. This research has resulted in the development of a model to capture how these theoretical concepts are connected in describing co-operative education as a system. The model has been validated within one organization and one university, and could be tested within the context of other co-op systems as will be described in Section 8.3.1. The benefit of using the concept of variety in this research is that it allowed for the development of a model that is believed to be flexible enough to also describe other co-op/WIL systems. Depending on the type of WIL, there may be different expected outcomes for students, the partner organizations and the academic institutions and yet the concept of variety is useful in capturing the associated outcomes. For example, in community service learning, one of the expected outcomes is be an increase in students' civic values (Morgan & Streb, 2001). While different than skill development, civic engagement could be cast as a form of response variety students have developed through the experience. Similarly, in a professional practicum in a health or education-related discipline, the response variety students develop as an outcome of the experience might be profession-specific competencies (Fouad et al., 2009).

Another contribution of this work is the in-depth description of a co-operative education system which provides insight to the way in which, the recruitment process and the work term unfold for an organization and an academic institution. Little research has been done that examines the recruitment process in depth to understand the critical aspects of that phase. The recruitment

process documented in this study was a competitive one, but the key activities were variety reduction through assessment of fit, for both the student and employer, and the setting of expectations for the work term. It is possible that there are ways other than a competitive employment search to structure the pre-work term phase to reduce variety for students and employers. For example, WIL staff might assess student-employer fit and match students with employers based on past experience with them. In addition, WIL staff might provide set expectations for employers and students through sharing key information with them. While not a competitive process, variety will be reduced for the employer and student. Student and employer preferences for the method of variety reduction during the recruitment phase is a separate issue that could be investigated.

The in-depth investigation of the student tasks and the support networks they use addresses a gap in the WIL literature. The semi-structured interviews enabled the researcher to capture a rich description of students' tasks and the associated characteristics of those tasks. From that data, a classification of tasks emerged that was further tested with a larger sample of students from Company A using an online survey. While the classification of tasks has not been tested beyond Company A, students in the validation session indicated that the task classification model would capture the tasks they were given in other work terms at other companies. This will be discussed further as an area for future research (Section 8.3.2).

The methods used to investigate co-operative education as a system are another contribution of this research to the literature. In conducting interviews with students and supervisors, the researcher was able to test the validity of scales by having the participants describe their thinking on the rating they were giving. This process enabled the researcher to ensure that the participants' interpretations of the questions were as intended and that across multiple participants, the scales



were similarly interpreted. The elicitation of helpful and not-so-helpful actions was not a technique previously described in the WIL literature and proved to be a powerful way of developing an understanding of the variety that was occurring across the system between different stakeholders. The list of ways that others were helpful and not-so-helpful that emerged as a result of the thematic analysis of the descriptions participants provided and, therefore, maps directly to the experience of the participants.

### **8.1.2 Practical Implications for WIL Stakeholders**

For WIL stakeholders, there are a number of practical implications of this research. As was mentioned in Chapter 4, it will be important for anyone applying the outcomes of this research to consider the transferability of the results for their context. A rich description of the processes of UW and Company A were provided to assist readers in determining whether the results of this research will be applicable in their context. There are a few areas that the researcher believes these results will be useful for other hiring organizations, students in WIL programs, and academic institutions that run co-op or WIL programs.

#### *8.1.2.1 Implications for Hiring Organizations*

The findings from the recruitment phase and the work term phase (assigning tasks and supporting students in completing tasks) of this research may provide useful advice and tools for employers in their participation with WIL programs.

One of the areas that this research has highlighted that may be valuable to employers was with respect to considering the purpose of the recruitment phase. Most employers, at least in the competitive employment process of co-operative education, likely view the recruitment phase as an opportunity to assess fit, the skills, and attitudes of the student. However, it was less clear that employers see the recruitment phase as an opportunity to share information with the students that

could clarify expectations about the experience working at the organization and the kind of work that they will be required to do. Explicitly communicating this information, whether through the job advertisement or the interview process, will help students assess the fit from their perspective and ease the transition into the workplace.

Studies in both Canada and Australia have identified that one of the challenges that employers experience with WIL was being able to identify suitable work for the students (Jackson, 2017; Sattler & Peters, 2012). In this research, a task classification model was presented that balances the goals of the students and employers by taking into account the level of the task relative to the student's capabilities, and the support required for task completion (Figure 7.1). The task classification model provides a tool for employers to identify tasks that will keep the student productively engaged throughout the work term, considering the characteristics of the different types of tasks while balancing the associated needs for support. A Highlight project is something that employers might consider incorporating into their co-op role(s). The Highlight project provided benefits to the students in terms of learning, in that it was more likely to be rated as slightly above their current capabilities. As well, given the profile of the projects being presented to senior leaders at the end of the term, teams felt additional pressure to support students in the successful completion of their project which created a task-related support network for the student. There were also benefits to the organization in having the students complete the project in that it introduced students to the continuous improvement culture of the organization, and it offered a public demonstration of the contribution that co-op students made to the organization.

This research confirms one of the challenges that employers experience in assigning tasks. The findings from this research suggest that for the student and employer goals to be achieved simultaneously, the level of the majority of the tasks assigned should be at the student's level, that

is within students' capabilities. For employers who hire students regularly they may have more defined expectations of students' capabilities and then can make minor adjustments with the specific students they hire, as seemed to be the case with Company A. For other companies, assigning tasks at the right level such that both the organization and the student benefit may be much more challenging, and may relate to their report having difficulties identifying suitable work (Jackson, 2017; Sattler & Peters, 2012).

Considering the support network that students access to complete their tasks is another practical implication of this research for employers. Company A had identified junior-level engineers to provide day-to-day oversight for students tasks. This strategy can distribute the responsibilities associated with supporting the student and provide low-risk supervisory experience for junior staff which builds capacity within Company A.

#### *8.1.2.2 Implications for WIL Students*

There are also relevant findings in this research for WIL students. There are implications for students related to the recruitment phase, and the work term phase.

In the recruitment phase, while it is important for students to be flexible and open-minded about the opportunities that are available, it is also important for students to think about the goals they have for their upcoming work experience and to consider those goals as they consider submitting applications. While the competitive process is challenging and it is natural for students to consider practical factors in the job search, students should not think of it only as the company assessing the students' fit role, but also that the students is assessing their own fit with the organization. It is important for students to think about what they can offer organizations and what organizations can offer them. When the students have the opportunity to make choices between organizations they should learn as much as they can about the organization, from the job

description, from online materials, from the recruiters and from previous students who have worked at the organization in order to determine their fit for the organization. This research has shown that the student gathering information prior to arrival at the organization will increase the likelihood of a positive experience for both the student and the organization.

During the work term experience, students may benefit from thinking about their role in terms of the characteristics of their tasks as identified in this research. In doing so, they may be able to more clearly identify the benefits or opportunities within the tasks, either to themselves, or to the organization. Students could be prompted to think about the balance of tasks they are given and to think about the ways in which they are assisting, and the ways in which they are developing as an emerging professional as a result of the tasks. While it may be typical in most work terms for supervisors to assign tasks, there may also be cases where students have time to do additional work. The task classification model developed in this research for co-op tasks may provide students with ideas of how to identify continuous improvement tasks, tackle a project that others have not had time for, or offer to help with a day-to-day tasks of a colleague.

### *8.1.2.3 Implications for Academic Institutions Offering WIL Programs*

This research has implications for the academic institutions that offer WIL programs. As was the case for employers and students, there are implications for academic institutions associated with both the recruitment phase and the work term phase.

In the recruitment phase, academic institutions can evaluate their processes to ensure that they are sufficiently handling the disturbance variety of the hiring organizations. Where they are not, it is important to work with the hiring organization to determine how processes on one side or both can be adapted so that the hiring relationship is sustainable. The second important area for attention based on these results for the academic institution to consider is how it supports the

exchange of information between students and employers. The more effective the exchange of information, the more effective the assessment of fit and setting of expectations for the students and the supervisors, the more likely that the work term will result in positive outcomes for both the student and the supervisor.

WIL staff within academic institutions can use the findings of this research as a tool for supporting students and employers. WIL staff could complement the support and education already provided to students by encouraging students to think about goals they have for their upcoming work term and how to use that information when viewing job postings and engaging in interviews. WIL staff could also support students in thinking about the tasks they have been assigned and how the characteristics of those tasks are contributing to outcomes for the students, themselves, and their employers. In the case of a work term where problems have arisen between the student and the employer, this research may provide a way for the WIL staff to target specific issues for improvement. For example, are the tasks that have been assigned consistently too high or too low relative to the students' capabilities? Is support available to the student according to the level and the type of task? Having this research, and specifically the classification of tasks model as a resource, could potentially assist the WIL staff in rectifying the situation and suggesting other ways that the student could contribute productively to the workplace.

WIL staff can help employers identify their goals for participating in WIL, and subsequently identify the types of tasks that will support organizational goals, and also share the goals that students have and how the assignment of tasks can support student goal achievement. WIL staff can also help employers determine the best ways to communicate what they are looking for in their ideal candidates and what the organization and role has to offer.

This research could lead to the development of metrics for tracking aspects of the effectiveness of a co-op program. Investigating the pressures within the system from the perspective of variety can identify specific areas in need of adjustment. For the academic institution, in this case UW, one set of measures might evaluate the effectiveness of variety reduction through the recruitment phase. For example, a set of metrics that includes ratios of recruitment activity for employers and students (e.g., applications:interviews, interviews:matches) and percentages of one-to-one matches to understand the variety that students, employers and universities are handling in the recruitment phase and to allow for the examination of trends over time. Those recruitment activity ratios could be tied to data collected during the work term asking students and employers whether the work term is meeting their respective expectations, and then could be combined with the outcomes that students and employers report at the end of the term. Tying metrics together from the beginning to the end of the system will provide more detailed information about how the various part of the process lead to various outcomes and would enable the academic institution to provide more customized support to its WIL students and employers.

In addition to a set of metrics on the recruitment phase, the effectiveness of a co-op program within one organization could be evaluated in a similar way to what has been done in this research for Company A. Collecting data at the task-level and understanding the students' support networks from the perspective of both supervisors and students is a time-intensive endeavour. That said, this work could be undertaken in a case-by-case basis where there was a strong desire to gain an in-depth understanding of what was working well and not-so-well within the co-op experiences at one organization.

## 8.2 Limitations

As with all research, there are limitations associated with this research. Given the nature of the research questions and the limited state of literature in the area, a decision was made to conduct exploratory research. To be able to conduct an in-depth study investigating the full system of cooperative education, the researcher decided to conduct a case study with one organization. As was noted in the introduction of the cases, there are notable properties associated with Company A and UW that may not be typical of other hiring organizations and WIL programs. The most notable characteristics of Company A related to this research are 1) the length of time it has been hiring students, 2) the volume of students it hires each term, 3) its hiring of primarily Engineering students who are typically in at least their third work term, 4) its LEAN manufacturing approach and its need for students to contribute to its productivity, and 5) culture of continuous improvement. The key characteristics of UW related to this research are 1) the length of time it has been running a co-op program and the size of the program, 2) high academic standards for becoming accepted to the University, in Engineering, 87% of admitted students have a high-school average greater than 90%, so UW has some of the top students in the country, 3) the year round operation of its program meaning there is a cohort of students always available for employers, 4) a large centralized team of staff to support the program and 5) a campus culture that values co-op and work term learning. As a result of the characteristics of Company A and UW, the results of this study are not easily generalizable to other academic institutions and other hiring organizations. Instead, the researcher aimed for transferability of results (Lincoln & Guba, 1985) where a thorough description of the case enables the reader to make decisions about the applicability of the findings to other contexts.

Due to the nature of the interview which required a 1.5-2 hours with each participant, the sample size for this research was small. The size of the interview sample size was a function of participants' willingness to commit that amount of time to the research. However, the small sample

size limited the possibility of stating and statistically testing hypotheses. Instead the researcher derived propositions from the theoretical foundation and used the propositions to frame the discussion of the results. The second phase of the research, the online surveys for supervisors and students, was designed to enable larger population of participants to be included in the research to allow for some quantitative analysis to be done.

Another limitation is the use of self-reported data. Participants were responding to the questions, both in the interview and on the surveys from what they remember and from their perspective. The questions were designed for participants to focus on the three main student tasks of the work term as a way of increasing the accuracy of their memory, but it is nonetheless a limitation of the research to be noted.

### **8.3 Related Areas of Future Research**

Based on what has been learned through this research, there are a number of areas of future research worth pursuing. Research is needed to examine the model of WIL as a dynamic system with different sets of stakeholder groups. Research is also needed to examine the task characteristics model for applicability to other forms of WIL and to examine how the characteristics of the tasks assigned to students may affect the outcomes for students and employers more broadly. This research also identified two themes for potential exploratory research in the areas of continuous improvement and LEAN organizations.

#### **8.3.1 Co-op Dynamic System Model**

The model presented in Figure 7.2 describes co-operative education as a system and identifies the key phases and propositions associated with different outcomes for students and employers. Six propositions related to the dynamic system of co-op (Appendix P) have been tested with evidence to support some, but not all, of the stated propositions in this case study. Further



research should examine the propositions within other systems of WIL varying the academic program of the students, the academic institutions and types of WIL programs they offer, and the host organizations in terms of sectors, sizes and experience with taking WIL students. Varying the properties of the key stakeholder groups, one could then examine, for example, whether the level of task and support given to students associated with student and supervisor outcomes in other WIL systems (i.e., WIL students from other academic institutions, and host organizations other than Company A)? Further research should also investigate if activity of the pre-work term phase in other WIL programs, specifically, assessing student-host organization fit and setting student and host organization expectations for the work-term positively contributes to outcomes for students and their hosts.

### **8.3.2 Task Classification Model**

The task classification model presented in Figure 7.1, presents a structure that describes the 44 co-op roles reported by students and employers at Company A for this research. Some specific characteristics of three different types of tasks were identified. Future research should examine whether this classification captures the tasks given to co-op students in other types and sizes of organizations, for students of different academic disciplines, from other co-op or WIL programs.

In addition to validating the task classification model in different contexts, the model could be used to examine differences in outcomes for students and supervisors. For example, if students are given a higher percentage of one type of task versus another, in what way does that affect student and employer outcomes? If students are primarily given Side projects, does increase the probability of negative outcomes for students, or supervisors?

As suggested by Rowe (2017), a way of classifying and describing the characteristics of the work that students do during WIL experiences may be an avenue for exploring the differences

between outcomes for different types of WIL. For example, how do structural differences such as paid/unpaid, full-time versus part-time, and the length of the experience affect the tasks and support given and the outcomes achieved?

### **8.3.3 LEAN organizations and their Connection to Work-Integrated Learning**

One of the other themes that emerged related to the culture of Company A was its LEAN practices as an organization. This area was not a focus of any specific question in the interviews, but data emerged from the interviews about how busy people, including the co-op students, were during the work terms with it being common for students to work 50 hour weeks including weekends. Examining organizations that pride themselves on being LEAN, one can see a possible attraction to employing co-op students as a flexible source of part-time labour. An area for exploratory research might be to examine the differences between how LEAN organizations make use of co-op or WIL students as compared with more traditional organizations and the differences between outcomes for students and their supervisors.

From this case, one can see the investment that Company A has made to its co-op program, for example, the centralized HR processes, and it is not clear if other LEAN organizations would be able to make that commitment. Another question for future research could be to examine the characteristics of LEAN organizations that enable them to make productive use of co-op students.

Research should also be done to investigate the differences in student experiences between organizations that pride themselves on being LEAN versus ones that do not. Students at Company A knew that they were contributing to work that needed to be done, and this seemed to have an impact on the outcomes of the experience for them. In organizations where the student's contribution is not a necessity for the team or the organization, the experience for the student may be quite different. It may be more likely that the experience is negative for students who feel like

they were just ‘kept busy’ with less meaningful work, or it could be more likely that the experience is positive because co-workers are not over-worked and have time to provide mentorship to students.

#### **8.3.4 Continuous Improvement and its Connection to Work-Integrated Learning**

A culture of continuous improvement was one of the themes identified in this research. For Company A there was a direct connection between its culture of continuous improvement and the tasks that were given to students. For one, the existence of the Highlight project and the processes associated with it show the company’s commitment to continuous improvement extends across all staff, including its co-op students. With Company A’s culture of continuous improvement, all employees are focused on identifying areas for improvement. As a result, there was a long list of possible tasks, at any given time, that a co-op student could be assigned as a Side project. This meant the team had options for selecting tasks to give the student and, therefore, could select tasks based on the perceived level of the student, and it meant that they were always able to keep the student engaged with productive work. Future research should explore the connection between a continuous improvement culture and the effective use of co-op students within the context of other organizations.

## References

- Ashby, W. R. (1957). *An introduction to cybernetics*. London, UK: Chapman & Hall Ltd.
- Ashford, S. J., & Black, J. S. (1996). Proactivity during organizational entry: The role of desire for control. *Journal of Applied Psychology, 81*(2), 199.
- Atkinson, G., Misko, J., & Stanwick, J. (2015). *Work-integrated learning in the STEM disciplines: employer perspectives*. NCVET consultancy report. Canberra: Office of the Chief Scientist.
- Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191.
- Bavelas, A. (1942). A method for investigating individual and group ideology. *Sociometry 5*, 371–377.
- Beer, S. (1974). *Designing freedom*. Toronto, ON: Anansi.
- Boulding, K. E. (1956). General systems theory: The skeleton of science. *Management Science, 2*(3), 197-208.
- Brown, S. (1985). *The relationship of cooperative education to organizational socialization and sense of power in first job after college* (Unpublished doctoral dissertation). Boston College University, Chestnut Hill, MA.
- Burns, T., & Stalker, G. M. (1961). *The Management of Innovation*. 1961. London: Tavistock.
- Business Higher Education Roundtable. (2016). *Taking the Pulse of Work-Integrated Learning in Canada*. Academica report.
- Callanan, G., & Benzing, C. (2004). Assessing the role of internships in the career-oriented employment of graduating college students. *Education + Training, 46*(2), 82–89.
- Canadian House of Commons (2019). *Investing in the Middle Class: Budget 2019*. Her Majesty the Queen in Right of Canada.
- Cates, C., & Jones, P. (1999). *Learning outcomes: The educational value of cooperative education*. Columbia, MD: Cooperative Education Association.
- Chatman, J. A. (2011). Improving Interactional Organizational Research: A Model of Person-Organization Fit. *Academy of Management Review, 14*(3), 333–349.
- Clutterbuck, D., & Devine, M. (1987). Having a mentor: a help or a hindrance?. In D. Clutterbuck & M. Devine (Eds.), *Business Woman* (pp. 91-109). London: Palgrave Macmillan.
- Coll, R. K., Lay, M. C., & Zegwaard, K. E. (2002). Enhancing access to experiential learning in a science and technology degree programme. *Journal of Vocational Education and Training, 54*(2), 197-218.
- Cooper, L., Orrell, J., & Bowden, M. (2010). *Work integrated learning: A guide to effective practice*. London: Routledge.
- Cooperative Education and Work-Integrated Learning Canada (2018). Applying for accreditation & benefits. CEWIL Canada. Retrieved from <https://www.cewilcanada.ca/advantages-accreditation.html>
- Cormier, L., & Drewery, D. (2017). Examining the effect of co-op non-employment and rejection sensitivity on subjective well-being. *Asia-Pacific Journal of Cooperative Education, 18*(3), 213–224.
- Creswell, J. W. (2013). *Qualitative research and research design: Choosing among five traditions*. London: Thousand Oaks, CA: Sage.

- Crichton, A. (2009). *From Impossibility to Reality: Documenting the History of CAFCE in Canada*. Retrieved from <http://www.cewilcanada.ca/Library/documents/2009-CAFCEHistory-AC.pdf>
- D'abate, C. P., Youndt, M. A., & Wenzel, K. E. (2009). Making the most of an internship: An empirical study of internship satisfaction. *Academy of Management Learning & Education*, 8(4), 527-539.
- Darch, J. (1995). Labour market outcomes for university co-op graduates. *Perspectives on Labour and Income*, 7(3), 20-24.
- DeClou, L., Sattler, P., & Peters, J. (2013). *The University of Waterloo and work-integrated learning: Three perspectives*. Toronto: Higher Education Quality Council of Ontario.
- Downey, J., Kalbfleisch, J. G., & Truman, R. D. (2002). *Co-operative education greater benefits greater costs*. Waterloo Centre for the Advancement of Co-operative Education, (October).
- Drewery, D., Cormier, L., Pretti, T. J., & Church, D. (2019). Improving unmatched co-op students' emotional wellbeing: Test of two brief interventions. *International Journal of Work-Integrated Learning*, 20(1), 43-53.
- Drewery, D., Nevison, C., Pretti, T. J., Cormier, L., Barclay, S., & Pennaforte, A. (2016). Examining the influence of selected factors on perceived co-op work term quality from a student perspective. *Asia-Pacific Journal of Cooperative Education*, 17(3), 265-277.
- Drysdale, M., Goyder, J., & Cardy, A. (2009). The transition from post-secondary education to the labour market: The role of cooperative education-phase 3. In *Annual Conference on Cooperative Education & Internships*. Portland, ON.
- Duimering, P. R., & Safayeni, F. R. (1991). A study of the organizational impact of the just-in-time production system. *Just-in-Time Manufacturing Systems-Operating Planning and Control Issues*, 19-31.
- Edleson, H. (1991). Innovative internships. *HR Magazine*, 36, 39.
- Engeström, Y. (2001). Expansive learning at work: Toward an activity theoretical reconceptualization. *Journal of Education and Work*, 14(1), 133-156.
- Feldman, D. C., & Weitz, B. A. (1990). Summer interns: Factors contributing to positive developmental experiences. *Journal of Vocational Behavior*, 37(3), 267-284.
- Fleming, J. (2015). Exploring stakeholders' perspectives of the influences on student learning in cooperative education. *Asia-Pacific Journal of Cooperative Education*, 16(2), 109-119.
- Fleming, J., McLachlan, K., & Pretti, T. J. (2018). Successful work-integrated learning relationships: A framework for sustainability. *International Journal of Work-Integrated Learning*, 19(4), 321-335.
- Fleming, J., & Pretti, T.J. (in press). The impact of work-integrated learning students on workplace dynamics. *Journal of Hospitality, Leisure, Sport & Tourism Education*.
- Fouad, N. A., Grus, C. L., Hatcher, R. L., Kaslow, N. J., Hutchings, P. S., Madson, M. B., & Crossman, R. E. (2009). Competency benchmarks: A model for understanding and measuring competence in professional psychology across training levels. *Training and Education in Professional Psychology*, 3(4S), S5.
- Frederickson, T. G. (2000). Work value congruence and internships. *Dissertation Abstracts International*, A61 (01), 250.
- Freudenberg, B., Brimble, M., & English, D. (2011). Professionalising Accounting Education – The WIL Experience. *Journal of Cooperative Education and Internships*, 45(1), 80–92.
- Fried, Y., & Ferris, G. R. (1987). The validity of the job characteristics model: A review and meta-analysis. *Personnel psychology*, 40(2), 287-322.

- Garavan, T. N., & Murphy, C. (2001). The co-operative education process and organisational socialisation: A qualitative study of student perceptions of its effectiveness. *Education+ Training, 43*(6), 281-302.
- Gault, J., Redington, J., & Schlager, T. (2000). Undergraduate business internships and career success: Are they related?. *Journal of Marketing Education, 22*(1), 45-53.
- Goffman, E. (1959). *The presentation of self in everyday life*. Garden City, NY: Doubleday/Anchor Books.
- Goho, J., & Rew, D. (2009). Effects of cooperative education on community college employment outcomes at the school to work transition. *Journal of Applied Research in the Community College, 16*(2), 9-17.
- Gruman, J. A., Saks, A. M., & Zweig, D. I. (2006). Organizational socialization tactics and newcomer proactive behaviors: An integrative study. *Journal of Vocational Behavior, 69*(1), 90-104.
- Guba, E. G. (1981). Criteria for assessing the trustworthiness of naturalistic inquiries. *ECTJ, 29*(2), 75.
- Hackman, J. R., & Lawler, E. E. (1971). Employee reactions to job characteristics. *Journal of Applied Psychology, 55*(3), 259.
- Hackman, J. R., & Oldham, G. R. (1976). Motivation through the design of work: Test of a theory. *Organizational Behavior and Human Performance, 16*(2), 250-279.
- Harvey, L., Moon, S., Geall, V., & Bower, R. (1997). *Graduates' work: Organisational change and students' attributes*. Centre for Research into Quality, University of Central England, Birmingham.
- Hayes, R. A., & Travis, J. H. (1976). Employer experience with the recruitment of cooperative education employees: An analysis of costs and benefits. *Journal of Cooperative Education, 8*(1), 16-31.
- Head, S. (2001). *Empirical study of organizational interactions*. (Master's thesis). University of Waterloo, Waterloo, Ontario, Canada.
- Henderson, A., & Trede, F. (2017). Strengthening attainment of student learning outcomes during work-integrated learning: A collaborative governance framework across academia, industry and students. *Asia-Pacific Journal of Cooperative Education, 18*(1), 73-80.
- Hite, R., & Bellizzi, J. (1986). Student expectations regarding collegiate internship programs in marketing. *Journal of Marketing Education, 8*(3), 41-49.
- Humphrey, S. E., Nahrgang, J. D., & Morgeson, F. P. (2007). Integrating motivational, social, and contextual work design features: A meta-analytic summary and theoretical extension of the work design literature. *Journal of Applied Psychology, 92*(5), 1332.
- Jackson, D. (2015). Employability skill development in work-integrated learning: Barriers and best practice. *Studies in Higher Education, 40*(2), 350-367.
- Jackson, D. (2017). Developing pre-professional identity in undergraduates through work-integrated learning. *Higher Education, 74*(5), 833-853.
- Jackson, D., & Collings, D. (2018). The influence of work-integrated learning and paid work during studies on graduate employment and underemployment. *Higher Education, 76*(3), 403-425.
- Jackson, D., Rowbottom, D., Ferns, S., & McLaren, D. (2017). Employer understanding of work-integrated learning and the challenges of engaging in work placement opportunities. *Studies in Continuing Education, 39*(1), 35-51.

- Jackson, S. E., Hall, N. C., Rowe, P. M., & Daniels, L. M. (2009). Getting the job: Attributional retraining and the employment interview<sup>1</sup>. *Journal of Applied Social Psychology*, 39(4), 973–998.
- Jackson, S. E., & Schuler, R. S. (1985). A meta-analysis and conceptual critique of research on role ambiguity and role conflict in work settings. *Organizational Behavior and Human Decision Processes*, 36(1), 16-78.
- Jones, J. (2013). *Anglers, warriors, and acrobats: The journey of learning in cooperative education* (Doctoral Dissertation). University of Ottawa, Ottawa, ON.
- Kahn, R. L., Wolfe, D. M., Quinn, R. P., Snoek, J. D., & Rosenthal, R. A. (1964). *Organizational stress: Studies in role conflict and ambiguity*. Oxford: John Wiley.
- Kampis, G. (1991). *Self-modifying systems in biology and cognitive science: A new framework for dynamics, information and complexity*. Oxford: Pergamon Press.
- Katz, D., & Kahn, R. L. (1978). *The social psychology of organizations vol. 2*. New York: Wiley.
- Khampirat, B., & McRae, N. (2016). Developing global standards framework and quality integrated models for cooperative and work-integrated education programs. *Asia-Pacific Journal of Cooperative Education*, 17(4), 349–362.
- Kiggundu, M. N. (1981). Task interdependence and the theory of job design. *Academy of Management Review*, 6(3), 499-508.
- Kiggundu, M. N. (1983). Task interdependence and job design: Test of a theory. *Organizational Behavior and Human Performance*, 31(2), 145-172.
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice-Hall.
- Kolm, J. (2013). Why are so many of Canada's young people out of work?. *CBC News*. Retrieved from <https://www.cbc.ca/news/canada/why-are-so-many-of-canada-s-young-people-out-of-work-1.1370260>
- Kopelman, R. E. (1985). Job redesign and productivity: A review of the evidence. *National Productivity Review*, 4, 237-255.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.
- Lawrence, P. R., & Lorsch, J. W. (1967). *Organization and environment: Managing differentiation and integration*. Boston: Division of Research, Graduate School of Business Administration, Harvard University.
- Laycock, A.B., Herman, N.D., & Lactz, U. (1990). Co-operative education: Key factors related to a quality experience. *Journal of Co-operative Education*, 27(3), 27-38.
- Lewington, J (2018, November 2). Co-op programs let students learn and earn. *The Globe and Mail*. Retrieved from <https://www.theglobeandmail.com/canada/education/canadian-university-report/article-co-op-programs-let-students-learn-and-earn/>
- Lincoln, Y. S., & Guba, E. G. (1985). Establishing trustworthiness. *Naturalistic Inquiry*, 289, 331.
- Louis, M. R. (1980). Surprise and sense making: What newcomers experience in entering unfamiliar organizational settings. *Administrative Science Quarterly*, 226-251.
- Major, D. A., & Kozlowski, S. W. (1997). Newcomer information seeking: Individual and contextual influences. *International Journal of Selection and Assessment*, 5(1), 16-28.

- Major, D. A., Kozlowski, S. W., Chao, G. T., & Gardner, P. D. (1995). A longitudinal investigation of newcomer expectations, early socialization outcomes, and the moderating effects of role development factors. *Journal of Applied Psychology, 80*(3), 418.
- Marchioro, G., Ryan, M. M., & Perkins, T. (2014). Implementing an interdisciplinary student centric approach to work-integrated learning. *Asia-Pacific Journal of Cooperative Education, 15*(4), 359-368.
- Martin, A. J., Rees, M., Fleming, J., Zegwaard, K. E., & Vaughan, K. (in press). Work-integrated learning gone full circle: How prior placement experiences influenced workplace supervisors. *International Journal for Work-Integrated Learning*.
- McRae, N. (2014). *Exploring Conditions for Transformative Learning in Work-Integrated Education* (Doctoral dissertation). University of Victoria, Victoria, British Columbia, Canada.
- McRae, N., & Johnston, N. (2016). The development of a proposed global work-integrated learning framework. *Asia-Pacific Journal of Cooperative Education, 17*(4), 337-348.
- McRae, N., Pretti, T. J., & Church, D. (2018). *Work-integrated learning quality framework, AAA★*. Waterloo: University of Waterloo, Centre for the Advancement of Cooperative Education. Accessed June 23, 2019. [https://uwaterloo.ca/centre-advancement-co-operative-education/sites/ca.centre-advancement-co-operative-education/files/uploads/files/wil\\_quality\\_framework\\_-\\_aaa\\_-\\_for\\_posting.pdf](https://uwaterloo.ca/centre-advancement-co-operative-education/sites/ca.centre-advancement-co-operative-education/files/uploads/files/wil_quality_framework_-_aaa_-_for_posting.pdf)
- Morgan, W., & Streb, M. (2001). Building citizenship: How student voice in service-learning develops civic values. *Social Science Quarterly, 82*(1), 154-169.
- Morgenson, F. P., & Humphrey, S. E. (2006). The work design questionnaire (WDQ): Developing and validating a comprehensive measure for assessing job design and the nature of work. *Journal of Applied Psychology, 91*(6), 1321-1339.
- Morrison, E. W. (2002). Newcomers' relationships: The role of social network ties during socialization. *Academy of Management Journal, 45*(6), 1149-1160.
- NACE (2017). Internship & Co-op Report. Accessed June 23, 2019. <https://www.naceweb.org/store/2017/internship-and-co-op-report/>
- Narayanan, V. K., Olk, P. M., & Fukami, C. V. (2010). Determinants of internship effectiveness: An exploratory model. *Academy of Management Learning & Education, 9*(1), 61-80.
- Neil-Smith, I. (2001). Some difficulties and dilemmas of a scholarship-based co-op program. *Journal of Cooperative Education, 36*(2), 37.
- Nevison, C., & Pretti, T. J. (2016). Exploring cooperative education students' performance and success: A case study. *Asia-Pacific Journal of Cooperative Education, 17*(3), 325-335.
- Ng, E. S., Lyons, S. T., & Schweitzer, L. (2017). Millennials in Canada: Young workers in a challenging labour market. In E. Parry & J. McCarthy (Eds.), *Palgrave handbook of age diversity and work* (pp. 325-344). London: Palgrave Macmillan.
- Ostroff, C., & Kozlowski, S. W. (1992). Organizational socialization as a learning process: The role of information acquisition. *Personnel Psychology, 45*(4), 849-874.
- Patrick, C. J., Peach, D., Pocknee, C., Webb, F., Fletcher, M., & Pretto, G. (2008). The WIL (work integrated learning) report: A national scoping study. Queensland University of Technology.
- Pennaforde, A. P. (2016). Organizational supports and individuals commitments through work integrated learning. *Higher Education, Skills and Work-Based Learning, 6*(1), 89-99.
- Perrow, C. (1967). A framework for the comparative analysis of organizations. *American Sociological Review, 194*-208.



- Peters, J., Sattler, P., & Kelland, J. (2014). *Work-integrated learning in Ontario's postsecondary sector: The pathways of recent college and university graduates*. Toronto: Higher Education Quality Council of Ontario.
- Plouff, C. (2006). Socialization of undergraduate engineering students into work-experienced organizations and occupational roles through a cooperative education program. *EdD dissertation, Eastern Michigan University, United States of America.*
- Porter, L. W., Lawler, E. E., & Hackman, J. R. (1975). *Behavior in organizations*. New York: McGraw-Hill.
- Pretti, T. J., Drewery, D., & Nevison, C. (2016). Unpacking cooperative education from the supervisor perspective: Key issues and strategies. *World Association for Cooperative Education (WACE)*, Victoria, Canada, 147-154.
- Quiñones, M. A., Ford, J. K., & Teachout, M. S. (1995). The relationship between work experience and job performance: A conceptual and meta-analytic review. *Personnel Psychology*, 48(4), 887-910.
- Richmond, K., Richards, K., & Britt, K. (2015). The impact of an authentic, simulated learning activity on student preparedness for work-integrated learning. *Asia-Pacific Journal of Cooperative Education*, 16(4), 343-354.
- Rothman, M. (2003). Internships: Most and least favored aspects among a business school sample. *Psychological Reports*, 93(3), 921-924.
- Rothman, M. (2007). Lessons learned: Advice to employers from interns. *Journal of Education For Business*, 82(3), 140-144.
- Rowe, P. M. (2017). Towards a model of work experience in work-integrated learning. In T. Bowen & M. T. B. Drysdale (Eds.) *Work-integrated learning in the 21st century: Global perspectives on the future* (International Perspectives on Education and Society) (Vol. 32, pp. 3–17). Bingley, United Kingdom: Emerald Publishing Limited.
- Royal Bank of Canada (2018). Humans wanted. How Canadian youth can thrive in the age of disruption. Accessed June 23, 2019.  
[https://www.rbc.com/dms/enterprise/futurelaunch/\\_assets-custom/pdf/RBC-Future-Skills-Report-FINAL-Singles.pdf](https://www.rbc.com/dms/enterprise/futurelaunch/_assets-custom/pdf/RBC-Future-Skills-Report-FINAL-Singles.pdf)
- Safayeni, F., Duimering, P. R., Zheng, K., Derbentseva, N., Poile, C., & Ran, B. (2008). Requirements engineering in new product development. *Communications of the ACM*, 51(3), 77.
- Sandström, K., & Johansson, K. S. (2016). A small scaled study on pro and cons with the educational design of Co-operative Education. *Engineering4Society 2016*, 87-90.
- Sattler, P., & Peters, J. (2012). *Work-integrated learning and postsecondary graduates: The perspective of Ontario employers*. The Higher Education Quality Council of Ontario.
- Saurin, T.A. (2017). Removing waste while preserving slack: The lean and complexity perspectives. In: *LC3 2017 Volume II – Proceedings of the 25th Annual Conference of the International Group for Lean, Heraklion, Greece*, pp. 217-224.
- Scala, J. (1995). *Manufacturing flexibility revisited* (Doctoral dissertation). University of Waterloo, Waterloo, Ontario, Canada.
- Shah, R., & Ward, P. T. (2003). Lean manufacturing: context, practice bundles, and performance. *Journal of Operations Management*, 21(2), 129-149.
- Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, 22(2), 63-75.

- Stonecash, J., Pecorella, R. F., & Winegar, L. (1988). Satisfaction with intern experiences: analysis of the New York Assembly intern programme. *Journal of Co-operative Education*, 25(1), 25-43.
- Swider, B. W., Zimmerman, R. D., & Barrick, M. R. (2015). Searching for the right fit: Development of applicant person-organization fit perceptions during the recruitment process. *Journal of Applied Psychology*, 100(3), 880-893.
- Taber, T. D., & Taylor, E. (1990). A review and evaluation of the psychometric properties of the Job Diagnostic Survey. *Personnel Psychology*, 43(3), 467-500.
- Tesluk, P. E., & Jacobs, R. R. (1998). Toward an integrated model of work experience. *Personnel Psychology*, 51(2), 321-355.
- The Premier's Highly Skilled Workforce Expert Panel (2016). Building the workforce of tomorrow: A shared responsibility. Accessed June 23, 2019. [https://files.ontario.ca/hsw\\_rev\\_engaoda\\_webfinal\\_july6.pdf](https://files.ontario.ca/hsw_rev_engaoda_webfinal_july6.pdf)
- Thompson, J. (1967) *Organizations in action*. New York: McGraw-Hill.
- Tubre, T. C., & Collins, J. M. (2000). Jackson and Schuler (1985) revisited: A meta-analysis of the relationships between role ambiguity, role conflict, and job performance. *Journal of Management*, 26(1), 155-169.
- Tucker, S. (1992). *Study of the impact of complexity on the communication of a manufacturing firm* (Master's thesis). University of Waterloo, Waterloo, Ontario, Canada
- Turner, A. N., & Lawrence, P. R. (1965). *Industrial jobs and the worker: An investigation of response to task attributes*. Harvard University, Division of Research, Graduate School of Business Administration.
- Van Maanen, J., & Schein, E. H. (1979). Toward a theory of organizational socialization. In B. M. Staw (Ed.), *Research in organizational behavior* (pp. 209-264). Greenwich, CT: JAI.
- Walters, D., & Zarifa, D. (2008). Earnings and employment outcomes for male and female postsecondary graduates of coop and non-coop programmes. *Journal of Vocational Education and Training*, 60(4), 377-399.
- Waters, R. K., & Gilstrap, C. M. (2010). Examining the roles of peer messages in the anticipatory socialization process of the internship experience. *Journal of Cooperative Education and Internships*, 44(1), 6-12.
- Weisz, M. (2001). *The added value of a cooperative education program*. Royal Melbourne Institute of Technology.
- Wiener, N. (1954). Cybernetics in history. In H. Muller & R. Craig (Eds.) *Theorizing in communication: Readings across traditions* (pp. 267-273). Sage.
- Williams, J. (2004). Sport management internships: Agency perspectives, expectations, and concerns: Knowing what the internship agency wants can help prospective interns prepare for the experience. *Journal of Physical Education, Recreation and Dance*, 75(2), 30-33.
- Yin, R. K. (2003). *Case study research; designs and method, 3rd ed.* Thousand Oaks, CA: Sage Publications, Inc.
- Zegwaard, K. E. (2015). Building an excellent foundation for research: Challenges and current research needs. *Asia-Pacific Journal of Cooperative Education*, 16(2), 89-99.

## Appendix A. Recruitment Activity, Performance Evaluations and Student Ratings

### Recruitment Activity For Company A by Term between Spring 2017 and Spring 2018

Term	Openings	Applications	Interviews	Filled
Spring 2017	44	804	136	33
Fall 2017	39	548	166	34
Winter 2018	46	942	191	46
Spring 2018	74	718	103	34

### Supervisors' Ratings of Student Performance at End of Work Term at Company A

Dimension	Avg. Rating of Engineering Students Employed at Company A (scale 1-7)	Dimension	Avg. Rating of Engineering Students Employed at Company A (scale 1-7)
Teamwork	6.21	Quantity of Work	5.69
Interest in Work	5.97	Reflection	5.66
Ethical Behaviour	5.97	Quality of Work Written	5.64
Appreciation of Diversity	5.96	Communication	5.57
Dependability	5.93	Oral Communication	5.54
Response to Supervision	5.88	Resourcefulness	5.48
Ability to Learn	5.86	Problem Solving	5.35
Interpersonal Communication	5.79	Entrepreneurial Orientation	5.29

### Students' Ratings After Work Term at Company A

Statements related to work term experience	n=93
Availability of employer support	4.2
Opportunities to learn or develop new skills	4.3
Opportunities to make meaningful contributions to workplace	4.4
Opportunities to expand your professional network	4.1
Appropriate compensation and/or benefits	4.3
How closely your work was related to your academic program	3.8
How closely your work was related to the skills you are developing at university	3.7
Your overall satisfaction level with your work term	8.0

*Scale is 1-5 for all dimensions except overall satisfaction which is a scale of 1-10.*

## **Appendix B. Information Consent Letter for Participants**

Dear Participant:

This letter is an invitation to consider participating in a study I am conducting as part of my PhD in the Department of Management Science at the University of Waterloo under the supervision of Dr. Frank Safayeni, Professor in Management Sciences at the University of Waterloo. This study will examine, by way of interviews, the perspectives of co-op students, co-op supervisors and HR staff who support the co-op hiring process in one organization.

Organizations who hire co-op students on a regular, continuous basis face the challenge of repeated four month cycles of recruiting, hiring, training, and giving students work to do. In order to minimize the disruption and maximize the contribution of students to their organization, processes and practices develop to meet this challenge. Through a case study approach with one organization, I will investigate the HR practices as well as the practices of several teams to understand the practices and capacity they have developed to help them manage co-op work terms. One of the areas that I will be investigating is the tasks that are assigned to students to gain an understanding of how work is assigned to students that doesn't pose a risk to the organization in terms of disruption and yet provides value to the team and the student. Students will be asked to provide examples of tasks they were given, who they interacted with to complete the tasks and the feedback they received on the tasks. They will also be asked to comment on their overall experience on the work term. Supervisors will be asked about the nature of the tasks assigned to students and comment on the students' performance in completing those tasks. HR staff will be asked about the processes used in screening, selecting and supporting co-op students. Where students and supervisors from the same team agree to participate in an interview, the data may be linked for analysis. A summary report, without any identifying information will be provided to the organization involved in this research.

Participation in this study is voluntary. It will involve an interview of approximately 1.5-2 hrs in length to take place in a mutually agreed upon location. You may decline to answer any of the interview questions if you so wish. With your permission, the interview will be audio recorded to facilitate collection of information, and later transcribed for analysis. Shortly after the interview has been completed, I will send you a copy of the transcript to give you an opportunity to confirm the accuracy of our conversation and to add or clarify any points that you wish. You can request your data be removed from the study up until December 2018 as it is not possible to withdraw your data once papers and publications have been submitted to publishers. Your identity will be kept confidential. All information that could identify you will be removed from the data we have collected within one week of the interview and stored separately. Your name will not appear in any thesis or report resulting from this study, however, with your permission anonymous quotations may be used. We will keep identifying information and our study records for a minimum of 5 years on a password-protected sharepoint site at the University of Waterloo. Data collected on paper during the interviews will be kept in a locked cabinet in the researcher's office at the University of Waterloo. A file mapping participant name and number will be maintained and stored on a password-protected sharepoint site. Only researchers associated with this project will have access. All records will be destroyed according to University of Waterloo policy. There

are no known or anticipated risks to you as a participant in this study. You will receive \$20/hr as remuneration for your participation. The money will be deposited on your WatCARD.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#23277). If you have questions for the Committee contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or [ore-ceo@uwaterloo.ca](mailto:ore-ceo@uwaterloo.ca).

For all other questions or if you would like additional information to assist you in reaching a decision about participation, please contact me at 519-888-4567 x32355 or by email at [tjpretti@uwaterloo.ca](mailto:tjpretti@uwaterloo.ca). You can also contact my supervisor, Professor Safayeni at 519-888-4567 ext. 32226 or email [fsafayni@uwaterloo.ca](mailto:fsafayni@uwaterloo.ca).

I hope that the results of my study will be of benefit to the organization involved in this study, other organizations that hire co-op students, as well as the broader co-op research community.

I very much look forward to speaking with you and thank you in advance for your assistance in this project.

Yours Sincerely,

Judene Pretti, PhD Candidate  
Management Sciences  
University of Waterloo

Dr. Frank Safayeni, Professor  
Management Sciences  
University of Waterloo

## CONSENT FORM

By signing this consent form, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

I have read the information presented in the information letter about a study being conducted by Judene Pretti of the Department of Management Sciences at the University of Waterloo. I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and any additional details I wanted.

I am aware that I have the option of allowing my interview to be audio recorded to ensure an accurate recording of my responses. I am also aware that excerpts from the interview may be included in the thesis and/or publications to come from this research, with the understanding that the quotations will be anonymous. I was informed that I may withdraw my consent at any time without penalty by advising the researcher.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#32128 - insert your ORE file # here). If you have questions for the Committee contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or [ore-ceo@uwaterloo.ca](mailto:ore-ceo@uwaterloo.ca).

For all other questions contact Judene Pretti at [tjpretti@uwaterloo.ca](mailto:tjpretti@uwaterloo.ca).

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

YES  NO

I agree to have my interview audio recorded.

YES  NO

I agree to the use of anonymous quotations in any thesis or publication that comes of this research.

YES  NO

Participant Name: \_\_\_\_\_ (Please print)

Participant Signature: \_\_\_\_\_

Witness Name: \_\_\_\_\_ (Please print)

Witness Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## Appendix C. Supervisor Interview Protocol

### Introductory Questions

1. How long have you worked at <COMPANY>?
2. What department do you work in?
3. Are you a graduate of a co-op program?
4. How long have you been a co-op supervisor?
5. Approximately how many co-op students have you supervised in your time at <COMPANY>?

### Decision to Hire, Application Screening, Interviewing and Selection

6. How is the process initiated to hire a co-op student? Is that something you decide within your team and make a request, or is it something initiated by the organization and they come to you with the offer to hire a student?

#### Follow-up:

- if initiated by supervisor/team, how do you decide if you need a student, or how many you will need on a given term? Why a co-op student and not another kind of temporary worker?
  - if initiated by the organization, how do you decide whether you will take a student?
7. Are you or is anyone from your team involved in specifying the requirements for the co-op student job (e.g. qualifications needed, work to be done)? If so, can you describe your involvement?
  8. Are you or is anyone from your team involved in the process for screening applications that are received? If yes, in what way?
  9. Are you or is anyone from your team involved in the interview process? If yes,
    - what does that involve for you?
    - how important is it that you are involved in the interview process? Why?
  10. Are you or is anyone from your team involved in ranking/offer decisions? If yes, can you describe that process?
  11. How are co-op student salaries set?
  12. Okay – here’s a question that can be a little tough, through the application, screening, interview and selection process, can you list all the helpful things that HR does? Can you list all the not-so helpful things that HR does?
  13. Through the application, screening, interview and selection process, can you list all the helpful things that UW does? Can you list all the not-so helpful things that UW does?

### Questions about Tasks During the Work Term

14. How do you decide what tasks to give your co-op student?
15. Okay, now thinking of your most recent co-op student, can you describe, let’s say the three main tasks they did?
16. Okay can you use this circle to create a pie chart of what percentage of the co-op student’s term was filled with each of these main tasks, and then how much falls into a misc. category?

**For each main task – label at top of star diagram**

17. In the process of doing this task, who did the student need to interact with (use a star diagram to label the interactions)?
18. How much do you know about the interactions the student had with others in completing this task? If some, or a lot, how frequently would the student have interacted with each of these people while completing the task?
19. With respect to your interactions with the student on this task, how frequent were your interactions? What was the typical duration of your interactions?
20. Okay – here’s another one that might be a bit tough - with respect to your interactions with the student on this task can you list all the helpful things that he/she did?
21. With respect to your interactions with the student on this task can you list all the not-so-helpful things that he/she did?

For some of the following questions, I’m going to ask you to provide an answer on a scale using the computer and then provide details or examples of why you would give that rating.

22. (S) How much time (in days) was spent training the student to do the task?  
Describe the training given to the student to complete this task.
23. (S) To what extent was there flexibility in how the student completed the task?  
Can you describe why it was low or high on flexibility?
24. (S) How long (in weeks) was it before the student seemed comfortable with the task?  
What made you think the student was comfortable?
25. (S) Did you feel like the task was above the student’s head, just at the right level, or below what he/she could do?  
What made you think that it was this level?
26. (S) How would you rate the student’s pace of work on this task?  
Was that faster or slower than you expected? How would that compare to the speed of a new grad?
27. (S) Roughly, how much time (in weeks) did the student spend doing this task over the work term?
28. Was there a set deadline for the student to complete this task? If yes, were there other processes within the team or organization relying on the completion of the task or was the deadline set just to keep the student on track?
29. If you didn’t have a co-op student to do this task, who would have done it? Would it have been done in the same time frame?
30. (S) To what degree would it impact you or your team if the student made a mistake or didn’t do a good job in completing this task?
31. (S) What degree of risk were you taking in giving this task to the student? Why would you describe it as that level of risk?
32. (S) To what degree were you satisfied with the work of the student on this task? Why did you provide this rating?
33. Did you provide feedback to the student on their performance on this task? If yes, can you describe the feedback provided.



Questions about work term overall for this specific student

34. Do you regularly hire co-op or intern students on your team? For this role?
35. (S) How busy was the co-op student compared to others on your team? Why would you say that? How many hours did the student typically work? If overtime, was that because you want to give the students chance to earn some extra money, or because there are things that need to be done that the student can do that nobody else wants to do?
36. (S) To what extent did the co-op student ask questions during the work term? Examples. What that more or less than you would expect?
37. (S) To what extent was the co-op student encouraged to propose new ways to do things? Can you provide examples.
38. (S) How would you rate the contribution that the student made to your team? How would you describe his/her contribution?
39. (S) How likely would you be to invite this student back for another work term? Why or why not?
40. (S) If there was a position available, how likely would you be to offer this student a job after graduation? Why or why not?
41. (S) On a scale of 1 to 9, how would you rate this work term experience, overall?
42. (S) When you think about the return on investment (ROI) as the benefit you received for the time/effort/money put in, how would you describe your ROI of hiring this co-op student? Can you describe why you gave it that rating?
43. Can you describe the process involved in completing the end of term performance evaluations for co-op students? What is your role? Are there others involved?
  - what other factors are you considering the evaluation process?
  - who are you comparing the student to?
  - Are you taking into account that the impact the rating will have on student's future employment opportunities?
  - How high would the rating need to be for you to recommend the student for full-time hiring?
44. During the work term, what are the helpful things that HR does for you? What are the not-so-helpful things?
45. During the work term, what are the helpful things that UW does for you? What are the not-so-helpful things?

General Questions

46. In general, what is <COMPANY>'s philosophy for hiring co-op students? There's a lot of time and effort invested in hiring and training the students and so why do you think <COMPANY> hires co-op students?
47. Are there any specific policies with respect to co-op students? If so, what are they? Would you be willing to share those with me?
48. (S) To what extent are co-op students treated like other employees at <COMPANY>? Examples?
49. What % of your week is typically spent interacting with co-op students?
50. Can you provide examples of things that a successful co-op student at <COMPANY> would do?
51. Can you provide examples of things that not-so-successful students at <COMPANY> would do?

## Appendix D. Student Interview Protocol

### Introductory Questions

1. What academic program are you in?
2. What work term # did you just finish?
3. Was it your first work term at Company A?
4. Who was your Assistant Manager? Before you answer this question, I would like to describe to you why I am asking you this question. As you know, I am also interviewing supervisors from Company A. I will not reveal to your supervisor that you have participated in this research, nor will I tell you whether your supervisor has participated in this research. However, in the event that I interview a student and Assistant Manager who have worked together, then when I anonymize the transcript, I will make note that the recordings are part of a student-supervisor pairing and this will provide me with an additional opportunity for analysis.

Decision to Apply, Interview and Ranking process. If this was your second term at Company A, please think back to when you first applied.

5. Why did you apply to Company A?
6. Do you remember anything about the job posting on Waterloo Works? If yes, what do you remember?
7. Had you heard anything about working at Company A prior to applying? If yes, what had you heard?
8. What do you remember about the interview process?
9. Did you rank Company A as a #1 on your ranking form? Why or why not? Was it a difficult decision?
10. How did you feel when you were matched with Company A? What were you most excited about? What were you least excited about?
11. Did you have expectations about what the work term would be like? If yes, can you describe those expectations? What were your expectations based on?

### Questions about Tasks During the Work Term

12. What were the main tasks you did on your last work term?
13. Here's a pie chart – can you draw what percentage of your work term was filled with each of these main tasks, and then how much falls into a misc. category?

### For each task:

14. (S) How much training were you given to complete this task? <SCALE> Describe the training given to you to complete this task.

15. NETWORK ANALYSIS

In the process of doing this task, who did you need to interact with (use a star diagram to label the interactions)?

Can you rank the interaction links from the most to least important in terms of being able to do that task?

Can you describe the typical duration and frequency of the interactions with each of these groups/people?

Thinking of each of those individuals, can you describe specific things that they did to help you with this task? List as many as you can think of.

Thinking of each of those individuals, can you describe specific things that were not-so-helpful that they did related to this task? List as many as you can think of.

What were your helpful behaviours to those you interacted with on this task?

What were your not-so-helpful behaviours towards others on this task?

16. (S) To what extent was there flexibility in how you completed the task?

Can you describe how you went about completing the task?

17. (S) How long (in weeks) was it before you felt comfortable with the task?

18. (S) Did you feel like the task was above your head, at the right level, or below?

What was it that made it above, at or below? Can you describe why you feel it was <..>

19. (S) How would you rate your pace of work on this task?

Can you describe why your pace was fast or slow?

20. (S) To what degree was there pressure for you to complete this task?

Was there a set deadline for you to complete this task? If yes, were there other processes within the team or organization relying on the completion of the task or was the deadline set just to keep you on track?

21. (S) Roughly how much time (in weeks) did you spend doing this task over the work term?

22. If they didn't hire you to do this task, who would have done it? Would it have been done in the same time frame?

23. (S) To what degree would it impact your team if you made a mistake or didn't do a good job in completing this task?

Can you describe or provide an example of why you think it wouldn't make an impact or why it would?

24. (S) From a company's point of view, what degree of risk were they taking in giving this task to you?

Can you explain why you think that?

25. (S) How much feedback was provided to you while you were doing the task?

Did that seem like the right amount of feedback or do you wish you'd had more or less

26. (S) How useful was the feedback you received?

Can you provide examples of the feedback you received?

I now want you to think about ***your work term as a whole*** for this set of questions.

27. (S) Coming back to the earlier questions about expectations. To what extent did the work term match what you were expecting prior to arriving? In what ways did it turn out to be similar to what you expected? In what ways did it turn out to be different than what you expected?

28. Does this team regularly hire co-op or intern students for this role?

29. (S) How busy were you on this work term compared to others on your team?

Can you provide examples of why you feel this way?

30. On your co-op work term, how many hours did you work per week?

31. (S) To what extent were co-op students treated like other regular employees at this company? Examples?

32. (S) To what extent did you feel comfortable asking questions during your work term? Examples.

33. (S) To what extent were you encouraged to propose new ways to do things? Examples.

34. (S) Return on Investment – ROI is a measure of how much you get out of something for how much you put in. What would you say the short-term/immediate ROI is for you in having completed this work term?
35. (S) What would you think the long-term ROI is for you in having completed this work term?
36. If you were invited back for another work term, would you accept, and why or why not?
37. If you were offered a job after graduation, would you accept, why or why not?

For this set of questions, I want you to think about *life in general* during your most recent work term and your most recent academic term.

38. How much would you say you **learned** on your most recent work term?
39. How much would you say you **learned** on your most recent academic term?
40. How much would you say you **socialized** on your most recent work term?
41. How much would you say you **socialized** on your most recent academic term?
42. How would you describe your **level of stress** on your most recent work term?
43. How would you describe your **level of stress** on your most recent academic term?
44. To what extent did you **develop new skills** during your most recent work term?
45. To what extent did you **develop new skills** during your most recent academic term?
46. To what extent did you have **free time** during your most recent work term?
47. To what extent did you have **free time** during your most recent academic term?
48. What was your **overall satisfaction** with your most recent work term?
49. What was your **overall satisfaction** with your most recent academic term?

I have one last pair of questions, and they relate to the connections between your academic program and your work term.

50. Can you recall courses that you've taken that were connected to the tasks that you did on your last work term?
51. Has your most recent work term increased your interest in taking specific courses in your program or made you think about taking specific elective courses? If so, which ones?

## Appendix E. Online Supervisor Survey

### **Title of Project: Investigating the Co-operative Education Work Term as a Dynamic System**

You are invited to participate in a study I am conducting as part of my PhD in the Department of Management Science at the University of Waterloo under the supervision of Dr. Frank Safayeni, Professor in Management Sciences at the University of Waterloo. This study is examining, by way of interviews and an online survey, the perspectives of co-op students, co-op supervisors and HR staff who support the co-op hiring process at <Company A>.

Organizations who hire co-op students on a regular basis face the challenge of repeated four month cycles of recruiting, hiring, training, and giving students work to do. In order to minimize the disruption and maximize the contribution of students to their organization, processes and practices develop to meet this challenge. Through a case study approach with <COMPANY A>, I am investigating those processes to understand the practices and capacity it has developed to manage co-op work terms.

Students were asked to provide examples of tasks they were given, who they interacted with to complete the tasks and the feedback they received on the tasks. They were also asked to comment on their overall experience on the work term. Assistant Managers were asked about the nature of the tasks assigned to students and to comment on the students' performance in completing those tasks. HR staff were asked about the processes used in screening, selecting and supporting co-op students. A summary report, without any identifying information will be provided to the organization involved in this research. The first phase of this research involved interviews with Assistant Managers and students and has been completed. A online survey was then conducted with students in January 2019 based on their Fall 2018 term. The last phase of this research is an online survey with Leads who have worked closely with a co-op student during the Winter 2019 term.

Participation in this study is voluntary. It will involve an online survey of about **20 minutes**. You may decline to answer any questions that you do not wish to answer and you can withdraw your participation at any time by not submitting your responses. There are no known or anticipated risks from participating in this study. You will be completing the study by an online survey operated by Qualtrics™. When information is transmitted over the internet privacy cannot be guaranteed. There is always a risk your responses may be intercepted by a third party (e.g., government agencies, hackers). Qualtrics™ temporarily collects your contributor ID and computer IP address to avoid duplicate responses in the dataset but will not collect information that could identify you personally.

Your identity will be kept confidential. All information that could identify you will be removed from the data we have collected within one week of the completion of the survey and stored separately.

Your name will not appear in any thesis or report resulting from this study. We will keep identifying information and our study records for a minimum of 5 years on a password-protected

sharepoint site at the University of Waterloo.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#23277). If you have questions for the Committee contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca.

For all other questions or if you would like additional information to assist you in reaching a decision about participation, please contact me at 519-888-4567 x32355 or by email at tjpretti@uwaterloo.ca. You can also contact my supervisor, Professor Safayeni at 519-888-4567 ext. 32226 or email fsafayni@uwaterloo.ca.

I hope that the results of this study will be of benefit to <COMPANY A> and other organizations that hire co-op students, as well as the broader co-op research community.

Thank you for considering participation in this study.

Yours Sincerely,

Judene Pretti, PhD Candidate Management Sciences University of Waterloo

Dr. Frank Safayeni, Professor Management Sciences University of Waterloo

By agreeing to participate in the study, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

Consent to Participate:

Yes

No

1. How long have you worked at <COMPANY A>?
2. What department do you work in?
3. Are you a graduate of a co-op program?
4. How long have you been involved in a supervisory capacity for co-op students?
5. For approximately how many co-op students have you had supervisory responsibilities at
6. Were you involved in the interviews conducted at UW in the fall of 2018 to select the co-op students for the Winter 2019 term?
7. Were you responsible for a student during the Winter 2019 term?
8. Did you interview the student who you ended up being responsible for during the Winter 2019 term?
9. In your opinion, how important is it for supervisors to be involved in the interview process? (1-9)  
1 - Not important -> 9 - Very important
10. In your opinion, how important is it for leads to select the student they end up working with (versus being selected by one of the other <COMPANY A> supervisors)?  
1 - Not important -> 9 - Very important
11. Thinking of the most recent student you were responsible for, was this their first work term at <COMPANY A>, or were they a returning student?

First work term at <COMPANY A>

They had previously completed a work term at <COMPANY A>

12. Continuing to think of your most recent student, what are three main tasks/projects that they worked on? Please include the student's TBP project as one of the three main tasks.

What was task #1? \_\_\_\_\_

What was task #2? \_\_\_\_\_

What was task #3? \_\_\_\_\_

13. Thinking about these three tasks, what % of the student's overall time for the work term was spent on the combination of these three projects?

14. Which one of the tasks was the student's <Highlight Project>?

Task 1

Task 2

Task 3

For each of the three main tasks that the student worked on there will be a set of questions to answer. **Please take your time to think about the tasks and answer these questions carefully.** The questions on this page relate to Task #1:

15. What % of the student's work term was spent on this task?  
16. Please list of all the helpful things that the co-op student did related to this task.  
17. Please list of all the not-so-helpful things that the co-op student did related to this task.  
18. How much training was provided to the student to do the task?  
19. To what extent was there flexibility in how the student completed this task?  
20. How long (in weeks) was it before the student seemed comfortable with the task?  
21. Did you feel like the task was above the student's head, just at the right level, or below what he/she could do?  
22. How would you rate the student's pace of work on this task?  
23. Roughly, how much time (in weeks) did the student spend doing this task over the work term?  
24. Who would have done the task if there wasn't a co-op student to do it?  
25. Would it have been done in the same time frame as the student did the task, or left to be done at another time?

This task needed to be done in the same time frame as the student did it - other employees would have reprioritized their work or worked additional overtime to get this task done.

This task would have been left to be done at a later time.

Other \_\_\_\_\_

26. To what degree would it impact your team if the student made a mistake or didn't do a good job in completing this task?  
27. What degree of risk were you taking in giving this task to the student?  
28. To what degree were you satisfied with the work of the student on this task?  
29. Regarding the work term as a whole with your most recent student:  
30. On a scale of 1-9 how would you rate the work term experience with this student,

overall?

31. How busy was the student compared to others on your team?
32. To what extent did the co-op student ask questions during the work term?
33. To what extent was the co-op student encouraged to propose new ways to do things?
34. How would you rate the contribution that the student made to your team?
35. How likely would you be to invite this student back for another work term?
36. If there was a position available, how likely would you be to recommend that <COMPANY A> hire this student after graduation?
37. When you think about the return on investment (ROI) as the benefit received for the time, money and effort put in, how would you describe the ROI for <COMPANY A> in hiring this co-op student?
38. To what extent are co-op students treated like regular employees at <COMPANY A>?

Thank you very much for your participation in this research project. If you are interested in receiving a summary of the results when they are completed, please provide your email address below. Your identifying information will not be stored with your responses to this survey.

Email Address \_\_\_\_\_



## Appendix F. Online Student Survey

### **Title of Project: Investigating the Co-operative Education Work Term as a Dynamic System**

You are invited to participate in a study I am conducting as part of my PhD in the Department of Management Science at the University of Waterloo under the supervision of Dr. Frank Safayeni, Professor in Management Sciences at the University of Waterloo. This study will examine, by way of interviews and an online survey, the perspectives of co-op students, co-op supervisors and HR staff who support the co-op hiring process at <COMPANY A>.

Organizations who hire co-op students on a regular, continuous basis face the challenge of repeated four month cycles of recruiting, hiring, training, and giving students work to do. In order to minimize the disruption and maximize the contribution of students to their organization, processes and practices develop to meet this challenge. Through a case study approach with <COMPANY A>, I will investigate the HR practices as well as the practices of several teams to understand the practices and capacity they have developed to help them manage co-op work terms.

One of the areas that I will be investigating is the tasks that are assigned to students to gain an understanding of how work is assigned to students that doesn't pose a risk to the organization in terms of disruption and yet provides value to the team and the student. Students will be asked to provide examples of tasks they were given, who they interacted with to complete the tasks and the feedback they received on the tasks. They will also be asked to comment on their overall experience on the work term. Supervisors will be asked about the nature of the tasks assigned to students and comment on the students' performance in completing those tasks. HR staff will be asked about the processes used in screening, selecting and supporting co-op students. Where students and supervisors from the same team agree to participate in an interview, the data may be linked for analysis. A summary report, without any identifying information will be provided to the organization involved in this research. The first phase of this research which involved interviews with supervisors and students has been completed. The next phase is an online survey for students who were employed at <COMPANY A> in the Winter 2019 term.

Participation in this study is voluntary. It will involve an online survey of about **30-45 minutes**. You may decline to answer any questions that you do not wish to answer and you can withdraw your participation at any time by not submitting your responses. There are no known or anticipated risks from participating in this study. You will be completing the study by an online survey operated by Qualtrics™. When information is transmitted over the internet privacy cannot be guaranteed. There is always a risk your responses may be intercepted by a third party (e.g., government agencies, hackers). Qualtrics™ temporarily collects your contributor ID and

computer IP address to avoid duplicate responses in the dataset but will not collect information that could identify you personally.

Your identity will be kept confidential. All information that could identify you will be removed from the data we have collected within one week of the completion of the survey and stored separately.

Your name will not appear in any thesis or report resulting from this study. We will keep identifying information and our study records for a minimum of 5 years on a password-protected sharepoint site at the University of Waterloo.

You will receive **\$15 as remuneration** for your participation in this survey. The money will be deposited on your WatCARD.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#23277). If you have questions for the Committee contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or [ore-ceo@uwaterloo.ca](mailto:ore-ceo@uwaterloo.ca).

For all other questions or if you would like additional information to assist you in reaching a decision about participation, please contact me at 519-888-4567 x32355 or by email at [tjpretti@uwaterloo.ca](mailto:tjpretti@uwaterloo.ca). You can also contact my supervisor, Professor Safayeni at 519-888-4567 ext. 32226 or email [fsafayni@uwaterloo.ca](mailto:fsafayni@uwaterloo.ca).

I hope that the results of my study will be of benefit to <COMPANY A> and other organizations that hire co-op students, as well as the broader co-op research community.

Thank you for considering participation in this study.

Yours Sincerely,  
Judene Pretti, PhD Candidate Management Sciences University of Waterloo  
Dr. Frank Safayeni, Professor Management Sciences University of Waterloo

By agreeing to participate in the study, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

Consent to Participate:

Yes

No

1. What faculty are you in?
2. What academic program are you in?
3. What is your current academic term?
4. What work term # did you just complete?
5. Was the Winter 2019 term your first work term at <COMPANY A>?
6. When did your most recent work term at <COMPANY A> begin?
7. When did (or does) your most recent (or current) work term at <COMPANY A> end?
8. What was/is your job title?
9. What department were/are you working in?
10. What are three main tasks/projects that you worked on during your most recent <COMPANY A> work term? Please include your Highlight Project as one of the three main tasks.

What was task #1? \_\_\_\_\_

What was task #2? \_\_\_\_\_

What was task #3? \_\_\_\_\_

11. Thinking about these three tasks, what % of your overall time for the work term was spent on the combination of these three projects?
12. Which one of the tasks was your TBP?

Task 1

Task 2

Task 3

For each of the three main tasks that you worked on there will be a set of questions to answer. **Please take your time to think about the tasks and answer these questions carefully.**

The questions on this page relate to Task #1

13. What % of your work term was spent on this task?
14. Who were the main people that you interacted with for this task? Please list their roles, the frequency of interactions and typical duration of the interactions. For example,
  - Engineer from the Production Team, daily, 1 hour
  - Assistant Manager from <Department>, once a week, 15 minutes
  - ...

---

15. How much training were you given to complete this task?

16. To what extent was there flexibility in how you completed this task?

17. How long (in weeks) before you felt comfortable with the task?

18. Did you feel like the task was above your head, at the right level, or below?

19. How would you rate your pace of work on this task?

20. To what degree was there pressure for you to complete this task?

21. Who would have done this task if there wasn't a co-op student to do it?

22. Would this task have been done in the same time frame as you did it, or left to be done at

a later time?

This task needed to be done in the same time frame as I did it - other employees would have reprioritized their work or worked additional overtime to get this task done.

This task would have been left to be done at a later time.

Other: \_\_\_\_\_

23. Roughly, how much time (in weeks) did you spend doing this task over the work term?
24. To what degree would it impact your team if you made a mistake or didn't do a good job in completing this task?
25. From a company's point of view, what degree of risk were they taking in giving this task to you?
26. How much feedback was provided to you while you were doing the task?
27. How useful was the feedback you received?

Thinking about your work term as a whole

28. To what extent did the work term match what you were expecting prior to arriving?
29. How busy were you on this work term compared to others on your team?
30. To what extent were co-op students treated like regular employees at this company?
31. To what extent did you feel comfortable asking questions during your work term?
32. To what extent were you encouraged to propose new ways to do things?
33. What was the **short term** return on investment for you with this work term? Think about what you put into the work term vs. what you got out of it as far as immediate returns (e.g. pay, developing new skills)
34. What do you think the **long term** return on investment for you with this work term? Think about what you put into the work term vs. what you expect to get out of having done this term (e.g. potential job offers in the future)

The last set of questions asks you to think about **Life In General**.

Thinking about your current work term and your most recent academic term, how much would you say you

35. learned on your most recent work term
36. learned on your most recent completed academic term
37. socialized on your most recent work term
38. socialized on your most recent completed academic term
39. developed new skills on your most recent work term
40. developed new skills on your most recent completed academic term
41. had free time on your most recent work term

Thinking about your most recent work term and your most recent completed academic term, how would you describe your

42. level of stress on your most recent work term
43. level of stress on your most recent completed academic term
44. overall satisfaction with your most recent work term
45. overall satisfaction with most recent completed academic term

Thank you for your participation in this research project. Please provide your email address and

student ID # below so that remuneration can be processed. Your identifying information will not be stored with your responses to this survey.

Email Address \_\_\_\_\_

Student ID#: \_\_\_\_\_

If you would like to receive a summary of the results when they are completed, please indicate below and a summary will be sent to the email address you have provided.

Yes

No

## Appendix G. Company A HR Interview Protocol

### General Questions

1. How long have you worked at <organization>?
2. What department do you work in?
3. How long have you been in this role?

### Up to and Including Job Postings

4. How does <organization> make decisions about how many co-op students will be hired?
  - Who is involved in making those decisions?
  - How are co-op roles funded (centrally or by departments/teams)?
  - What is HR's role in this process?
5. How does <organization> make decisions about what roles need to be filled?
  - Who is involved in making those decisions?
  - Who is responsible for the content of the job advertisements?
  - What is HR's role in this process?
6. Are there other activities happening related to co-op hiring at this stage, i.e. before applications are received from students? If so,
  - Who is involved?
  - What is HR's role in the process?

### Application Screening, Interviewing and Selection

7. Can you describe the process for screening applications that are received?

#### Follow up Questions:

- Who is involved?
- What is HR's role in the process?

8. Once students have been selected for interviews, what happens prior to the interview?

#### Follow up Questions:

- Who is involved?
- What is HR's role in this?

9. How does <organization> conduct interviews? (length, group + individual interview, or just individual?)

#### Follow up Questions:

- Who is involved?
- What is HR's role in this?
- Is there a standard set of questions? Would you be able to share the interview questions?
- Can you provide examples of things that a successful co-op student at <organization> would do?
- Can you provide examples of things that not-so-successful students at <organization> would do?

10. How are decisions made about the ranking/offer phase?

#### Follow up Questions:

- Who is involved?

- What is HR's role in this?
- How are unfilled positions handled?

#### During the Work Term

11. How is it determined which team a student will work with and/or who their supervisor will be?
12. Are there specific requirements or training for new co-op supervisors?
13. Are there established processes for co-op students once they arrive for the work term? If so, can you describe the processes including who is involved and what the role of HR is in those processes?
14. Over the course of a student's work term at <organization>, what interactions might they have with HR?

#### General Questions

15. In general, what is <organization>'s philosophy for hiring co-op students? There's a lot of time and effort invested in hiring and training the students and so why do you think <organization> hires co-op students?
16. Are there metrics that <organization> uses to measure the success of co-op student hiring? If so, what are those?
17. Are there any specific policies with respect to co-op students? If so, what are they? Would you be willing to share those with me?
18. What % of your role is allocated to working on co-op related activities?
19. Are there others in HR that are involved in co-op related activities? If so, what activities are they involved in, and what % of their role is allocated to co-op activities?

## **Appendix H. UW Co-op Staff Interview Protocol**

Introductory Comments: I'm examining the processes that organizations develop in order to run co-op programs. I have been interviewing students, supervisors and people from HR at Company A to get an understanding of how all the pieces work together, but the piece that I'm missing is the UW side.

### Questions

- How long working in co-op at Waterloo?
- Can you describe the main responsibilities of your role? – related to the different phases of co-op (job posting, applications, interviews, rankings)
- How long supporting Company A?
- What are the main things that you do for Company A that are the same as the other hiring organizations you work with?
- Are there things that you do that are different than Company A?
- What are the helpful things that Company A does with respect to your role?
- What are the not-so-helpful things that Company A does?



## Appendix I. Summary of Data Collected – Quantitative

10 students were interviewed, 22 students participated in online survey and provided data for 89 tasks in total

4 supervisors were interviewed, 10 supervisor participated in online survey and provided data for 37 tasks

Participants were asked to provide a rating on a scale of 1-9 the following task dimensions

<b>Task Dimension</b>	<b>Labels on Scale</b>	<b>Participant</b>
Training	1-None 9-A great deal	students & supervisors
Flexibility	1-No flexibility; a set way to do it 9- Complete flexibility; no set way to do it	students & supervisors
Time to Comfort (in weeks)	1- 1 week or less 9-9 weeks or more	students & supervisors
Level	1 - Below the student's level 5 - At the student's level 9 - Above the student's level	students & supervisors
Pace	1-Slow pace 9-Fast pace	students & supervisors
Pressure	1-No pressure 9-High level of pressure	only students
Impact of Mistake	1-No impact 9-Significant impact	students & supervisors
Risk of Giving Task to Student	1-No risk 9-High level of risk	students & supervisors
Feedback Quantity	1-No feedback 9-Great amount of feedback	only students
Feedback Quality	1-Not useful at all 9-Very useful	only students
Satisfaction with Student Performance on Task	1-Not satisfied 9-Very satisfied	only supervisors

Participants were asked to provide a rating on a scale of 1-9 for the following experience measures

<b>Experience/Outcome Dimension</b>	<b>Labels on Scale</b>	<b>Participant</b>
How busy compared to others	1-Much less busy 5-About the same as others 9-Much busier than others	students & supervisors
Treated like a full-time employee	1-Treated very differently 9-Treated exactly the same	students & supervisors
Encouraged to propose new ideas	1-Not encouraged at all 2-Regularly encouraged	students & supervisors

Short-term return on investment	1- Low-I got a lot less than what I put in 9-High – I got a lot more out of the work term than what I put in	students & supervisors
Overall satisfaction	1-very low 9-high	students & supervisors
Matched Expectations	1-Didn't match expectations at all 9-Was exactly what I expected	only students
Long-term return on investment	1- Low-I got a lot less than what I put in 9-High – I got a lot more out of the work term than what I put in	only students
Learned	1-not at all 9-great amount	only students
Socialized	1-not at all 9-great amount	only students
Developed New Skills	1-not at all 9-great amount	only students
Level of Stress	1-very low 9-high	only students
Amount of free time	1-not at all 9-great amount	only students
Comfortable asking questions	1-Not comfortable at all 9-Very comfortable	only students
Rating of student's contribution	1-Very minimal 9-Very significant	only supervisors
Asked Questions	1-Not at all 9-Very regularly	only supervisors
Would invite for another WT?	1-Not likely at all 9-Extremely likely	only supervisors
Would consider for post-graduation employment?	1-Not likely at all 9-Extremely likely	only supervisors

With students who were interviewed and surveyed, additional information was collected about the interactions they had with co-workers. For each interaction of each task the following information was collected:

- Who did they interact with? - Importance Ranking	- Frequency/week - Duration per interaction	- # weeks doing task
---	--	----------------------

**Appendix J. Descriptive Statistics for Task Ratings and Outcomes Data by Supervisors**

<b>Task Dimensions</b>	<b>mean (scale 1-9)</b>	<b>st.dev.</b>
Training	4.47	2.990
Flexibility	4.81	2.436
Time to Comfort	3.51	2.490
Level	5.14	1.791
Pace	5.63	1.664
Impact of Mistake	5.19	2.162
Risk	3.33	1.621
Satisfaction with Student Performance	6.89	1.737

<b>Overall Experience Dimensions</b>	<b>mean (scale 1-9)</b>	<b>st.dev.</b>
Overall Rating for WT	7.00	1.359
Busy	4.93	1.492
Ask Questions	7.14	2.070
Encouraged to Propose New Ways	7.07	1.685
Rate Contribution	6.50	1.225
Invite back for another WT?	6.36	2.405
Recommend for job after graduation	5.71	2.431
ROI	6.07	1.328
Treated like FT?	6.71	2.164

## Appendix K. Descriptive Statistics for Task Ratings and Outcomes Data by Students

<b>Task Dimensions</b>	<b>mean (scale 1-9)</b>	<b>st.dev.</b>
Training	4.53	2.148
Flexibility	5.76	2.450
Time to Comfort Level	2.90	1.925
Converted Level	5.12	1.364
Pace	2.02	0.522
Pressure	6.07	1.845
Impact of Mistake	6.27	2.125
Risk	5.66	2.169
Feedback Quant	4.27	2.093
Feedback Quality	6.37	2.342
6.88	2.033	

<b>Overall Experience Dimensions</b>	<b>mean (scale 1-9)</b>	<b>st.dev.</b>
Matched Expectations	6.30	2.087
Busy	6.37	1.884
Treated like FT?	7.31	1.775
Comfortable asking questions	7.73	1.258
Propose new ways	7.60	1.522
Short term ROI	6.07	1.311
Long term ROI	6.93	1.461
Learned	8.03	1.351
Socialized	6.03	2.297
Level of Stress	6.37	1.829
Developed new skills	7.57	1.569
Amount of free time	3.73	1.874
Overall satisfaction	7.40	1.380

## Appendix L. Correlations of Student Experience/Outcome Data

		Matched Expectations	Busy	Treated like FT?	Comfortable asking questions	Propose new ways	Short term ROI	Long term ROI
Matched Expectations	Pearson Correlation	1	-0.178	0.023	0.005	-0.037	0.257	.425*
	Sig. (2-tailed)		0.347	0.907	0.978	0.846	0.17	0.019
	N	30	30	29	30	30	30	30
Busy	Pearson Correlation	-0.178	1	-0.051	0.261	-0.115	-0.303	-0.354
	Sig. (2-tailed)	0.347		0.793	0.164	0.544	0.103	0.055
	N	30	30	29	30	30	30	30
Treated like FT?	Pearson Correlation	0.023	-0.051	1	0.338	0.203	0.096	0.279
	Sig. (2-tailed)	0.907	0.793		0.073	0.291	0.62	0.143
	N	29	29	29	29	29	29	29
Comfortable asking questions	Pearson Correlation	0.005	0.261	0.338	1	0.231	0.011	-0.048
	Sig. (2-tailed)	0.978	0.164	0.073		0.22	0.953	0.803
	N	30	30	29	30	30	30	30
Propose new ways	Pearson Correlation	-0.037	-0.115	0.203	0.231	1	0.238	0.251
	Sig. (2-tailed)	0.846	0.544	0.291	0.22		0.205	0.18
	N	30	30	29	30	30	30	30
Short term ROI	Pearson Correlation	0.257	-0.303	0.096	0.011	0.238	1	.615**
	Sig. (2-tailed)	0.17	0.103	0.62	0.953	0.205		0
	N	30	30	29	30	30	30	30
Long term ROI	Pearson Correlation	.425*	-0.354	0.279	-0.048	0.251	.615**	1
	Sig. (2-tailed)	0.019	0.055	0.143	0.803	0.18	0	
	N	30	30	29	30	30	30	30

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

		Learned	Socialized	Level of Stress	Developed new skills	Amount of free time	Overall satisfaction
Matched Expectations	Pearson Correlation	0.106	.365*	0.106	.505**	-0.032	.448*
	Sig. (2-tailed)	0.576	0.047	0.578	0.004	0.868	0.013
	N	30	30	30	30	30	30
Busy	Pearson Correlation	-0.059	-0.027	0.08	-0.248	-0.245	-0.218
	Sig. (2-tailed)	0.756	0.888	0.675	0.187	0.192	0.248
	N	30	30	30	30	30	30
Treated like FT?	Pearson Correlation	0.321	-0.034	.389*	0.186	-0.259	.459*
	Sig. (2-tailed)	0.089	0.86	0.037	0.334	0.175	0.012
	N	29	29	29	29	29	29
Comfortable asking questions	Pearson Correlation	0.188	0.111	0.029	-0.043	0.057	0.083
	Sig. (2-tailed)	0.32	0.561	0.879	0.821	0.767	0.661
	N	30	30	30	30	30	30
Propose new ways	Pearson Correlation	.526**	0.181	-0.119	0.243	-0.16	.407*
	Sig. (2-tailed)	0.003	0.337	0.531	0.196	0.4	0.026
	N	30	30	30	30	30	30
Short term ROI	Pearson Correlation	0.252	0.194	0.018	.434*	-0.105	.404*
	Sig. (2-tailed)	0.18	0.305	0.924	0.017	0.582	0.027
	N	30	30	30	30	30	30
Long term ROI	Pearson Correlation	.595**	-0.082	0.126	.499**	-0.107	.493**
	Sig. (2-tailed)	0.001	0.668	0.508	0.005	0.572	0.006
	N	30	30	30	30	30	30

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

		Matched Expectations	Busy	Treated like FT?	Comfortable asking questions	Propose new ways	Short term ROI	Long term ROI
Learned	Pearson Correlation	0.106	-0.059	0.321	0.188	.526**	0.252	.595**
	Sig. (2-tailed)	0.576	0.756	0.089	0.32	0.003	0.18	0.001
	N	30	30	29	30	30	30	30
Socialized	Pearson Correlation	.365*	-0.027	-0.034	0.111	0.181	0.194	-0.082
	Sig. (2-tailed)	0.047	0.888	0.86	0.561	0.337	0.305	0.668
	N	30	30	29	30	30	30	30
Level of Stress	Pearson Correlation	0.106	0.08	.389*	0.029	-0.119	0.018	0.126
	Sig. (2-tailed)	0.578	0.675	0.037	0.879	0.531	0.924	0.508
	N	30	30	29	30	30	30	30
Developed new skills	Pearson Correlation	.505**	-0.248	0.186	-0.043	0.243	.434*	.499**
	Sig. (2-tailed)	0.004	0.187	0.334	0.821	0.196	0.017	0.005
	N	30	30	29	30	30	30	30
Amount of free time	Pearson Correlation	-0.032	-0.245	-0.259	0.057	-0.16	-0.105	-0.107
	Sig. (2-tailed)	0.868	0.192	0.175	0.767	0.4	0.582	0.572
	N	30	30	29	30	30	30	30
Overall satisfaction	Pearson Correlation	.448*	-0.218	.459*	0.083	.407*	.404*	.493**
	Sig. (2-tailed)	0.013	0.248	0.012	0.661	0.026	0.027	0.006
	N	30	30	29	30	30	30	30

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

		Learned	Socialized	Level of Stress	Developed new skills	Amount of free time	Overall satisfaction
Learned	Pearson Correlation	1	-0.078	0.107	.495**	-0.105	.473**
	Sig. (2-tailed)		0.681	0.575	0.005	0.58	0.008
	N	30	30	30	30	30	30
Socialized	Pearson Correlation	-0.078	1	-0.167	.368*	0.114	0.311
	Sig. (2-tailed)	0.681		0.377	0.046	0.548	0.094
	N	30	30	30	30	30	30
Level of Stress	Pearson Correlation	0.107	-0.167	1	0.069	-.554**	-0.101
	Sig. (2-tailed)	0.575	0.377		0.716	0.001	0.595
	N	30	30	30	30	30	30
Developed new skills	Pearson Correlation	.495**	.368*	0.069	1	0.018	.529**
	Sig. (2-tailed)	0.005	0.046	0.716		0.925	0.003
	N	30	30	30	30	30	30
Amount of free time	Pearson Correlation	-0.105	0.114	-.554**	0.018	1	0.123
	Sig. (2-tailed)	0.58	0.548	0.001	0.925		0.518
	N	30	30	30	30	30	30
Overall satisfaction	Pearson Correlation	.473**	0.311	-0.101	.529**	0.123	1
	Sig. (2-tailed)	0.008	0.094	0.595	0.003	0.518	
	N	30	30	30	30	30	30

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).



## Appendix M. Codebook for Thematic Analysis of Recruitment Phase Data

### Appendix M.1 UW Co-op's Perspectives on Recruitment Behaviours

Code	Definition	#stmts
UW Response Variety	UW staff report their own actions in support of the recruitment process of Company A with specific references to practices that have evolved as a result of previous disturbance variety	17
UW Disturbance Variety	UW staff report their actions that may not be perceived to be helpful (i.e. creates disturbance variety) to Company A in the recruitment process	5
Company A Response Variety	UW staff report actions of Company A related to the recruitment process that are helpful to UW with specific references to practices that have evolved as a result of previous disturbance variety	14
Company A Disturbance Variety	UW staff report actions of Company A that aren't as helpful to UW in managing the recruitment process	6

### Appendix M.2 Company A Human Resources' Perspectives on Recruitment Behaviours

Code	Definition	#stmts
Company A Response Variety	Company A staff report their own actions in support of the recruitment process with specific references to practices that have evolved as a result of previous disturbance variety	14
Company A Disturbance Variety	Company A staff report their actions that may not be perceived to be helpful (i.e. creates disturbance variety) to UW in the recruitment process	1
UW Response Variety	Company A staff report actions of UW related to the recruitment process that are helpful to Company A with specific references to practices that have evolved as a result of previous disturbance variety	7
UW Disturbance Variety	Company A staff report actions of UW that aren't as helpful to Company A in managing the recruitment process	2

### Appendix M.3 Company A Co-op Supervisors' Perspectives on Recruitment Behaviours

Code	Definition	#stmts
HR Response Variety	Company A supervisors report actions of HR related to the recruitment process that are helpful to the supervisors	12
HR Disturbance Variety	Company A supervisors report actions of HR related to recruitment process that are not-so-helpful to the supervisors	3
UW Response Variety	Company A supervisors report actions of UW related to the recruitment process of Company A that are helpful	14

UW Disturbance Variety	Company A supervisors report actions of UW related to the recruitment process of Company A that are not-so-helpful	3
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#### Appendix M.4 Reasons Students Applied

Code	Definition	#stmts
Reputation	Students see this company as having a strong reputation overall as well as being popular as a co-op employer	20
Field of Interest	Students see the roles offering them experience in a field of interest for them, e.g. manufacturing, automotive or specifically related to their academic discipline	12
New/Growth Experience	Students want to try something new or different than their previous experiences and something that will give them opportunity for growth	10
Qualified	Students believe they are qualified for the positions available	3
Practicality	Students apply because they are applying to many jobs to maximize their chances of getting a job, or there are practical factors that influence their decision to apply such as a desirable location	2

#### Appendix M.5 Students' Perspectives on the Recruitment Process

Code	Definition	#stmts
Details about Company, Department, Roles	Students describe details they learned about the company, the hiring departments and the roles through the job description and interview process	17
Interviewed by Engineering and sometimes HR	Students describe the roles of the people involved in interviewing them which included one or two people from the Engineering teams and sometimes and HR person	10
Typical Interview	Students describe the interview process of Company A as typical, and some explicitly state that it did not include technical questions.	6
Lack of Information	Students state that they did not have enough information about the company, department or roles which included references to the job description being vague	6
Do not remember details about job posting or interview	Students state that they do not remember details about the job posting or interview process for Company A	2

## Appendix M.6 Students' Emotions and Expectations Prior to Arrival

Code	Definition	#stmts
Excitement	Students describe aspects of the experience they are excited or happy about which includes the results of the match, the reputation of Company A, working with other co-op students and the money they will make.	27
Not so excited	Students describe aspects of the upcoming work experience that they are not so excited about	9
Expectations	Students describe expectations they have about the work experience which includes expectations about <ul style="list-style-type: none"> <li>- Workload</li> <li>- Work they will be doing</li> <li>- Opportunities for growth/learning</li> <li>- People/Environment of Company A</li> <li>- Did not know what to expect</li> </ul>	41
Information Acquired from Peers	Students describe that the information they have about what to expect at Company A comes from other students who have worked there	15
Information Acquired from Interview Process	Students describe that the information they have about what to expect at Company A comes from participating in the interview process	2

## **Appendix N. Engineering Co-op Job Advertisements**

### **Fall 2017 Job Posting**

Responsibilities will vary according to ability and to production requirements, but typical assignments may include the following:

- Project management, including budgeting, bid package preparation, liaison with external suppliers / contractors.
- Construction / commissioning management / Liaison with team members.
- Troubleshooting engineering problems and reporting recommendations / solutions to senior management.
- Daily manufacturing / engineering activities and other activities as assigned.

Focus Areas: Electrical / Mechanical / Chemical / Mechatronics / Management / Nano / Systems Design

Subject specialization preferred in one of the Focus Areas listed above

- Self-starter with strong interpersonal skills and organizational ability. / Strong multi-tasking abilities
- Ability to work in a multi-disciplined environment with minimal supervision. / MS Office

### **Spring 2018 Job Posting**

The <Company A> Engineering Team is responsible for equipment selection, installation and commissioning for new production facilities as well as for modification and improvement of existing processes with an emphasis on improved safety, quality and productivity. Students will work with a lead engineering specialist in either one of the paint, press, plastics, weld, facilities or assembly engineering group. Students are typically a member of project specific teams, which include staff from many other plant departments. (e.g. production control, purchasing, finance, maintenance).

Responsibilities will vary according to ability and to production requirements, but typical assignments may include the following:

- Project management, including budgeting, bid package preparation, liaison with external suppliers / contractors.
- Construction / commissioning management / Liaison with team members.
- Troubleshooting engineering problems and reporting recommendations / solutions to senior management.
- Daily manufacturing / engineering activities and other activities as assigned.

FOCUS AREAS: Electrical / Mechanical / Chemical / Mechatronics / Management / Nano / Systems Design

Subject specialization preferred in one of the Focus Areas listed above

- Self-starter with strong interpersonal skills and organizational ability. / Strong multi-tasking abilities
- Ability to work in a multi-disciplined environment with minimal supervision. / MS Office and Lotus Notes

Hours of Work: 40 hours per week with the ability and willingness to support overtime and weekend work when required.

Overtime paid after 44 hours worked in a week.

Co-op students will be required to attend a <Company A> Orientation session for the first 2 days of the work term. This is a required activity that all new Co-op students must attend.

At <Company A> accommodations are available for applicants with disabilities during any stage of the recruitment process. If you require an accommodation in relation to the materials or assessments used in this recruitment process, please notify us so that we can find an accommodation that best suits your individual needs

## Appendix O. Codebook for Thematic Analysis of Work Term Phase Data

### Appendix O.1 Organizational Factors

Code	Definition	#stmts
Actual Business Need	Supervisors describe one of the main reasons for hiring as having actual work that needs to be done	9
Pre-screening Future Hires	Supervisors describe the opportunity to pre-screen future hires as one of the reasons they participate in the co-op program	9
Connect with Local Community	Supervisors describe one of the main reasons for hiring as connecting with their local community	4
Current Knowledge and Fresh Ideas	Supervisors describe one of the reasons for hiring co-op students is that they have up-to-date knowledge of the field and bring fresh ideas to the organization	3
Supervisory Opportunity	Supervisors describe the opportunity for more junior employees to have the opportunity to supervise students as one of the reasons they participate	1
LEAN approach to manufacturing	Students and supervisors commented on the ways that students' roles were connected to LEAN practices of the organization	8
Culture of Continuous Improvement	Students and supervisors described how the students' tasks contribute towards continuous improvement efforts. Statements made about the Highlight Projects were not included in this category, as those were included in the descriptions of the roles below.	15

### Appendix O.2 Role Expectations

Code	Definition	#stmts
Start of Term Processes	Supervisors describe the describe the processes at the start of the term related to task assignment	9
Factors Affecting Assignment of Tasks – Supervisors	Supervisors describe the describe the factors that affect the tasks they assign students	13
Factors Affecting Assignment of Tasks – Students	Students describe factors they believe affect the tasks that they are assigned	3

### Appendix O.3 Sent-Role - Supervisor Perspective

Code	Definition	#stmts
Highlight Projects - Challenges	Supervisors' perspectives on the challenges they have with the assigning students highlight projects and supporting them in completing highlight projects	12

Highlight Project – Value	Supervisors’ perspectives on the value of the students completing a highlight project	2
Ad hoc Tasks	Supervisors perspectives on ad hoc tasks or projects given to students	6
Engineering Support Tasks	Supervisors’ perspectives on the engineering support tasks given to students	13
Side Projects	Supervisors’ perspectives on the side projects given to students	1

#### Appendix O.4 Received-Role - Student Perspective

Code	Definition	#stmts
Highlight Project - Process	Students perspectives on the process involved in completing their highlight projects	16
Highlight Project - Pressure	Students spoke about the pressure involved in completing their highlight project and noted specifically the presentation to senior leads as part of the pressure they felt	10
Highlight Project – Support	Students spoke about the support they were given in completing their highlight project	6
Highlight Project – Value	Students’ perspectives on the value of the highlight project for the organization and themselves	9
Ad hoc Tasks	Students perspectives on ad hoc projects they are given	3
Engineering Support Tasks	Students perspectives on the engineering support tasks they are given	11
Side Projects	Students perspectives on the side projects they are given	3

#### Appendix O.5 Overall Evaluation of Experience – Students

Code	Definition	#stmts
Development/ Growth/Gained Experience	Students describe what they’ve learned, the opportunities they’ve had or the ways they’ve grown	26
Met/Exceeded Expectations	Students describe the experience as what they expected or better	7
Did not match Expectations	Students describe the experience was not what they expected	4
Positive Return on Investment	Students describe the return on investment – how they expect having had this experience will impact them in the future	14
Lower ROI	Students describe the return on investment as being less than what they put into it	2

Enjoyable Environment and People	Students describe enjoying the environment and people they worked with	11
Busy/Stressful	Students describe the experience as being busy or stressful	9
Interest in returning post-graduation	Students describe the whether they would consider returning after graduation and the factors that might affect their decision	11
Not returning for another work term	Students describe why they aren't interested in returning for another co-op work term	8
Pay/compensation - Positive	Students felt they were fairly or well compensated for their work	3
Pay/compensation - Negative	Students felt they were not fairly compensated for their work	2
Workload Reasonable	Students describe the workload as being reasonable	2
Workload Not Balanced	Students describe the workload as imbalanced	3
Work-life balance	Students describe their views on of work-life balance	8

## Appendix O.6 Ways Co-workers Were Reported to be Helpful

These codes were treated as a hierarchy. If specific details or examples were given of how the co-worker was helpful, then the statement was coded as 'providing information or resources (proactive or responsive)' or 'stepping in to help'. The other three codes were used when more generic statements were made about the attributes of the person, or that they were available, or knowledgeable, but more specific details were not given. There are many cases where proactively giving information means that the co-worker was knowledgeable. There are also many cases where being helpful in responding to questions and providing feedback implied that the co-worker was available.

Code	Definition	# stmts
Providing information or resources	Students describe ways that co-workers provided information or resources that helped them complete their tasks. There were two sub-categories: <b>Proactive:</b> co-workers gave students information, directions, resources or taught them what to do	94
	<b>Responsive:</b> co-workers responded to questions, provided feedback or approvals (Statements in this category implied that co-workers were available and knowledgeable, but provided more specific details about the helpful behaviours)	74
Stepping in to help	Students describe situations where co-workers stepped in to help the student complete the task, beyond providing information or resources	34
Being available	Students describe co-workers as being helpful by being available and responsive to the student	30



Being knowledgeable	Students describe the helpfulness of co-workers as being knowledgeable in a particular area	46
Having positive attributes	Students describe the helpfulness of co-workers with specific positive attributes such as friendly, supportive, flexible or approachable	24

### Appendix O.7 Ways Co-workers Were Reported to be Not-so-Helpful

Code	Definition	# stmts
Busy/ inaccessible/ unreliable	Students describe ways that co-workers were not available, were too busy to help or were unreliable in helping the student, they describe waiting for help or approvals	60
Problems with information or resources given to undertake task	Students describe ways that the information or resources from co-workers' communication was not as helpful to them in completing their tasks including unclear or conflicting directions or expectations, not having enough information or explaining irrelevant details	32
Problems with responsiveness to student	Students describe ways that co-workers were not as helpful due to the ways they responded to the work done by the student or requests, questions, ideas of the student	30
Not as knowledgeable	Students describe ways that co-workers were not as helpful because they were not as knowledgeable on a particular topic	9

### Appendix O.8 Ways Students Were Reported to be Helpful

Code	Definition	# stmts
Investigation and Problem Solving	Supervisors described that students being helpful by conducting investigations into existing issues and undertaking problem solving activities	33
Coordination	Supervisors described students coordinating and scheduling various aspects of projects as a way that students were helpful	32
Collected and Organized of Data	Supervisors described the collection and organization of data as well as organizing physical areas as ways that students were helpful	14
Communicated Results	Supervisors described students communicating results of various projects as being helpful	6
Responsible for Physical Spaces	Supervisors described ways that students were helpful by being responsible for, or organizing specific physical areas	3

## Appendix O.9 Ways Students Were Reported to be Not-so-Helpful

<b>Code</b>	<b>Definition</b>	<b># stmts</b>
Made assumptions or misunderstood requirements	Supervisors described students making assumptions or misunderstanding the requirements of the task as ways that students were not-so-helpful	7
Lack of experience/confidence	Supervisors described ways that students were not-so-helpful in general terms of lacking experience or confidence for the task	7
Lack of attention to detail	Supervisors described students as being not-so-helpful in not paying attention to details in completing their tasks	6
Poor work ethic/work habits	Supervisors described some challenges with tasks relating to students having poor work ethic or work habits such as poor time management or complaining about the work	6
Required too much oversight or support	Supervisors described that students were not-so-helpful because they needed too much oversight or support	5
Lack of communication/buy-in	Supervisors described that students had not properly communicated or gotten necessary buy-in as a way that students were not-so-helpful	3
Did not finish or slow completing tasks	Supervisors described students not finishing tasks or being slow with tasks as a way of being not-so-helpful	2

## Appendix P. Summary of Research Questions, Propositions and Relative Findings

1. How, if at all, does the recruitment phase contribute to the management of variety within the co-op system?
  - **Proposition 1:** Disturbance variety needs to be effectively managed by the hiring organization and the academic institution during the recruitment phase so that the process is sustainable for both the organization and the academic institution.
    - o **Supported**
  - **Proposition 2:** The reduction of student and employer disturbance variety during the recruitment phase increases the likelihood of positive outcomes for students and hiring organizations.
    - o **Supported**
2. How can variety be managed during the work term to enable both students and employers to benefit from the experience?
  - There are two main areas for investigation: the level of tasks and the support given to students in completing those tasks.
  - **Proposition 3:** For the system to be balanced in terms of variety handling, the majority of tasks assigned to the student need to be “at” the student’s level.
    - o **Supported**
  - **Proposition 4a:** When the majority of tasks given to the student are “at” or “above” the student’s level, the work term is more likely to result in positive outcomes for the student.
    - o **Supported** – student learning is higher when tasks are not “below” the student’s level
  - **Proposition 4b:** When the majority of tasks given to the student are “below” or “at” the student’s level, the work term is more likely to result in positive outcomes for the supervisor.
    - o **Support was not found for Proposition 4b.** Further research with a larger sample would be needed explore this further.
  - **Proposition 5:** For the variety in the system to be balanced, students require task-related support. The amount of support students need is relative to:
    - o **Prop 5a)** level of the task and
      - **Support for this proposition from both the student and the supervisor data**
    - o **Prop 5b)** type of the task
      - **Partial support but further research would be needed to confirm proposition**
  - **Proposition 6a:** When a student receives a moderate to high level of support, the work term is more likely to result in positive outcomes for the student.
    - o **Supported**
  - **Prop 6b:** When a student receives a low to moderate level of support, the work term is more likely to result in positive outcomes for the supervisor.
    - o **Support was not found for Proposition 6b.** Further research with a larger sample would be needed explore this further.

- **Prop 6c:** When the task-related support provided to students matches the needs of the student, based on the level and the type of the task, variety in the system is balanced and is more likely to produce positive outcomes for students and supervisors.
  - **Supported**