Electronic Thesis and Dissertation Repository

12-3-2018 10:00 AM

Leadership in a Complex Adaptive System: An Exploratory Case Study of One Faculty at a Canadian Post-Secondary Educational Organization

Helen Mawdsley, *The University of Western Ontario*

© Helen Mawdsley 2018

Abstract

The research study examined leadership in one post-secondary educational organization through the lens of complexity theory. The post-secondary educational organization in this study is a complex adaptive system that is entangled in uncertainty, non-linearity, and interconnectivity, where the system is under constant change and predictions based on past practice are not always possible. Leaders in this context do not have the luxury to rely primarily on history, best practices, or simplistic linear solutions in response to their challenges. This dissertation focuses on providing a connection between educational leadership and complexity theory, so that the latter can strengthen investigation of the former, within a complex adaptive system.

This research project used an exploratory qualitative case study methodology grounded in the interpretive paradigm. The dataset was comprised of 11 semi-structured interviews and an examination of organizational documents bounded by the case. Thematic analysis of the dataset provided insight into leadership within complexity. The findings in this research study make a contribution to the literature by exploring how leadership can nurture the adaptive space found in the complex contexts. Specifically, these findings demonstrate that educational leaders, all educational leaders in formal, informal, and emergent roles, are positioned to enable this adaptive space, with which they are a part of. Implications to practice and recommendations for future research are discussed.

Keywords*: educational leadership; complexity theory; exploratory case study*

Acknowledgments

Many thanks to Western University, and their vision to have a program accessible to working professionals. The faculty and staff of this program have been exceptional in their support and encouragement throughout the doctoral journey. A special thank-you to my supervisor, Dr. Brenton Faubert, for his advice and encouragement along the way. This work would not have been possible without him.

I would also like to acknowledge and give thanks to my family, J, E, and J, for including this program as part of our home. Their patience and support was integral to the progression of this program.

Table of Contents

List of Tables

List of Figures

List of Appendices

CHAPTER ONE: INTRODUCTION

Complexity is the irreducible behaviour of a system (Koopmans, 2017), and complexity theory explores systems by considering the individual organizational actors of a system *as well as* the relationships between organizational actors (Byrne, & Callaghan, 2014; Cillers, 2005; Clancy, Effken, & Pesut, 2008; Fidan, & Balci, 2017; Simon, McGinniss, & Krauss, 2013; Uhl-Bien, & Marion, 2009). Within the concept of complexity, there are *complex adaptive systems*, which are systems where relationships between actors of the system and their resulting adaptability to changes and challenges are shaped by independent abilities *as well as* the interactivity of each actor shown through: non-linearity, self-organization, emergence, and adaptation (Fidan, & Balci, 2017; Holland, 2014; Holland, 2012; Lichtenstein, Uhl-Bien Marion, Seers, Orton, & Schreiber, 2006).

Taken from a nominalist ontological standpoint, systems are approached from the perspective of human actors and situate change or adaptability in the actions of these people who respond to challenges (Riveros, & Newton, 2016). Leaders constitute a group of said actors that traditional literature in administration single out as being responsible for addressing these challenges. This same literature often recommends that leaders separate and reduce each challenge into a smaller, more easily perceived and, at least thought to be, solvable package, which scholars refer to as *reductionism* (Wheatley, 2006). Reductionism is defined as, "research logic in which parts of a system are isolated and studied independently of the system from which they derive – the general idea is that if one can understand the parts, one can draw conclusions about the whole" (Marion, & Uhl-Bien, 2001, p. 391). Traditional leadership scholars have considered reductionism into their approach of what leadership is by focusing on traits, power, actions to an individual or role, and yet, "a consensus about the role of leader traits, the

magnitude and mechanisms of their influence, and the determining role of leadership situations has remained elusive" (Zaccaro, 2007, p. 14). To complement this work, leadership scholars have also considered notions of values, behaviors, culture, and context, etc., to further understand and explore what leadership is from other sets of sociological assumptions (Fidan, & Balci, 2017; Marion, 2008; Uhl-Bien, & Arena, 2017; Schneider, & Somers, 2006; Wheatley, 2006). However, less is known about the intersection of complexity and leadership, which is also the case in the context of post-secondary education (Wang, & Sedivy-Benton, 2016).

The research study is situated in the interpretive paradigm, and examined the nature of leadership through the lens of complexity theory grounded in an ontology of nominalism and epistemology of constructivism. Consistent with these assumptions, the concept of leadership for the purpose of this study is defined as "a human phenomenon that is embedded in culture, which includes art, literature, religion, philosophy, language, history, and generally all those things that constitutes what it means to be and to live as a human being" (Ciulla, 2008, p. 393). This definition is situated within an academic argument that leadership studies should be grounded in the human studies, which is to include humanities and the social sciences (Ciulla, 2008). Drawing from this definition, the nature of leadership, then, is understood as the iterations of how organizational actors, through relationships and interactions of their complex adaptive system, contribute to the manifestation, continuance, and adaptation of their system. Specifically, I am interested in understanding how leaders, as actors of a system, are adapting to changes and challenges successfully in the complex adaptive system of a post-secondary educational organization through a lens that can account for this complexity, and not reduce this understanding to a particular leadership trait, organizational process or part. In order to explore the nature of leadership within the inherent complexity present in post-secondary educational

organizations, some educational researchers have employed the lens of complexity theory as a complimentary view to reductionism (Davis, 2008; Davis, & Sumara, 2010; Glatter, 2006; Koopmans, 2017; Mason, 2008; Mitchell, Jonas-Simpson, & Cross, 2013; Regehr, 2010; Reich, Garrison, & Neubert, 2016).

This study employed qualitative exploratory case study methodology, drawing on document review and participant interviews as data sources. Participants for this included a range of leaders (formal, informal, and emergent) working across levels of the case study site, including faculty, staff, and administrators. This wider conception of what constitutes recognizes that the manifestation, continuance and adaptation of any human body is the combined efforts of many types of leaders, not just the formal, who are exercising leadership in some capacity. This wider conception is also consistent with complexity leadership theory, and essential to understanding the nature of leadership situated in complexity (Schneider & Somers, 2006).

Problem of Practice

Scholars, working from a complimentary view to reductionism, have argued that actors working in educational organizations operate in a context that is recognized as a complex adaptive system (Fidan & Balci, 2017; Glatter, 2006; Morrison, 2008). Research in the field of educational leadership includes a call for inquiry into understanding the nature of leadership in such complex systems (Cochran-Smith, Ludlow, Grudnoff, & Aitken, 2014; Mason, 2008; Morrison, 2008; Storberg-Walker, 2016). Specifically, the leadership response to the emerging challenges facing post-secondary educational organizations requires adaptation, as the ability to rely on past-practice is not an option when situated within complexity, as "prediction", a rational-linear concept, has limited utility in complexity (Cilliers, 2000; Snowden & Boone, 2007).

Some of the complex and challenging mandates that post-secondary educational organizations are faced with include producing more graduates, increasing student satisfaction, conducting more research, updating educational programming, ensuring a stable supply of faculty, and providing more classes, but with less resources (Brownlee, 2015; Hornsby, & Osman, 2014; Milian, Davies, & Zarifa, 2016; Milian, & McLaughlin, 2017; Senior, Moores, & Burgess, 2017; Vandyk, Chartrand, Beke, Burlock, & Baker, 2017; Yakusheva, & Weiss, 2017). To address any one challenge requires that organizational actors, specifically leaders in the context of this study, understand the dynamic interplay between the actor relationships and their adaptations to the challenges within the complex adaptive system that is a post-secondary educational organization (Austin, 2012; Piché, 2015; Piché, & Jones, 2016). Leaders' adapting to complexity in post-secondary education is a constant; however, the relationship between leaders' adaptability and challenges within complexity takes all sorts of non-linear forms (Davis, & Fifolt, 2017).

It is the notion of leaders' constantly adapting to complexity and their subsequent actions of leaders within the complex adaptive system that serves as the entry-point in this study to understand how post-secondary educational organizations, as human, complex adaptive systems, are responding to the challenges facing post-secondary organization. This dissertation addressed this gap in the academic literature by examining the connection between educational leadership in a complex adaptive system and leaders' adaptability during times of educational program changes in health professions education, through the lens of complexity theory.

Purpose Statement

The purpose of this qualitative exploratory case study is to explore the nature of leadership within the complex adaptive system of a Canadian public university amidst changing

educational programs. The site of this study is one of the five Colleges within a Faculty of

Health Sciences, which delivers health professions education. The research site is described as

entangled in uncertainty, non-linearity, interconnectivity, and constant change, all features of

complexity, which means that leaders cannot rely on past practice exclusively to lead the

organization into the future. The lens and concepts that makeup complexity theory as used by:

complexity scholars such as Cillers (2005, 2000) and Dekker, Cilliers, and Hoffmeyer (2011),

educational researchers such as Koopmans (2017), Mason, (2008), Morrison (2012, 2008), and

Clancy, Effkun, and Pesut, (2008), and leadership scholars such as (Marion, 2008; Uhl-Bien, &

Arena, 2017; Schneider, & Somers, 2006; Wheatley, 2006), are used as a way to conceptualize

the problem of practice within this inquiry.

Research Questions

The central research question is: What is the nature of leadership in one College of a

Faculty in a Canadian public university adapting to changes in educational programming in a

complex context? This question subsumes the following sub-questions:

1. How do leaders understand their role?

2. How do leaders adapt to changes in educational programming within the context
   of complexity?

3. In what ways are leadership and complexity interactive?

Definition of Key Terms

For the purposes of this study, the following terms are defined:

System. A system is a collection of actors and/or components which interact, where

these interactions may be ordered or random.

Actor. This term is defined as an individual who is a member that constitutes the complex adaptive system of the study, who may (or may not) also be a leader. The term actor is interchangeable with agent.

Component. This term is defined as a resource within a system, which can include technology, information, found in a complex adaptive system (Byrne, & Callaghan, 2014; Marion, & Uhl-Bien, 2001; Uhl-Bien, & Arena, 2017).

Complexity. Koopmans (2017), an educational researcher, stated that, "the idea of complexity can be qualified in our scholarly discourse and illustrate the many different ways we can use it to build theories about educational processes and their impact on learning and achievement" (p. 18). Complexity discusses what cannot be predicted (Mason, 2008). Complexity is the irreducible behaviour of a system (Koopmans, 2017).

Complex adaptive system. A complex adaptive system is a specific type of system. This term is for a system where relationships between actors of the system and their resulting adaptability are defined by their interaction, rather than solely by their position (Lichtenstein, Uhl-Bien, Seers, Orton, & Schreiber, 2006).

Complexity theory. Complexity theory studies systems, including complex adaptive systems. For the purposes of this study, this theory is defined as, "…the study of the dynamic [human] behaviors of complexly interacting, interdependent, and adaptive agents under conditions of internal and external pressure" (Marion, 2008, p. 3). This interpretation of complexity theory was presented by leadership scholars as a way to challenge a reductionist perspective when making sense of the role of leadership within a complex system (Marion, 2008). As this interpretation of complexity theory is applied throughout this document, further

nuances and applications of this definition will be explored. From the perspective of educational research scholars, complexity discusses what cannot be predicted (Morrison, 2008).

Leadership. For the purposes of this study, "Leadership is a human phenomenon that is embedded in culture, which includes art, literature, religion, philosophy, language, history, and generally all those things that constitutes what it means to be and to live as a human being" (Ciulla, 2008, p. 393).

Leader. For the purposes of this study, this term is defined as any individual who actively engages (either formally or informally, or emergently) within the given definition of leadership. A *formal leader* is recognized through current titles on the organizational chart at a more senior level. An *informal leader* is recognized through a person's actions. An *emergent leader* is recognized as a leader who is developing potential in leadership. An emergent leader is someone who may be shifting in their leadership activities. By including this range, it will encourage a continuum of participation in this research study so that a larger system-level view of role within the complex adaptive system can be observed. This type of wording was used in the recruitment procedure so then potential participants did not self-censor their participation based on their current title. Furthermore, it is possible that an organizational actor may exist as a combination of formal leader, informal leader, and emergent leader.

Post-secondary educational organization. This is an organization which offers post-secondary education, where an organization is interpreted in this research study as an, "open, social [system] which endeavor[s] to survive in contemporary, unpredictable environments" (Fidan, & Balci, 2017, pp.11-12).

Significance of the Study

The significance of this study is that it will contribute to the growing body of academic literature that examines educational leadership in complex adaptive system through the lens of complexity (Regehr, 2010; Storberg-Walker, 2016). Specifically, an analysis of leadership within health professions education in higher education situated within complexity in this study provided: 1) context to understand the complexity facing leaders working in a contemporary Canadian post-secondary educational organization, and 2) insight into how leadership and complexity are interactive within the case study site in ways that address the challenges facing all actors in provision of quality health professions education.

Graduates from health professions education programs emerge as actors, also known as health human resources, in Canada's health care systems, who are essential in ensuring that health services are available to Canadians, when they are needed (Canadian Institute for Health Information, 2018). As the case study site is currently undergoing changes in educational programming to meet the challenges of health care systems, this research study is timely. By exploring the nature of leadership within complexity during changes to health professions education, it is hoped that educational leaders will also be given insight to help inform future practice when navigating the complexity around changes to educational programs.

Positionality

While I currently work in a post-secondary educational organization delivering health professions education, the bulk of my career has been outside of higher education. After some time in basic medical sciences research at the beginning of my career, I spent over 12 years working with statistics in the provincial civil service researching health care systems. The majority of my work focused on planning, developing, implementing, and monitoring health human resource supply and policies to address the needs in health service delivery. The ability

to predict and forecast from large administrative datasets was essential to this work. As such, I worked from a quantitative perspective to develop numerous time series analytics and predictive modelling to help answer "what if" questions to support the development of evidence-informed health policy and health human resources. These models were found to be valuable by decision-makers, and were shared and used by the provincial government, external senior provincial stakeholders, and even some federal organizations, including research projects on health human resources supported by the federal funding agencies. While valuable and useful, these predictive models were difficult to bind. That is, in order to be able to solve an equation confidently, the equation must be able to be bound. In order to bind an equation, one has to be certain that absolutely everything needed to produce a reliable prediction has been accounted for. Within the conversation of health human resources, it is difficult to justify closing the equations for prediction without entering into the education system and other social systems, in addition to the health care system, which moves the possible predictions within this context to be almost infinite. However, a balance needs to be sought between a perfect predictive model, and the best predictive model available, given available data. Fortunately, the art of statistics allows us to quantify error in prediction, and so we can continue with confidence until the p-value suggests otherwise.

Datasets are stories waiting to be told. While this work in health human resources research continued, my curiousity also continued in trying to explore when, where, how, and why, predictions from predictive analytics fail. Said another way, I was curious about what stories – human stories - within datasets were waiting to be told that were still behind an acceptable p-value (for now), but were on their way to challenge the boundaries of the current predictive equation. At what point does an outlier – a human actor - become a beginning of a

pattern? This curiousity brought me to the concept of complexity, and complexity theory, as a way to make sense of lurking uncertainty. Prediction needs data, but uncertainty can exist without data. Today, data is abundant; however, there is a difference between data and knowledge (Silver, 2012). Within this pearl of wisdom provided by Silver (2012), a respected statistician, I began to wonder about the transition between data and knowledge, and if this could assist in exploring why predictions from predictive analytics fail while exploring why complexity flourishes. For me, knowledge in this sense is synonymous with education. And so, I continued my education by embarking on the Doctorate of Education, Educational Leadership at Western University so that I could rigorously explore the space around prediction, reductionism, certainty, and uncertainty but from a different set of epistemological and ontological assumptions characteristic of positivist theories and methodologies.

The positivist paradigm which I have been working provided me with limitations, and I wanted to explore another epistemology. Within this EdD program, this curiosity took the shape of this research study, which is to explore the nature of leadership within complexity during changes to educational programs in health professions education in an interpretive paradigm using a qualitative exploratory case study. My experiences and reflections as a former civil servant working within health human resources, combined with my current employment within a post-secondary educational organization which delivers health professions education, helped to shape my problem of practice. By taking up this problem of practice and grounding it in academic literature, I hoped to contribute to the body of literature on the importance of the perception of context, and how this can inform leadership practice, particularly within complexity.

Assumptions

The scope of this research study focuses the nature of leadership within complexity. Therefore, the ability to discern complexity from simplicity, and other contexts, within the same system is necessary. Snowden & Boone (2007) developed the Cynefin framework to help leaders make sense of which context they are in, so that they can make better decisions. The Cynefin framework, which will be explored in the literature review, draws on complexity science, and is a tool used to understand leadership within complexity (Uhl-Bien, & Marion, 2009) and specifically complex adaptive systems (Flynn, & Speier, 2014; Van Beurden, Kia, Zask, Dietrich, & Rose, 2013), as well as other contexts such as: simple, complicated, chaotic, and disordered (Snowden, & Boone, 2007). The Cynefin framework is important to this study because it acknowledges not only the connection of leaders' adaptability, internal and external system challenges, while situated in complexity, but also how other contexts may be within our organizations.

As the members of any organization may find themselves with several contexts overlapping simultaneously depending on the change or challenge, it is important to this research study to ensure that the complex context is explored. While this research study focuses on complexity, and the unit of analysis is the nature of leadership within a complex adaptive system, it is possible that there are other sub-systems or overlapping systems within the larger selected system at the case study site, which may not be in a complex context. It is assumed that during the analysis of this research study, it was possible for me as the researcher to discern between a context that is complex versus other types of contexts, and to do so through the responses of my research participants.

Limitations

The time span for data collection within this study is restricted to the site within this exploratory case study, within a defined data collection period. Thus, this point-in-time perspective, as bounded by this qualitative exploratory case study, will frame the conclusions drawn. Further limitations are discussed in Chapter 6.

Organization of the Dissertation

This first chapter has introduced the problem of practice found at the heart of this research study, along with the purpose, research questions, followed by key definitions, an articulation of the study's significance, its assumptions, and a brief introduction to some of the limitations of the study. The following chapter provides an in-depth review of relevant literature found to inform my problem of practice, research questions, my study's theoretical/conceptual framework, methodology, research protocols, and later ground my research findings. The third chapter presents the study's theoretical and conceptual framework. The fourth chapter outlines the study's methodology, and the fifth chapter provides the findings. The sixth chapter grounds the findings from this study in the academic debates in the relevant literature. The seventh and final chapter provides a conclusion with implications and recommendations for future research.

CHAPTER TWO: LITERATURE REVIEW

A review of literature was conducted with the aim to better understand the topic and problem under study and inform the overall design of the research study. There are many approaches to searching for literature (Boeker, Motschall, & Vach, 2016; Boeker, Vach, & Motschall, 2013; Boote & Belle, 2005; Cabello, Emparanza, & Ansuategi, 2006). This section begins with a brief overview of the search methodology that guided the review of the literature. Then, the review delves into issues, debates, influential studies and their implications for the research study that was conducted.

Search Methodology

The search methodology used draws from standard educational research texts (Booth, Colomb, Williams, Bizup, & Fitzgerald, 2016; Creswell, 2014; Mills & Gay, 2016) as well as informed advice from professors, peers, and suggestions from literature; a blend of approaches informed the search methodology so that the context and complexity of the research problem could be informed by a variety of disciplines, research bodies, and theories.

As a first step, parameters of the literature search were set for inclusion and exclusion criteria. As the research problem is situated within the post-secondary sector, literature that spoke to educational institution outside of post-secondary sector were excluded as much as possible. Other criteria included a publishing date preferably in the last decade (unless the content was relevant to inform theory or design), works limited to the English language.

Following this first step of establishing inclusion and exclusion criteria, the literature search was conducted. The literature search used the following online search portals: PubMed, University of Western Ontario Library Portal, ERIC database, ScienceDirect database, Google Scholar, and the ProQuest dissertation database. A combination of the following terms was

used: "leadership," "complexity," "theory," "Cynefin," "higher education," "post-secondary education," "health education," "educational program," "organization," "adaptive," "system," "chaos," "case study," and "qualitative" using various "AND" and "OR" permutations.

The third step involved an analysis of what was retrieved. Overall, University of Western Ontario Library Portal, and the PubMed and ERIC databases returned the most useful results. The ERIC database was especially useful as it is a database tailored for educational research, and the ability to enter search parameters for post-secondary education (referred to as higher education) is a built-in feature of this search engine, and the PubMed database was able to do this within articles that focused explicitly on health education. The combinations of keywords were necessary, as the articles were indexed with variability between the publishers; thus, the flexibility in the permutations allowed for a greater depth and breadth of literature to be retrieved. This flexibility did produce many results, and when an article added value to the literature review process, the reference list was reviewed to see if additional literature may be added to strengthen this research project. In total, just over one hundred pieces of literature were included in this literature review.

The first part of this literature review will begin with a brief history of scholarship on general systems theory, and how complexity theory emerged from general systems theory. Following this, I will provide an overview complexity theory from the natural sciences to the social sciences. This is accomplished by introducing the Cynefin framework, followed by a discussion of various sub theories of general systems theories, and ending with a discussion on complexity theory. The third part of this literature review will focus on exploring leadership, including connections to various theories that help to illuminate educational leadership within complexity. The fourth section of this literature review will discuss influential studies, which

have inspired this research study. A fifth section of this literature review will discuss the field of

health professions education in Canada and the challenges facing leaders. A summary will

follow, to complete the chapter.

From General Systems Theory to Complexity Theory

Over 50 years ago, von Bertalanffy observed that while some phenomena can be

explained in isolation, other phenomena relied on the connections and relationships with other

phenomena to be understood (von Bertalanffy, 1967). von Bertalanffy (1967) identified general

systems theory as an interdisciplinary means to, "…elaborate properties principles and laws that

are characteristic of 'systems' in general, irrespective of their particular kind, the nature of their

component elements, and the relations or 'forces' between them." (p. 125). While this seminal

paper focuses on the application of general systems theory to psychology, this theory was

intended to be transferable to other areas for further development, such as through the usage of

mathematics, cybernetics, words, and narratives (von Bertalanffy, 1967). The ability to develop

general systems theory in a number of mediums, such as words, numbers, as well as art, creates

potential for numerous theories to emerge within general systems theory, which will be explored

later in this literature review.

Leading up to this seminal paper, von Bertalanffy has examined this topic in detail,

including completing a doctoral thesis in 1925, in addition to publishing numerous scholarly

articles (von Bertalanffy, 1972). When completing these works, von Bertalanffy (1972)

suggested placing the history of the theories of systems outside trendiness, and within, "…the

context of the history of ideas," and considers Aristotle's statement of "the whole is more than

the sum of its parts" (~384 BC-322 BC) as a viable entry point of the study of systems (p. 407).

During the Scientific Revolution in the 16th and 17th century, systems were examined with a

positivist approach through direct causal explanations via mathematics (Bertalanffy, 1972). Specifically, during this time, Galileo labored to show the shortcomings of Aristotle's philosophy and work (von Bertalanffy, 1972). Newton succeeded Galileo in this work by continuing to reduce phenomena into quantifiable, observable, and discrete components, which seemed to affirm the (positivist) Newtonian framework (Fara, 2015).

While positivism and the Newtonian framework continued to advance during the Scientific Revolution (Neidorf, 1963; Ryder, 1987), Newton, towards the end of his career, expressed a need to consider a non-mechanistic view to approach systems, as the Newtonian framework could not provide an explanation for everything (Holland, 2014). von Bertalanffy contributed to this discussion by developing the general systems theory, which began a dialogue on how principles of systems may offer insight, *after* reductionism has been considered (von Bertalanffy, 1967). That is, it is not necessary to go lengths to discredit one in favor of another; rather a collaboration between general systems theory and reductionism can yield, "…fruitful discussions…" among scholars (Cilliers, 2005, p. 83; von Bertalanffy, 1967). Said another way, the emergence of general systems theory was not meant to compete with reductionism; rather, general systems theory (and subsequently complexity theory) was intended to be complementary with reductionism. This research study continues with this intent, of offering complementary views of the world, and hopes to draw inspiration from each other. Now that we have returned to general systems theory, let us explore what it is, and continue the journey towards complexity theory.

Earlier in this literature review, it was said that the ability to develop general systems theory occurs in a number of mediums (i.e.: words, numbers, art, etc.), which creates potential for a diversity of insight to emerge from (and within) general systems theory. Even though there

are numerous options of mediums to explore general systems theory, there is consistency of the key tenet of general systems theory, which is that components (however this concept is understood through various ontologies) of the system cannot be removed and studied in isolation from the larger system without leading to misunderstanding (Koopmans, 2017; Simon, McGinnis, & Krauss, 2013; Simon, 2009; von Bertalanffy, 1972; von Bertalanffy, 1967). Said another way, the medium used to study a system is studied is secondary to keeping the system intact while studying the system.

From Natural Sciences to Social Sciences

The spirit and intent of general systems theory is that it is interdisciplinary, and can be developed in various mediums (von Bertalanffy; 1967). Keeping this spirit and intent central, complexity theory is finding traction with the social sciences, as well as the natural sciences, and scholars across various disciplines of study have used various mediums to develop this theory further (Drack, & Schwarz, 2010; Nowotny, 2005). The use of different mediums is helpful with the interdisciplinary aspect of complexity theory, as each medium offers another option of interpretation of a phenomena. Byrne and Callaghan (2014) who are scholars in applied social science go as far as to say:

> Complexity theory represents an important challenge to the disciplinary silos of the twentieth-first-century academy. We will argue…that the future of useful social science is at the very least inter-disciplinary and probably post-disciplinary. Complexity science provides a central element in the foundation of such a post-disciplinary programme. (p. 3)

While this is a rather bold statement, it is also an important one. The importance here is to acknowledge the multiple approaches to complexity theory, and the multiple ontological

positions behind the range of approaches to complexity theory. Byrne and Callaghan (2014) position themselves within a blend of ontologies of complex realism, and complexity as a scientific ontology, as for them, "complexity theory is an ontologically founded framework of understanding" (p. 8). Continuing with this multi-ontology approach, the Cynefin framework introduces the potential of a multi-ontology approach, and how the multi-ontologies can be complimentary, rather than competing. Following this discussion of the Cynefin framework, sub-theories of general systems theory will be explored, along with how this scholarship continues in multiple ontologies, in both the natural sciences and the social sciences.

The Cynefin framework. I was first introduced to the Cynefin framework through my Master's program in a course which was focusing on theories behind how decisions are made in an interdisciplinary setting, and specifically, in an interdisciplinary health care setting. The Cynefin framework was presented as a useful tool for decision-making, as it seeks to draw on the strengths of multiple ontologies, rather than compete with a sole ontology to be used forevermore. The rationale for the usefulness came from the multi-ontology perspective, and alignment with interdisciplinary practices, as:

> Multi-ontology sense making argues that different approaches are legitimate, but within boundaries, and that methods and tools that work in one ontology do not necessarily work in another. It is this an obligation for management [and leaders] to know in which ontological domain they are operating, and what transitions between domains they wish to achieve. (Snowden, 2005, p. 47)

In the Cynefin framework, there are domains, which are interchangeable with the term context as defined in this research study. The five contexts in the Cynefin Framework are: simple, complicated, complex, chaotic, and disordered. These contexts will now be briefly introduced.

After this introduction, general systems theory and selected sub-theories will be explored through these contexts.

Simple contexts are characterized, *"by stability and clear cause-and-effect relationships that are easily discernible by everyone"* (Snowden, & Boone; 2007; p. 2). In this context, the cause-and-effect relationships are linear, measurable, observable, and easily agreed upon. The information gathered in this context has a high degree of certainty and acceptance. Some examples within health professions could include using standard procedures to collect vital signs such as taking a patient's temperature, blood pressure, etc. There are standard procedures for collecting this information, and the information gathered is measurable, observable, and has a high level of certainty in what has been measured or observed.

Complicated contexts, "may contain multiple right answers, and though there is a clear relationship between cause and effect, not everyone can see it," (Snowden, & Boone; 2007; p. 3). In this context, there is still a clear relationship between cause and effect; however, there may be additional relevant information to explain this mechanism which is not fully understood. An example of this in the health professions setting would the refining best practices, based on advances in the health professions, changes in health care delivery, changes in health care needs, etc. When problems arise in complicated contexts, the use of subject matter experts are useful to determine how to bring clarity to the relationship between cause and effect, and importantly within the complicated context, it is possible to bring this clarity to the relationship between cause and effect.

Complex contexts, as is the emphasis in this research study, is a context that is, "unordered- there is no immediately apparent relationship between cause and effect, and the way forward is determined based on emerging patterns" (Snowden, & Boone; 2007; p. 4), and that,

"at least one right answer exists" (Snowden, & Boone; 2007; p. 5). In this context, there is not a nonlinear relationship between cause and effect, that is, even if a cause is known, the effect, in actuality and magnitude, is unknown. An example of this in the health professions could include navigating patient flow in an emergency department. If a problem were to arise in the complex context, innovation is needed, as the ability to rely on past practices is limited. Furthermore, retrospect is needed to ascertain what the cause was, and what the effect was. This is important – within a complex context, prediction is not useful.

Chaos contexts are where, "the relationships between cause and effect are impossible to determine because they shift constantly and no manageable patterns exist" (Snowden, & Boone; 2007; p. 5). An example of a chaos context in the health professions could include responding to an epidemiological event, such as an outbreak of a contagious disease. The Cynefin framework sees situations in this context for a limited time, at which point the situation would shift into another context when urgency subsides.

Disorder contexts occur when, "multiple perspectives jostle for prominence" (Snowden, & Boone; 2007; p. 4). In a disordered context and it is unknown which context is most reflective of the situation. An example of a disorder context in the health professions could include reverting to a preferred style of leadership within a clinical site with the perception that universal application of this leadership style is solely sufficient, instead of sensing and responding to what form of leadership is valuable, helpful, or necessary, to a clinical site.

The multi-ontology approach of the Cynefin framework is useful, as it allows a leader to compare the various contexts within this framework, to the context which the leader is experiencing and perceiving. The Cynefin framework is not intended to be a prescriptive guide; rather, it is a tool to aid in thinking about how we perceive where we live – quite literally – as the

term 'Cynefin' is a Welsh term which roughly translates to 'habitat' in English (Snowden, 2002).

By using the Cynefin framework, leaders can reflect on how they see simplicity, complicated,

complexity, chaos, and disorder, and how their leadership can be informed by this awareness.

As such, the Cynefin framework is showing acceptance and utility within the health professions

as a tool for organizational actors to make sense of complexity (Gray, 2017; Kempermann, 2017;

Van Beurden, Kia, Zask, Dietrich, 2013). Furthermore, the Cynefin framework has been found

to be useful for balancing when quantitative and/or qualitative approaches are useful depending

on context (French 2015), and specific to qualitative data, the Cynefin framework has been

useful for analysis as it supports viewing data holistically and embedded within context

(McLeod, & Childs, 2013).

Snowden (2005) expressed that, "multi-ontology sense making is thus a means to achieve

a requisite level of diversity in both the way we interpret the world and the way we act in it" (p.

46), and complimentarily, in this research study, the nature of leadership, is understood as the

iterations of how organizational actors, through relationships and interactions of their complex

adaptive system, contribute to the manifestation, continuance, and adaptation of system, and is

positioned within a nominalist ontological standpoint, where systems are approached from the

perspective of human actors and situate change or adaptability in the actions of these people who

respond to challenges (Riveros, & Newton, 2016). Consistent with Interpretivist assumptions,

this study takes a constructivist epistemology that recognizes complexity and relational aspects

and ways of knowing among individuals (Creswell, 2014). With this very brief introduction to

the Cynefin framework and connections to this research study, the discussion of various theories

within general systems theory, as they may apply to different contexts, will now be explored.

Sub-theories within general systems theory. Under the umbrella of general system theory, there are numerous sub theories that have been developed. Complexity is sometimes referred to as the place at the edge of chaos (Florczak, & Poradzisz, 2012; Fidan & Balci, 2017; McCleod, & Child, 2013). Considering the proximity of chaos and complexity in the literature, theories relevant to the chaos context will be explored first. Chaos theory, also known as nonlinear dynamical systems theory (Goldstein, 2008), rests on the premise that behavior in a system can be determined if all inputs are known, although given potential errors in identifying inputs, the behavior is usually understood in retrospect (Krishnamurthy, 2015; Resler, 2016). For example, predicting weather falls under the umbrella of chaos theory. Chaos theory is useful in settings where there are cyclical events, and there will be opportunity to predict again, within a similar context. Chaos theory thrives when there is the ability to articulate and populate initial conditions and variables, control all of the variables, and to have power and access to all of the information needed to populate those variables to then predict future conditions (Clancy, Effken, & Pesut, 2008; Florczak, Poradzisz, & Hampson, 2012; Morrison, 2012; Nowotny, 2005). Said another way, chaos theory is helpful in building sophisticated models through reductionism which allow for an initial prediction, and for ongoing predictions.

Models generated from chaos theory have some application at an organizational level in the world of drawing predictions from big data (Silver, 2012). However, the limitation in using chaos theory is drawn in by how many of the predictions generated can be repeated with little to nil modification – or knowing when a modification is needed. That is, if business continues as usual, then the models generated from chaos theory would be useful and valid. However, if something new were to emerge within the organization, then the model generated under chaos theory for the organization would begin to have an increasing and unknown error. Therefore, the

likelihood of having ongoing predictive value generated *solely* by the lens of chaos theory in organizations, and specifically leadership in post-secondary educational organizations, suggests that an alternate perspective, such as complexity theory, be used (Clancy, Effken, & Pesut, 2008; Fidan, & Balci, 2017; Mitchell, Jonas-Simpson, & Cross, 2012; Simon, McGinniss, & Krauss, 2013). While chaos theory provides the ability to predict events if sufficient information, a stable context, and a model were available, there may be other occurrences in systems that need other theory to makes sense of what is experienced, and what needs to be actioned within the system.

Predictions made through chaos theory have their use; however, there events occur that can only be explained in retrospect, no matter how hard we tried to make a model or equation for prediction. Furthermore, predictions require assumptions to be made within a model to be used for prediction, thus limiting transferability outside of these parameters. A key assumption to be made in prediction, which chaos theory requires, is that all variables used within the prediction must be known. That is, chaos theory does not embrace emergence of new variables in a predictive equation. At times, defining variables and parameters for an equation can be accurately done, and the value of prediction is actualized; however, prediction is not always appropriate. In addition to experiencing failure of a prediction, there is an ethical concern when predictive models are used in contexts that are inappropriate to predict in, as this may result in dismissing information and voices. The ethical concern enters when only confirmed components of the prediction are used, at the expense of including other new information. Within an organization, this would look like a decision-maker choosing not to change their decision *even when* presented with information that would suggest alternate decisions are needed. Therefore, the ability to discern context is important, so that prediction is used responsibly and ethically.

Context matters in prediction, and appropriate use of prediction must be discerned. For predictive analytics to be ethically used, the variables (within a context of how the prediction will be used), must be stable, and the model *must be bound*. Said another way, this means that everything relevant in the context of the prediction must be defined, must refuse change, and must be articulated within the model for the predication to be valid. Depending on the context, the ability to provide a boundary to a model may be possible, impossible, or even unknown. The ability to provide a boundary can happen in contexts that are simple and complicated, it can be developed in contexts that are chaotic; however, it *cannot* be done in contexts that are complex due to the emergent and self-organizing behaviors in this context. Complexity offers us infinity.

In the complicated and simple contexts, the medium of numbers is often found in theories which can be applied in these contexts. For example, cybernetic theory builds mathematical explanations through reductionism of feedback loops, which are mechanisms that re-introduce products of the system to further enable the system, to represent reality with quantifiable mathematical models (Pouvreau, & Drack, 2007; Rose, 2009). Network theory builds models to represent how interaction yield specific outcomes, for the purposes of explanation and prediction (Borgatti, & Halgin, 2011). Exploring these contexts further, if an entity can be reduced into smaller components and then summed up without losing any meaning or value, it is at best complicated (Dekker, Cilliers, & Hofmeyr 2011; Snowden & Boone, 2007; Uhl-Bien, & Marion, 2009; Uhl-Bien, & Arena, 2017). This is important distinction between complicated and complex, as reductionism is useful and viable in prediction within complicated (as well as chaotic) contexts; however, reductionism has limited utility in complex contexts. Again, complexity offers us infinity, whereas the other contexts suggest finiteness.

In addition to the difficulty in applying reductionism within complexity due to its infinite nature, there is an ethical dimension for leaders to consider with using the concept of reductionism *on people*. Organizations, including organizations that delivery post-secondary education, are made up of people. When we reduce people (to solely a term, task, title, etc.), the person's complexity is removed through this process of depersonalization through simplification and creates the opportunity for harm through misuse of power (Montuori, 2013). For example, dismissing a contribution to a decision based on a person's title shows the simplification of person in their role, to just their title, and the perceived value and power attached to that title. The consequence of this is that everything else in that role – the lived experience of the person, their potential in the workplace, their abilities to contribute beyond pre-determined value and power of their current title – becomes irrelevant. From this perspective, it highlights the need to ensure that the decision concerning which theoretical lens to use considers how this choice may harm people. As the purpose of this research study is to explore and co-construct within the interpretive paradigm, rather than predict within finite hypotheses, theories that rely on reductionism were not selected as the main theoretical lens for this research study. With these considerations on the nuances within contexts other than complexity, the next section will discuss how complexity theory is useful when exploring and co-constructing complex contexts.

Complexity Theory. Complexity theory provides guidance in exploring complex systems (Florcak, Poradzisz, & Hampson, 2012). The approach taken by complexity and philosophy scholars working on complexity theory is that this theory considered complementary (rather than competing) with theories that focus on reductionism (Human, Preiser, & Cilliers, 2013). Dekker, Cilliers, and Hofmeyr (2011) explained the strength of complexity with:

Analytic reduction cannot tell how a number of different things and processes act

together when exposed to a number of different influences at the same time. This is

complexity, a characteristic of a system. Complex behavior arises because of the

interaction between the components of a system. It asks us to focus not on individual

components but on their relationships. The properties of the system emerge as a result of

these interactions; they are not contained within individual components. Complex

systems generate new structures internally, they are not reliant on an external designer. In

reaction to changing conditions in the environment, the system has to adjust some of its

internal structure. Complexity is a feature of the system, not of components inside of it.

The knowledge of each component is limited and local, and there is no component that

possesses enough capacity to represent the complexity of the entire system in that

component itself. The behavior of the system cannot be reduced to the behavior of the

constituent components. If we wish to study such systems, we have to investigate the

system as such. It is at this point that reductionist methods fail. (p. 941)

Complexity theory, which has evolved from general systems theory and is informed by chaos

theory, is thus used for the study of complex systems (Schneider, & Somers, 2006), as

complexity theory acknowledges patterns, individuals, interactions between individuals, and

explores adaptability to changes in the system in a blend of, "behavior and context,"

(Lichtenstein, & Plowman, 2009, p. 628).

A complex system is in a state of emergent and novel practice, whereas a complicated

system is one which can be reduced to smaller components, specifically:

If relationships in a system cannot be fully explained by analyzing its individual

components because they are not fixed but shifting and changing, it is complex (e.g. the

brain is complex). This complexity results in novel features (e.g., self-organization)

usually referred to as emergent properties. For example, natural language, the Brazilian

rainforest and social systems are complex because they are richly interactive, emergent,

nonlinearly dynamic, and unpredictable. (Uhl-Bien, Marion, 2009, p. 632)

Taking the example above of the brain as complex, within this system, there are cells. The cells

are simple; they can be reduced to their individual components, and linear cause and effect can

be established between components. In contrast, the brain is complex due to the relationships

between the cells. The brain is understood by observing the relationships between the cells.

These relationships are pivotal to a complex system, as in a complex system, only relationships

hold the system together (Dekker, Cilliers, & Hofmeyer, 2011).

In addition to the work done by Snowden and Boone (2007) with the Cynefin framework

grounded in complexity science, this research study draws on literature form other noted

complexity scholars such as Cillers (2005, 2000) and Dekker, Cilliers, and Hoffmeyer (2011).

Key works in this literature review, which have shaped this research study, are noted by

Koopmans (2017) an educational researcher has contributed to the scholarship on the application

of complexity within education. Mason (2008), another educational researcher, has edited a

book which examined how complexity theory can inform the philosophy of education. Morrison

(2008), another educational researcher, provided an explicit definition of complexity theory as,

"a theory of change, evolution, adaptation and development for survival" (p. 22). The definition

taken above for complexity theory was taken from the field of educational research. In addition

to the field of education, complexity theory has been viewed by scholars from numerous areas,

including within the field of management and leadership (Uhl-Bien, & Arena, 2017; Schneider,

& Somers, 2006) and health professions education (Clancy, Effkun, & Pesut, 2008). On the

shoulders of these scholars, for the purpose of this research study, complexity in complex

adaptive systems manifests as:

- *Non-linearity*, where future states of the system are quantitatively and

  qualitatively different and rely on emergent conditions rather than initial

  conditions (as starting conditions) and inputs do not provide a proportionate

  response (Morrison, 2012; Schneider, & Somers, 2006; Uhl-Bien & Marion,

  2009)

- *Adaptation*, which is a response to constraints facing the system leading to

  emergence (Fidan, & Balci; 2017; Uhl-Bien, & Arena, 2017)

- *Emergence*, where rich interconnection *from within* the system generates novel

  activity through self-organization (Clancy, Effken, & Pesut, 2008; Fidan, & Balci;

  2017; Schneider, & Somers, 2006; Uhl-Bien, & Arena, 2017)

- *Rich interconnection*, where the relationships and connections are a part of the

  emergent conditions for adaptation and self-organizations (Clancy, Effken, &

  Pesut, 2008; Fidan, & Balci, 2017; Koopmans, 2017; Uhl-Bien, & Marion, 2009)

Within complexity, events emerge from actions and interactions of organizational actors, and

complexity theory makes sense of this larger holistic view (Cilliers, 2000; Cohen, Manion, &

Morrison, 2007; Fidan, & Balci, 2017; Glatter, 2006; Koopmans, 2017; Koopmans, 2014;

Osborn, Hunt, & Jauch, 2002; Schneider, Wickert, & Marti, 2017; Trombly, 2014; Uhl-Bien,

Marion, 2009). Thus, complexity theory is chosen as the central theory for this research study,

as this theoretical lens will be useful to explore the nature of leadership within the complex

adaptive system of a Canadian public university amidst changing educational programs, where

the research site is described as entangled in uncertainty, non-linearity, interconnectivity, and

constant change, which means that leaders cannot rely on past practice exclusively to lead the organization into the future.

While there are many advantages to complexity theory, there are also limitations. In particular, if only a complexity theory lens is adopted, then educational leaders may be prone to dismiss their role in reasonable expectations of achieving organizational metrics (Morrison, 2010). That is, if prediction is not possible in a leader's context, then there may be a sense of futility in responsibility and accountability. If leaders are unable to predict outcomes of their actions, the ability to be held responsible and accountable to those actions becomes difficult. Indeed, this is a difficult terrain for leaders to navigate.

Even though post-secondary educational organizations are situated within complex contexts, complex contexts are not the sole contexts that educational organizations face. The Cynefin framework is important to this study because it acknowledges not only the connection of leadership within complexity, but in other contexts as well. As an organization may be in several contexts simultaneously depending on the challenge, various *combinations* of leadership action may need to be considered. Fortunately, there are numerous approaches to leadership identified in literature, and some of these will be explored in the next section.

Constructing Leadership

The concept of leadership is broad and dynamic, as "leadership is widely seen as both the problem and solution to all manner of contemporary issues" (Jackson & Parry, 2011, p. 8). The development of leadership theory has been led by the desire, "to explain the complexities of the leadership process" (Northhouse, 2016, p. 1), and it, "[forms] an important cornerstone of organizational science" (Dinh, Lord, Gardner, Meuser, Liden, & Hu, 2014, p. 42). Leadership has been described with adjectives such as authentic, shared, complexity, and servant, to name a

few (Avolio, Walumbwa, & Weber, 2009; Northouse, 2016). The study of leadership has considered leaders as being either born or made (Boerma, Coyle, Dietrich, Dintzner, Drayton, Early, & Williams, 2017), and composed of specific traits (Nichols, 2016). The study of leadership has also been placed into relationships, networks and continuums (Anderson, & Sun, 2015; DeRue, Nahrgang, & Ashford, 2015), where the effect of followers on leaders and subsequently determine leadership (Epitropaki, Kark, & Mainemelis, 2017), or that leadership is an artifact of culture or context (Gurr, 2014). The study of leadership has also been viewed through different sectors. Of interest to this study is educational leadership, which is the practice of leaders who action learning and administrative processes in educational settings (Michelle, & Santamaria, 2016).

This research study has defined, "Leadership [as] a human phenomenon that is embedded in culture, which includes art, literature, religion, philosophy, language, history, and generally all those things that constitutes what it means to be and to live as a human being" (Ciulla, 2008, p. 393). This definition was considered after reading an article about what direction leadership scholarship should take (Tourish, 2017). Tourish (2017), who is the editor of the respected journal *Leadership* wrote about how he wanted this publication to guide leadership scholarship. In a recent editorial, he wrote:

> I would suggest, at a minimum, that the distinction between the humanities and social sciences has been overblown. It is no longer helpful in pursing questions that really matter. We need to embrace different methodologies, different traditions of scholarship and different theoretical orientations. As Ciulla (2008: 393) observed, 'Leadership is a human language, history, and generally all those things that constitutes what it means to

be and to live as a human being.' Acknowledging this might lead us to explore more

interesting issues than those that currently dominate our journals. (Tourish, 2017, p. 3)

This definition is also aligned within the context of complexity, as informed by the Cynefin

framework. Complexity theory focuses on systems, where each individual agent or component

is shaped by the meaning drawn from the relationships and iterations of interactions with other

agents and components in the system. Therefore, with the lens of complexity theory, a narrower

conceptualization of leadership may have the unintended consequence of losing a larger complex

adaptive systems' view. In this study, the definition of leadership must be broad enough to

encompass the complex adaptive system view of where leadership occurs.

Another consideration is the inclusivity of the definition of leadership within a complex

context. The definition by Ciulla (2008) can happen with an individual, as well as within a

system. What is also intriguing about the Ciulla (2008) definition, is that the definition of

leadership seems to request a necessary description of where, when, how, and why the leadership

is being experienced. This definition from Ciulla (2008) leaves room for complexity to emerge

(or not) should the situation contain emergent conditions. This definition also raises the profile

of leadership from tangible observations to intangible expressions. Personal leadership is

intangible, and can happen through a personal reflective process, and the relationship between

personal leadership and other forms of leadership are essential to growth as a leader (Kouzes, &

Posner, 2017; Sullivan-Marx, 2013). A reflective leadership practice can bring awareness to the

complexity of post-secondary educational organizations (Mennin, 2010, Wells, & Herie, 2018).

Palmer (2016), who is an educator as well as a scholar, posed the wicked question, "How do we

educate professionals who understand that the personal identity and integrity they bring to work

are at least as important as the skills and knowledge needed to do that work?" (p. 10).

Connecting this wicked question to this research study, this research study considered the challenges of leading within complexity during changes to educational programs of health care professionals. Health care professionals are seen as future leaders of the health care system (Scott, & Pringle, 2018). This places educational leaders at the case study site at the crux of continual learning about leadership, at a personal and system level, while teaching and enabling the leadership of the next generation of health care professionals. Given the magnanimity of this endeavor, it is fortunate that the Ciulla (2008) definition is as generous as it is.

Another intriguing feature about this definition is that it incorporates the term, "humans." The ethics of reductionism *on people* played a pivotal role in the decision of theoretical lens for this research study. When reading about leadership approaches, such as a trait-based approach which identifies preferred characteristics for leaders (Northouse, 2016), I have wondered about the unintended consequences of using such an approach. For example, if we view a leader as a whole person, but have identified preferred characteristics within them that make them a leader, what happens to the balance of their person? It seems to set up a person to be a combination of a leader, and leader leftovers. I wanted to consider viewing the leader as a whole person within this study, with leadership opportunity at the personal level, and up to organizational levels.

Another unintended consequence of a reductionist approach when considering leadership within complexity is embracing simplicity in a context which may have components of complexity, or even other contexts for that matter. Humans are rather complex at an individual level, let alone when they interact within an organization. For example, the human genome project has found that it is not just about the individual genes which human have, but the *combination* and *relationships* which these genes have that matter, and while helpful to have a map of the genome, the work to understand the patterns and rich interconnections that

underscore the "secret of life" are still awaiting discovery (Moraes, & Góes, 2016, p. 222). It is important that we can understand pieces within humans under a microscope; however, I am not convinced that humans as a whole, humans as leaders, humans interacting in an organization, can be *fully* captured in reductionist approaches. Consistent with this decision-making approach on which theoretical lens to use for this research study, this definition by Ciulla (2008) of leadership provides traction with me as it acknowledges the complexity of humans, found on the micro and macro level.

While the complex context has a bit of attention in this research study, there are other contexts to consider. In other contexts, as informed by the Cynefin Framework, i.e.: simple or complicated, leadership definitions such as, "leadership is a process whereby an individual influences a group of individuals to achieve a common goal" (Northouse, 2016, p. 6) find traction. This definition draws boundaries on how we may see and enact leadership by stepping towards a finite number of possibilities of what leadership is. The term "process" implies sequencing of steps, with a linear connotation. The terms "individual" and "groups" have identified that at least two individuals need to be involved in order for leadership to occur. In sum, this definition emphasizes task completion and group compliance. The phrase "achieve a common goal" implies that a pre-defined successful action must be observed. This places leadership in a positive light, and excludes terminology to cover processes where an individual fails to influence anyone (or more than one individual) to achieve a common goal. This definition is well suited for contexts which are simple or complicated, but has limited utility in complex contexts.

Selected Leadership Theories

In addition to considering leadership within complexity, it is worthwhile to consider what leadership theories would look like in the contexts, as guided by the Cynefin Framework. A selection of leadership theories are presented, alphabetically.

Authentic leadership theory Authentic leadership, which is found in health professions education (Al-Moamary, Al-Kadri, & Tamim; 2016; Shapira-Lischinsky, 2014; Pinelli, Sease, Nola, Kyle, Heldenbrand, Penzak, & Ginsburg, 2018), is defined as:

> A pattern of leader behavior that draws upon and promotes both positive psychological capacities and a positive ethical climate, to foster greater self-awareness, an internalized moral perspective, balanced processing of information, and relational transparency on the part of leaders working with followers, fostering positive self-development. (Walumbwa, Avolio, Gardner, Wernsingm, & Peterson, 2008)

For example, with authentic leadership theory, authentic leadership happens when there is alignment between a person's individual internal value, and the roles and titles that the same person enacts as a leader (Leroy, Ansell, Gardner, & Sels, 2015). With this alignment, authentic leaders can provide stability through their authenticity to their followers in uncertain and complex contexts due to the flexibility of this theory to encompass diversity (Duignan, 2014). Extending the alignment from a person's values in and around their role, illustrates the importance of alignment with leadership theory and context. Authentic leadership theorists also see that the personal values and self-awareness of the leader, the development of the leader enacting leadership, as well as the interpersonal relationships on the part of the leader, culminate in the description of authentic leadership (Northouse, 2016).

Viewing authentic leadership within the context of complexity, there are many possible combinations and permutations of the multiple levels of personal values and awareness,

development, and relationships through the lens of complexity theory, and the number of

possibilities may not be predictable, let alone quantifiable. These possibilities provided by

authentic leadership theory would be seen as emergent conditions. This is important, as there is

an alignment within authentic leadership theory and the diversity seen within role. With the

sheer amount of combinations and permutations and possible a finite prediction seems unlikely,

which makes authentic leadership theory one which aligns well with complexity.

  Complexity leadership theory. Scholars in organizational development and leadership

call for the development of leadership theory for our organizations (Schein, 2010) that

recognizes the complexity of leadership (Wheatley, 2006), and some researchers in the field of

management and leadership are looking at developing leadership theories grounded in

complexity theory (Uhl-Bien, & Marion, 2009), which has, in turn, partly inspired this research

study. Within the literature, there is a blend of leadership theory and complexity theory known

as complexity leadership theory, which is defined as, "a leadership paradigm that focuses on

enabling the learning, creative, and adaptive capacity of complex adaptive systems within a

context of knowledge-producing organizations" (Uhl-Bien, Marion, & McKelvey, 2007, p. 298).

Complexity leadership theory is a, "contextual theory," and, "it requires consideration and

examination of context in both theorizing and operationalization (Uhl-Bien & Marion, 2009, p.

632). There is reason to pause here with complexity leadership theory, as it considers context

which is complex, as well as the theory to practice gap. While complexity leadership theory was

considered as a theoretical lens for this study, it was not selected as the primary lens because the

intent of this research study does not focus on validating a specific leadership theory. While this

research study does not focus on validating a specific leadership theory, leadership theory is still

important to this study, as it will help to situate the findings within the literature.

Path-Goal leadership theory. Evans (1996) described the role of path-goal leadership theory over the first twenty years of its development as, "the mediator between leader behavior and subordinate satisfaction and performance, most tests of path-goal theory have focused on the direct effects, under different contingencies of leader behaviors examined, the dependent variables studied, and the moderator variables examined. (p. 307). Currently, Northouse (2016) described the purpose of path goal leadership as the intent to, "enhance follower performance and follower satisfaction by focusing on follower motivation" (p. 115). From the view of complexity, the introduction of motivation is interesting, as motivation can take so many forms that how motivation was manifested within an individual, relationship, or organization, would be rather difficult to predict. This is important, as this presents a rich opportunity for emergent conditions. However, if this leadership was applied as a simple and predictable cause and effect process, instead of an opportunity for nonlinearity and emergence, then the path-goal leadership theory may not provide additional insight within a complex context.

Relational leadership Theory. Branson, Franken, and Penney (2016) discuss having a middle role (such as a Department Head or Program Head) in a general higher education setting through the lens of relational leadership theory, with:

> Relationship is at the heart of this reconstruction of the middle leader's role. The middle leader's role in higher education must be reconceived as being fundamentally and unquestionably relational in its entirety. To this end, this paper is aligned with Bush's (2008) description of leadership, which challenges the perception that power and authority is an automatic feature of the position. Rather, this paper has illustrated how the middle leader's power and authority is more akin to influence and persuasion and is formed within a relationship with others built upon trust, transparency and consistency. In

higher education, the role of the middle leader contains little trace of positional or

coercive power and, thus, their authority is formed within the nature of their

relationships. (p. 142).

This excerpt is interesting as it brings in a perspective that there are multiple dimensions to

consider within a leader. Eacott (2018) encouraged a relational approach when engaging with

educational leadership, as this approach allows for iterative co-construction of relationships, as

driven by context. From the perspective of complex context, this ability to have iterative co-

construction aligns well. While some relationships can be predicted based on titles and hierarchy

of an organization, the depth and quality of the relationships are driven by the complexity of the

organizational actors within those titles.

     Servant leadership. Greenleaf (1977) through VanMeter, Chonko, Grisaffe, and Goad

(2006) defined servant leadership as, "it begins with the natural feeling that one wants to serve,

to serve first. Then, conscious choice brings one to aspire to lead. The servant leader is sharply

distinctive from one who is a leader first, perhaps because of the need to assuage the unusual

power drive or to acquire material possessions" (p. 62). Over time, various refinements to this

definition have been made; however, what is still key to them all is the importance of

servanthood first (VanMeter, Chonko, Grisaffe, & Goad, 2006). Servant leadership in the health

professions looks can look like cultivating relationships with patients and colleagues which share

advocacy, and power (Fahlberg, & Toomey, 2016). Within post-secondary education, Hays

(2008) calls for the teacher to embrace servant leadership to be, "not only possible, but

desirable" (p. 130), as the enhanced relationships between teacher and learner enhance both the

teaching, and the learning.

In order to establish the meaning of servanthood, reflection is needed. In contexts which are simple or complicated, this approach would be useful as there is the leisure of clarity between cause and effect, and the reflective process may serve to inform the best practices which are common in this context. In contrast, in the chaotic context, there may not be the leisure of time for reflection. In the complex context when non-linearity suggests that phenomena are best understood in retrospect, the encouragement to reflect would be useful to make sense of emerging patterns.

Trait-Based leadership. Viewing leadership from the perspective of specific traits has been a focus of leadership theory development (Northouse, 2016; Zaccaro, 2007). The trait-based approaches to leadership were quite influential in leadership scholarship until the late 20th century, where leader traits are defined as, "relatively coherent and integrated patters of personal characteristics, reflecting a range of individual differences, that foster consistent leadership effectiveness across a variety of group and organizational situations" (Zaccaro, 2007, p. 7). Interestingly, Zaccaro (2007) makes and argument for extending scholarship into exploring trait-based leadership from multiple perspectives, including studying traits in combination, rather than independent contributions per trait. This is interesting because it draws a parallel to the metaphor presented earlier on the human genome project, and the importance of the combination and relationships in the genetic material, and shows opportunity for growth and development of this leadership theory. However, currently, viewing leadership from the trait-based approach does not link leader to context, needed action in a situation, or diversity of followers; rather, this approach focuses on ensuring that selected traits are present in selected individuals who occupy select positions within an organizational chart (Northouse, 2016).

From the perspective of complexity theory, this may work very well in contexts that are simple, as well as contexts that are complicated. Perhaps even, this may be a preferred approach to leadership in contexts that are chaotic and are striving to work towards a repeatable best practice, as a means to restore order to chaos. In a complex context, leadership is socially constructed (Hannah, Sumanth, & Cavarretta, 2014; Liu, 2017; Nyberg, & Sveningsson, 2014; Osborn, Hunt, & Jauch, 2002; Tourish, 2014), and the narratives that form this construction draw in factors outside of what trait-based leadership theories draw upon (Liu, 2017; Nichols, 2016). Furthermore, Liu (2017) argues that, "leadership is not seen as solely located within individuals in the form of traits and styles, but also in the myriad ways people interact, engage and negotiate with other" (p. 345). With this view, leadership theories developed in a trait-based approach may be strengthened with other theories that draw on considerations such as relationships and context, especially if leadership is operating within complexity.

Influential Studies

The trend in higher education research to recognize post-secondary educational organizations as complex adaptive systems and to incorporate complexity theory as a lens to study leadership issues in higher education offers new possibilities for exploring complexity (Bento, 2011; Bonnette. 2015; Price, 2014). Bento (2011) argued that systems, such as academic units, are key units of analysis within higher education. Bonnette (2015) provided an example of a case study within higher education, that while had the focus on the complexities of fundraising in an American post-secondary educational as opposed to delivering health professions education, showed that the unit of analysis within complexity is not to be reduced to solely a title. Price (2014) showed how the post-secondary education system is inextricably linked to

other social systems, and that a larger system view is needed to engage within any of the systems.

The use of complexity theory in this research study builds on a line of influential research incorporating the lens of complexity theory to understand leadership within complex adaptive systems (Blandin 2008; Hinzey, 2016). For example, Blandin (2008) provided an influential study in that it explored leadership in a complex adaptive system, and concluded that, "…organizations functioning as complex adaptive systems need a new framework for leadership that involves a new way of thinking, a new way of acting and a new way of being" (p. 197), which moves away from the metaphor of organizations as machines. This research study intends to extend this finding and recommendation by applying complexity theory to understand leadership in another complex adaptive system. That is, Blandin (2008) chose a case study site of a nonprofit organization which delivers educational programing, and this research study will focus on a case study site within a post-secondary educational organization which delivers health professions education. Hinzey (2016) who studied complexity leadership behaviours within a complex adaptive system also inspired this study. Hinzey (2016) recommended that future research needs to explore the relationship between how interconnections are manifested within complexity (p. 259).

Selected Challenges in Health Professions Education

Post-secondary educational organizations are situated in complexity (Clancy, Effken, & Pesut, 2008; Fidan & Balci, 2017; Glatter, 2006; Jones, Harvey, Lefoe, & Ryland, 2014; Morrison, 2008). Within this complex landscape and specific to health professions education, post-secondary educational organizations are tasked with not only recruiting students, staff and faculty, but also ensuring that they are able to contribute to the larger health workforce

(Ferguson, & Lloyd, 2017; Staiger, Chattopadhyay, Buerhaus, Zangaro, & Auerbach, 2017; Tourangeau, Saari, Patterson, Ferron, Thomson, Widger, & MacMillan, 2014; Tourangeau, Wong, Saari, & Patterson, 2015). For example, specific to health professions' education, the ability of all members of post-secondary educational organization to adapt their provision of education that supports the development of graduates who can engage and contribute to the health workforce is key to supporting health care delivery (Glasper, 2016; Hoare, 2016; Kurth, Jacob, Squires, Sliney, Davis, Stalls, & Portillo, 2016; Schell, Lavieri, Jankovic, Li, Toriello, Martyn, & Freed; 2016). This is often expressed with provincial mandates where a revision to supply of health care providers is presented, or a re-structuring of when and how health care providers will deliver services. The response of health professions educational programming to direction provided by government mandates and professional associations is commonplace (Birch, 2007; Canadian Medical Association, 2005; Canadian Nurses' Association, 2009; Tomblin-Murphy, MacKenzie, Alder, & Budz, 2017).

The use of simulation as a means to offer clinical exposure has been increasing in health professions education in Canada, as, "educators are seeking new learning strategies that support the ability of the student to learn complex skills in a safe environment" (Garrett, MacPhee, Jackson, 2010, p. 671). In addition to being able to access complex situations during the learning process, simulation also offers the ability to integrate other pedagogical approaches, such as team-based learning, and functioning in an interdisciplinary environment (Garrett, MacPhee, Jackson, 2010, p. 671). However, the ability to integrate simulation into the curricula requires a substantial financial investment in capital costs, as well as faculty and curriculum development (Goldsworthy, 2012). These challenges in implementing simulation within health care curricula in Canada were recently explored in a constructivist grounded theory study, and confirmed that

such an undertaking is indeed a complex undertaking by educational leaders (Taplay, Jack, Baxter, Eva, & Martin, 2014).

In addition to simulation, new technologies also enter health professions education as technology in health care delivery develops (Martin, Polisena, Dendurki, Rhainds, & Sampietro-Colom, 2016). Given the expanse geography of Canada, the continued inclusion of new technologies is essential to improving access for remote locations (Khan, Ndubuka, Stewart, McKinney, & Mendez, 2017). While it is accepted that new technologies improve quality, to what extent, remains contested (Tyagi, Cook, Olsen, & Belohlav, 2013). As new health technologies continue to enter the health care system, the education on how to engage with this technology will continue to be a challenge in education of health professionals.

Another challenge to health professions education is to teach a discipline, as well as to teach how to work in an interdisciplinary setting (Grant, & Kanji, 2017). The implementation of interprofessional education is complex; however, this complexity must be embraced as, "interprofessional education is a growing focus for educators in health professional academic programs" (Grymonpre, Ateah, Dean, Heinonen, Holmqvist, MacDonald, Ready, & Wener, 2016). Furthermore, interprofessional education in Canada has transitioned from being an elective or option within a curricula, to a requirement for accreditation of some healthcare professions education programs (Dean, MacDonald, Alessi-Severini, Halipchuk, Sellers, Grymonpre, & 2014). In short, there are numerous challenges facing health professions education in Canada today, where the implications spread across the experiences not only within post-secondary education, but with the provision of health care services.

Case overview. The post-secondary organization where this research study occurs in the largest post-secondary educational organization in its province today. Within this post-

secondary educational organization there is a Faculty that delivers health professions education

in a recently merged combination of five Colleges. This newly merged Faculty has an

organizational structure with decanal roles for each College, as well as decanal roles for

integrated areas such as: research, continuing competence and assessment, education, Indigenous

affairs, and academic affairs.

One of the Colleges within this Faculty is the case study site for this research study. In

addition to changes in educational programming, other challenges experienced by organizational

actors include meeting priorities as identified in the organizational strategic plan, adapting to a

budget model re-design of the larger University, complexity and content saturation within

curricula (Giddens, & Brady, 2007), along with the challenges associated with integrating health

education with the health care system (Davis, & Sumara, 2010; Doll, William, & Trueit, 2010;

Mennin, 2010). The coupling of the education system with the health care system provides a

rich foundation to explore the emergent conditions in complexity, as health care professionals are

created to serve within the health care system, and the health care system cannot exist without

these health human resources. In order to respond to the public needs and funding constraints,

such as health care re-organization and the domino effect of shifting clinical practicum

placements, the site is using creativity to respond, and sometimes adapt, to these challenges.

Indeed, there are couplings of numerous systems within the case study site of this research study.

Literature Review Summary

This literature review discussed a brief history on the scholarship of general systems

theory, and how complexity theory emerged from general systems theory. Complexity theory

has been taken up in the natural sciences, as well as the social sciences, and in various mediums,

which have contributed to the development of this theory. The Cynefin framework was explored

and discussed, and shown to align with the theoretical foundations of this research study. Following this discussion, the construction of leadership was explored, including selected leadership theories which could be experienced within post-secondary educational organizations.

The literature review has positioned post-secondary educational organizations as complex adaptive systems, and highlighted some of the broader challenges facing post-secondary educational organizations today, including a specific focus on the proposed site for this single case study. The site fits within the nonlinearity of complexity theory, as the site integrates into the public health care system, which is another system that could be considered a complex adaptive system of its own. For example, within the College selected for this study, educating a graduate cannot be simply reduced to creating one more health care professional for the province. Rather, there is a potential for generating research outcomes, adapting to changes in health care professions, and changes in health care system delivery, which may shift the trajectory of the individual pursuing education, as well as the post-secondary educational organization delivering the education. The following chapters will discuss the theoretical and conceptual framework for this research study, where leadership within complexity will be further explored.

CHAPTER THREE: THEORETICAL AND CONCEPTUAL FRAMEWORK

In this chapter, I will begin by explaining the theoretical framework for this research study. Following this, I will explain how complexity theory informed the analysis of the data and findings through a conceptual framework. The following chapter, Chapter 4, will build on this by providing the methodological details for this research study.

Theoretical Framework

The purpose of this qualitative exploratory case study is to understand the nature of leadership in a Canadian public university operating in a turbulent, uncertain and complex context. This research project is grounded in the fundamental sociological assumptions of the Interpretivist paradigm, which is based on the belief that, "reality is socially constructed, complex and ever changing, and what is important to know is how people interpret and make meaning of some object, event, action, etc." (Glesne, 2011, p. 8). Within a nominalist ontology, reality is subjective, where the reality constructed is an irreducible combination of action(s) and actor(s) (Riveros, & Newton, 2016). Consistent with Interpretivist assumptions, this study takes a constructivist epistemology that recognizes complexity and relational aspects and ways of knowing among individuals (Creswell, 2014). From the interpretive constructivist view, "both reality and knowledge are constructed and reproduced through communication, interaction and practice. Knowledge about reality is therefore always mediated through the researcher" (Tracey, 2013, p. 40). Thus, the interpretive paradigm provides the paradigmatic foundation for this study's exploration of leadership within complexity, as a co-construction between participants, and the researcher.

Complexity Theory. After careful consideration of other theories such as chaos theory and systems theory, complexity theory was chosen as the central theory of this study to make

sense of leadership within complexity, as was discussed in the literature review. Complexity theory challenges reductionist tendencies and embraces organizational actors' emergence and adaptation through a constructivist approach (Reich, Garrison, & Neubert, 2016), which means this theory's embedded assumptions are consistent with the underlying assumptions of the Interpretivist paradigm, contributing to its suitability for exploring leadership within complex contexts (Houglum, 2012). The conceptual framework, which includes the concepts of leadership, complexity, role, diversity, and interactivity, will now be discussed.

Conceptual Framework

The conceptual framework for this research study consists of the following concepts: leadership, complexity, role, diversity, and interactivity. This framework is employed here to explore the nature of leadership in one College of a Canadian public university, situated in complexity. In the section that follows I describe each of the major concepts of the study drawing connections to complexity theory that have helped to conceptualize and articulate the key concepts of this study that were used to guide the data analysis.

Leadership. Within this study, "Leadership is a human phenomenon that is embedded in culture, which includes art, literature, religion, philosophy, language, history, and generally all those things that constitutes what it means to be and to live as a human being" (Ciulla, 2008, 393). The Cynefin framework informs the conception of leadership in this study by offering a pragmatic connection between leadership and context (Snowden & Boone, 2007; Uhl-Bien, & Marion, 2009). This is not the first research study to consider the connection between complexity and leadership. As discussed earlier in the literature review, the Cynefin Framework is a tool used to understand leadership within complexity (Uhl-Bien, & Marion, 2009) and specifically complex adaptive systems (Flynn, & Speier, 2014; Van Beurden, Kia, Zask,

Dietrich, & Rose, 2013). The Cynefin framework is important to this study because it

acknowledges not only the connection of leadership within complexity, but in other contexts as

well. As an organization may be in several contexts simultaneously, depending on the challenge,

various types of leadership action may need to be considered.

      Complexity. Leaders within the complex adaptive system can be operating in one of

many contexts at a specific moment in time, as expressed in the Cynefin framework (Snowden,

& Boone, 2007).   Complexity theory finds a relationship with inquiry when a, "…simple cause-

effect conceptualizations cannot capture and do justice to the nonlinear dynamics and emergent

properties of the phenomenon of interest" (Patton, 2015, p. 146) due to the, "dynamic

adaptability" found within complex adaptive systems (Marion, 2008, p. 1). By accepting

complexity within organizations, inquiry becomes exploratory and curious about how non-

linearity, adaptation, emergence, and rich interconnection can be experienced.

      As discussed in the literature review, complexity within complex adaptive systems

involves non-linearity, adaptation, emergence, and rich interconnection. Furthermore, the

presence of complexity does not negate the presence of other contexts. This is important. If the

leader's perception is such that the system within which they are operating is solely a simple

context and bases their leadership actions on historical best practices, they will be blind to

starting conditions. These starting conditions are the leader's opportunity to explore

opportunities in creativity, to explore opportunities in navigating catastrophe, or perhaps other

general opportunities for exploration. If the leader's perception is such that there are potentially

several systems overlapping, then the leader can see when applying historical best practices and

bringing in subject matter experts are needed, and when openness to emergent practices (i.e.: in

complexity) are needed. Without this perception of the context of systems, and layering of

systems, a leader may erroneously assume their context. Consequences of this would include attempting to predict within complexity, or on the other hand, miss an opportunity to rely on a historically tested best practice within simplicity.

Role. The term role in this study has a connection to a person, and is more specific than a broader term such as actor. Furthermore, role is not another word for the organizational title held by an organization actor of the complex adaptive system. Role adds dimension(s) to an organizational actor. Role, as it is understood in this study, is a combination of a person's title, their actions, and how they interact within the system. While functions can be predicted through organizational titles to a point, the role a person wishes to play is driven by their engagement, autonomy, and ability, among other factors, and is difficult to predict. Role emerges as a person's action emerge. For example, within a work setting, an individual with a certain title may be expected to accomplish certain activities, given their title, yet they may fail to follow-thru. As a response, another individual in the work setting, with a different title may fill the gap. What happened in this example cannot be reduced to solely title, or solely the person. Rather, the combination of a person, their title, their actions, and where they are in the system captures their role. While viewing the concept of role in this way lessens the ability to predict based on organizational title, this view draws in complexity by exploring the connection between people, titles, and the systems within which they are in.

In order to explore role in this manner, the recruitment efforts for leadership participants was broadened beyond formal to include informal and emergent leader roles. A *formal leader* is recognized through current titles on the organizational chart. An *informal leader* is recognized through a person's actions. An *emergent leader* is recognized as a leader who is developing potential in leadership. An emergent leader may also be someone who may be shifting in their

leadership activities. Including such a wide range of organizational members was intentionally done to enable a collection of perspectives from leaders exercising leadership. These broader conceptions of both leader and role were used in the recruitment procedure so then potential participants did not self-censor their participation based on their current title.

  Diversity. Within this system, there are multiple roles, where each role has a diversity in type, variation, and composition. Similar to the case study site within this research study, the diversity in type can be seen as faculty, staff, or administrator. Diversity in type could also be seen as job titles or union classifications. Within diversity in variation, this could be seen as teaching clinical or theory courses, providing administrative support for students or staff, etc. Diversity in variation could also be seen as the proportionate amount of time spent on teaching, service, and research, or the amount of time spent administering or teaching in one educational program or in multiple educational programs. The diversity in composition brings distinct characteristics to how within the types and variations are enacted by each individual role. The diversity in composition is when leadership theory enters in this example, in that each role draws upon their preferred leadership theory (or leadership theories). Role is a combination of a person's title, their actions, and how they interact within the system. This is important, in that understanding the role involves understanding how the role *interacts within the system*. Diversity is important for complexity.

  Interactivity. Interactivity is *why* organizational actors perceive diversity (Page, 2011). Interactivity in this study is the connection between leadership, complexity, diversity, and role within the complex adaptive system, which produce the, "…emergent processes through which complex adaptive systems form and operate" (Uhl-Bien, & Marion, 2009, p. 639. The openness to non-linearity found in complexity theory supports the interactivity found in complex adaptive

systems (Byrne, & Callaghan, 2014; Holland, 2012). The interactivity, which builds to rich interconnection within and between complex adaptive systems, relies on diversity (Clearfield, & Tilcsik, 2018). To accomplish this interactivity, a pattern of movement must begin at some point within the complex adaptive system.

Mason (2008) described the development of patterns within complexity as inertial momentum of emergent conditions, called a "snowball effect" (p. 37). Taking this term and moving it towards a metaphor may offer some additional insights. Let us visualize emergent conditions as single, small snowballs. The enabling of the emergent conditions occurs as the snowballs begin to move. The momentum of emergent conditions, and diversity begin to create a pattern. Diversity can be seen here in variation (size of snowball), type (does the snowball have a hard ice centre, or is it fluffy snow loosely held together), and composition (how are the snowballs arranged i.e.: where are the snowballs coming from, how fast, in what frequency, etc.). This network could appear as snowballs moving in unison, from one end of an area to another area. This pattern could also appear as collision between all of the snowballs, where in the collision, the snowballs may break apart, or join together to continue momentum. It is unknown in these collisions what the outcome will be. These collisions can be considered the feedback loops present in complex adaptive systems. The outcome of the collision will only be known in retrospect. Once the outcome is seen, then perhaps, some form of prediction may be possible with a similar collision. However, the pattern may have changed, thus questioning the reliability of prediction. As discussed in the literature review, chaos theory and other theories which rely on predication, have a requirement that predictions must occur in an equation which is bound. In complexity, and complex adaptive system, the ability to be bound for a prediction as such is idealistic over realistic. Thus, the ability to rely solely prediction, or best practices, is

questioned. As the ability to rely on best practices is questionable, then leaders must sort out what is the *next* practice. The ability to be aware of the inertial momentum of emergent conditions, the snowball effect, may offer leaders the necessary insight to successful navigate complexity.

Moving this metaphor to the nature of leadership within complexity, the range of feedback loops observed within complexity supports considering multiple theories of leadership simultaneously, in multiple roles, in lieu of a solitary leadership theory, as each "collision" will require a unique approach to optimize the feedback loop. Let us consider another example, this time using the terms found in the conceptual framework, employed in a complex adaptive system, where collisions the point at which roles meet within the complex adaptive system.

As stated earlier, complexity is a feature of system, where the behaviour of actors that constitute the system interacts with the components that constitute a system *as well as* the relationships amongst these (Koopmans, 2017; Trombly, 2014; von Bertalanffy 1967; von Bertalanffy 1972). This is where interactivity and complexity meet role, diversity, and leadership. As the diverse components of a role begin to interact with other roles, relationships as system feedback begin to emerge. These connections continue between roles in the system. As new roles enter, new relationships are made. As roles continue their work, relationships are strengthened, tested, abandoned, or even forged, as leadership theory enters to inform the composition of how the role engages in the system. Stepping back now, this example shows a system of diverse roles capable of complexity, mired non-linearity, adaptation, emergence, and rich interconnection.

CHAPTER FOUR: METHODOLOGY

The study's design allowed for in depth insight into an account of leadership within complexity. The use of the interpretive paradigm endeavors to understand the subjective world of the human experience, while retaining the integrity of the phenomena being investigated (Cohen, Manion, & Morrison, 2007). Considering the topic of leadership, the use of the interpretive paradigm and its roots in socially constructed knowledge is fitting, as leadership is a socially constructed concept, which depends on shared narratives and context (Hannah, Sumanth, & Cavarretta, 2014; Liu, 2017; Nyberg, & Sveningsson, 2014; Osborn, Hunt, & Jauch, 2002; Tourish, 2014). This is important because seeing leadership as a socially constructed concept elevates leadership from being solely about individuals and traits which may or may not be present or absent, to the consequences of interconnections and interactions of people, within a context.

The qualitative research approach was chosen for this study as it, "is an approach for exploring and understanding the meaning individuals or groups ascribe to a social or human problem" (Creswell, 2014, p. 4). Patton (2015) stated that, "the openness, flexibility, and adaptability of qualitative methods make complexity theory an especially useful framework for qualitative inquiries into complex dynamic situations and phenomena" (p. 145). The pairing of qualitative data achieved through interviews aligns practically and theoretically with complexity and the overarching interpretive theory that underlies this project.

Methodology

A methodology is the overall approach, connected to an overarching theoretical framework, for gathering, collecting, and analyzing data with the intent to understand deepen understanding and knowledge (Tracy, 2013). The case study methodology is an appropriate

choice for the interpretive paradigm because it, "…facilitates exploration of a phenomenon within its context using a variety of data sources (Baxter, & Jack, 2008, p. 544), and for blending educational research with complexity theory (Hetherington, 2013). This research study draws on the work of Yin and is influenced by the emphasis placed on the formal structuring of a case study, which is in subtle contrast to the Stakian view, which encourages evolution throughout case study research (Yazan, 2015). However, the Stakian view sees a case as a specific *thing*, rather than a *phenomena*, as through a Yin view of case study methodology (Yazan, 2015). In order to maintain consistency with the theoretical and conceptual framework for this study, the Yin view was adopted.

The purpose of an exploratory case study is to identify research questions for further study, rather than provide explicit descriptions of causation, such as would be produced by an explanatory case study (Yin, 2014). Thus, by using an exploratory case study, this study will seek to deepen understanding of leadership within a complex adaptive system and provide options for further inquiry, rather than provide final conclusions on leadership with a complex adaptive system. Furthermore, this research study was undertaken as part of an EdD program centred on a specific problems of practice. However, this research study generated findings and analytic generalizations, which can be drawn to inform practice and awareness for further potential inquiry into leadership within complex adaptive systems found in higher education.

The selection of a case can range from an individual to an organization (Mertens, 2015), and in this study, the case is a College within a Faculty in a post-secondary educational organization. In addition, the unit of analysis within complexity theory should be a system, such as a complex adaptive system, and not an individual component within a system (Avolio, Walumbwa, & Weber, 2009; Baxter, & Jack, 2008; Hetherington, 2013; Trombly, 2014). Within

this case, there will be two methods for data collection: 1) document review to provide context, and 2) semi-structured interviews. The individual semi-structured interviews provided deep, contextual, subjective data related to components of complexity and leadership that may not have been available if I had employed a document analysis or semi-structured interviews alone. Polkinghorne (2005) stated that qualitative data are full of, "complex relations" and, "the purpose of data gathering in qualitative research is to provide evidence for the experience it is investigating" (p. 138).

The exploratory case study allows an in-depth look at phenomena within a bounded case, which may inform further research at this site, or other similar sites. This exploratory case study will be bound by a College within a post-secondary educational organization, participants from this College consenting to participate in the study, and the timeline of the study. This site was purposively and conveniently selected as it is a complex adaptive system where leadership is present within complexity, and is connected to the researcher's professional practice, which is consistent with an EdD research study. A purposive sampling technique has been defined "as selecting units (e.g., individuals, groups of individuals, institutions) based on specific purposes associated with answering a research study's question" (Teddlie, & Yu, 2007, p. 77), and as such, this site was selected based on the value that it adds to the research question.

Data Collection Methods

The methods of a study describe how the data for analysis will be collected. Creswell (2013) suggested that, "a good qualitative case study…presents and *in-depth understanding* of the case. To accomplish this, the researcher collects many forms of qualitative data" (p. 98). The data collection in a qualitative case study is intended to focus on depth which means the

recruitment of interviewees and the selection of documents reflected richness, rather than magnitude (Patton, 2015, p. 264).

Document review. Data collection began with the document review. The document review provided insight into the leadership and complexities of the site through artifacts that provided a larger context for the qualitative interviews. The document review was bounded by documents which are publicly available on the site's website, and focused on documents mentioned in interviews. In the final analysis, the document review included 69 documents from the site's website, which included details about members of the site, research activities, changes in educational programs, alumni information, information for current students, opportunities for funding, and information on how to be a part of the site as a scholar, student, or researcher.

During the semi-structured interviews, some participants referred to documents on the site's website. Specifically, participants referred to documents which provided an overall view of the site's strategic plans, research activities, and documents which highlighted specific recruitment streams of students. Following the interviews, a final wave of document review was done prior to the ethics approval data collection deadline.

Semi-structured interviews. The opportunity to participate in interviews was extended to all members of the site, in formal, emergent, and in-formal leadership roles. Recruitment for the semi-structured interviews was conducted through two phases of recruitment. The first phase used a blend of purposive, convenience and snowball sampling. The second phase was done as blend of convenience and snowball sampling. Convenience sampling occurs when participants are chosen from the larger research population based on their availability (Mertens, 2015; Patton, 2015). Snowball sampling is where Patton through Merriam (1998) stated that, "this strategy involves identifying participants or cases of interest from people who know people who know

people know what cases are information-rich" (p. 63). A combination of convenience sampling with snowball sampling was used to enable opportunity to gather a rich description of the site.

An invitation was sent to all members of faculty and staff, regardless of formal leadership position. This was done with the aim to include informal and emergent members exercising leadership, in addition to those in formal leadership positions in this study. All modes of the invitation included exclusion and inclusion criteria, where the criteria for inclusion includes: an active member of the site and have a curiosity to discuss how they are exercising leadership in the complex adaptive system. A pre-conversation was conducted with members who identified as exercising leadership to ensure that the participant met the inclusion criteria of the study. Following successful pre-conversations, the interviews continued. This pre-screening was done to ensure that the potential participant was a current member of the site, and was not self-censoring their participation based on current organizational title, as explored in the conceptual framework. The classification of formal, informal, or emergent leader was left up to the discretion of the participant. In *Table 1 – Frequency of leader types* below, the frequency and types of leaders within this research study are shown:

Table 1 *Frequency of Leader Types*

Participant	Formal	Informal	Emergent
Participant #1	X	X	
Participant #2	X	X	
Participant #3	X	X	
Participant #4		X	X
Participant #5	X	X	X

Participant #6		X	X
Participant #7	X	X	
Participant #8		X	X
Participant #9		X	X
Participant #10	X	X	
Participant #11	X	X	X

Interestingly, not all participants who held a formal title, identified as a formal leader. Rather, some participants who had formal titles identified as an emergent or informal leader. During design of the study, it was expected to potentially have some dissonance here with a person's title and actions, as defining leadership is a delicate endeavor. In addition, all participants identified as an informal leader. At times, the identification of being an informal leader was in combination with also identifying as an emergent leader, or as a formal leader, or in combination of all three presented options. This is an important observation, as it suggests diversity in perception of one's leadership within the case study research site. By including this range (formal, informal, and emergent), it encouraged a continuum of participation in this research study so that a larger system-level view of role within the complex adaptive system was observed. In some of the conversations during pre-screening, it was confirmed that if this type of broad approach to defining leader was not used in the recruitment method, then potential participants would have self-censored their participation. During the planning of this study, it was unknown how leaders would identify as formal, informal, and emergent. It was anticipated to gather 20-25 interviews over the course of this study; however, saturation was received earlier. The number of 20-25 interviewees was carefully chosen to provide options in obtaining a breadth

across the site of the study, depth within the phenomena, integration with document analysis, as well as the scope of the dissertation timeline.

The first stage of recruitment involved a direct email invitation, as e-mail addresses were publicly available on the organizational website. The second stage of recruitment used two approaches: 1) posters were displayed on public bulletin boards which are visible to site members who are located on site, 2) a flyer was delivered to each member's personal mailbox at the site with information about the study, and how they may be able to participate, and 3) a second email was purposively sent to all members of the site to encourage a representative composition within the study sample.

In total, 11 people reached out to participate in the study, and 11 semi-structured interviews were held, with 9 interviews held in-person, and 2 held over the phone. The semi-structured interview questions are found in Appendix A of this document. The 11 participants in this study were representative of the diversity of positions available as staff members, faculty members, instructors, and administrators. The years of service for the participants spanned from under 2 years, to over 15 years, although exact years will not be provided, as this would clearly identify some of the participants. To maintain protection of identity of the semi-structured interview participants, only selective descriptive information will be used to convey the breadth and depth of diversity among participants. While 11 participants was less than the intended 20-25 participants, saturation was starting to set-in around the 5th interview. By the end of the data collection period approved by the institutional ethics board, the saturation present in the data in the last few interviews confirmed that a generous dataset had been achieved.

Following consent from the participant, the interviews were conducted and recorded for transcription. The interviews averaged around 45 minutes. A copy of the transcript, which was

done by the researcher, was provided to the participant within one week so that the participant could validate its accuracy, and authenticate the data. The participants were given up to two weeks to identify any needed changes. Four of the participants elected to participate in member-checking, and majority of changes had to do with catching small typographical errors, and a minority of the changes requested redaction of detail to support as much privacy of the participant as possible. Following member-checks by the participants, the interview data had pseudonyms attached to maintain anonymity during analysis and dissemination.

As the site is represented largely by females in the workforce, male pseudonyms were used for all excerpts from the transcripts, in an effort to provide privacy to participants (Lahman, Rodriguez, Moses, Griffin, Mendoza, & Yacoub, 2015). During the semi-structured interviews, many participants expressed concern over how their privacy will be protected. The participants were very genuine and generous in sharing their voices to support the potential success of this research study, and the dissemination of findings from this study will hold the duty of ethic first and foremost. The transcripts created from the 11 semi-structured interviews, totalling just over 54,300 words from 7 hours of recordings.

Triangulation of this research project was maintained through the data points of information through literature, data gathered through the document review, and data gathered through the interviews. The use of using multiple sources of data to create a dataset supports data source triangulation (Patton, 2015). Combining different source of information not only strengthens the findings, it provides triangulation as this integrates the findings in a holistic manner, rather than simply replicate the findings (Patton, 2015). This study used multiple methods of data collection and analysis, which assists in triangulation and internal validity (Merriam, 1998).

Data analysis

Data analysis began as data was collected, and was guided by the purpose of this research study, research questions, and the theoretical/conceptual framework. The data analysis of this dataset followed an inductive approach, where codes, categories, and themes emerged from the data (Glesne, 2011; Merriam, 1998; Tracy, 2013; Patton, 2015; Saldaña, 2015), rather than an approach that would be seeking to confirm a theory or hypothesis. Saldaña (2015) spoke of some attributes necessary for coding qualitative data successfully, including: organization, perseverance, ability to deal with ambiguity, flexibility, creativity, ethics, and having an extensive vocabulary (pp. 38-39). Considering this advice, I considered *how* this could be done, at this point, to condense the data into meaningful categories, and eventually themes, without diluting the meaning of the words shared by the participants. In addition to using computer software for qualitative analysis, researchers can also successfully code in a more manual process (Glesne, 2011; Saldaña, 2015 Tracy, 2013). Thus, I considered *how* qualitative analysis could look like within this research project.

I began coding with qualitative analysis software, however I found the software to be cumbersome when working through the iterative process of refining codes. When selecting an appropriate method for qualitative analysis, Saldaña (2015) quoted Patton (2015) who stated, "because each qualitative study is unique, the analytical approach used will be unique (p. 522)" (p. 69). Thus, as I found that the qualitative software was getting in the way of seeing patterns in the larger dataset, I considered a manual approach. For this manual process, I used a paper and colored pencil approach. First, all transcripts and documents from the document review were printed out, and attached to poster paper, and placed up on a wall. Given the sensitivity of data, this was done in a secure location. The data was then read and re-read, with notes made in the

margins of the paper. The notes were circled and shaded in various colors to help show potential patterns within the dataset.

With this manual process, I began to see that some of the codes were overlapping. This overlapping led to either a refinement of the codes, and eventually, this overlapping hinted at emerging pattern, which became the categories, and eventually the themes. The manual approach, with paper and pencils facilitated awareness of when codes were overlapping, as it was possible to view the entire dataset. In contrast, within the qualitative software being used, the entire dataset would be quite difficult, if not impossible, to view on one computer screen. Rather, I could only see one computer screen's worth of data at a time, which made it difficult to see patterns within the entire dataset, and compare nuances between excerpts. When I put the dataset up in a manner where I could see more than one computer screen at a time, I began to clarify where codes were needed, where codes overlapped, and what each code meant. With this awareness, I was finally able to create a coding dictionary which was reflective of the dataset.

Coding within this project was an iterative process, which is common in qualitative analysis (Creswell, 2013; Glesne, 2012; Patton, 2015; Saldaña, 2015; Tracy, 2013). After the documents and transcripts were read several times, and a coding dictionary was established, primary codes were assigned throughout the dataset. The purpose of establishing this primary code is to condense the data into datum, rather than reduce it into fewer words (Saldaña, 2015). This primary code was a descriptive word or a short phrase (Saldaña, 2015) that captured an excerpt from the dataset that may represent a portion of a response to the central research question (Tracy, 2013). Using a constant comparative method (Tracy, 2013), the list of primary codes was refined so that the primary codes were distinct enough to capture details unique to

each code, yet not so large as to dilute the purpose of the document, or the voice of the

participant.

Following this stage, I began the process of consolidating the primary codes. This

consolidation occurred as a process called second-level coding (Tracy, 2013), or categorization

(Saldaña 2015), where interpretation and assembling of the primary codes provides an

opportunity to see the emergence of patterns in the data, which can be seen as categories or

themes (Mills, & Gay, 2016; Patton, 2015; Saldaña, 2015; Tracy, 2013). There were over 60

codes originally identified, and while categories were beginning to emerge, the categories were

yet to be clearly bounded. Given the topic (of complexity in educational research), some overlap

of codes is to be expected; however, the overlap which was present reflected a requirement of

further need for analysis, rather than from the topic being discussed. To accomplish this, an

electronic spreadsheet program was used to extend the manual process of coding to begin

consolidation of categories, along with representative excerpts. Throughout this process, the

categories were refined as decisions were made on how excerpts served as evidence to support

the categories. The emergence of codes, categories, and themes within the dataset will be

discussed in Chapter 5.

In summary, the process of data analysis began with the collection of the first piece of

data, and continued until all data was coded and themed (Glesne, 2012; Saldaña, 2015; Tracy,

2013). Data analysis began with the document review as documents fitting the inclusion criteria

for this study were located, and data analysis began for the semi-structured interview data when

the member-checking step was complete for the first interview. It was helpful to have data

analysis occur concurrent with collection, as this allowed me to see that saturation was achieved,

and perhaps, the dataset generated within this research study may be able to provide a response to the research questions.

Ethical Protocols

Researchers have a duty of care in relation to all people engaged in the processes of investigation, which are achieved through the enacting of ethical protocols. To ensure this duty of care, this research project was approved by the Office of Human Research Ethics at Western University, and following this approval, it was sent to the Institutional Research Ethics Review Board at the site of the case study for approval. This project adhered to the ethical protocols with the *Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans*.

The following challenges of the exploratory case study were recognized.

1. I am employed as an academic at the site whose positionality has been declared. During the writing of the proposal for this research study I was a member of the complex adaptive system within this research study, and my employment to be external to the site; however, still within the organization, 2 weeks prior to the commencement of data collection. In both positions, I do not have direct reports; therefore, there is no direct conflict of interest. However, as the participants and I share a work location and work collaboratively on some projects, there may be a sense of coercion to participate. To meet the Tri-Council's requirement of free and informed consent and to mitigate any power-over issues related to my involvement in this study, I conducted interviews in a way that recognizes that the participants are speaking to a researcher. This was accomplished by meeting at a time and place at the participants' convenience, communicating through my UWO email, maintaining consistency in professional demeanor, and treating

participants with respect. The beginning of each interview also had a short conversation where any questions or curiosities that the participants had could be answered, and I emphasized that this conversation is ongoing throughout the study, at their convenience. This offer was well received by the participants, as it provided an engaging conversation about the background and relevance of the research study prior to moving towards discussing the possibility of being involved in the research study.

2. The timing of the study coincided with the beginning of the 2017/18 academic year. The data collection covered several months to provided participants opportunity to balance their personal commitments and workload, with participation in this research study. This extended time frame allowed for flexibility in scheduling the semi-structured interviews, which was well received by participants in this research study.

3. The specificity and accuracy of the data reflected the voices of the participants, and the publicly available documents.

Chapter 4 outlined the methodology, methods, data collection, data analysis and ethics for the study. Chapter 5 will now present the findings of the study.

CHAPTER FIVE: FINDINGS

Three meta-themes emerged from the dataset of this exploratory case study. Each of these themes contain a number of subthemes. The first theme that emerged was the *starting conditions of the complex adaptive system*. This theme begins with participants describing the point at which they identify as being a part of the complex adaptive system. This point is important, as it becomes the foundation for how the participants understand their role within the complex adaptive system. Participants also reported how relationships and connections within the complex adaptive system also led to emergent conditions for complexity. The second meta-theme, *experiencing and effecting leadership through enabling the potential of the complex adaptive system*, refers to how leaders, and their work, are enabled (or disabled) within the complex adaptive system. In this theme, participants explored the potential for complexity, as seen through emergence and adaptation within the complex adaptive system, within the context of changing educational programs. When participants shared their experiences, they talked about potential for complexity during changes in educational programs on an individual level, as well as an organizational level. This theme includes the subthemes of: enabling innovative pedagogy, and enabling participation. The third meta-theme that emerged was *momentum of emergent conditions through diversity within the complex adaptive system*. Subthemes included: diversity of perspectives on changes in educational programs, and diversity of perspectives on roles, leaders, and leadership.

These themes and subthemes emerged from the data sources that were analyzed within this exploratory case study. *In Figure 1 – Visual representation of the relationships between dataset, data analysis, and findings*, the visual displays how the meta-themes emerged through the process of data analysis, as described in the previous chapters. In summary, the dataset was

composed of a document review and semi-structured interviews. From this dataset, the data

analysis was accomplished with thematic analysis, beginning with the generation of codes and

categories, which ultimately yielded the meta-themes and subthemes.

Figure 1. Visual representation of the relationship between dataset, data analysis, and findings

The rich thick description of the meta-themes and subthemes, grounded in the data and related

academic literature, will now be presented.

As previously discussed in the literature review, the unique perspective of complexity

theory is driven by the distinction between initial conditions from emergent conditions. Initial

conditions provide a solid foundation for prediction, and emergent conditions provide

opportunities for complexity, as found in complex adaptive systems. This discussion is

organized by the three themes that emerged during analysis. The presentation of these themes

have been sequenced in a manner to highlight how complexity theory offers a unique perspective

on the findings of this research study. Complex systems are very sensitive to specific starting

conditions (known as initial conditions or emergent conditions), and how feedback plays a role

(Gribbin, 2004). It is through feedback in a system that leaders can experience the context

within which they are in. That is, when system feedback confirms a prediction, initial conditions

are at play, and chaos theory provides the structure to reduce these initial conditions to a

determined cause (or causes), so that prediction can happen. As this cycle continues, predictions

are strengthened, refined, and trusted. Conversely, when system feedback generates something

beyond what could have *ever* been predicted, emergent conditions are at play. It is important for

leaders to be aware of the effect of system feedback within their context, so that they can

question when prediction and repeatable best practices will help, or hinder, the larger system.

The discussion of the research findings begins with individual starting conditions, and

moves through exploring how emergent conditions evolve throughout the complex adaptive

system. The discussion will begin with the first theme, *starting conditions of the complex*

adaptive system, which explores a range of initial and emergent conditions of the complex

adaptive system, with a focus on emergent conditions. Carrying these emergent conditions

forward, the second theme of *enabling emergent conditions of the complex adaptive system*

explores how individual emergent conditions are enabled (or disabled) within the complex

adaptive system. The third theme, *momentum of emergent conditions through diversity within*

the complex adaptive system, explores how leadership and complexity interact, as leadership

considers reconciling the diversity of enabled and evolved emergent conditions of the complex

adaptive system. While the discussion is presented in a sequenced and somewhat linear fashion,

it is important to note that there is an underlying non-linearity to the discussion of findings. That

is, without first working through the findings from identifying starting conditions through

exploring how these starting conditions have behaved and perhaps evolved, it would not be possible to categorize which starting conditions were initial conditions, and which starting conditions were emergent conditions. Thus, the theme presented last in this discussion of findings was pivotal in informing what was emergent in the first place. As the rationale for the structure of the discussion has been provided, the discussion will now begin with an exploration of starting conditions of the complex adaptive system.

Theme 1: Starting Conditions of the Complex Adaptive System

As discussed in the literature view, within complexity starting conditions matter, and there is a distinction for emergent conditions from initial conditions. Initial conditions provide a solid foundation for prediction. However, within complexity, emergent conditions provide the opportunity within complex adaptive systems for novel activities to occur. There is an important distinction here, in that initial conditions lead to confident and reliable predictions, and emergent conditions are unable to yield prediction. This distinction is important, as it is the division between predictive theories, such as chaos theory, and theories that account for complexity, such as complexity theory. A complex adaptive system demonstrates non-linearity, adaptation, emergence, and rich interconnection. In this study, participants reported how they became a part of the complex adaptive system. Complex adaptive systems, including educational organizations undergoing staff turnover, present a paradox of maintenance and renewal as new starting conditions are introduced (Morrison, 2008). Furthermore, the relationship between new starting conditions and existing emergent conditions provide additional opportunities for autopoiesis, which enables the system to continually regenerate itself through emergence from these starting conditions (Morrison, 2008; Wheatley, 1999). Given that recruitment for a range of positions is constantly ongoing, the emergent conditions at the case study site are ever-evolving, as the

people, and the roles that they fill, are constantly changing. This meta-theme explored the evolving emergent conditions of the complex adaptive system, where the evolving emergent conditions can be found within people, and the relationships and connections that people have within the complex adaptive system.

As this meta-theme begins with participants describing the point at which they identify as being a part of the complex adaptive system. This description was inextricably linked with how their relationships and connections within the complex adaptive system also led to emergent conditions for complexity. Furthermore, as these relationships and connections grew over time, emergent conditions also evolved to provide continuing opportunities for complexity. This is important, because how these relationships and conditions evolved over time was not always predictable, should prediction have occurred at the point at which they identify as being a part of the complex adaptive system. Together, these two subthemes provide some insight into how the participants understand their role within the complex adaptive system.

Identifying as being part of the complex adaptive system. In this research study, the starting conditions of the complex adaptive system were influenced by recruitment of new faculty, staff, and students, as reported by the participants. During the semi-structured interviews, participants described how they became a part of the complex adaptive system. The motivations for becoming part of the complex adaptive site had a range of internal (e.g.: always wanted to work somewhere challenging and different) and external motivations (e.g.: absence of clinical jobs). The description of wanting to work somewhere challenging and different is an example of an emergent condition, and the response to an absence of a clinical job is an example of an initial condition. That is, it is reasonable to predict that if a clinical job is not available, and employment is desired, then employment will be sought in a related industry where clinical skills

are required. For some, it was a planned journey to work in academia; however, for most of the

participants, it was an unexpected career path. This is an important observation, as it

demonstrates a range of starting and emergent conditions within the complex adaptive system.

For example, Jackson described his motivation to work within academia with,

I always had an interest in working in academics… wanting a bigger challenge, wanting

to use my head and do something different day to day and not be in a job that I didn't feel

very stimulated in and I think the environment of working with students as well, I just

knew that was something I would enjoy once I got into that type of work.

It is interesting to note that the example drawn on internal motivation is likely to be associated as

an emergent condition, whereas the example drawn on external motivation is likely to be

associated as an initial condition. The internal desire to always want to work somewhere

different and challenging shows robust adaptability. Furthermore, in this excerpt, Jackson

suggests openness to what will occur, rather than having a finite prediction and repetition of what

the day to day would be in this workplace setting. This is an example of a potential emergent

condition, as adaptability on an individual level of an organizational actor is integral to the

continued interactions of organizational agents within the larger complex adaptive systems

(Clancy, Effken, & Pesut, 2008; Fidan, & Balci; 2017; Florczak, Poradzisz, & Hampson, 2012;

Uhl-Bien, & Arena, 2017). This is an avenue for further exploration here, as to how motivation,

as internal or external, is associated with organizational actors within complexity. As the path-

goal leadership theory incorporates motivation (Northouse, 2016), there may be an opportunity

to explore further with this theoretical guidance.

There are many places to work in within health professions education. As to why some

of the participants chose to become a part of this specific complex adaptive system, may be

reflective of the emergent work done by the case study site. For example, Jerry noticed that sometimes people join when they are inspired by the work generated from within the complex adaptive system. He recalled, *"I have seen the College really having developed a voice by virtue of the fact that we have got some people who are quite celestial in what they do in terms of their research, and that brings prominence, and people will take notice of those kinds of things."* Those who are yet to be a part of the site see the work being produced, which is an example of emergence from the case study site, and they wish to be a part of the complex adaptive system.

For Randy, the case study site was a place to contribute and develop skills within the health profession while waiting for a direct-care position within the health profession, with, *"Unfortunately, when I graduated, there were no jobs. It was one of the, you know, sort of cyclical periods of downsizing in the health care sector and so I took a quote-unquote temporary position … in the hopes that something would come up in the service sector."* When Randy, and other participants who had similar experiences were presented with a situation where linearity – employment following education as planned – did not occur, an adaption occurred by finding an alternate route to employment following education. In this case, the adaptation to constraints at the individual level led to becoming a part of the complex adaptive system identified within this study. Alex spoke of how adaptation within his career, within both the health and education system, provided opportunity for adaption, and eventually emergence, with,

> *"I've always like learning, so I knew that since nursing is such a vast career, I knew that I would want to go, I knew bed side nursing was a great start, but that I wanted to do more, and that in today's day and age, a Bachelor's of nursing will only get so far, and that the way things are moving forward, that you would need your Master's to be competitive to be competitive in a higher level job, So that was kind of my thinking, that I*

would come after a few years, and I thought, well I'll get my Master's, and even if I don't

have a job in the fore-front of my mind, it will, I'll have my Master's so that one day

when the job presents itself, I'll have it in my back pocket and it will make me a more

competitive candidate for a job in the future"

This adaptation described by Alex brings in the rich interconnection of the complex adaptive

system identified within this study with the health care system, which is another complex

adaptive system adjacent (if not overlapping) to this study. While this study focuses on the

identified complex adaptive system of a College within a Faculty, in order to describe this

complex adaptive system, the relationship that it may have with other assemblies of

organizational actors, such as the health care system, is relevant to its description.

In addition to the adaptability shown on an individual level through recruitment of new

members, adaptability after recruitment extends to relationships with new colleagues. Some of

the participants continued with reflecting on how they were now within the complex adaptive

system, how they may expand in their role, as well as develop other points of entry for future

roles within the complex adaptive system. This is consistent with the literature, where new and

novel rich interconnections are possible (Nübold, Dörr, & Maier, 2015), which further refine and

define the complex adaptive system (Koopmans, 2014), and the health education programs

delivered (Mitchell, Jonas-Simpson, & Cross, 2012). These future roles were described as

spanning not just entry-points for faculty and staff, but also for students to engage with the

educational programs offered. Curtis stated, *"...we've always been working towards having the*

baccalaureate program as entry-to-practice [for the profession], but always with the opportunity

for people who had their [diploma] to come back and get the [degree]." That is, the site works

to expand potential entry-points for students so that there would be an increased opportunity for

entry to the site to increase the flow of new students into the developing community. However, even with this openness, Marvin expressed more can be done to increase opportunity for prospective new members generally by acknowledging the need to substantially diversify recruitment with,

> *"You know, I think we've built much stronger links with the broader nursing community, I think our students are more, definitely more diverse [that] we've brought in, we have sort of opened up and moved away from only nurses being on faculty, although I think we still have some ways to go there, and we don't have a very diverse faculty in terms of, you know, ethno-cultural, like how many Indigenous faculty members do we have?"*

Diversity is important within complexity, in that not only does it provide a range of emergent conditions for novel activity to occur, but diversity supports the non-linearity, adaptation, emergence and rich interconnection within a complex adaptive system (Clearfield, & Tilcsik, 2018). Within this specific complex adaptive system, diversity was seen by the participants as not just with previous education received, but is a *combination* of a person's heritage, a person's lived experience as well as a person's credentials. For example, from the document review, it was found that there are articulated pathways for potential students who have health professions education from other institutions on how they can become a student at the case study site, at either the graduate or undergraduate level, with a diverse range of prior learning accomplishments. In addition, there is a program intentionally designed to support potential students with Canadian Indigenous ancestry transition into a career as a nurse.

Another document read with,

> *"We are committed to provide [health] care in a variety of settings and to make a difference in people's lives. We offer programs in a community that is characterized by a*

mosaic of cultural groups. Our curriculum gives students a solid base in theory and our

clinical practice allows students to apply their skills and techniques in actual care-giving

environments. Our [health care providers] view people in their entirety through

providing a service essential to community health and welfare."

It is an inviting phrase to read while seeking employment as a faculty or staff member, as a student, and even as a general citizen of the public. This phrase acknowledges the rich interconnection that the case study site has with a dynamic health care system, which includes the health status of the people who depend on this health care system.

Adapting relationships and connections within the complex adaptive system. This research study focuses on complexity during educational program changes at the site, and the participants spoke about how these educational program changes generated opportunity for novel starting conditions with respect to recruitment of new members. Participants observed how changes specific to educational programs have not only provided evolving emergent conditions for the complex adaptive system, but these changes have also presented opportunity to re-consider relationships within the complex adaptive system. For example, the creation of a new educational program, a PhD program, has provided the site with an entirely novel opportunity to generate starting conditions, as PhD graduates become peers. For example, the adaptation of relationships between graduate students and faculty that evolved out of the new PhD program were described by Bennet with,

> *"Well just a PhD student is very close to becoming one of your colleagues, especially*
>
> *near the end of the program, especially for tenure-track people. They've never had*
>
> *students in their own college that were that close to becoming their colleagues … That*
>
> *often doesn't happen, for people here, with their PhD up until now, that hasn't happened.*

When people graduate, they're not at their level. They either gradate with a BN or an

MN, but all of a sudden you're graduating students who are going to be at your level."

This is an important observation, as it demonstrates a range of evolving emergent conditions

within the complex adaptive system stemming from adaptations in relationships. The creation of

a new educational program, a PhD program in this example, has provided the site with an

entirely novel opportunity to generate starting conditions, as PhD graduates become peers. Non-

linearity is observed by a graduate of the site to re-engage with the site after graduation instead

of continuing with a mechanistic student-in, graduate-out process. Adaption is seen with how

faculty of the site respond to a potential new colleague who emerged from being one of their

students, as opposed to a new colleagues recruited from outside the case study site. Specifically,

within this adaptation of relationships as PhD graduates become peers, the relationship between a

faculty member and new colleague is built on the constraints from the previous relationship

between a faculty member and graduate student. Bennet continued to share how these evolving

emergent conditions are generating feedback within the complex adaptive system, with,

> *"I generally sense the faculty is excited about the new PhD program, but I think as well,*
>
> *just learning how to work with PhD students, and the supports that need to be in place*
>
> *has probably placed a drain on faculty, like even if it's been positively, it still takes*
>
> *energy."*

Randy also spoke of the energy and resources required for this new program with, *"we managed*

finally after years of struggling and arguing to get a PhD in [health professions] that was a huge

achievement." While the energy and resources required to support this program have been

noteworthy, participants describe it as a worthwhile endeavour. The case study site has seen a

recent shift in recruitment of faculty from their PhD program, which has shifted how

relationships adapt between faculty and graduate students, as graduate students become peers. These observations appeared as a result of the rich interconnections between the physical site, members, the work, and the changing educational programs at the complex adaptive system.

Participants also described the adaptation of relationships and connections within the complex adaptive system as they worked with each other to deliver educational programs. Jerry spoke of how titles have the ability to sever the rich interconnections within the complex adaptive system by presenting divisions between people, with, *"I would see myself fitting in at the rank of the tenured faculty, right? I don't like that dichotomizing, but that's the way we're structured here."* Randy spoke of this as well, and continued to articulate a potential difference in these groups with, *"I think that the instructors, although they don't verbalize it as much as they used to, ... really don't feel like they have the same standing in the [site], as tenure/tenure-track."* The difference between these groups is associated with different activities and workloads, notably, that instructors fulfill more of the teaching duties, and tenure/tenure-track fulfill more of the research duties. With a differentiation of groups and the lens of complexity theory, it would be prudent to consider if belonging in either of these groups would matter as a starting condition. This differentiation has existed for some time, and is not unique to a complex adaptive system. However, it is noteworthy that this consistency continues to persist in a complex adaptive system. It is possible that leadership, within this complex adaptive system, has provided stability for this traditional dichotomy to continue. While there may be stability in this dichotomization, there is also room for some fluidity in interpreting how this dichotomization comes through a person's overall role within the complex adaptive system, which is explored further below.

As this research study considers the changes in educational programs as a focus of inquiry, all of the participants who had a faculty appointment described how this dichotomization played out during the implementation of a new curriculum at the site. In his interview, Curtis spoke of how teaching in teams became formalized, and that this started to remove some of the boundaries around individuals. Michael spoke of teaching teams, which were new to his teaching practice, and how teaching in teams over time helped to build a connection between people with, *"we formed teaching teams instead of lone rangers, so that there would be more input into the development of particular courses, and it won't be just one person who owned the course."* Bennett spoke of the success in this sort of teamwork and how it helped to cultivate community with colleagues, *"I've worked with people where we were able to create together, and so it felt synergistic, Yeah, so it felt more synergistic than restrictive."* Continuing with relationships, participants spoke of how developing teams – connections with each other - was necessary to successful deliver the new curriculum being implemented at the site. Stephen spoke of how the experience of working in a new environment for him, which focuses on delivering a new curriculum in a team, has helped him adapt to changes in educational programs overall, with,

> *"... we were encouraged to adopt more active learning strategies that would align with flipped classroom. And, we had opportunities to attend workshops, we had opportunities to work together as teams, and that, the team model has always been something that I've embraced. Its nice to be able to toss ideas around and work together and not feel like you're the only one who's trying to do something…Clinically, we have had to make a number of changes, some because of internal changes within the [site], and some that are externally applied, such as the changes to the [local health authority] now, are requiring*

a lot of intricate dance steps to still provide quality educational opportunities for

students."

The teaching teams have had an effect to develop community from not only developing solutions

to adapting to changes in educational programs, but also in responding to events occurring

outside of the complex adaptive system.

In this research study, given the sector of health professional education, the events

outside the complex adaptive system are often driven by the larger health care system. These

events have an influence on the site, and test the boundaries of the community at the site.

Relationships and partnerships are needed with the larger health care system (clinical partners as

well as the funding government body) to deliver on the business of the site. All participants

spoke of the changes occurring in the local health authority due to recent changes in a provincial

government mandate, and how it is impacted and influencing not only further changes to

educational programs, but also their community. Michael spoke of the relationship that the case

study site has with the local health authority and clinical partners as part of the community which

the case study site wishes to continue to grow, with,

> *"I think they feel connected, and I use language like this that, we do not own the*
>
> *[program], because we cannot deliver it without clinical, so I need you, as clinical*
>
> *partners, to help us deliver this program, and it belongs to you as well, it belongs to the*
>
> *Province, because we put out professional nurses together."*

Overall, all of the participants spoke of the importance of relationships as an enabling force to

continuing to be able to fulfill changes (and even maintain) educational programs.

A pattern was observed in the responses provided by interviewees. The coupling

between the system which provides health professions education, and the system which provides

health care was mentioned by all participants. For emerging leaders, even if their time at the case study research site was only a few months, emerging leaders spoke of their connections in other systems on a more personal or individual level, whereas formal leaders extended their connections to titles and organizations. This pattern is significant, as it shows how leaders are able to generate starting conditions from connections between systems through adapting relationships at various levels, regardless of their time spent at the case study site. Within this theme, this is significant because it articulates that the ability to make a connections between systems can occur at any time, and any level. Furthermore, the ability to make connections as such generates starting conditions for the complex adaptive system, whether they viewed their leadership as formal or emerging, and it shows how distributed leadership theory can exist within complexity.

Some of the starting conditions at this site also evolved through iterative interactions and connections with clinical partners and government. This is consistent with other findings, in the complex adaptive systems overlap, including health professional education and the health care sector (Clancy, Effken, & Pesut, 2008; Fetherston, Browne, Andrus, & Batt, 2018; James, 2010; Weberg, 2012). The participants in this research study described several overlapping systems with the site, each with unique stakeholder interests, including: clinical partners, government, regulatory bodies, professional associations, where similar challenges and circumstances were within several systems simultaneously. For example, specific to changes in educational programs as was the focus of this research study, participants spoke of how recent changes in health care delivery was impacting delivery of clinical practicum placements, as well as the future of the health care workforce (and potential changes in student enrollment) as further efficiencies are sought.

It is important to note here, that the starting condition is not the larger changes in the health care system; rather, the starting conditions are the relationships that people within the complex adaptive system of this research study may have with other roles in other overlapping systems. Viewing this starting condition as an initial condition would position us in a place to draw comfortable predictions, where past practices can completely inform future practice without any adjustments. However, viewing this starting condition as an emergent condition, would position us in a place to explore options in how these systems may adapt and respond. As this research study is restricted to the complex adaptive system offering the educational program for a health profession, the scope will align with this boundary of the case study, and will not consider how the relationships between overlapping systems as starting conditions evolved in the other systems. Perhaps, as will be further discussed in the next theme, the starting condition of relationships that people within the complex adaptive system of this research study may have with other roles in other overlapping systems provides some room for prediction, as well as some room for complexity.

This theme has explored the evolving emergent conditions for the complex adaptive system through participants describing the point at which they identify as being a part of the complex adaptive system, as well as how relationships and connections within the complex adaptive system also led to emergent conditions for complexity. The next theme will build on this theme by considering how emergent conditions may be enabled within the complex adaptive system.

Theme 2: Enabling Emergent Conditions of the Complex Adaptive system

Building on the evolving emergent conditions in the previous theme, this theme describes how participants explored the potential for complexity, as seen through experiencing and

effecting leadership within the complex adaptive system, within the context of changing

educational programs. Starting conditions, whether initial conditions or emergent conditions

need to be enabled in order to progress beyond merely a starting condition. Within this research

study, the participants described overall motivations for why, and how, they may be specifically

enabling emergent conditions within their complex adaptive system. This theme has the

following subthemes: enabling innovative pedagogy, and enabling participation.

      Enabling innovative pedagogy. Some of the encouragement to change educational

programs, and pair with innovative pedagogy during its delivery, comes from changes in the

health care system. In the health care system, change is constant, and this change is inextricably

linked with other social systems, including the delivery of education (Khan, Vandermorris,

Shepherd, Begun, Lanham, Uhl-Bien, & Berta, 2018). During the time of this research study, the

site was undergoing a response to changes stemming from a new provincial government. In

particular, during the course of this research study, participants spoke about the amalgamation

and reconfiguration of provincial health care services, such as emergency rooms and urgent care

centres. Specific to changes in educational programs at the site, these health care system

changes impacted clinical spaces for students. With the spaces for clinical education being

impacted by re-structuring in the health care system, a renewed look at how the use of simulation

in the curriculum was seen as a way for the educational programs at the case study site to

respond. Knowing that the students still need clinical exposure as part of their educational

experience, the site has adapted. Stephen explained how the use of simulation became

innovative pedagogy at the site, as,

> *"...with all of these changes to the [local health authority], the case was made again for*
>
> *utilizing simulation as a part of clinical education, and there are some Universities in the*

country that are using it considerably more than we are. U of T does 50% for example,

and we do 25%. It gives everybody equal access to some learning opportunities

clinically, that you just can't orchestrate for everybody."

The equal access mentioned in this excerpt contributes to how leaders at the case site enable

potential learning opportunities found within the clinical setting. This is consistent with

literature in that the use of simulation within health education in Canada is gaining acceptance as

a way to respond to the complexities in the context of delivering educational programs in health

care professions (Landeen, Perazzo, Akhtar-Danesh, Baxter, & van Eijk, 2015). The site has

been able to adapt to complexities in its context, as enabled by the changes in the health care

system, beginning from the starting emergent conditions.

The changes in educational programs have also been felt inside the classroom, with how

teachers are contributing to potential learning opportunities as well with innovative pedagogy,

such as a concept-based curriculum, as Paul shared,

"*we have completely changed the [program] so that it is a concept-based as opposed to*

content-heavy. We use a learning-centred pedagogy, we are interested in supporting our

students, and I really think it's one of the best program in the country. Certainly our

[entry-to-practice] results will bear that out…we have cutting edge pedagogical

approaches, our simulation labs and our skills labs are on the forefront, and we are

working on teaching our faculty to be [health care profession] educators."

By lifting the potential of how teaching can be delivered, the contributions of the students were

shifted, in a way that enabled their health care profession career, and presents an example of how

instructional leadership theory is useful at this case study research site. There is an entry of path-

goal leadership theory here to, that underscores the motivation of why the organizational actors

wanted to teach in a different way. The leaders at the case study site had a goal of moving to a concept-based curriculum. A concept-based curriculum is expected to better-prepare health care professions for the entry-to-practice exam as well as working in a complex health system, as the concept-base curriculum emphasizes critical thinking over content memorization (Giddens, Caputi, & Rodgers, 2014). Jerry expressed that,

> *"I think that everyone has been trying to operationalize a concept-based approach in the classroom. I have heard of, I have not experienced this, but I have heard of that in the concept based approach as you know, they call it teaching lite, I don't call it teaching lite, it's teaching heavy. It's bringing the content to life, and the application, so it's not just information to students, but doing activities in the class that are thoughtful and get them engaged in application, and that takes a lot of energy and a lot of time."*

The rationale to change to a concept-based curriculum was to enable the potential of the student to succeed in an information rich career, as well as better prepare program graduates for their entry-to-practice exam. However, to actualize these benefits, the students needed to approach learning in a different way. During Darren's interview, he shared that he,

> *"[remembered conversations] in which the student would have to adapt the way they study the material, you know, they find it's a lot of material to study, and so, they're challenged with changing the way in which maybe they were used to studying, for example, maybe they were, one of the ways they studied was to memorize more, and you're not able to memorize the sheer volume of material."*

In order to enable the potential of students to successfully complete the entry-to-practice exam and contribute to their health care profession, supports were put in place. Stephen shared how some of these supports are accomplished for students, with,

"We had our students do a mock [entry-to-practice exam] testing situation where they had to do the palm scan, they had to do everything else, and they came in and used the computers etc., and everything here in the lab. Our results compared to other places nationally that didn't do any prep with their students, our results were significantly higher. Our students did considerable better on the first writing, etc. So, we're very pleased with that. It cost time and money, and people resources, but it was well worth it for the students."

This excerpt provides an example of a blend of servant leadership and instructional leadership, as the participants considered how they, as educational leaders, could serve their students better during the transition to a new entry-to-practice exam as well as a new curriculum.

Overall, while some successful results were achieved as Stephen mentioned, there were also some challenges in enabling students to become successful on the entry-to-practice exam, as it is an American-based exam. The move to this entry-to-practice exam is relatively recent (2015 in Canada), and has introduced implications for educational programs. For example, as students score on the entry-to-practice exam are seen as an evaluative indicator of the education program in and of itself (Foreman, 2017), educators are looking to adapt teaching styles to learning styles to support student success on the entry-to-practice exam (Lown, & Hawkins, 2017), and administrators are considering what prerequisites for theory educational programs would be best (Schaffer, & McCabe, 2013). There is also a conception that the entry-to-practice exam is not representative of nursing practice (Staple, & Urban, 2014). Randy expressed a concern that the entry-to-practice exam itself might shape, by disabling rather than enabling, the potential and contribution of graduates with in the larger health workforce with, *"I don't think any of us wanted to believe we wanted to become an American ... there's a lot to [our profession] in*

Canada, sort of values that we have, that are unique to us…it is very easy to get yourself twisted

around so that you are only teaching to the test." Randy further described the content that may

be missed if one is "only teaching to the test" with,

> *"so that means you forget things like the values of a publicly funded health care system,*
>
> *you don't teach about cultural safety, you don't integrate sort of you concerns about the*
>
> *social determinants of health, diversity in the workplace, diversity in client population,*
>
> *there's a lot of stuff that we teach that is not in the [entry-to-practice exam]"*

Duncan and Schulz (2015) attempted to look for predictors and causal mechanism from a

concept-based curriculum to the pass-rate of the entry-to-practice exam; however, they

concluded that factors at this site other than a change to a concept-based curriculum need to be

considered before a clear articulation of mechanism can be made to evaluate the impact of a

concept-based curriculum. While there is desire for educational programs to predict what

supports success on the entry-to-practice exam, it is recognized that this is almost impossible due

to the complexity present in health professional education, and that a larger systems view should

be considered when considering educational programs influence entry-to-practice scores (Simon,

McGinniss, & Krauss, 2013).

The participants who were directly involved in teaching had their potential in the ability

to not only adapt, but excel, when extending their pedagogical skills as it became necessary to

change educational programs as a response to changes in health care delivery. While the need to

change an educational program could have been predicted, as some of the changes (such as

including simulation in clinical education, moving to a concept-based curriculum at the

undergraduate level) brought the site in line with other schools, how the change would be

enabled at the site was beyond prediction. Considering the starting point of recruitment into the

complex adaptive system, a momentum from this point was facilitated through the connections within the complex adaptive system with other starting conditions such as changes in the health care system, and relationships within the complex adaptive system, as well as relationships with stakeholders. This study found that starting conditions can be facilitated to emergent conditions through connections, such as those made through relationships with colleagues during team-teaching and administrative activities. The relationships and connections developed within this complex adaptive system can be seen as enabling or constraining of starting conditions; however, with the lens of complexity theory, whether or not the activities were enabling or constraining can only be observed in retrospect. This research study confirmed that there are enablers and constraints for starting conditions within complex adaptive system, and that these enablers and constraints can be driven by leadership practices, which is consistent with the literature (Cilliers, 2005; Davis, & Sumara, 2010; Fidan, & Balci, 2017; Uhl-Bien, & Arena, 2017).

This study found that changes in the larger health care system, including changes within the health profession within which they are educating students for, enabled the emergent conditions of who was recruited to the complex adaptive system, and the relationships held within the complex adaptive system, as described in the previous section. The enablement was observable through participants sharing descriptions of: ensuring success of their program graduates in their educational program, ensuring success of students' performance on their entry-to-practice exam, promoting and extending the scholarship of teaching and learning within their classrooms and among their peers, and promoting collegiality with their colleagues and peers. The combination of recruitment with people who have an internal motivation to work somewhere challenging, and with changes in relationships both inside the complex adaptive system and with stakeholders, enabled by changes in health care delivery and the profession,

presents a situation where prediction of what changes would happen in educational programs

may not be sufficient. Thus, the area outside of what could have been predicted shows the

emergence of complexity.

This research study focused in on points of changes in educational programs at the site.

Some of the encouragement to change educational programs, and pair with innovative pedagogy

during its delivery, comes from changes in the health care system. Specifically, participants in

this research study, including senior administrative roles, student advisors, instructors, and

tenure-track faculty, spoke of the intent behind the responses (e.g. use of simulation in clinical

education, and the adoption of a concept-based curriculum at the undergraduate level) to health

care system changes. Jerry spoke of this and shared that, *"We're on this precipice of doing some*

really new and innovative things with education that I think could be really, really exciting." To

build this exciting future as Jerry spoke of requires a substantial amount of contribution made by

each member of the site. That is, the intent was not only to ensure student's success within the

program, but also to ensure success on the entry-to-practice exam, as well as success when

transitioning to the health workforce through enabling innovative pedagogy as a response to

changes in the health care system.

Enabling participation. Enabling participation has a thread through how people enter,

interact, work, and exit the complex adaptive system. The relationships and connections

developed within this complex adaptive system has enabled participation of each member in the

past, present, and future. Paul offered,

> "*The people I work with are, they are people who work incredibly hard, they are very*
>
> *bright, they are dedicated, and they have the interest and the skill to be the best, to be*
>
> *course leaders in the best program in the country and that's what my goal is, is for this to*

> *be one of the best programs in the country, so I think that this is sort of what our future*
>
> *holds."*

Bennett extended how participation is being enabled through recognition of research excellence at the case study site, with,

> *"I think that we have some really excellent, as far as research goes, some really excellent*
>
> *researchers here, and I think that there's a growing, you know, there's been quite a few*
>
> *new faculty lately, and I think a sense of community amongst the new faculty."*

Jackson shared how participation was enabled through promoting co(excellence) with colleagues, with,

> "*I think there's exceptional people working at the College, and I think they are incredibly*
>
> *committed to excellence for themselves, and for the students, and I think it's really*
>
> *tapping into that and recognizing it, and promoting it, and encouraging it, even more I*
>
> *think there's opportunity for us to trust each other and to draw on each other's*
>
> *strengths."*

Jerry continued to speak on the importance of trust as enabling participation at the site, with, "*everyone brings something to the party, and we leverage the strengths that people have, and we celebrate those, and we trust each other, we respect each other, and we go forward."* This study found that trust within colleagues at the case study site enabled participation, which is consistent with literature (Blackmore, 2013; Harms, Bai, & Han, 2016; Nübold, Dürr, & Maier, 2015).

Participation was also described as being enabled in a negative fashion – that is, participation at times was disabled through workload. Bennet spoke of how the workload with respect to changes in education programs can be easily underestimated with:

"So [this new curriculum has], definitely been a huge change for faculty. Just even the workload of creating a new class, and then revising a new class, is immense, and I think it's very very easy to underestimate the time and energy that takes from faculty, who care about teaching."

This concern was echoed and extended by Marvin, with,

"The negative thing, and I don't know if this is a fault in nursing, is that the workload has gradually increased over the years, and for my particularly grouping, the professors, it's not related to teaching, I think it's the Instructors are the ones who are drowning in their teaching load. But, for us, for professors, there's just more and more demands related to establishing and sustaining a research program. That just takes up a huge amount of time, and then service also, because service goes beyond committees, because as you become known outside of the College or the Faculty, you are asked to do more and more and more things, and it's very hard to say no."

However, while the workload is incredibly high, Jackson offered that:

"I think I enjoy the job I do, and the students, and the creative capacity of the whole, and the fact that every day is a little bit different than the previous one, I enjoy it immensely and I can't think of too many jobs that I have had a nurse that I have enjoyed as much."

Stephen shared, *"Yeah, so, the workload metric doesn't give me nearly enough telephone time or email time, but I don't really care."* It seems that this enjoyment and fulfillment somewhat tempers the workload, as there is value drawn from being able to participate and contribute. This is an important observation because it builds on the internal motivation from leaders at the site.

In addition to motivation to accomplish work, workload was mentioned by Alex as a factor in his decision-making to take on work outside of teaching, but with the case study research site. He explained that:

> *"Somebody just approached me to be a part of a committee. So I was kind of, my first question as, what kind of time commitment is this? Because I already feel a little stretched to the max, so we discussed further, and it should fit within my schedule. And I wanted to be a part of it just to learn more, and to learn more about what's going on here and upcoming things, I just wasn't sure if it would fit, but it does fit, so I'm excited. Yeah, it was really nice! Yeah, I was flattered, it felt really nice, I felt like I had something to contribute, so I was flattered, and honored, but I wanted to make sure I could do a good job, and with that you need time to commit."*

This shows that even with workload being high, participants are still seeking out ways to contribute, and reach their potential. It also shows though, that workload is a barrier to participation within the complex adaptive system.

While the work can sometimes be difficult, the support that the members gave each other at the site came through as they continued to talk about their work relationships. Jackson shared that, *"I certainly enjoy my personal work and the relationships that I have developed with colleagues is, what I want to say, and I think the rest is not here-say, but it's secondary to my job satisfaction."* While Jackson and a few other participants were able to articulate how they managed to continue to contribute, this experience was not transferrable to all members, as turnover was an increasing phenomenon at the site.

While contributions were enabled, contributions were also dis-abled through turnover. Curtis noticed this issue too, with, *"...we've got a bit of a revolving door with support staff and*

instructors, and we need to stop that, we need to find out why it's happening and stop that, stop the bleeding, use a medical term," and went on to explain that, *"we need a healthy mix of tenured and instructor positions, and we can't afford to loose instructors, we've had more movement there, and that's unfortunate."* Randy also noticed this, by stating, *"In the last two or three years, there has been an amazing turnover in the instructor rank."* The relationships and connections developed within this complex adaptive system has enabled participation of each member in the past, present, and future. The next section will build on enabled emergent conditions by exploring the momentum of emergent conditions within the complex adaptive system.

Theme 3: Momentum of Emergent Conditions through Diversity within the Complex Adaptive System

Each person, and each role, has a unique perspective on what is happening in and around the site of this research study. While individual leaders' perspectives are noted, this theme is based on the interaction of leaders' perspectives. As perspectives are revealed, awareness of the multiple dimensions of the complex adaptive system emerges. In addition to the voices of the participants in the semi-structured interview, the dataset for this research study is also comprised of a document review. Within this theme, the document review revealed multiple perspectives on how emergent conditions within the complex adaptive system displayed momentum. Numerous alumni newsletters were found on the site's website, which showed the importance that the case study site has in maintaining its relationship with previous students. The alumni newsletters are written with a balance of pride and humility in the work continuing, with momentum, at this site. This positive tone of momentum also extended to several pages on the website where the history of the site is considered. Other documents highlighted the

relationships that the case study site has with other schools, clinical partners who help deliver clinical education opportunities, government, funding bodies, as well as the public. This theme considers the diversity of perspectives within the complex adaptive system through the sub-themes of: diversity of perspectives on changes in educational programs, and diversity of perspectives on roles, leaders, and leadership.

Diversity of perspectives on changes in educational programs. During the interview with Randy, he spoke of the different changes to educational programs that happened at the case study site. He spoke about the introduction of an educational program for a diploma-prepared health care professional, which will pause on accepting future enrollments. While describing the start-and-stop of this program, he paused, leaned back, and said, *"Nothing is linear, everything goes around and you get dizzy. I've seen this before."* When speaking of the whole system, and changes over time, and thinking of the future as to what will emerge, it is difficult to extrapolate a linear cause and effect, or a linear prediction. The opening and closing of educational programs is inextricably linked with provincial government mandates working to address provincial health care system needs, and how many enrollments will be requested of educational programs is difficult to predict.

With the lens of complexity theory, it is important for leaders to consider context when implementing educational program changes (James, 2010; Trombly, 2014). While context is drawn upon in the larger leadership literature, complexity theory offers a unique nuance to context. That is, in complex contexts, there are emergent conditions rather than initial conditions that makes the transfer of best practices between contexts somewhat idealistic. It is crucial for educational leaders to understand not just the change occurring in/to the educational programs, but also the mechanism for the change. It is important to understand the mechanism for change

to be able to discern if the underlying mechanism could have ever been predicted, or if the mechanism could only be determined in retrospect. If the mechanism could only have been determined in retrospect, as opposed to more functionalist models that are deterministic and rely on prediction, then this will inform leaders that complexity is present, and perhaps next practices, instead of best practices, may be better to employ.

However, even in the absence of certain prediction, there is repetition in some issues. With respect to adapting requests of increases or decreases to student enrollment, how these issues are worked through depends on the context and the people, at the time that it happens. For example, Jerry spoke of how there is increased engagement with government on working through these issues, with, *"I think there has been an increased responsibility and engagement with government around things like we need to increase the number of seats that you have."* A decision to increase or decrease enrollments is based on many factors, and can be driven by health human resources needs. Randy explained this further, with:

> *"It's mostly the number of students who were expected to graduate each year is driven by the need to replace retirees in the workforce, that's been going on for a long time, a long-long time. The government watches our intake and graduates very closely we have to account every year how many students we graduated, how many we admitted, we are funded for that, there's a lot of pressure on us to keep the number of graduates up…we're producing an incredible number of graduates this year. It's mind-boggling."*

However, the explanation on increasing or decreasing seats becomes a little richer when considering the perspective of the provincial government and the larger health care system, in that a change in one of these areas can create a domino of unknown proportions in other areas.

During elections and mandates, provincial governments, promises and commitments are made to the public on many issues, including counts of health care providers, and how health care will function. There is a balance to be struck here between offering better quality and availability of care, with efficiencies and cost to tax payers. The health discipline at the site connects with election and mandate conversations, and Randy explained how this affects the site:

> *"I have always believed that [our profession] is a very political, a very political, and very politicized profession, but I think it came as a pretty rue shock to a lot of people here. When the stakes were high, when things were very difficult, when the health care system was begging for [more health care providers] and we couldn't, didn't, have the resources to produce them fast enough, the government, took action in way that they felt were in benefit to [citizens.] Yeah there were some very interesting times politically."*

These changes go further than just the number of student enrollments. Another way that the perspective of government comes in is with how clinical experience is delivered. Stephen explained how balancing health cares system efficiencies with opportunities for clinical experiences with students were generating changes to educational programs within a larger political landscape, with:

> *"I think that the changes to the [local health authority] once the dust settles and the Band-Aids are put on, although not in ER, we will have to see how we fit in there. Most people would say, would agree, that even if you don't agree with any of the changes that are happening in the [local health authority], most people would agree that something needed to change."*

Randy also mentioned how balancing health cares system efficiencies with opportunities for clinical experiences with students were generating changes to educational programs with:

> *"So anyway, here we are rolling out year 4 and of course the whole health care system is in chaos. So, I know that the people that were responsible for clinical practice courses and clinical placements are just having a really difficult time right now because our, the units that we are sending students to, they might not be acute care units anymore. We have lost 2 ERs, and the practice community itself is in chaos. They don't know what they're going to be doing "*

The diversity of perspectives here has helped to not only foster how the changes to educational programs can best be accomplished within this context; it has also helped to create stronger relationships. Jerry explained that:

> *"I think that, from a distance what I see is that I think there has been an increased effort to try and have closer affiliations with our clinical colleagues, and the people who make decisions around the larger clinical issues…and talking to the key people at various institutions and places where students would have clinical practice rather than sort of saying we need these many spaces, you know, for clinical practice. There's a real I think effort to try and engage and find things that are mutually palatable for both."*

By integrating perspectives, the relationship between the site and external agencies have strengthened. Stephen reflected on this, and offered, *"we as educators will have to start looking at health care delivery maybe in a slightly different way, and that's always exciting, I think, to kind of take a look at that."* In addition to these external relationships, the pattern of integrating perspectives was also seen with internal relationships as the site continued to experience changes in educational programs. When reflecting on changes in educational programs in comparison to other sites, Alex shared that,

"*I think it's the way that kind of programs are moving in general, so I think it's keeping*

up with the times. But, in terms of complexity, I don't know necessarily, I think that it's

basic, I think that it's the same information being taught, just in new methods, which is

geared towards the type of learners we have now."

This excerpt is interesting as it provides insight into the amount of change needed by the site in

its educational programs to appear at a neutral status-quo level. Said another way, the landscape

surrounding this site is so dynamic, that continual change is necessary to provide the appearance

that it is not lagging, let alone leading, in delivery of health professional education. Michael also

spoke about how the changes bring the site towards equivalency to expectations of the graduate

in the workforce, with, *"in implementing the new curriculum, we actually responded to the*

clinical landscape, and what we were doing to address our better connection with clinical, better

connection with clinical practice, right, so that created a complexity." Furthermore, Marvin

noted that, *"I think this [new curriculum] is forcing us to think in new ways, and to think*

creatively, I think that's good," adding to the pace necessary to think in new and novel ways to

keep pace with the larger health profession, and health care system.

Diversity of perspectives on roles, leaders, and leadership. The momentum of

emergent conditions was also found through the diversity of perspectives on roles, leaders, and

leadership. Each person, and each role, has a unique perspective on what is happening in and

around the site of this research study. While individual leaders' perspectives are noted, this

theme is based on the interaction of leaders' perspectives. As perspectives are revealed,

awareness of the multiple dimensions of the complex adaptive system emerges. Jackson

explained that there is a need to view the entire organizational chart, from all perspectives and

position of each role within the organization when considering the potential of leaders and

leadership within the site, with, *"I think there's some really, really things great going on between colleagues, and I think people are very self-motivated to do things outside, but I think within, I don't feel like there's much listening to the grassroots."* This is important, as it suggests a need to view leadership in multiple dimensions and trajectories. Curtis shared how he provided informal leadership to support the momentum of emergent conditions of individual and their opportunity within the complex adaptive system with,

> *"If you're talking about informal leadership, if you're around for a long time, and you're fairly decent, and you can keep a secret, people will come to your office and talk to you about stuff, and they will say well what do you think? What should I do? And I am very discreet, and so, I hear lots of things, and I make suggestions as I can."*

Darren spoke about how the abilities of any leadership role, with its power and value, needs to consider the diversity within the complex adaptive system with,

> *"I think leadership is really important, the leader of any place we are sets the tone of how it's going to be, and I think the leadership is critical to the success of the [site], and I think sometimes, yeah they need to lead, but sometimes they have to follow too-, so they have to have many [talents], and they have to know who they are I think, so to lead from openness, and be non-judgemental, and for us as Aboriginal people, being non-judgemental towards us, I think is important, is essential for me."*

The practical abilities of seeing the multiple dimensions which lay the foundation for diversity of perspectives was noted by Randy with,

> *"I've seen visionary people, but they couldn't, some of them couldn't get their feet on the ground to actually lead themselves in that direction, let alone anybody else. Leaders, and the other thing that I believe is leaders are not always kind. Sometimes the truth has*

to be told, and the truth isn't always particularly pretty. And if I had a criticism of myself

as a leader, it is that I have too often been too plain spoken. I don't have a great talent

for telling the truth in an easy-to-take kind of fashion, I'm too much like my grandmother.

But, there has to be truth telling. There has to be some toughness, because not

everything that goes on is okay. And sometimes people need to be sat down and told, this

is not okay."

This excerpt shows the struggle that leaders at the site face between fulfilling perceived

obligations of their title, while maintaining relationships with colleagues. This struggle is

consistent with literature, in that leaders need to have relational sensibilities, in addition to the

ability to do the work related to their title (Giles, Bills, & Otero, 2015; Liu, 2017; Nyberg, &

Sveningsson, 2014; Uhl-Bien, & Ospina 2012). This study extends this consistent finding

through the value of *perceiving* the diversity and complexity within the role so that the many

layers of interactions within relationships between roles can be distilled for exploration and

reflection, but not with the unintended consequence of disrupting or disregarding how the role

interacts within the system as a whole.

Within the complex adaptive system, the interaction of perspectives on roles, leaders, and

leadership involved threaded through a common node. This node was the point in which a role

held the title of Dean. Coincidentally, this research study coincided with a decanal search at the

case study site. The interviewees provided insight that while the *title* of the Dean is constant,

how a person fills this *role* introduces complexity. Said another way, while the title of a Dean

remains constant and the presence of this title is predictable, but the role of the Dean which

includes the diversity in type variation and composition leaves room for emergence of starting

conditions, as well as momentum of enabled emergent conditions during changes to educational

programming. The interviewees expressed that the relationship that one has with the role of the

Dean, was a notable measure of time spent at the case study site. For example, Stephen said, *"In*

my time here, I am trying to think, how many Deans have we had, one, two, three, four, five, five

different Deans," and Paul said, *"I have to think how many Deans we have been through…"*

This counting of Deans came organically, and was not a direct question asked in the semi-

structured interviews. Often, these responses came to a question related to changes one has

experienced at the site. For Bennett, he answered with, *"How has it changed, well this will be*

my 3rd Dean since I've been here," before continuing on to other changes. The Deans were

compared and contrasted by some, as Curtis observed, *"some Deans are friendlier than others. I*

can't think of how many Deans I've been through." Jerry reflected with,

> *"so I was hired in …, and I think over that time I have seen, so I've been through several*
>
> *Deans, and Associate Deans, and I would say during that time I've seen a focus on being*
>
> *less insular, and ivory tower to being more integrated in the health, in the field with our*
>
> *colleagues who are out in practice, and who are in government positions, and sort of*
>
> *more policy kind of people."*

This shows that the ability for the role of the Dean to be aware of the numerous perspectives and

personalities, and motivations behind those perspectives and personalities, was seen to be of

importance to the participants. Specifically, participants spoke of the diversity in relationships

which they had with the Dean, and not the individual traits or personality of each specific Dean.

This shows the important role of connection between the members of the complex adaptive

system, and that this connection is attached to the role; not just the title. With the traits,

relationships, and motivation present, the trait-based leadership theory, relational leadership

theory, as well as path-goal leadership theory and authentic leadership theory are entering to make sense of how diversity emerges from the role of this organizational actor.

The participants offered some thoughts on what a new person fulfilling that role could mean for the College. Stephen explained further, with,

"Well, we're getting a new Dean, and with it, there will be a complete shift in terms of philosophy, ... the change [new Dean] is something that brings great opportunity. They're not the same person we have, so as soon as we have somebody else, you've got new ideas, you've got new philosophies of relationships, new strengths, new challenges."

The interviews continued to offer insight into the kind of leader that would integrate with the perspectives at the site. For example, Paul said:

"We need a leader; we need a leader who has backbone. To be a leader in academia, you have to be like a piece of bamboo. You have to be very strong, but at the same time, you have to have some flex because there are times when you do need to bend, but you can't bend so far that you break. At the same time, you need to have enough backbone when a faculty member or an external partner is not cooperative, or is wrong, and so no this doesn't go with our path, and we're going to have to find another way to negotiate. You have to have someone with excellent communication skills who can negotiate. We need someone who understands budgets because the university is bringing in the new budget model, and the money is basically divided up amongst all the five colleges and it can be a bit of a bun fight to see who gets the funding they think they need. We need someone who can manage our money properly. We need someone who is fearless."

Participants spoke of this decanal search, and in particular, the tension between historical practices and potential novel practices were discussed in what is needed when adapting to

changes in educational programming. For example, some participants spoke of the tension to hire into senior administrative positions those that have the qualities to be a researcher, but also understood that the role needs a different set of skills, as will be described below. An extension on trait-based leadership theory is made here, in that the combination of traits is needed; however, given the complex context, this exact combination is unknown. For example, Randy spoke of the tensions around navigating the traits of intelligence, determinism, and sociability, in the process of filling of the Decanal role, within the context of the site, and larger higher education sector:

> "It's always a competition, even when they think they are not competing, they are. And that will get you a long way in a research a career, but it isn't very helpful in the enterprise of creating an environment that's learning centred and puts students first, and that makes you an equal member of a teaching team. So, there's some paradoxes, and leaders need to negotiate those, you know, you can't clip people's wings and say you have to be collaborative, when they've spent half their lives, especially tenure/tenure-track are competing madly all of the time, but its, I think that leadership in academia is in sore need of a huge re-think, and I think that the fundamental flaw is continuing to search for candidates [who] are very successful researchers. I would like to see a lot more evidence of their ability to work with people, to inspire people, to make tough decisions, you know, to tell the truth, and if you're lucky you'll get one of those anyways, but that's not exactly what search committees are looking for."

Pausing on this excerpt for a moment, we can see how participants are challenged by continuing with historical linear best practices in hiring into this specific role. If a historical best practice is being questioned, it may be a signal that the context is complex, rather than simple or

complicated. If the context were free from all complexity, then this historical practice could continue and produce the same intended results as was previously seen without causing tension within the complex adaptive system. However, members at the site are wondering – and even questioning – if perhaps another approach may be better. That is, an approach which may have a less predictable, but more adaptable person in this role to enable the rich interconnections within and around the complex adaptive system.

This study confirmed the importance of relationships, as understood in relational leadership theory, to be manifested in higher education, and that authority is formed *through* relationships (Branson, Franken, & Penny, 2016), as well as organizational titles. This study found that history is still important within complexity. As complexity is the context for novel activity to occur, it may seem peculiar to find the importance of history. However, this study shows that through the role of the Dean, history is open to being written with each person who choses to fill role. Undoubtedly, the role of Dean faces constraints, as would any role within higher education. However, each Dean was able to respond and emerge in their own choosing, reflective of their role diversity, and in a way that was not completely predictable. The relationships around how the Dean chose to emerge within their role generating feedback in the larger complex adaptive system by how other roles chose to relate. This shift in feedback became synonymous with the how changes occurred at the case study site, through the memory of how many Deans one has experienced. The adaptiveness shown in the larger complex adaptive system at the case study site showed that relationships adapted to how the role of Dean emerged, and that this adaption, while expected, was not predictable.

Stepping back, and seeing how the complex adaptive system interacts with other systems, such as health care, Alex offered insight into how leaders within the site impact and influence to the larger health care system through graduates with:

"I think we need leaders who expect the best in our students, who help facilitate our students to be the best that they can possibly be, and who don't accept low standards as, ... I always think of it, if it was my mom, or my grandma lying on the hospital bed, what kind of [health care provider] would I want, what kind of [health care provider] would I want looking after them, and I would want the best possible [health care provider]. Somebody who cared a lot, who advocated really highly, who had a strong voice, and who had a lot of knowledge to back up, yeah, to back up all of that, and the ability to advocate for our patients, and those are the kinds of [health care providers] I hope we continue to produce."

In closing, even with the diversity in perspective and challenges in relationships and work, there is a common thread that provides an overall momentum for emergent conditions with the complex adaptive system through Michael's eloquent and efficient summation of what it means to be an educational leader within complexity at the end of the day with, *"Let's focus on the students, because that is our core business."* This excerpt is also an example of servanthood, as understood within servant leadership theory.

As the site engages in adapting to change, members of the site are curious to see what will emerge, as the future is quite unknown. Complexity is present and likely staying for some time. Within this complexity, leadership appears to mediate the changes in educational programs. It was a lovely experience to listen to the generosity of the participants who gave their time to share their experiences in leadership within complexity. The creativity, strength, hope,

and optimism shared by the participants as they wade through personal and professional experiences was humbling to hear, and to work with. Without this generosity, these findings could not have been written. The experiences of the participants, as well as the content from the document review, have provided insight in the nature of leadership within complexity while managing changes to educational programs. These findings will continue to be discussed further in the next chapter, Chapter 6, with specific responses to each of the research questions posed by this research study. Chapter 7 closes the document with implications for practice, and recommendations for further research.

CHAPTER SIX: INTERPRETATION AND DISCUSSION OF FINDINGS

This chapter provides an interpretation and further discussion of the findings within this research study by providing responses to the original research questions grounded in the related academic literature. To accomplish this, I will revisit the purpose of this research study, and will provide an overview of the methodology and methods used. Following this, a response to each of the research questions will be provided, along with study limitations. The next and final chapter will explore the implications for practice and recommendations for further research.

Summary of the Study

The purpose of this research study was to understand the nature of leadership in one College of a Faculty in a Canadian public university operating in a complex context. The focus of this inquiry has occurred through the lens of complexity theory, and the entry point of exploring this complexity occurred through leaders' adaptations to changes in educational programs. The central research question is: What is the nature of leadership in one College of a Faculty in a Canadian public university adapting to changes in educational programming in a complex context? This question subsumes the following sub-questions:

1. How do leaders understand their role?

2. How do leaders adapt to changes in educational programming within the context of complexity?

3. In what ways are leadership and complexity interactive?

The research study is situated in the interpretive paradigm, and examined leadership through the lens of complexity theory. An exploratory qualitative case study was employed, which included document review and semi-structured interviews. Participants for this study included a range of formal, informal, and emergent leaders working across levels of the College,

including faculty, staff, and administrators. Including such a wide range of organizational members was intentionally done to enable a collection of perspectives from leaders exercising leadership. This approach is consistent with exploring leadership situated within complexity (Hetherington, 2013; Schneider & Somers, 2006).

Complexity is the study of systems, and complexity theory explores complex systems by considering not just the individual components within a system, but the relationships between components. Complexity theory is found within the umbrella of general systems theory. While complexity theory may share such similarities with other theories found under general systems theory, such as chaos theory or network theory, complexity theory brings a unique perspective with respect to starting conditions and feedback. Starting conditions can be known as initial conditions, or emergent conditions. Initial conditions are conditions which build to confident and dependable predictions. Emergent conditions on the other hand, cannot provide the same prediction. Emergent conditions are best understood in retrospect. The implication here is that the use of prediction in emergent conditions may lead to very different outcomes than what is intended.

The document review included publicly available documents located during the three-month data collection period, as identified in the approved ethics protocol. The semi-structured interviews were held in-person or over the telephone, based on convenience for the participant. The responses to these questions, in addition to the documents gathered during the document review, provided a rich dataset for analysis. The findings from this analysis have been discussed in chapters five according to themes; in this chapter, the findings will be presented in relationship to the original research questions and grounded in the academic debates connect to the phenomenon under study.

Research Question 1: How do leaders understand their role?

In the conceptual framework for this study, role was seen as a diverse interplay between title, and how a person acted within that title. That is, role is a *combination* of a person's title, their actions, and how they interact within the system, and provides dimension(s) to an organizational actor. Within this research study, all participants identified as an informal leader, in combination with formal and emergent leadership. This is an important finding, as it suggests diversity in perception of one's leadership within their role. This study demonstrated that leaders identified their role as multi-faceted, in that not only do educational leaders educate the next generation of health professionals, but they also identified their role as relational with their colleagues, drawing out (co)excellence from each other. This finding is consistent with the literature I reviewed, in that relationships can be seen as mediating mechanisms to enable the potential of others (Blackmore, 2013; Gronn, 2010; Harms, Bai, & Han, 2016; Nübold, Dörr, & Maier, 2015; Schneider, & Somers, 2006).

A change of organizational actor associated with a title provides opportunity to explore this potential. At the case study site, some titles shift between organizational actors. As an organizational actor assumes association with a title, relationships are re-negotiated. During this re-negotiation, diversity in relationships between organizational actors may appear, which may challenge and domino other relationships. What this study found is that the establishment and continued connection of relationships is not entirely dependent upon the title. For example, participants expressed how a change in Dean impacted them, specifically, participants spoke of the relational connection to the person *within* that title and *how* they chose to lead, *as well as* the title; and not solely the person, their traits, or solely the title. Roles co-refine relationships, and

these relationships continue to shape the complex adaptive system in the form of system feedback.

There is a parallel here, to the concept of double-loop learning, which is described as, "a reflection of how [leaders] think – that is, the cognitive rules or reasoning they use to design and implement their actions" (Argyris, 2002, p. 5). Where single-loop learning is viewed as a linear action of problem solving where incorporating past practices is generally helpful, double-loop learning moves to embrace complexity by encouraging questioning of underlying assumptions, values, and beliefs, to inform what action would be valuable (Pitard, 2017). Argyris (2002) offers an analogy to the difference with the use of a thermostat; single-loop learning would focus on adjusting the temperature to maintain a specific setting, and double-loop learning would wonder why the temperature is shifting – that is, questioning if the use of a furnace or air-conditioner is the most useful approach, and exploring why the temperature has shifted, and if other options should be considered. Another example within health professions of single-loop learning is continuing to use best practices, and double-loop learning would occur when an organizational actor questions why a best practice no longer works, and embarks with curiousity into developing a novel practice as well as exploring why a novel practice is needed.

Argyris (2002) explained that he began his inquiry into double-loop learning when he observed that leaders struggled to learn, even with a commitment to continuous improvement and excellence. That is, there is a nuance between knowing how to solve problems, and learning how to solve problems by exploring the underlying values and assumptions of knowing how to solve problems. Tsoukas (2002) extended this by explaining how the role of organizational actors extends to encompass a complex interaction with their lived experience and their actions as an organizational actor. With this complex interaction, leaders are bringing in underlying

values and assumptions which will influence their actions as organizational actors, and ultimately, system feedback amongst organizational actors. The parallel between the concept of double-loop learning and this research study, is that the system feedback manifested through relationships between organizational actors can be enhanced by incorporating double-loop learning.

Research Question 2: How do leaders adapt to changes in educational programming within the context of complexity?

A curriculum was introduced which enabled innovative approaches to pedagogy. As this curriculum was being rolled out, organizational actors at this site were transitioning from being independent course leaders to a team-based model. This was a shift, in not only how work was accomplished, but how work was perceived. Organizational actors found that strengthening relationships, and encouraging curiousity and innovation with their colleagues as well as with learners in their classrooms, supported ability to adapt to changes in educational programming.

This study found that while undergoing changes in educational programs, educational leaders, whether formal, informal, or emerging leaders, consider strengthening their relationships with not only their colleagues, but also with clinical partners and the provincial government as they plan on how to deliver health care within the health care system. This is consistent with literature, in that within complex adaptive systems, the strengthening of relationships within, and between, complex adaptive systems will support the adaption of a complex adaptive system (Fidan, & Balci, 2017; Meuser, Gardner, Dinh, Hu, Liden, & Lord, 2016; Tourish, 2014; Trombly, 2014; Uhl-Bien, & Ospina, 2012). Extending this, this research study found that those who identified as emerging leaders spoke of their connections with other systems on a more

personal or individual level, whereas formal leaders extended their connections to experiences with titles and organizations.

Uhl-Bien and Arena (2017) advocate for the ability of leaders within complexity to consider the tension not just between challenges and people, but between the space in which activity occurs, which is known as the "adaptive space" (Uhl-Bien, & Arena, 2017, p. 19). This adaptive space is where relationships between roles are formed, and where each individual role will grow, or decline. How growth, decline, and formation of roles and relationships within this adaptive space occur is a function of the feedback within the complex adaptive system. As responses to complexity require novel activity, rather than repeatable ordered responses (Uhl-Bien, & Arena, 2017), leadership within complexity needs to consider what this adaptive space will look like, what constrains or enables this adaptive space, and when constraints and enablers are best employed. With this awareness of adaptive space, educational leaders can consider how they may enable the adaptive space in their context to be as hospitable as possible to the changes desired for their educational programs.

As relationships are the key to interconnectivity within a system, adaptive space is enabled through relationships. The coupling between the systems which provides health professions education, and the system which provides health care, was mentioned by all participants. For emerging leaders, even if their time at the case study research site was only a few months, emerging leaders spoke of their connections in other systems on a more personal or individual level, whereas formal leaders extended their connections to titles and organizations. This pattern is significant, as it shows how leaders are able to generate starting conditions from connections between systems through adapting relationships at various levels, regardless of their time spent at the case study site. Within this theme, this is significant because it articulates that

the ability to make a connection between systems can occur at any time, and any level. Furthermore, the ability to make connections as such generates starting conditions for the complex adaptive system, whether they viewed their leadership as formal or emerging, and it shows how distributed leadership practice can be experienced within complexity during time of changes to educational programming within a complex context. In combination, leaders at this site responded to the complexity presented with changes in educational programs through fostering connections within the complex adaptive system, and with other systems.

Participants in this study shared how they are encouraging curiousity and innovation with the learners in their classrooms, to support larger changes in educational programming. This is important, as this encouragement of curiousity and innovation in the classroom to support larger changes in educational programs shows the function of adaptive space at the site at various levels through a diversity of roles. Participants, whether involved in teaching or not (as some participants included titles such as student advisors, etc.) emphasized the novel teaching and learning strategies used. These novel teaching and learning strategies for the case study research site may not have even been considered as contributing to adaptability, if it not for the emergence experienced from the complex adaptive system through the adaptive space. For example, participants spoke of the use of active learning and flipped classrooms used in addition to traditional lectures. While it is not new to report that changes in educational programs prompt changes in pedagogy (Mitchell, Jonas-Simpson, & Cross, 2012; Pigza, 2015; Toh, 2016), this research study contributes that the leaders' changes in pedagogy as a response to changes in educational programs can be enabled through adaptive space and contribute to the self-organization of the organizational actors at the case study site.

Research Question 3: In what ways are leadership and complexity interactive?

This research study found that leadership and complexity are interactive through adaptive space, which can constrain or enable events of complexity. The unique perspective of complexity theory is driven by the distinction between initial conditions from emergent conditions. Initial conditions provide a solid foundation for prediction, and emergent conditions provide opportunities for novel activity to occur, as found in complex adaptive systems. One option to operationalize what initial conditions vs. emergent conditions means is through the utility of practices. When initial conditions are present, the use of best practices is highly transferable, as prediction can be used to inform what a response to a present condition should be. The use of best practices offers success through refined predictions of what a response should be given the current state. There is comfort and confidence in what will happen if best practices are applied. On the other hand, the use of said "best" practices in emergent conditions may yield unintended consequences. In emergent conditions, new variables are present which can only be understood in retrospect. When "best" practices are applied in emergent conditions, failure often ensues (Snowden & Boone, 2007), as such practices are not robust enough to respond (and adapt) to the novel activity occurring from emergent conditions.

Organizational actors shared experiences on the introduction of a new entry-to-practice exam. Specifically, it was felt that local values pertaining to what it means to excel in professional practice in a local context was not represented in the entry-to-practice exam. Not surprisingly, many of the best practices developed in preparing students for this exam do not include the implications for this local context. Thus, organizational actors took a best practice, and refined it to a next practice, where *both* values in a local context and requirements for the entry-to-practice exam were acknowledged and accessible to learners.

Emergent conditions are consistent with complexity. Leaders are faced with a choice to discover and enable emergent conditions through "next" practices, or rely on initial conditions with prediction and "best" practices. Nevertheless, given that contexts and systems overlap, in that, the context may have components of complexity along with simplicity; this choice may be anything but binary. This is consistent with the literature in that next practices, rather than best practices, matter in educational leadership within complexity (Clarke, 2016; Linsky, & Lawrence, 2011). This research study found that educational leaders can enable the adaptive space to foster changes in educational programs as a response to complex challenges. Furthermore, the dynamic nature of adaptive space may provide a rationale as to why transferability of best practices is limited. Where transferability of best practices are limited, leadership has the potential to develop next practices. Leadership and complexity are interactive in developing unlimited next practices, as a response to limited transferability of best practices.

Participants in this study also experienced the need to draw connecting systems together, specifically the system that deliver health professions education, and the system that delivers health care services. For example, when availability of clinical placements were affected by health care system re-structuring due to changes in the provincial mandate, there were diverse perspectives by leaders on how to continue to find connections and opportunities and adapt to this challenge. This research study found that leaders who identified as formal or emergent were more likely to be involved in creating and strengthening these connections, the impact of these connections was experienced by leaders and members at the site. A robust connection between these systems allowed for the site to continue to adapt educational programs in a manner that would be useful and responsive to the needs of the health care system. Specifically within this research study, the effects of changing provincial governments and mandates challenged these

connections, and it was those leaders who identified as formal or emergent who facilitated a response to focus on maintaining connections between systems.

Main Research Question: What is the nature of leadership in one College of a Faculty in a Canadian public university adapting to changes to educational programming in a complex context?

In this research study, the nature of leadership was perceived as the iterations of how leaders, through relationships, interactions, and components of their complex adaptive system, have engaged in adaptability in the face of changes to educational programming. The nature of leadership in this complex context is to: 1) seek connections and provide opportunities for starting conditions, and 2) nurture adaptive space so that emergent conditions can enable the potential of the complex adaptive system through diversity of roles, relationships, and perspectives. That is, instead of proceeding in a determined linear cause and effect path of inputs to outputs, the nature of leadership within complexity is to consider how to *create* starting conditions, *notice* emergent conditions, and *nurture* adaptive space for the emergent conditions. Leaders' ability to create the conditions to enable emergent conditions requires constant curiousity and inquiry, as the complex adaptive system is ever changing. Furthermore, this ability of leaders' to *create* starting conditions, *notice* emergent conditions, and *nurture* adaptive space is not isolated to any specific title or 'level'; rather, this ability occurs through roles and relationships with organizational actors within the complex adaptive system, as well as with other coupled systems.

Further Limitations of the Study

This study has a number of limitations. As mentioned in Chapter 1, the time span for data collection within this study is restricted to the site within this exploratory case study, within

a defined data collection period. Thus, this point-in-time perspective as bounded by this exploratory case study frames the conclusions drawn.

Another limitation, is that complex adaptive system chosen for this research study had to be consistent with the scope and timeline of the EdD program. Participants spoke of coupling with the health care system; however, this was not explored in depth. A subsequent study could view the complex adaptive system as one which encompasses the health professions education program *in addition to* the health care system. However, even with this larger view, it could still be viewed from a larger system to include the public that receives services from the health care system. Indeed, the boundary around a complex adaptive system is less a firm line, and more of a fuzzy interface ready for interactivity and coupling of organizational actors.

The data sources also provide a limitation. One of the influential studies for this research study which was done as an ethnography, asked participants to draw the complex adaptive system. This is consistent with discussion in the literature review on how multiple mediums can be used to develop complexity theory. A recent research study in Canada viewing the relationships between health professions education and the health care system through perception of complexity used art-based data with participant drawing as a source of data for their study (Cristancho, Bidinosti, Lingard, Novick, Ott, & Forbes, 2017). Subsequent studies may include art as an additional data source within a dataset when exploring complexity.

Continuing with considerations in methodology, this research study focused solely on qualitative data. The use of semi-structured interviews provided a rich and deep description from the participants who chose to participate; however, not all voices at the site were captured. In addition to the interviews, the use of an online survey could have balanced these rich deep findings which a broader summary overall. In addition, this type of data collection method may

have been appealing to participants who chose not to participate if the time to commit to a study

for an interview was overwhelming, but a shorter online survey may have provided an

opportunity for participation.

This chapter provided a summary of the study, and a response to each of the research

questions. A discussion on study limitations as well as significant contributions was provided.

The next and final chapter of this dissertation will provide summarize the significance of the

study by providing implications for practice and recommendations for further research.

CHAPTER SEVEN: IMPLICATIONS FOR PRACTICE

The purpose of this research study was to understand the nature of leadership in one College of a Faculty in a Canadian public university operating in a complex context. Grounded in the research study findings, this chapter first outlines the significance of the study with contributions to theory. Recommendations for further research, policy, and practice are provided. A summary closes the chapter.

Further Significance of the Study

Relationships through diverse roles are the key to interconnectivity within a complex adaptive system. These relationships, which can also be thought of as system feedback, are formed through the iterations of how organizational actors interact. For emerging leaders, even if their time at the case study research site was only a few months, emerging leaders spoke of their connections to organizational actors in other systems on a more personal or individual level, whereas formal leaders extended their connections to external organizational actors having formal titles . At an individual level and through the iterations of how organizational actors interact, the connections between the system providing health education, and the system providing health services, was enabled by all leaders. In this study, all leaders responded to the complexity of changing educational programs by continuing to foster and promote the work of their colleagues within the system. In combination, leaders at this site responded to the complexity presented with changes in educational programs through fostering connections within their own complex adaptive system, as well as with other systems. Knowledge and 'next practices' within this complex adaptive system was co-constructed through interactions with roles in the system, and interconnected systems. While some of these interactions could have been predicted, some of theme were not open to prediction. It is important for leaders to notice

starting conditions so that we can become aware of the complexity within our organizations, and adapt our leadership, on a personal *as well as* through the iterations of how organizational actors have the potential interact. Furthermore, it is important for leaders to notice the opportunity found in all forms of actors to accomplish this.

This study has shown the importance of perception. How leaders perceive leadership within the complex context, where there is an infinite amount of combinations and permutations of roles, constraints, and interactivity within a system, will inform how leadership theories and practices are enacted within complexity. Said another way, awareness by leaders of which context a leader is in *must* inform which combination of leadership theories are enacted to avoid the unintended consequences of prediction within complexity. To extend with a metaphorical example, the ability to predict from the possibilities of the iterations of how organizational actors interact, from any solitary leadership theory *on their own* mirrors the same struggles of the n-body problem in the natural sciences, when scholars struggled with linearity and reductionism in development of the laws of thermodynamics within a closed system (Gribbin, 2004). Known as the n-body problem, this occurs when there is an inability to predict the outcome of the collision of more than two objects, which produced the requirement to view laws of thermodynamics in closed systems only (Gribbin, 2004). That is, the system must be considered a closed system, in a forced simple context, in order to ensure that only initial conditions (which are appropriate for prediction) are used, and emergent conditions (which are not compatible with prediction), are excluded. In contrast, complex adaptive systems are open systems, which is why prediction is precarious. Prediction is precarious here, because there is an infinite amount of combinations and permutations of roles, constraints, and interactivity from the possibilities of iterations of how organizational actors could interact. The potential diversity in combining leadership theories

presents some initial conditions, which are ready for confident and accurate prediction *as well as* emergent conditions. Therefore, using multiple leadership theory to make sense of what is happening is useful, if not necessary, when working within emergent conditions.

Recommendations for Future Research

The adaptive space within complexity is dynamic, and constant curiousity and inquiry is needed to explore this adaptive space. I recommend the following potential research questions: How can leadership theories provide insight into the balance of prediction and accountability when undertaking educational research and evaluation in complex contexts? Exploring this question may open up further opportunities to explore how leadership theories can be integrated in educational practice, and what can be learned from such connections.

Future recommendations for research include exploration into the methodology and methods to support inquiry into complexity. Greenlaugh and Papoutsi (2018) urged for scholarship which will go deeper into how complexity-informed inquiry can occur within healthcare systems (including the delivery of health professions education), with:

> Complexity sciences will not provide a simple fix for the inherent tensions and paradoxes in contemporary health systems, but it will allow us to focus on – and begin to research – uncomfortable knowledge, to negotiate good compromises and to embrace creative, reflexive and collaborative ways of working and thinking. (p. 5)

That is, complexity science has the ability to challenge assumptions currently held within health professions education, so that new insights can emerge to inform the wicked questions, or problems of practice found within health professions education (Greenlaugh, & Papoutsi, 2018).

This research study was an exploratory qualitative case study completed within an EdD program, which is only one form of inquiry a limitless option of inquiry. Other lines of inquiry

can open up to multiple methods, and explore the value of describing complexity in words *and* numbers, as well as pictures, to provide a more fulsome view of the system. How do we attach new forms of inquiry to existing forms? Our education systems, and the other social systems which they interact with have substantial administrative data. How do we maintain the use of our administrative databases within a complex context? How can we co-construct and draw meaning from the stories of complexity within datasets? How do we create a fulsome dataset within complexity? Exploring the ways in which we answer our questions will provide an opportunity to refine inquiry within complexity.

It is also recommended that future research consider the influence of discipline within asking questions of health professions. That is, the diversity in opening up inquiry to be interdisciplinary may assist in enabling the complexity of questions in this field. While each discipline brings unique contributions, the systems in which each discipline is taught and practices is diverse and interdisciplinary. Our questions and curiousities may also benefit from a diverse interdisciplinary view. The research recommendations here can be advanced by advancing complexity theory.

Advancing Complexity Theory. This research study embraced a holistic picture of complexity theory. Some scholars, such as Morin (2007) call for a view of restricted complexity and general complexity, where restricted complexity is a model of the natural occurring phenomena within general complexity. Human, Preiser, and Cilliers (2013) encouraged that restricted complexity be used to help manage make sense of vast amounts of information, however caution that the interpretation of any findings be interpreted within the general complexity. There is opportunity to here to advance complexity theory. If a complex phenomena can be viewed as a model with restricted complexity, then applied and interpreted

within general complexity (as opposed to a linear reaction to findings found in restricted complexity), then perhaps, complexity theory may find a new niche of flexibility to inform practice. For example, in the field of educational data mining which draws on massive amounts of administrative data within complex contexts, the introduction of complexity theory (with general complexity and restricted complexity) may assist in the development and interpretation of findings. That is, the development of models used in educational data mining can occur in a general complexity space, however educational leaders would take mindful care to ensure that the interpretation of findings from these models would be done in fulsome general complexity. This line of inquiry provides opportunity to inform not only methodology and methods within educational data mining and the learning analytics and academic analytics field as informed by complexity theory, but it also has the opportunity to enable adaptive space around the educational leaders interpreting findings from educational data mining and analytics.

Recommendations for Policy

Healthcare professions education does not occur in a vacuum. Healthcare professions education is richly connected with other social systems, such as the health care system. It is suggested that:

- leaders as decision-makers engage with complexity, so that policies are complexity-informed through next practices *as well as* evidence-informed through best practices.

- those who support decision-makers share when predictions work, and when predictions lose stability.

- leaders, whether formal, informal, or emergent (are enabled to) contribute to the complexity of a system.

- leaders acknowledge that creativity and innovation emerge from complexity, and the need for diverse contribution of each role must be mindfully considered and enabled.

Recommendations for Practice

Educational evaluation. Mertens (2015), who is a scholar in educational research and evaluation stated that:

Evaluation is more typically associated with the need for information for decision making in a specific setting, and research is more typically associated with generating new knowledge that can be transferred to other settings. In practice, a larger area of overlap exists between evaluation and research. (p. 3)

While evaluation has not been mentioned within the research study yet, when I think about how the recommendations for policy would look like, evaluation comes to my mind. Specifically, the first recommendation for leaders as decision-makers to engage with complexity, so that policies are complexity-informed through next practices *as well as* evidence-informed through best practices is a recommendation which can be constructed through complimentary approaches to evaluation. That is, within complexity, our work is combination of what we plan to achieve and how our work brings value in ways that could not have been predicted. However, our methods of evaluating typically do not capture both planned and emergent outcomes (Koopmans, 2014).

To provide a complimentary view to positivism, evaluation can also take a constructivist view where, "reality is not absolute, but is socially constructed and that multiple realities exist that are time and context dependent" (Mertens, 2015, p. 237). This is important, as complexity, which stems from emergent conditions, can only be seen in retrospect. Evaluation within complexity is tricky, as traditional notions of prediction in outcomes from currently defined

metrics may not be as relevant due to the non-linearity present in complexity. Specifically, evaluation with complex contexts may benefit from reflection on what were the starting conditions – either initial conditions or emergent conditions, and how those starting conditions were enabled and experienced throughout the adaptive space of the complex adaptive system. This means that some approaches to educational evaluation, which encompass a linear approach such as logic models or randomized control trials, may need to be enhanced by including other forms of evaluation which can capture emergent conditions *as well as* initial conditions within educational evaluation (Koopmans, 2014; Maxwell, 2012). There is an implication for practice here. The recommendation for practice is that educational leaders must consider complimentary views to educational evaluation to leverage evaluation activities to encompass *both* initial (planned) conditions and emergent outcomes so that a deeper understanding of how reality has been constructed within an educational program can be explored and understood.

Leadership literacy. Perceiving adaptive space as the connection between leadership within complexity is helpful, because awareness of adaptive space will help leaders engage to discern when best practices are useful, and when next practices need to be developed. This research study supports a combination of leadership theories to be used within a complex context. What this research study adds is that by viewing the context through the lens of complexity theory, the rationale of emergent conditions from the adaptive space begins to provide an informed leadership response, and that leadership theories should be chosen best on their suitability to these starting conditions *as well as* the reality which the leader wishes to construct. This work is hard, but leaders do not have to do it alone or in isolation. There are tools, such as the Cynefin framework (Snowden, & Boone, 2007), and approaches such as

double-loop learning (Argyris, 2002), to guide the development of leaders, and support an informed leadership response.

Systems overlap. At a given site, there are numerous systems. Within each system, there are numerous feedback loops which can strengthen a consistent experience (such as in a simple or complicated context), or a feedback loop may provide an opportunity for novel activity to occur (such as in a complex or chaotic context). If the novel activity could never have been predicted, then complexity is present. If the novel activity could have been predicted given more information at the time of prediction, then chaos is present. The distinction here is important. Within a simple or complicated context, best practices can be adopted. With a chaotic context, a best practices may be useful with some revisions. With a complex context, a next practice is needed. Each of the feedback loops within simple, complicated, chaotic, or complex contexts can be used to diagnosis the efficacy of best practices.

When efficacy is questioned, then leaders have the option to become aware of the adaptive space in their context, and how feedback loops may add value within the system. The decision as to which feedback loops to engage with within the system is where the combination of leadership theories to inform practice can be helpful, as this will help bring a balance between diversity and redundancy. The range of feedback loops observed within complexity supports considering multiple theories of leadership simultaneously in lieu of a solitary leadership theory. That is, there may be instances where the use of single-loop learning is sufficient; however, there may be instances where the use of second-loop learning is needed to generating system feedback. In complexity, relationships with organizational actors form system feedback. The recommendation for practice is to enhance leadership ability to discern which leadership theories would be best applied to the feedback loops experienced by organizational actors.

Summary

This dissertation explored leadership within complexity with a qualitative case study at a selected site. The site was chosen as it is a complex adaptive system, and provided the author the ability to conduct a research study within the scholar-practitioner manner, as is intended in the EdD program. The inquiry into the complex adaptive systems was viewed through leaders' adaptability To changes in educational programs at the site, and complexity theory was used a lens to make meaning from artifacts (document review) and experiences (semi-structured interviews) from the site.

The findings in this research study make a contribution to the literature by exploring how leadership can nurture the adaptive space found in the complex contexts. Specifically, these findings demonstrate that educational leaders, all educational leaders in formal, informal, and emergent roles, are positioned to enable this adaptive space, with which they are a part of. That is, the context *includes* educational leaders and their relationships, at all levels and roles, *includes* a diversity of feedback loops, and *includes* ongoing interconnections between roles, relationships, and responses to challenges felt within the complex adaptive system. Given this inclusion, it becomes increasingly foreign to exclude and reduce components of a system into individual isolated responses to challenges with the intent that solving individual components in isolation will be successful, or even sufficient. While much was explored and shared in this research study about the intersection of complexity and leadership within higher education, there is plenty of opportunity to explore further.

References

Al-Moamary, M. S., Al-Kadri, H. M., & Tamim, H. M. (2016). Authentic leadership in a health sciences university. *Medical Teacher, 38 Suppl 1*(sup1), S19-S25. doi:10.3109/0142159X.2016.1143092

Anderson, M. H., & Sun, P. Y. T. (2015). The downside of transformational leadership when encouraging followers to network. *The Leadership Quarterly, 26*(5), 790-801. 10.1016/j.leaqua.2015.05.002

Argyris, C. (2002). Teaching smart people how to learn. *Reflections: The SoL Journal, 4*(2), 4-14. doi:10.1162/152417302762251291

Austin, A. E. (2012). Challenges and visions for higher education in a complex world: Commentary on barnett and barrie. *Higher Education Research & Development, 31*(1), 57-64. 10.1080/07294360.2012.642840

Avolio, B. J., Walumbwa, F. O., & Weber, T. J. (2009). Leadership: Current theories, research, and future directions. *Annual Review of Psychology, 60*(1), 421-449. doi:10.1146/annurev.psych.60.110707.163621

Basham, L. M. (2012). Transformational and transactional leaders in higher education. SAM Advanced Management Journal, 77(2), 15-23.

Blandin, N. (2008). *Re-conceptualizing leadership for an era of complexity and uncertainty: A case study of leadership in a complex adaptive system*. Ph.D. diss., The George Washington University.

Bento, F. (2011). The contribution of complexity theory to the study of departmental leadership in processes of organisational change in higher education. *International Journal of Complexity in Leadership and Management*, *1*(3), 275-288.

Birch, S., & SEDAP Research Program. (2007). *Health human resources planning and the production of health: Development of an extended analytical framework for needs based health human resources planning*. Hamilton, Ont: SEDAP.

Boeker, M., Vach, W., & Motschall, E. (2013). Google scholar as replacement for systematic literature searches: Good relative recall and precision are not enough. *BMC Medical Research Methodology, 13*(1), 131-131. doi:10.1186/1471-2288-13-131

Boeker, M., Motschall, E., & Vach, W. (2016). Literature search methodology for systematic reviews: Conventional and natural language processing enabled methods are complementary (letter commenting on: Journal clinical epidemiology. 2015;68:191-9). *Journal of Clinical Epidemiology, 69*, 255-257. doi:http://dx.doi.org/10.1016/j.jclinepi.2015.05.022

Boerma, M., Coyle, E. A., Dietrich, M. A., Dintzner, M. R., Drayton, S. J., Early, J. L., & Williams, N. T. (2017). Point/Counterpoint: Are outstanding leaders born or made? *American Journal of Pharmaceutical Education, 81*(3), 58A.

Bonnette, J. M. (2015). *A case study of complex systems leadership in higher education fundraising* (Order No. 3746559). Available from ProQuest Dissertations & Theses Global. (1757275527).

Boote, D. N., & Beile, P. (2005). Scholars before researchers: On the centrality of the dissertation literature review in research preparation. *Educational Researcher, 34*(6), 3-15. doi:10.3102/0013189X034006003

Booth, Colomb, William, Bizup, & Fitzgerald. (2016). *The Craft of Research* (4th edition). University of Chicago Press: USA.

Borgatti, S. P., & Halgin, D. S. (2011). On network theory. *Organization Science, 22*(5), 1168-

1181. 10.1287/orsc.1100.0641

Branson, C. M., Franken, M., & Penney, D. (2016). Middle leadership in higher education: A relational analysis. *Educational Management Administration & Leadership, 44*(1), 128-145. doi:10.1177/1741143214558575

Brown, M. E., & Mitchell, M. S. (2010). Ethical and unethical leadership: Exploring new avenues for future research. *Business Ethics Quarterly, 20*(4), 583-616. 10.5840/beq201020439

Brownlee, J. (2015). Contract faculty in Canada: Using access to information requests to uncover hidden academics in Canadian universities. *Higher Education*, 70(5), 787;805;-805. 10.1007/s10734-015-9867-9

Byrne, D. S., & Callaghan, G. (2014). *Complexity theory and the social sciences: The state of the art*. London: Routledge, Taylor & Francis Group.

Cabello, J. B., Emparanza, J. I., & Ansuategi, E. (2006). Improving literature searches. geographic filters, methodology filters. two different algorithms, two different applications. *Revista Española De Cardiología (English Edition), 59*(12), 1221-1224. doi:10.1016/S1885-5857(07)60077-2

Canadian Council on Learning. (2010). *Navigating post-secondary education in Canada: The challenge of a changing landscape.* Canadian Council on Learning.

Canadian Institutes of Health Information. (2017). *Health Workforce*. Retrieved from https://www.cihi.ca/en/health-workforce

Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of

Canada, and Social Sciences and Humanities Research Council of Canada. (2014). *Tri-council policy statement: Ethical conduct for research involving human*. Retrieved from http://www.pre.ethics.gc.ca/pdf/eng/tcps2-2014/TCPS_2_FINAL_Web.pdf

Canadian Institutes of Health Information. (2018). *Health Workforce*. Retrieved from https://www.cihi.ca/en/health-workforce

Canadian Medical Association, & Canadian Nurses' Association. (2005). *Toward a pan-Canadian planning framework for health human resources: A green paper*. Ottawa, Ont: Canadian Nurses Association.

Canadian Nurses' Association, & Pan-Canadian Planning Committee on Unregulated Health Workers. (2009). *Maximizing health human resources: Valuing unregulated health workers : Highlights of the 2009 pan-Canadian symposium*. Ottawa, Ont: Canadian Nurses Association.

Cilliers, P. (2000). What can we learn from a theory of complexity? *Emergence*, *2*(1), 23-33.

Cilliers, P. (2000). Knowledge, complexity, and understanding. Emergence: *Complexity and Organization, 2*(4), 7-13. 10.1207/S15327000EM0204_03

Cilliers, P. (2005). Complexity, deconstruction and relativism. *Theory, Culture & Society, 22*(5), 255-267. doi:10.1177/0263276405058052

Clancy, T. R., Effken, J. A., & Pesut, D. (2008). Applications of complex systems theory in nursing education, research, and practice. *Nursing Outlook, 56*(5), 248-256.e3. doi:10.1016/j.outlook.2008.06.010

Clearfield, C., & Tilcsik, A. (2018). *Meltdown: Why our systems fail and what we can do about it*. New York: Penguin Press.

Ciulla, J. B. (2008). Leadership studies and "the fusion of horizons". *The Leadership Quarterly,*

19(4), 393-395. doi: 10.1016/j.leaqua.2008.05.001

Cochran-Smith, M., Ell, F., Ludlow, L., Grudnoff, L., & Aitken, G. (2014). The Challenge and Promise of Complexity Theory for Teacher Education Research. *Teachers College Record*, *116*(5), n5.

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6th edition). Routledge: USA.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks: SAGE Publications.

Creswell, J. W. (2013). *Qualitative inquiry & research design: Choosing among five approaches* (3rd ed.). Los Angeles: SAGE Publications.

Cristancho, S., Bidinosti, S., Lingard, L., Novick, R., Ott, M., & Forbes, T. (2017). What's behind the scenes? Exploring the unspoken dimensions of complex and challenging surgical situations. *Academic Medicine, 89*(11), 1540-1547.

Davis, B. (2008). Complexity and education: Vital simultaneities. *Educational Philosophy and Theory, 40*(1), 50-65. doi:10.1111/j.1469-5812.2007.00402.x

Davis, M., & Fifolt, M. (2018). Exploring employee perceptions of six sigma as a change management program in higher education. *Journal of Higher Education Policy and Management, 40*(1), 81. 10.1080/1360080X.2017.1377970

Davis, B., & Sumara, D. (2010). 'If things were simple.': Complexity in education. *Journal of Evaluation in Clinical Practice, 16*(4), 856-860. doi:10.1111/j.1365-2753.2010.01499.x

Dean, H. J., MacDonald, L., Alessi-Severini, S., Halipchuk, J., Sellers, E., & Grymonpre, R.

(2014). Elements and enablers for interprofessional education clinical placements in diabetes teams. *Canadian Journal of Diabetes, 38*(4), 273-278. doi:10.1016/j.jcjd.2014.02.024

Dekker, S., Cilliers, P., & Hofmeyr, J. (2011). The complexity of failure: Implications of complexity theory for safety investigations. *Safety Science, 49*(6), 939-945. 10.1016/j.ssci.2011.01.008

DeRue, D. S., Nahrgang, J. D., & Ashford, S. J. (2015). Interpersonal perceptions and the emergence of leadership structures in groups: A network perspective. *Organization Science, 26*(4), 1192-1209. doi:10.1287/orsc.2014.0963

Dinh, J. E., Lord, R. G., Gardner, W. L., Meuser, J. D., Liden, R. C., & Hu, J. (2014). Leadership theory and research in the new millennium: Current theoretical trends and changing perspectives. *The Leadership Quarterly, 25*(1), 36-62. doi:10.1016/j.leaqua.2013.11.005

Doll, J., William E, & Trueit, D. (2010). Complexity and the health care professions. *Journal of Evaluation in Clinical Practice, 16*(4), 841-848. doi:10.1111/j.1365-2753.2010.01497.x

Drack, M., & Schwarz, G. (2010). Recent developments in general system theory. *Systems Research and Behavioral Science, 27*(6), 601-610. doi:10.1002/sres.1013

Duignan, P. (2014). Authenticity in educational leadership: History, ideal, reality. *Journal of Educational Administration, 52*(2), 152-172. doi:10.1108/JEA-01-2014-0012

Duncan, K., & Schulz, P. S. (2015). Impact of change to a concept-based baccalaureate nursing curriculum on student and program outcomes. *Journal of Nursing Education, 54*(3, Suppl), S16. 10.3928/01484834-20150218-07

Eacott, S. (2018). *Beyond leadership: A relational approach to organizational theory in education*. Singapore: Springer.

Epitropaki, O., Kark, R., Mainemelis, C., & Lord, R. G. (2017). Leadership and followership identity processes: A multilevel review. *The Leadership Quarterly, 28*(1), 104-129. 10.1016/j.leaqua.2016.10.003

Fahlberg, B., & Toomey, R. (2016). Servant leadership: A model for emerging nurse leaders. *Nursing, 46*(10), 49-52. doi:10.1097/01.NURSE.0000494644.77680.2a

Fara, P. (2015). Newton shows the light: A commentary on newton (1672) 'A letter … containing his new theory about light and colours…'. Philosophical Transactions. Series A, *Mathematical, Physical, and Engineering Sciences, 373*(2039), 20140213-20140213. doi:10.1098/rsta.2014.0213

Ferguson, S. L., & Lloyd, J. (2017). Innovative information technology solutions: Addressing current and emerging nurse shortages and staffing challenges worldwide. *Nursing Economics, 35*(4), 211.

Fidan, T., & Balcı, A. (2017). Managing schools as complex adaptive systems: A strategic perspective. *International Electronic Journal of Elementary Education, 10*(1), 11-26. doi:10.26822/iejee.2017131883

Florczak, K., Poradzisz, M., & Hampson, S. (2012). Nursing in a complex world: A case for grand theory. *Nursing Science Quarterly, 25*(4), 307-312. doi:10.1177/0894318412457069

Foreman, S. (2017). The accuracy of state NCLEX-RN© passing standards for nursing programs. Nurse Education Today, 52, 81-86. doi: 10.1016/j.nedt.2017.02.019

Flynn, B. W., & Speier, A. H. (2014). Disaster behavioral health: Legal and ethical considerations in a rapidly changing field. *Current psychiatry reports*, *16*(8), 457.

French, S. (2015). Cynefin: Uncertainty, small worlds and scenarios. *The Journal of the*

Operational Research Society, 66(10), 1635-1645. doi:10.1057/jors.2015.21

Garrett, B. M., MacPhee, M., & Jackson, C. (2011). Implementing high-fidelity simulation in

Canada: Reflections on 3 years of practice. *Nurse Education Today, 31*(7), 671-676.

doi:10.1016/j.nedt.2010.10.028

Glasper, A. (2016). Improving the resilience of the healthcare workforce. *British Journal of*

Nursing, 25(21), 1216-1217. doi: 10.12968/bjon.2016.25.21.1216

Greenhalgh, T., & Papoutsi, C. (2018). Studying complexity in health services research:

Desperately seeking an overdue paradigm shift. *BMC Medicine, 16*(1), 1-6.

doi:10.1186/s12916-018-1089-4

Giddens, J. F., & Brady, D. P. (2007). Rescuing nursing education from content saturation: The

case for a concept-based curriculum. *The Journal of Nursing Education, 46*(2), 65.

Giddens, J., Caputi, L., & Rodgers, B. L. (2014). Mastering concept-based teaching: A guide for

nurse educators. St. Louis, Missouri: Elsevier/Mosby

Giles, D. L., Bills, A., & Otero, G. (2015). Pedagogical approaches for developing relational

sensibilities in educational leaders. *Reflective Practice, 16*(6), 744-752. doi:

10.1080/14623943.2015.1095725

Gillatt, M. (2014). A new face on the old : Teaching smart people how to learn. *Australian*

Educational Leader, 36(2), 36-39.

Glatter, R. (2006). Leadership and organization in education: Time for a re-orientation? *School*

Leadership & Management, 26(1), 69.

Glesne, C. (2011). *Becoming qualitative researchers: An introduction* (4th ed.). Pearson

Education: Boston, MA.

Goldstein, J. (2008). Conceptual foundations of complexity science. *Complexity Leadership*, 17-

48.

Goldsworthy, S. (2012). High fidelity simulation in critical care: A Canadian perspective. *Collegian, 19*(3), 139-143. doi:10.1016/j.colegn.2012.06.003

Grant, J. C., & Kanji, Z. (2017). Exploring interprofessional relationships between dental hygienists and health professionals in rural Canadian communities. *Journal of Dental Hygiene : JDH, 91*(4), 6-11.

Gray, B. (2017). The Cynefin framework: Applying an understanding of complexity to medicine. *Journal of Primary Health Care, 9*(4), 258. doi:10.1071/HC17002

Gribbin, J. (2005). *Deep simplicity: Chaos, complexity and the emergence of life*. USA: Random House.

Grymonpre, R., Ateah, C., Dean, H., Heinonen, T., Holmqvist, M., MacDonald, L., Ready, E., & Wener, P. (2016). Sustainable implementation of interprofessional education using an adoption model framework. *The Canadian Journal of Higher Education, 46*(4), 76-93.

Gurr, D. (2014). Successful school leadership across contexts and cultures. *Leading and Managing, 20*(2), 75-88.

Harms, P. D., Bai, Y., & Han, G. H. (2016). How leader and follower attachment styles are mediated by trust. *Human Relations, 69*(9), 1853-1876. doi: 10.1177/0018726716628968

Hannah, S. T., Sumanth, J. J., Lester, P., & Cavarretta, F. (2014). Debunking the false dichotomy of leadership idealism and pragmatism: Critical evaluation and support of newer genre leadership theories. *Journal of Organizational Behavior, 35*(5), 598-621. doi:10.1002/job.1931

Hays, J. M. (2008). Teacher as servant applications of Greenleaf's servant leadership in higher education. *Journal of Global Business Issues, 2*(1), 113.

Hetherington, L. (2013). Complexity thinking and methodology: The potential of 'complex case study' for educational research. *Complicity, 10*(1), 71-85.

Hinzey, A. L. (2016). *Exploring How Complexity Leader Behaviors Shape the Connectivity of Agents within a Complex Adaptive System: A Case Study* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (Accession Order No. [1778511334])

Hoare, K. J. (2016). Retaining new graduate nurses in practice; under-pinning the theory of reciprocal role modelling with 'routinisation' theory and transition shock. *Social Theory & Health, 14*(2), 224-238. 10.1057/sth.2015.30

Holmes, Bev J., Best, A., Davies, A., Hunter, D., Kelly, M., Marshall, Martin, & Rycroft-

Holland, J. H. (2012). *Signals and boundaries: Building blocks for complex adaptive systems*. MIT Press.

Holland, J. H. (2014). *Complexity: A very short introduction*. OUP Oxford.

Hornsby, D. J., & Osman, R. (2014). Massification in higher education: Large classes and student learning. *Higher Education, 67*(6), 711;719;-719. 10.1007/s10734-014-9733-1

Houglum, D. T. (2012). Myth-busters: Traditional and emergent leadership. *Emergence: Complexity and Organization*, *14*(2), 25.

Human, O., Preiser, R., & Cilliers, P. (2013). Deconstruction and complexity : A critical economy. *South African Journal of Philosophy, 32*(3), 261-273. 10.1080/02580136.2013.837656

Jackson, B., & Parry, K. (2011). *A very short fairly interesting and reasonably cheap book about studying leadership*. Sage Publications.

Kacmar, K. M., Bachrach, D. G., Harris, K. J., & Zivnuska, S. (2011). Fostering good citizenship

through ethical leadership: Exploring the moderating role of gender and organizational politics. *The Journal of Applied Psychology, 96*(3), 633-642. 10.1037/a0021872

Karp, T. (2013). Studying subtle acts of leadership. *Leadership, 9*(1), 3-22. doi: 10.1177/1742715012447007

Kempermann, G. (2017). Cynefin as reference framework to facilitate insight and decision-making in complex contexts of biomedical research. *Frontiers in Neuroscience, 11,* 634. doi:10.3389/fnins.2017.00634

Khan, I., Ndubuka, N., Stewart, K., McKinney, V., & Mendez, I. (2017). The use of technology to improve health care to Saskatchewan's first nations communities. *Canada Communicable Disease Report = Releve Des Maladies Transmissibles Au Canada, 43*(6), 120-124.

Khan, S., Vandermorris, A., Shepherd, J., Begun, J. W., Lanham, H. J., Uhl-Bien, M., & Berta, W. (2018). Embracing uncertainty, managing complexity: Applying complexity thinking principles to transformation efforts in healthcare systems. *BMC Health Services Research, 18*(1), 192. doi:10.1186/s12913-018-2994-0

Koopmans, M. (2017). Perspectives on complexity, its definition and applications in the field. *Complicity, 14*(1), 16-35.

Koopmans, M. (2014). Change, self-organization and the search for causality in educational research and practice. *Complicity, 11*(1), 20-39.

Kouzes, J., & Posner, B. (2017). Who you are isn't who you will be. Student Affairs Today, 20(1), 7-7. 10.1002/say.30322

Kouzes, J. M., & Posner, B. Z. (2012). *The Leadership Challenge: How to Make Extraordinary Things Happen in Organizations* (5th ed.). USA: Jossey Bass Incorporated.

Kurth, A. E., Jacob, S., Squires, A. P., Sliney, A., Davis, S., Stalls, S., & Portillo, C. J. (2016).

   Investing in nurses is a prerequisite for ensuring universal health coverage. *Journal of the*

   Association of Nurses in AIDS Care, 27(3), 344-354. 10.1016/j.jana.2016.02.016

Krishnamurthy, V. (2015). Edward norton lorenz: Discoverer of chaos. *Resonance, 20*(3), 191-

   197. doi:10.1007/s12045-015-0169-4

Koopmans, M. (2014). Change, self-organization and the search for causality in educational

   research and practice. *Complicity* 11, (1): 20-39.

Landeen, J., Pierazzo, J., Akhtar-Danesh, N., Baxter, P., Eijk, S. v., & Evers, C. (2015).

   Exploring student and faculty perceptions of clinical simulation: A Q-sort study. *Journal*

   of Nursing Education, 54(9), 485. doi: 10.3928/01484834-20150814-02

Leroy, H., Anseel, F., Gardner, W. L., & Sels, L. (2015). Authentic leadership, authentic

   followership, basic need satisfaction, and work role performance: A cross-level study.

   Journal of Management, 41(6), 1677-1697. 10.1177/0149206312457822

Lichtenstein, B. B., & Plowman, D. A. (2009). The leadership of emergence: A complex systems

   leadership theory of emergence at successive organizational levels. *The Leadership*

   Quarterly, 20(4), 617-630. doi:10.1016/j.leaqua.2009.04.006

Lichtenstein, B. B., Uhl-Bien, M., Marion, R., Seers, A., Orton, J. D., & Schreiber, C. (2006).

   Complexity leadership theory: An interactive perspective on leading in complex adaptive

   systems. *Emergence: Complexity and Organization, 8*(4), 2.

Liu, H. (2017;2015;). Reimagining ethical leadership as a relational, contextual and political

   practice. *Leadership, 13*(3), 343-367. doi:10.1177/1742715015593414

Lown, S. G., & Hawkins, L. A. (2017;2016;). Learning style as a predictor of first-time NCLEX-

RN success: Implications for nurse educators. *Nurse Educator, 42*(4), 181-185. doi: 10.1097/NNE.0000000000000344

Malone, J. (2017). Mobilising knowledge in complex health systems: A call to action. *Evidence & Policy 13*(3), 539-560.

Marion, R. (2008). Complexity theory for organizations and organizational leadership. In M. Uhl-Bien, & R. Marion (Eds.), *Complexity leadership* (pp. 1-16). USA: Information Age Publishing, Inc.

Marion, R., & Uhl-Bien, M. (2001). Leadership in complex organizations. *The Leadership Quarterly, 12*(4), 389-418. doi:10.1016/S1048-9843(01)00092-3

Martin, J., Polisena, J., Dendukuri, N., Rhainds, M., & Sampietro-Colom, L. (2016). Local health technology assessment in Canada: Current state and next steps. *International Journal of Technology Assessment in Health Care, 32*(3), 175-180. doi:10.1017/S0266462316000210

Mason, M. (2008). Complexity theory and the philosophy of education. *Educational Philosophy and Theory*, *40*(1), 4-18.

Maxwell, J. A. (2012). The importance of qualitative research for causal explanation in education. *Qualitative Inquiry 18*(8), 655-661.

McLeod, J., & Childs, S. (2013). The Cynefin framework: A tool for analyzing qualitative data in information science? *Library and Information Science Research, 35*(4), 299. doi:10.1016/j.lisr.2013.05.004

Mennin, S. (2010). Complexity and health professions education. *Journal of Evaluation in Clinical Practice, 16*(4), 835-837. doi:10.1111/j.1365-2753.2010.01502.x

Merriam, S. B. (1998). *Qualitative Research and Case Study Applications in Education. Revised*

and Expanded from Case Study Research in Education. San Francisco, CA: Jossey-Bass

Publishers.

Mertens, D. M. (2015). *Research and evaluation in education and psychology: Integrating

diversity with quantitative, qualitative, and mixed methods* (4th edition). Los Angeles,

USA: Sage publications.

Mertkan, S. (2014). In search of leadership: What happened to management? *Educational

Management Administration & Leadership, 42*(2), 226-242. doi:

10.1177/1741143213499252

Mennin, S. (2010). Complexity and health professions education: Complexity and medical

education. *Journal of Evaluation in Clinical Practice, 16*(4), 835-837.

doi:10.1111/j.1365-2753.2010.01502.x

Michelle, L., & Santamaria, J. (2016). Theories of Educational Leadership. *Oxford

Bibliographies*. http://www.oxfordbibliographies.com/view/document/obo-

9780199756810/obo-9780199756810-0153.xml#firstMatch doi:

10.1093/OBO/9780199756810-0153

Milian, R. P., Davies, S., & Zarifa, D. (2016). Barriers to differentiation: Applying

organizational studies to Ontario higher education. *The Canadian Journal of Higher

Education, 46*(1), 19.

Milian, R. P., & McLaughlin, N. (2017). Canadian Sociology for Sale? Academic Branding in

the 'Neo-Liberal Age'. *The American Sociologist*, 1-20.

Mills, G. E., & Gay, L. R. (2015). *Educational research: competencies for analysis and

applications*. Pearson.

Mitchell, G. J., Jonas-Simpson, C. M., & Cross, N. (2013). Innovating nursing education:

interrelating narrative, conceptual learning, reflection, and complexity science. *Journal of Nursing Education and Practice*, *3*(4), 30.

Montuori, A. (2013). Complexity and transdisciplinarity: Reflections on theory and practice. *World Futures, 69*(4-6), 200-230. 10.1080/02604027.2013.803349

Moraes, F., & Góes, A. (2016). A decade of human genome project conclusion: Scientific diffusion about our genome knowledge. *Biochemistry and Molecular Biology Education, 44*(3), 215-223. doi:10.1002/bmb.20952

Morin, E. (2007). Restricted complexity, general complexity. In *Worldviews, science and us: Philosophy and complexity*, 5-29.

Morrison, K. (2008). Educational philosophy and the challenge of complexity theory. *Educational Philosophy and Theory, 40*(1), 19-34. doi:10.1111/j.1469-5812.2007.00394.x

Morrison, K. (2010). Complexity theory, school leadership and management: Questions for theory and practice. Educational Management Administration & Leadership, 38(3), 374-393. 10.1177/1741143209359711

Morrison, K. (2012). Searching for causality in the wrong places. International Journal of Social Research Methodology, 15(1), 15-30. 10.1080/13645579.2011.594293

Murphy, Gail Tomblin, Adrian MacKenzie, Robert Alder, and Bernice Budz. 2017. Evaluation of a redesigned Canadian undergraduate nursing program: A prospective cohort study. *Journal of Nursing Education* 56(8), 484-489.

Neidorf, R. (1963). Discussion: Is Einstein a positivist? Philosophy of Science, 30(2), 173-188.

Nichols, A. L. (2016). What do people desire in their leaders? the effect of leadership experience

on desired leadership traits. *Leadership & Organization Development Journal, 37*(5), 658-671. 10.1108/LODJ-09-2014-0182

Northouse, P. G. (2016). *Leadership: Theory and practice (7th ed.).* Thousand Oaks, California: SAGE Publications, Inc.

Nowotny, H. (2005). The increase of complexity and its reduction: Emergent interfaces between the natural sciences, humanities and social sciences. *Theory, Culture & Society, 22*(5), 15-31. doi:10.1177/0263276405057189

Nübold, A., Dörr, S. L., & Maier, G. W. (2015). Considering the orphan: Personal identification and its relations with transformational leadership, trust, and performance in a three-path mediation model. *Leadership, 11*(2), 230-254. doi:10.1177/1742715014522679

Nyberg, D., & Sveningsson, S. (2014). Paradoxes of authentic leadership: Leader identity struggles. *Leadership, 10*(4), 437-455. doi:10.1177/1742715013504425

Osborn, R. N., Hunt, J. G., & Jauch, L. R. (2002). Toward a contextual theory of leadership. *The Leadership Quarterly, 13*(6), 797-837. doi:10.1016/S1048-9843(02)00154-6

Palmer, P. J. (2016). Parker J. palmer reflects on a lifetime of learning. *About Campus: Enriching the Student Learning Experience, 21*(4), 4-13. doi:10.1002/abc.21248

Patton, M. Q. (2015). *Qualitative evaluation and research methods (4th ed.).* Thousand Oaks, California: SAGE Publications, Inc.

Piché, P. G. (2015). Measuring systemic and climate diversity in Ontario's university sector. *The Canadian Journal of Higher Education, 45*(4), 63-80.

Piché, P. G., & Jones, G. A. (2016). Institutional diversity in Ontario's university sector: A policy debate analysis. *The Canadian Journal of Higher Education, 46*(3), 1-17.

Pitard, J. (2017). A journey to the centre of self: Positioning the researcher in autoethnography.

Forum: Qualitative Social Research, 18(3) ,10. doi:10.17169/fqs-18.3.2764

Pinelli, N. R., Sease, J. M., Nola, K., Kyle, J. A., Heldenbrand, S. D., Penzak, S. R., & Ginsburg,

D. B. (2018). The importance of authentic leadership to all generations represented within academic pharmacy. *American Journal of Pharmaceutical Education, 82*(6), 637-640.

Polkinghorne, D. E. (2005). Language and meaning: Data collection in qualitative research. *Journal of Counseling Psychology*, *52*(2), 137.

Pouvreau, D., & Drack, M. (2007). On the history of ludwig von bertalanffy's "general systemology", and on its relationship to cybernetics: Part I: Elements on the origins and genesis of ludwig von bertalanffy's "general systemology". *International Journal of General Systems, 36*(3), 281. 10.1080/03081070601127961

Price, M. H. (2014). Complexity Leadership Theory May Help Statewide PLA Coordination. *The Journal of Continuing Higher Education*, *62*(3), 180-185.

Regehr, C. (2013). Trends in higher education in canada and implications for social work education. *Social Work Education, 32*(6), 700-714. 10.1080/02615479.2013.785798

Reich, K., Garrison, J., & Neubert, S. (2016). Complexity and reductionism in educational philosophy-john dewey's critical approach in 'democracy and education' reconsidered. *Educational Philosophy and Theory, 48*(10), 997. 10.1080/00131857.2016.1150802

Resler, L. M. (2016). Edward N Lorenz's 1963 paper, "Deterministic nonperiodic flow", *Progress in Physical Geography, 40*(1), 175-180. doi:10.1177/0309133315623099

Rose, J. (2009). The early years: Some comments on the origins and concepts of cybernetics. *Kybernetes, 38*(1/2), 20-24. doi:10.1108/03684920910930853

Ryder, L. H. (1987). From Newton to Einstein. Physics Education, 22(6), 342-349.

    doi:10.1088/0031-9120/22/6/003

Saldaña, J. (2015). *The coding manual for qualitative researchers* (Third ed.). Los Angeles:

    SAGE.

Senior, C., Moores, E., & Burgess, A. P. (2017). "I can't get no satisfaction": Measuring student

    satisfaction in the age of a consumerist higher education. *Frontiers in Psychology,*

    *8*10.3389/fpsyg.2017.00980

Schell, G. J., Lavieri, M. S., Jankovic, F., Li, X., Toriello, A., Martyn, K. K., & Freed, G. L.

    (2016). Strategic modeling of the neonatal nurse practitioner workforce. *Nursing*

    Outlook, 64(4), 385-394. 10.1016/j.outlook.2016.03.007

Schein, E. H. (2010). *Organizational culture and leadership* (4th ed.). San Francisco: Jossey-

    Bass.

Schneider, M., & Somers, M. (2006). Organizations as complex adaptive systems: Implications

    of complexity theory for leadership research. *The Leadership Quarterly, 17*(4), 351-365.

    10.1016/j.leaqua.2006.04.006

Schneider, A., Wickert, C. M. J., Marti, E. (2017). Reducing complexity by creating complexity:

    A systems theory perspective on how organisations respond to their environments.

    Journal of Management Studies, 54(2), 182-208. doi:10.1111/joms.12206

Scott, K. A., & Pringle, J. (2018). The power of the frame: Systems transformation framework

    for health care leaders. *Nursing Administration Quarterly, 42*(1), 4-14.

    doi:10.1097/NAQ.0000000000000261

Shaffer, C., & McCabe, S. (2013). Evaluating the predictive validity of preadmission academic

criteria: High-stakes assessment. *Teaching and Learning in Nursing, 8*(4), 157.

10.1016/j.teln.2013.07.005

Shapira-Lishchinsky, O. (2014). Simulations in nursing practice: Toward authentic

leadership. *Journal of Nursing Management, 22*(1), 60-69. doi:10.1111/j.1365-

2834.2012.01426.x

Silver, N. (2012). *The signal and the noise: Why so many predictions fail-- but some don't / Nate

Silver.* New York: Penguin Press.

Simon, E. (2009). *Systems theory in nursing education. The Nursing Journal of India, 100*(2),

29-31.

Simon, E. B., McGinniss, S. P., & Krauss, B. J. (2013). Predictor variables for NCLEX-RN

readiness exam performance. *Nursing Education Perspectives, 34*(1), 18.

Sinclair, A. (2009). Seducing leadership: Stories of leadership development. Gender, Work and

Organization, 16(2), 266-284. 10.1111/j.1468-0432.2009.00441.x

Snowden, D. (2002). Complex acts of knowing: Paradox and descriptive self-awareness. *Journal

of Knowledge Management, 6*(2), 100-111. doi:10.1108/13673270210424639

Snowden, D. J. (2005). Multi-ontology sense making: A new simplicity in decision making.

Informatics in Primary Care, 13(1), 45-54.

Snowden, D. J., & Boone, M. E. (2007). A leader's framework for decision making. *Harvard

Business Review*, *85*(11), 68.

Staiger, D. O., Chattopadhyay, A., Buerhaus, P. I., Zangaro, G., & Auerbach, D. I. (2017).

Improving nursing workforce forecasts: Comparative analysis of the cohort supply model

and the health workforce simulation model. *Nursing Economics, 35*(6), 283-326.

Staples, E., & Urban, A. (2014). Transitioning to the NCLEX. *SRNA Newsbulletin*, 16(1), 19.

Statistics Canada. (April 29, 2010). *Definition of postsecondary education*. Retrieved from

http://www.statcan.gc.ca/pub/81-004-x/2010001/def/posteducation-educpost-eng.htm

Storberg-Walker, J. (2016). Reaction to: Leadership misplacement: How can this affect

institutions of higher education? *New Horizons in Adult Education and Human Resource*

Development, 28(3), 30-32. doi:10.1002/nha3.20150

Sullivan-Marx, E. M. (2013). The bear and the canyon: Toward an understanding of personal

leadership. Nursing Science Quarterly, 26(4), 373-375. 10.1177/0894318413501961

Taplay, K., Jack, S. M., Baxter, P., Eva, K., & Martin, L. (2014). "Negotiating, navigating, and

networking": Three strategies used by nursing leaders to shape the adoption and

incorporation of simulation into nursing curricula-a grounded theory study. *ISRN*

Nursing, 2014, 854785.

Teddlie, C., & Yu, F. (2007). Mixed methods sampling a typology with examples. *Journal of*

mixed methods research, 1(1), 77-100.

Tourangeau, A. E., Wong, M., Saari, M., & Patterson, E. (2015). Generation-specific incentives

and disincentives for nurse faculty to remain employed. *Journal of Advanced Nursing,*

71(5), 1019-1031. 10.1111/jan.12582

Tourangeau, A., Saari, M., Patterson, E., Ferron, E. M., Thomson, H., Widger, K., & MacMillan,

K. (2014). Work, work environments and other factors influencing nurse faculty intention

to remain employed: A cross-sectional study. *Nurse Education Today, 34*(6), 940-947.

10.1016/j.nedt.2013.10.010

Tourish, D. (2017). Introduction: Writing differently about leadership. *Leadership, 13*(1), 3-4.

doi:10.1177/1742715016680668

Tourish, D. (2014). Leadership, more or less? A processual, communication perspective on the

role of agency in leadership theory. *Leadership, 10*(1), 79-98.

doi:10.1177/1742715013509030

Tracy, S. J. (2013). *Qualitative research methods: Collecting evidence, crafting analysis,*

communicating impact. John Wiley & Sons.

Trombly, C. E. (2014). Schools and complexity. *Complicity, 11*(1), 40-58.

Tsoukas, H.. (2002). Commentary: Vulnerability, Moral Responsibility, and Reflexive Thinking.

Reflections: The SoL Journal, 4(2), 4-14. doi:10.1162/152417302762251291

Tyagi, R. K., Cook, L., Olson, J., & Belohlav, J. (2013). Healthcare technologies, quality

improvement programs and hospital organizational culture in Canadian hospitals. *BMC*

Health Services Research, 13(1), 413. doi:10.1186/1472-6963-13-413

Uhl-Bien, M., & Arena, M. (2017). Complexity leadership. *Organizational Dynamics, 46*(1),

9-20. doi:10.1016/j.orgdyn.2016.12.001

Uhl-Bien, M., & Marion, R. (2009). Complexity leadership in bureaucratic forms of organizing:

A meso model. *The Leadership Quarterly 20*(4), 631-650.

Uhl-Bien, M., Marion, R., & McKelvey, B. (2007). Complexity leadership theory: Shifting

leadership from the industrial age to the knowledge era. *The Leadership Quarterly, 18*(4),

298-318. doi:10.1016/j.leaqua.2007.04.002

Uhl-Bien M., & Ospina S. (2012) *Advancing Relational Leadership Research, A Dialogue*

Among Perspectives. Charlotte, NC: Information Age Publishing

Van Beurden, E. K., Kia, A. M., Zask, A., Dietrich, U., & Rose, L. (2013). Making sense in a

complex landscape: How the Cynefin framework from complex adaptive systems theory

can inform health promotion practice. *Health Promotion International, 28*(1), 73-83.

doi:10.1093/heapro/dar089

Von Bertalanffy, L. (1967). General theory of systems: Application to psychology. *Social Science Information, 6*(6), 125-136. doi:10.1177/053901846700600610

Von Bertalanffy, L. (1972). The History and Status of General Systems Theory. *The Academy of Management Journal, 15*(4), 407-426.

Vandyk, A., Chartrand, J., Beké, É., Burlock, L., & Baker, C. (2017). Perspectives from academic leaders of the nursing faculty shortage in Canada. *International Journal of Nursing Education Scholarship, 14*(1), 286. 10.1515/ijnes-2017-0049

VanMeter, R., Chonko, L. B., Grisaffe, D. B., & Goad, E. A. (2016). In search of clarity on servant leadership: Domain specification and reconceptualization. *AMS Review, 6*(1), 59-78. doi:10.1007/s13162-016-0075-2

Walumbwa, F. O., Avolio, B. J., Gardner, W. L., Wernsing, T. S., & Peterson, S. J. (2008). Authentic leadership: Development and validation of a theory-based measure. *Journal of Management, 34*(1), 89-126. doi:10.1177/0149206307308913

Wang, V. C. X., & Sedivy-Benton, A. L. (2016). Leadership misplacement: How can this affect institutions of higher education? *New Horizons in Adult Education and Human Resource Development, 28*(3), 14-25. doi:10.1002/nha3.20148

Wells, S., & Herie, M. (2018). Reflective leadership practice for academic chairs. *The Department Chair, 29*(1), 1-3. doi:10.1002/dch.30196

Wheatley, M. (2006). *Leadership and the New Science: Discovering Order in a Chaotic World (3rd ed.)*. Berett-Koehler; USA.

Yakusheva, O., & Weiss, M. (2017). Rankings matter: Nurse graduates from higher-ranked institutions have higher productivity. *BMC Health Services Research, 17*(1) doi: 10.1186/s12913-017-2074-x

Yazan, B. (2015). Three Approaches to Case Study Methods in Education: Yin, Merriam, and

      Stake. *The Qualitative Report*, *20*(2), 134-152.

Yin, R. (2014). *Case study research: Design and methods (5th edition)*. Sage Publications: USA.

Zaccaro, Stephen J. (2007). Trait-based perspectives of leadership. *American*

      Psychologist, 62(1), 6-16.

Appendix A – Interview Protocol and Questions

Number of interviews: 11
Timeline of interviews: September 2017 – November 2017

Introduction:
At the beginning of the interview, I thanked the participant for considering to participate in this research study. At that point, we discussed the how this research study came to be, and what the research study aims to explore. Next, I explained the entire process of their participation, which would include pre-screening, obtaining consent, semi-structured interview, member-checking, and information on how the results of the research study would be shared.

Interview Questions:
1) Please tell me how your professional experiences brought you to the [site].

2) Where does your professional role fit within the governance structure of the [site].

3) How has the [site] changed since you have been here?

4) How have educational programs at the [site] changed since you have been here?

5) Have the changes in educational programs developed complexity at the [site]? If so, how?

6) How have changes in educational programs at the [site] influenced relationships with

   external stakeholders?

7) What do you see the future holding for the [site]?

   Probes:

   - In your view, what type of leadership is needed for the future?

   - From your perspective, what would encourage this type of leadership to

     emerge? To be successful?

Conclusion:
At the end of the interview, I thanked the participants for their valuable contribution to the research study. I went over how the transcript would be available for member-checking, and let them know that I was available at any time to respond to questions, concerns, or curiousities.

Appendix B – Letter of Information and Consent

Western ⬛

Project Title: Leadership within Complexity
Principal Investigator:
Dr. Brenton Faubert, Assistant Professor, University of Western Ontario
Helen Mawdsley, Doctoral candidate, University of Western Ontario

<u>Letter of Information</u>

1. **Invitation to Participate**

   You are being invited to participate in this study, as the ▮▮▮▮▮▮▮▮ is the site of an exploratory case study examining leadership within complexity at a Canadian Post-Secondary Educational Organization.

2. **Purpose of the Letter**

   The purpose of this letter is to provide you with information required for you to make an informed decision regarding participation in this research.

3. **Purpose of this Study**

   The purpose of this qualitative exploratory case study is to understand the nature of leadership in the College of a Faculty in a Canadian public university operating in a complex environment. The proposed study will investigate the phenomenon through the lens of complexity theory to provide a framework to understand interactions and actions members in leadership roles, either formal, emergent, or informal, within the complex adaptive system.

4. **Inclusion Criteria**

   The opportunity to participate in this study will be extended to all active members of the ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮ acting in a formal, emergent, and in-formal leadership roles. Participants of this study must be an active member of the College and have a curiosity to discuss leadership within complexity.

5. **Exclusion Criteria**

   Individuals who are who are not active members of the ▮▮▮▮▮▮▮▮▮▮▮▮▮▮ ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮ and are not acting in a formal, emergent, or in-formal leadership role, are not eligible to participate in this study.

6. Study Procedures

If you agree to participate, you will be asked to take part in a recorded, in-person interview. This interview will be audio-recorded. It is anticipated that the entire interview will take 30-60 minutes, over one session. The interview will be conducted at the ██████████, or over the telephone. It is anticipated to have 20-25 participants for this study. After the interview, you will be sent the transcript and given the opportunity to review and make revisions. The transcript will be delivered through password-protected online site housed at the University of Western Ontario. Participants will be given three weeks to complete this optional component.

7. Possible Risks and Harms

There is a possibility of the loss of confidentiality. Participants will be asked to comment on leadership that they may have experienced. There is a possibility that you could be identified through the data you provide. To minimize this possibility, we will remove all references to names and titles in the final report. The information collected will be reported in generalized categories that are applicable to the entire site of the case study, and not to any specific member. Specific supporting quotes will be carefully reviewed to assure that they cannot be associated with the source. Potential anonymity cannot be guaranteed but every effort will be taken to protect confidentiality.

8. Possible Benefits

The anticipated benefit to each participant extends to allowing each to have a voice in shaping the larger body of knowledge with respect to leadership within complexity, at this specific site. The potential benefits to society are that the results of this study will inform future research, leadership practices at this site of nursing education, as well as with stakeholders who interact with this site.

9. Compensation

You will not be compensated for your participation in this research.

10. Voluntary Participation

Participation in this study is voluntary. You may refuse to participate, refuse to answer any questions or withdraw from the study at any time with no effect on your future employment.
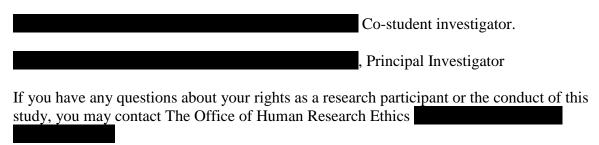
11. Confidentiality

All data collected will remain confidential and accessible only to the investigators of this study. If the results are published, your name will not be used. Results will be shared through the use of pseudonyms, and in a broader level of detail concerning roles and responsibilities of members so that confidentiality will be maintained. When writing up

the analysis, direct quotations from the semi-structured interviews will be scrambled (i.e., multiple quotes from a single interviewee will not be presented sequentially) and any details relating to specific events that can be traced back a specific individual will be avoided. Any personal/identifiable information revealed by the interviewee during the interview will be redacted.   If the results are published, the participant's name will not be used, and results will be shared in a manner that avoids implicating any specific participant. Even with these safeguards in place, it is possible that data collected during the interviews may identify a participant. If you choose to withdraw from this study, your data will be removed and destroyed from our database. Representatives of The University of Western Ontario Non-Medical Research Ethics Board may contact you or require access to your study-related records to monitor the conduct of the research. The data for this study will be securely stored for 5 years, and then destroyed.

12. Contacts for Further Information

If you require any further information regarding this research project or your participation in the study you may contact:

██ Co-student investigator.

████████████████████████████████████ , Principal Investigator

If you have any questions about your rights as a research participant or the conduct of this study, you may contact The Office of Human Research Ethics ████████████████ ███████████

This research has also been approved by the University of Manitoba Education/Nursing Research Ethics Board, and the College of Nursing Leadership Team

13. Publication

If the results of the study are published, your name will not be used. If you would like to receive a copy of any potential study results, please provide your name and contact number on a piece of paper separate from the Consent Form.

14. Consent

If you wish to participate in this study, please contact the Co-student investigator. A screening for the interview using the inclusion and exclusion criteria will occur. If the screening is successful, then a consent form will be signed. If the screening is successful, then interviewee will send a signed electronic copy of the consent form to the Researcher (see participant consent form). Once the consent form is completed, the semi-structured interview will continue.

This letter is yours to keep for future reference.

Western 🛡

Participant Consent Form

Project Title: Leadership within Complexity
Principal Investigator: Dr. Brenton Faubert
Student Investigator's Name: Helen Mawdsley
I have read the Letter of Information, have had the nature of the study explained to me and I agree to participate. All questions have been answered to my satisfaction. If, after reviewing the letter of information and consent form, you agree to participate in the study, please sign and send an electronic copy of the consent form to Helen Mawdsley at ████████████. A signed Digital copy of the consent form must be received by the researcher prior to your interview date.

I agree to be audio-recorded for this study.
   Please check:
   ◯ Yes ◯ No

I consent to the use of unidentified quotes obtained during the study in the dissemination of this research.
   Please check:
   ◯ Yes ◯ No

Participant's Name (please print): _____

Participant's Signature: _____

Date: _____

Person Obtaining Informed Consent (please print):   _____

Signature: _____

Date: _____

Curriculum Vitae

Name: Helen Mawdsley

Post-secondary   The University of Western Ontario
Education and   London, Ontario, Canada
Degrees: 2015 – present (Ed.D. candidate)

                     Royal Roads University
                     Victoria, British Columbia, Canada
                     2012-2014 MA (Health Leadership)

                     University of Manitoba
                     Winnipeg, Manitoba, Canada
                     1997-2001 B.Sc.

Related Work   ██████████████ Educational Specialist (2016-present)
Experience:

                     ██████████████ Coordinator of Innovation in Teaching & Learning (2016-2017)

                     ██████████████ Analyst (2004-2016)