2016

From Exceptional to Expelled: Exploring the Psychological Types of Exceptionally Bright but Academically 'At-Risk' University Learners

Andrea Prier
University of Windsor

From Exceptional to Expelled:

Exploring the Psychological Types of Exceptionally Bright but Academically 'At-Risk' University Learners

By

Andrea Prier

A Dissertation

Submitted to the Faculty of Graduate Studies

through the Faculty of Education

in Partial Fulfillment of the Requirements for

the Degree of Doctor of Philosophy

at the University of Windsor

Windsor, Ontario, Canada

2016

From Exceptional to Expelled:

Exploring the Psychological Types of Exceptionally Bright but Academically At-Risk University Learners

by
Andrea Prier

APPROVED BY:

J. Cuseo, External Examiner
Marymount College

P. Boulos
Centre for Teaching and Learning, University of Windsor

K. Smith
Faculty of Education, University of Windsor

T. Gallagher
Faculty of Education, Brock University

G. Salinitri, Advisor
Faculty of Education, University of Windsor

April 14th, 2016

AUTHOR'S DECLARATION OF ORIGINALITY

I hereby certify that I am the sole author of this thesis and that no part of this thesis has been published or submitted for publication.

I certify that, to the best of my knowledge, my thesis does not infringe upon anyone's copyright nor violate any proprietary rights and that any ideas, techniques, quotations or material from the work of others included in my thesis, published or otherwise, are fully acknowledged in accordance with the standard referencing practices. Furthermore, to the extent that I have included copyrighted material that surpasses the bounds of fair dealing within the meaning of the Canada Copyright Act, I certify that I have obtained a written permission from the copyright owner(s) to include such material(s) in my thesis and have included copies of such copyright clearances to my appendix.

I declare that this is a true copy of my thesis, including any final revisions, as approved by my thesis committee and the Graduate Studies Office. This thesis has not been submitted for a higher degree to any other university or institution.

ABSTRACT

This research identifies characteristics of exceptionally bright but academically ‘at-risk’ university learners using Jung’s Theory of Psychological Type (1921). This theory is examined in relation to academic success rates in a southwestern Ontario university. This case study highlights students whose secondary school averages were above 85% when they entered university, but were required to withdraw from the university after their first year. Quantitative data including MBTI self-assessment results and end of term grades were collected from 420 students. Qualitative data were collected from nine semi-structured interviews with instructors and advisors who worked with these students. A mixed methods approach and transformative research design inform the data collection and analysis process. Quantitative results highlight patterns in student characteristics based on Jung’s Theory of Psychological Type. Qualitative results identified student learning approaches and the administration of the retention program as barriers to students’ academic success. Finally, binary logistic regressions identified direct correlations between students’ Strategies and Skills for Academic Success course grades, their Psychological Types (as noted by the MBTI self-assessment tool) and their persistence to continue in university studies. Practical implications from this study add another analytical dimension to the conversation between the advisor and their ‘at-risk’ student who is considering retention programming. Jung’s Theory of Psychological Type is incorporated into a screening process that advisors can use. Finally, a theoretical model suggests the dynamic interplay between how students learn, how they process information and make decisions and the need to be cognizant of the environmental,

personal and behavioural factors when designing interventions that are in-line with students' Psychological Types.

DEDICATION

This dissertation is dedicated to my husband Chris.

Much of my passion and inspiration for exploring differences in individuals comes from observing his uniqueness. He reminds me every day of just how important it is to celebrate what is ‘different’. While completing this dissertation is a milestone in my life, by far my greatest accomplishment is in finding and appreciating him.

ACKNOWLEDGEMENT

The completion of this dissertation would not have been possible without the unwavering support of so many individuals.

My doctoral committee:

First, I would like to thank my supervisor, Dr. Geri Salinitri, for the patient guidance, encouragement and advice she has provided throughout my degree. I feel so fortunate to have a supervisor who cared so much about my work. Geri was an influential role model who showed me how to translate my 'practical' experiences within the field of education into academic 'scholarly' work. Without her guidance my journey as a doctoral student would not have been nearly as rich and rewarding. I would also like to thank my committee members, Dr. Pierre Boulos, Dr. Kara Smith and Dr. Tiffany Gallagher for the significant time they put into reviewing my work. The written suggestions noted as I progressed through my manuscript and verbal insights provided during my comprehensive portfolio and research proposal defenses truly helped to shape the approach I took as I worked to complete my dissertation. As well, their engagement and thought provoking questions / suggestions during my dissertation defense has provided me with additional insights to consider as I continue my research journey. Finally, I would like to acknowledge my external examiner Dr. Joseph Cuseo for the time he put into reviewing my work. The detailed written suggestions on my dissertation helped to clarify some of my 'eclectic' approaches to research, as well as how I can continue to define the approach I take to ensuring clear writing and practical recommendations within my work.

To my entire committee, I am very thankful for the words of encouragement

and interest in my research as they have provided me with some 'validation' that I have things to contribute in the world of scholarship. It has truly been an honour.

Staff in the Faculty of Education:

I would also like to thank the staff in the Faculty of Education who have kept me on track and answered my questions over the past five years. In particular, I would like to thank Mandy Turkalj and Lina Nardone for going above and beyond what is required in their jobs. From helping my committee members and I in navigating technical and electronic issues to 'doggie-sitting' so that my husband could attend my oral defense the support of these individuals did not go unnoticed. It truly made me feel thankful to be apart of the Faculty of Education at the University of Windsor.

My family:

I am overwhelmingly thankful to all the members of my family for encouraging me, supporting me and generally putting up with me throughout this long journey! My mother Cathy and father Peter, I was continually amazed by their willingness to proof read countless pages of theories and statistics. My grandfather Tom, who welcomed me into his home for over a month while I completed portions of my coursework. Finally, the unwavering patience of my husband Chris who fed me, made sure I took breaks and listened openly during periods of frustration.

Students in the Joint PhD program:

Completing this PhD would have been much more difficult were it not for the support and friendship of the students in the doctoral program. In particular, the well timed emails and words of encouragement from Jeff Irvine and Shawn Schat. I am truly indebted to them for their continued connections – particularly during the isolating

portions of dissertation writing.

Finally, to everyone who has walked with me through this journey and provided me with much needed forms of escape from my studies – thank you for helping me keep things in perspective. The last five years have been difficult, but also exhilarating and I have so many amazing memories!

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER ONE

Introduction

The shift in North American demographics, wealth and culture over the past twenty years has resulted in more individuals seeking post-secondary education. While the influx of college and university-bound students is positive, once admitted to an Ontario university, one in six students will be required to withdraw in their first year because they did not meet their academic requirements (Common University Data Ontario, 2012). Research into student persistence in post-secondary education in Canada documents that many first year students report having trouble meeting deadlines, maintaining academic performance and creating efficient study behaviors (Parkin & Baldwin, 2009).

> "It's a lot harder than I thought it would be, [said the 17-year-old English student at the University of Toronto. High schools don't prepare you very well for lectures 'cause they really spoon feed you'. [In high school] they speak very slowly and put everything on the board, and you copy it down and you know exactly what they want you to know, whereas here it's a lecture, and for an hour a guy's talking and you're like, 'Oh My God I don't know what to write'"(Freeman, 2009, para. 2).

A study conducted by the Ontario Confederation of University Faculty Associations confirms this student's claim. Over 55% of the Ontario university faculty respondents suggest first year students are less prepared than their counterparts entering university only three years before (Mandelbaum & Rosenfeld, 2009). This raises a number of questions: If students are so unprepared for higher education, what are administrators and

faculty doing to facilitate a smoother transition? Next, what supports should be implemented to help with this process? Finally, are there any indicators that can assist administrators, staff and faculty in their support and intervention?

Statement of the Problem

Student retention, academic persistence and the academically 'at-risk' learner are topics that have been comprehensively studied within educational research over the past thirty years (Tinto, 2010). However, this research often does not result in pragmatic models that institutions can employ to improve student retention and inform their student success initiatives (Daniels & Pears, 2012; Farnsworth & Solomon, 2013, Tinto, 2010).

Recently, research has begun to emerge around the use of pre-defined student-success algorithms. These mathematical models are being created and used to connect and measure student success objectives and 'at-risk' retention outcomes with some success. They also help to identify students' sooner who are academically 'at-risk' (Arnold, 2010; Pardo & Kloos, 2011). The use of these algorithms is promising; however, differentiating characteristics of each university's student population, as well as the differing socio and cultural demographics and geographic regions present unique challenges to the use of these tools. Therefore, each model must be customized to each institution and then evaluated regularly to ensure they are meeting the unique needs of the students (Fike & Fike, 2008). The problem of retention and academic success at the post-secondary level are not confined to Ontario universities. However, to support the customization Fike and Fike (2008) suggest this study will be based at one Ontario university. The findings of this study cannot be directly generalized; however, the

research process and outcomes could be adapted or applied to other Ontario universities to support their research on retention.

Purpose of the Study

A southwestern Ontario university, hereafter known as the researched university, with an entrance average of 91% in 2013, will be used to conduct this research. In 2013, over 70% of the incoming students at this institution had more than a 90% average. No first year student entered that year with an average below 85% (Common University Data Ontario, 2012). This university is not alone. A number of Ontario university campuses now have such high admission standards that almost their entire campus body is made of these exceptionally bright students (Common University Data Ontario, 2012). Fisher, Director of Student Life at the University of Toronto St. George's campus, suggests, "We're dealing with students who are overachievers in high school. They often have never had anything worse then an A. So, when they come to U of T and find they might have got a C +, or worse, on their first mid-term that can have quite an emotional impact on them" ("Students who dropout over grades," 2010). Increasingly higher admission standards should suggest that these exceptionally bright students would be academically successful (e.g., Geiser & Santelices, 2007; Mattson, 2007; Olani, 2009; Richardson, Abraham, & Bond, 2012); however, higher admission standards to Ontario universities do not necessarily mean better prepared students. High school GPA, while considered a standardized method of identifying student achievement is not a perfect indicator of academic success. Registrars' offices and common university data highlight a sizable increase in the number of students applying to University with above an 80% average over the past 7 years. For example, in Ontario, 60% of students had an entrance average

of 80% or higher in 2003, compared to almost 70% of students in 2013 (Common University Data Ontario, 2013). The debate about whether high school grade inflation is 'real' is a pervasive topic. The Ontario Education Minister denies the idea of grade inflation suggesting "We expect grades to accurately reflect student achievement and that teachers will use their professional judgment in assessing a student's work. It is important that end-of-term or end-of-year marks do not misrepresent the student's actual achievement" (Alphonoso, 2014). As well, others note that while there has been a moderate increase in grades, this may be due to other factors, including the increase in demographic and financial access to post-secondary education that creates a wider applicant pool (Casas & Meaghan, 1995). Whether or not high school grade inflation is 'real', students retaking courses and curriculum standards regarding assignment submission may be leading to an artificial view of how academically 'prepared' students are for post-secondary education. As well, there are other determinants of success in post-secondary education beyond GPA, including psychological and psychosocial factors for example: self-efficacy, program fit, gender, first generation and cultural background (e.g., Geiser & Santelices, 2007; Mattson, 2007; McKenzie & Schweitzer, 2001; Olani, 2009; Richardson, Abraham, & Bond, 2012). While it has been identified that GPA is not a perfect indicator of academic success at university, it is the current approach we use to admit students to Ontario universities. Therefore, for this study GPA will be used to measure a specific population of 'at-risk' students' success rates at the researched university.

Research exists on academically 'at-risk' post-secondary learners. However, to date, research does not exist for students who enter into their post-secondary education

with a grade point average (GPA) that exceeds 85% and then fail within their first year of university. Since there is no specific retention research on this population, there are no indicators to help identify which intervention approach, or approaches, would be most appropriate to assist these exceptionally bright learners if or when they become academically 'at-risk'. Consequently, the purpose of this research is to begin to identify patterns in the site-based data that can help to define different characteristics of exceptionally bright university learners who have become academically 'at-risk' during their first year of university.

Academic interventions and retention efforts are effective when they aim to customize learning strategies and learning environments to learner preferences (Hirsch, 2013). Jung's Theory of Psychological Type, which identifies preferences towards information processing and decision-making, may be beneficial to help identify these learner preferences (e.g.,Hirsch, 2013; Keirsey & Bates, 1984; Kuh, 2009). Drawing on Fike and Fike's (2008) suggestion that each retention initiative must be customized to each institution, the objective of this study is to identify if patterns in students' Psychological Type can be used to build different characteristics of exceptionally bright but academically 'at-risk' post-secondary learners at the researched university. Practically, these characteristics could then be used to assist faculty and administrators in advising this exceptional population of students around appropriate intervention strategies.

Research Questions

The following research questions will inform this study:

- Research Question #1: Are their identifiable patterns in the data based on the students' Psychological Type for students enrolled in the Foundation Term[1] intervention strategy? If so, do these patterns vary by their discipline of study?
- Research Question #2: Does the student's Psychological Type relate to his/her level of academic success before, during and after engaging in the Foundation Term?
- Research Question #3: What perceptions do instructors have about the learning environment and learner preferences of Foundation Term students enrolled in their course?

Theoretical / Conceptual Framework

This study draws on the foundational learning theories of Piaget (1952), Vygotsky (1978), and Bandura (1977). As well, theories surrounding learning styles and Personality Type as shaped by Jung's Theory of Psychological Type (1921) will be applied to help simplify and categorize factors that influence learner preferences.

Foundational Learning Theories. While there is no one definition of learning that is universally agreed upon, there are many theories that employ common elements (Ertmer & Newby, 1993). Three key theorists shaping my thought processes around learning and development are Piaget (1952), Vygotsky (1978), and Bandura (1989).

---

[1] The Foundation Term is a retention or intervention strategy unique to my institution. It is designed for first year students who have been required to withdraw from their faculty because they did not meet their academic requirements. Each Faculties academic requirements are different, but, often include maintaining a cumulative average of 60% or above. The Foundation Term consists of three half-credit courses. Two courses are chosen by the student from their academic discipline (e.g., Science) along with the mandatory Strategies and Skills for Academic Success course.

While literature exists which highlights the differences in their theories, there are also many connections and similarities (Tudge & Winterhoff, 1993). To help categorize elements of these foundational learning theories and identify commonalities around their conceptual underpinnings, I employ five definitive questions as suggested by Schunk (1991):

1. How does the theory suggest learning occurs?
2. What factors does the theory suggest influences the learning process?
3. What role does memory play within the learning process?
4. How does the theory suggest that the transfer of knowledge occurs?
5. What types of learning are easily identified and explained using the theory?

How does the theory suggest learning occurs? While not specifically classified as a learning theory, educational researchers and policy makers have heavily cited Piaget as the first scholar to identify the importance of cognitive development in the learning process and coining it as Theory of Cognitive Development (Zimmerman & Schunk, 2014). Learning occurs as "an effort to construe personal learning through the metaphor of emergent biological forms, the structures of which are conditioned but never determined by their contexts" (Davis & Sumara, 2002 p. 411-412). As such, learning is seen as progressive reorganization of cognitive processes as a result of biological and environmental influences.

Unlike Piaget, Vygotsky's Social Development Theory (1978) positions the learner in relation to their historical, cultural or institutional environment. Biological implications do not influence the learner's higher order thought processes. Instead, Vygotsky suggests the interactions between individuals and the interplay of their cultural

beliefs and attitudes affect how learning occurs (Crawford, 1996; Woolfolk, 1998). Bandura's Cognitive Theory (1989) bridges the framework of the above two theorists. He suggests that learners are neither driven by biological forms, nor by social interactions. Instead, learning occurs through a dynamic interplay among personal (cognition, affect and biological forms), behavioral (social and cultural beliefs), and environmental influences. Bandura calls this process triadic reciprocal causation (1989).

What factors in the theory influence the learning process? Piaget suggests that individuals construct their own learning processes. Then, based on their experiences, they must reshape their thought processes when they are met with a feeling of cognitive dissonance[2]. Learning is an individual but not isolated activity where "the individual knower [engages] in the unrelenting project of assembling a coherent interpretive system, constantly updating and revising explanations and expectations to account for new experiences" (Davis & Sumara, 2002, p.413).

Similar to Piaget, Vygotsky also believed that individuals are actively involved in creating their own learning experiences. However, Vygotsky places more emphasis on the social interactions between the learner and their mentor and less on self-discovery (Davis & Sumara, 2002, p.414). Bandura bridges the above two theories but adds the distinctive hypothesis that we learn through imitation within our social environment. Interestingly, neither Piaget nor Vygotsky discredit Bandura's Social Cognitive Theory. Instead, they integrate components of it into their own work. For example, Piaget

---

[2] A feeling of discomfort experienced by an individual who has conflicting beliefs, ideas, or values. Or feelings of discomfort when new information is presented to an individual that contradicts their existing beliefs ideas, or values (Festinger, 1962).

suggests, “those who are most experienced and competent provide models of efficacious styles of thinking and behavior”(Bandura, 1989, p.45). Similarly, Vygotsky states that, “Imitation is the source of instruction’s influence on development… Instruction is possible only where there is potential for imitation” (Vygotsky, 1987, pp.210 - 211 in Tudge & Winterhoff, 1993).

What role does memory play within the learning process? Many of Piaget, Vygotsky and Bandura’s statements suggest that memory is only a component of our learning and development processes. It cannot be untangled from our other higher mental thought processes like perception, comprehension, inference, language and problem solving abilities (Brown, 1975). Piaget suggests that our memory is not a ‘thing’ that stores information, but instead, our memories are connection points – which change in clarity and intensity based on the purpose of the information. Piaget believes that memory always involves reconstruction and is either ‘active’ or ‘passive’ in nature. Memory “is based not only on what a subject ‘learns’ continually from the environment, but also, on such factors as self-regulation and equilibration, in search of organization” (Piaget, Inhelder, & Sinclair-de Zwart 1973, pg. 8). Vygotsky and Bandura add additional components surrounding the role of memory in the learning process. They both suggest that cultural context and social interaction influences the connection points that are formed around information. Overall, these interactions will inform the clarity, perception and purpose of the experience (Tudge & Winterhoff, 1993).

How does the theory suggest that the transfer of knowledge occurs? For Piaget, transferring of knowledge occurs between the learner and their environment as they adapt, explore and construct their world. Learning is less about acquiring information

from someone or mimicking their ideas and values and more about the hands-on experiences the individuals construct for themselves. Cognitive Development suggests that these experiences are learned in increments. At different stages of development, the learner will be able to transfer different components of their learned experiences to other situations (Ackerman, 1982; Schneider & Pressley, 2013).

Unlike Piaget, Vygotsky highlights the importance of teaching for the transfer of knowledge. More specifically, that some form of teaching should prequel exploration because social interaction and cultural knowledge will shape the learner's language and understanding of concepts (Tudge & Winterhoff, 1993; Vygotsky, 1978).

Bandura again bridges the gap between the two theories suggesting that knowledge transfer occurs through ongoing modeling and feedback to the learner, while at the same time, still allowing the learner time to explore and practise the experience in a hands on way (Tudge & Winterhoff, 1993).

What types of learning are easily identified and explained using the theory? The broadly used term student-centered learning can be used to describe Piaget, Vygotsky and Bandura's approaches to learning (e.g. Gibbs, 1995; Lea, Stephenson, & Troy, 2003; O'Neill & McMahon, 2005). Slavin (2012) and Baeten, Kyndt, Struyven, and Dochy (2010) identify four main areas:

Deep Learning. Deep learning focuses on the learner's thought process within the learning experience and not just the product of the learning experience. The importance of facilitating and encouraging deep learning experiences allows the learner to explore and to construct their environment. It also helps to support the learner's progress towards formal or higher-order thought processes. In

contrast, rote memorization and teacher-centered instruction facilitates a surface-level approach to learning.

Experiential Learning. Experiential learning allows the learners to explore, discover and understand themselves through spontaneous interaction with their environment. Rather than the dissemination of ready-made experiences and the presentation of structured and ordered knowledge, experiential learning is student-centered. Within a learning experience, Piaget recognizes the crucial role of self-initiated, action-oriented learning. Vygotsky notes the importance of mentor-oriented experiences to enhance a learning experience.

Self-Directed Learning. For Piaget, learning and development must be achieved when the learner is ready. Hence, the question is not 'how can we speed up development?' Instead, the question is, 'how can we support development?' Learners should be supported in a way that allows them to progress at their own speed through the content.

Differentiated Learning. Similarly, student-centered learning, as described by Piaget, Vygotsky and Bandura, supports the importance of differentiated instruction. This instruction is tailored to meet individual needs and allows each leaner to learn and interact with the content in an individualized way.

How we analyze the learning process depends on how we view the individual within the environment (Cobb, Zhao, & Dean, 2009; Tudge & Winterhoff, 1993). Piaget, Vygotsky and Bandura's theories are similar in many ways; however, their epistemological approach of how one learns raises some unique differences. This is not negative. A 'multiplicity of positions' within the classroom, while sometimes competing

and creating conflict, often provide a richness that enhances the learning process (Cobb & Bauersfeld, 1995).

While differing in their epistemological positions, the similarities in Piaget (1952), Vygotsky (1978) and Bandura's (1989) research has helped to shape my theoretical thought processes about how students learn and process information. The commonalities in their theories highlight that learning is complex. Students learn through experience, but modeling can help to facilitate a smoother and more fulfilling learning process. When a student begins to 'think about their own thinking' they can begin to understand 'how' they learn through their experiences. As well, when a student understands 'how' others learn, they can better interpret the skills or strategies others are modeling for them. As such, metacognition acts as a bridge between our thinking and memory, our learning and motivation to learn, and our cognitive development (Metcalfe & Shimamura, 1994). A student's metacognitive awareness enables them to be a successful learner (e.g., Hannafin, Hill, Land, & Lee, 2014; Livingston, 1997). A metacognitively aware student can apply their cognitive resources in more strategic ways, recognize their strengths and weaknesses as learners and find ways to extend their knowledge and capabilities (Bransford, Brown, & Cocking, 2000). Those who can identify their strengths and weaknesses can plan how to approach learning tasks, accurately assess their own comprehension and evaluate their progress and task completion (Bransford, Brown, & Cocking, 2000; Livingston, 1997; Pintrich, 2002). As well, they can "actively monitor their learning strategies and resources and assess their readiness for particular tasks and performances" (Bransford, Brown, & Cocking, 2000, p. 67). Those who struggle with their metacognitive awareness "tend to be blissfully

unaware of their incompetence," lacking "insight about deficiencies in their intellectual and social skills" as identified by Dunning, Johnson, Ehrlinger, and Kruger in the research article "Why People Fail to Recognize Their Own Incompetence" (2003).

Theories surrounding Jung's Psychological Type and Learning Styles. As a pragmatist I look to learning models that can help students to understand simplified ways to 'think about their own thinking' and in turn become more metacognitively aware. Carl Jung's Theory of Psychological Type (1921) and the numerous theories/models (e.g., Holland's Person-Environment Theory, Kolb's Theory of Experiential Learning, Felder and Soloman's Index of Learning Styles and Myers and Briggs' Myers-Briggs Type Indicator) which align with this theory can be useful for understanding individual differences in student learning and how these unique characteristics may influence academic success (e.g., Felder & Brent, 2005; Fourqurean, Meisgeier, & Swank, 1990; Kim, Lee, & Ryu, 2013; Kuh, 2009; Riding & Rayner, 2013; Sadler-Smith, 2001; Xie, 2015). A student's learning preferences and more specifically the topic of learning styles is not considered to be a scientifically validated theory within education and psychology research. In 2008, Pashler, McDaniel, Rohrer and Bjork reviewed the literature on learning styles and concluded that there was little empirical research to either support or negate the theory. The authors proposed a process to test learning styles empirically. In 2015, Rogowsky, Calhoun and Tallal conducted research on learning styles using this process. They concluded there was no statistically significant relationship between an individual's learner preferences and the mode of instruction. Akbulut and Cardak (2012) conducted a content analysis on 70 recent studies around learning styles. Findings suggest one-third of these studies identified a framework, but included little empirical

evidence on how the framework impacted students; however, the authors did identify empirical evidence that suggests some models did influence student satisfaction and success levels.

Broadly defined, learning styles can be described as the different ways a student approaches 'thinking about' and 'interacting with' new information (Pashler, McDaniel, Rohrer, & Bjork, 2008). While not universally accepted in the literature, models that help to classify individual differences in students' learning styles have been shown to play a significant role in understanding student academic performance levels and approaches to learning (e.g.,Bhattacharyya & Shariff, 2014; Deborah, Baskaran, & Kannan, 2012; Felder & Brent, 2005; Kim, Lee, & Ryu, 2013; Riding & Rayner, 2013). As well, these models are often used as reflective tools within the classroom for students to simplify the complexity of learning (Myers & Myers, 1995; Hirsch, 2013). When relating learning styles to Jung's Theory of Psychological Type, Lawrence (2009) identifies four factors that influence the learning process: 1) the approach in which an individual processes information cognitively; 2) the individual's attitude and interest in engaging with the information; 3) the individual's drive to identify learning environments that match their interests; and 4) the individual's ability to identify and successfully integrate appropriate learning tools and strategies into their learning process.

Similar to Jung's Theory of Psychological Type, there is a debate as to whether an individual's learning style is innate or whether it can be developed and expanded through practice. However defined, it is considered to be relatively stable. This suggests that individuals will learn best by using strategies and engaging in situations that align with the way they think (Hirsch, 2013; Lawrence, 2009; Lawrence, 1997; Myers & Myers,

1995). Also similar to Psychological Type, no learning style is considered superior to another; however, certain academic environments and certain instructional approaches tend to complement certain learning characteristics (Lawrence, 2009). Keirsey and Bates (1984), two of the premier researchers on Learning Styles, suggest that understanding students' Psychological Types (which they refer to as students' Personality Types) can have strong implications for understanding how they learn and their motivation to learn. Similarly, there have been numerous studies that have followed Keirsey and Bates seminal work including Bhattacharyya and Shariff's (2014) study on learning styles and its impact in higher education. As well, Felder's numerous studies with post-secondary engineering students including his 2005 study which highlighted potential applications for learning styles, and the reliability and validity of the learning styles tool. Each of these studies hold true to the premise that each Personality Type displays very different learning characteristics. For example, some students prefer abstract learning while others prefer sequential learning. Some students prefer theoretical learning while other students prefer experiential learning. Some students prefer to be actively involved while other students prefer to be more reflective. As well, some students prefer to learn through visual aids or hands on demonstrations while other students prefer to learn through listening or reading and writing of the information (Hirsch, 2013). Therefore, the addition of Psychological Type can add an "extra analytical dimension" to assessing an individual learner's strengths and challenges, to supporting their metacognitive awareness and to ensuring the learner participates in suitable programs or interventions (Keirsey & Bates, 1984).

My Personal Grounding

I situate myself in this research in relation to my past work as the instructor of a *Strategies and Skills for Academic Success course*. This course is a part of the Foundation Term. This term is administered exclusively for exceptionally bright but academically 'at-risk' university learners. The students who are identified for the Foundation Term have technically failed university. For most students this means approximately a 40% decline in their GPA in one term. To determine their 'fit' for this optional Foundation Term an academic advisor has screened students taking into account each students previous grades, extenuating circumstances, mental and physical health concerns and command of the English language; however, to date no standardized 'best practices' have been established around this screening process. Common practice does including deterring students from entering into the Foundation Term who have experienced an extenuating circumstance, struggle with mental or physical health concerns, and/or have poor English language skills. It is my personal opinion that without best practice research to inform advisors and support a more standardized approach to screening, a number of students will enter into the Foundation Term who may have been better served through a different intervention. As well, the inclusion of standardized screening measures may also be able to extend beyond the identification of particular individuals for the Foundation Term. Proactive screening of students could assist advisors to identify patterns and trends in student behaviour and grades. In turn, advisors could then inform students of more customized, less intensive and more extensive intervention approaches before they become 'at-risk'.

I have a longstanding history of working with exceptional populations of students. This includes students with disabilities, mental health concerns and gifted learners. I believe all learners have the ability to be successful and achieve their own 'personal best' as long as the right tools are available, they have access to appropriate interventions and supports and they are empowered to achieve success. My close relationship to this exceptionally bright but academically 'at-risk' population, therefore, brings some biases to my research. My understanding of different cultural implications and definitions of a 'successful student' and 'at-risk' learner, my preferred choice in self-assessment tools and my beliefs around 'at-risk' intervention strategies could produce blind spots.

Instead of engaging in debates around research paradigms, 'what' a successful student means, 'how' students learn and 'which' student assessment measures are valid, I look to identify commonalities between researchers, to simplify complex issues and to apply practical outcomes within my work. As previously noted, my epistemological position aligns with pragmatism. As a pragmatist, I believe that research methods are independent from any specific epistemological position. I will therefore make use of eclectic research methods that complement my specific research objectives and can help to mitigate any blind spots that I may bring to my research (Bryman, Teevan, & Bell, 2009).

Dewey (1938), Pierce (1974), James (1907) and Mead (1934) have helped to align my research objectives to understanding patterns in students' experiences. The commonalities in Piaget (1952), Vygotsky (1978) and Bandura's (1989) research has helped to shape my theoretical thought processes around the complexity of student's learning and information processing. Piaget (1952) and Flavell's (1976) work on

metacognition helps to bridge my understanding between our thinking and memory, our learning and motivation to learn, and our cognitive development. Finally, Jung (1921) helps to simplify and categorize these complex issues into learning models that can help students to understand simplified ways to 'think about their own thinking' and in turn become more metacognitively aware.

As a practical researcher I will use an eclectic mix of research strategies to highlight the experiences of one particular group of exceptionally bright students who were enrolled in a Foundation Term at the researched university. The methods I will choose to explore this population will include quantitative analyses of students identified Personality Types and student grades, as well as, qualitative analyses of instructors' observations of working with this exceptionally bright population of students. The dissemination of my results and discussion surrounding my findings will be guided by a need to provide simple analysis and practical models that can be easily interpreted by students, staff and faculty to make informed decisions around the best intervention for each 'at-risk' learner.

Significance of the Study

Within my institution, a variety of different approaches have been taken to filter exceptionally bright but academically 'at-risk' students to appropriate intervention strategies (e.g., pre-screeners, conversational interviews, mandatory intervention approaches based on grades). However, we do not know if these approaches actually are screening each exceptionally bright but academically 'at-risk' learner into an appropriate intervention strategy or, if the chosen intervention provides little to no added value to the actual student's success. A student's advisor drives a key part of this screening process.

Advisors are often the first point of contact for our 'at-risk' leaners. Also, after a student fails, these advisors assist students in making decisions around whether to enter into our Foundation Term.

Advisors are one of the most important resources for students within the post-secondary environment. They are often the first place students go when they have questions and need support and guidance. They also are a key influencer of student's decision-making processes, involvement in educationally purposeful extra-curricular activities and persistence to graduate at the post-secondary level (Chickering & Gamson, 1987; Cuseo, 2003; Glennen, Farren, & Vowell, 1996; Guillén, 2010; Kuh et al., 2007; Seidman, 1991). Chickering, one of the prominent researchers on student development in post-secondary settings, suggests, "the fundamental purpose of academic advising is to help students become effective agents for their own lifelong learning and personal development" (1994, p.51). As a key support agent for students within the post-secondary environment, it is important that advisors feel appropriately prepared to engage in informed conversations about learning and personal development with students regarding their chosen 'path' after failure. The incorporation of learning models into a standardized screening tool can help to create a number of different student characteristics that advisors and students can use to help each student define their learning, categorize their psychological preferences and 'think about their own thinking'. This in turn will help each student become more metacognitively aware about the choices they are making. Without standardized screening tools that can assist advisors and students in identifying patterns in the student's performance and preferences, often these decisions are made based on anecdotal evidence and advisor experience instead of on actual student data. A

screening tool based on identified patterns in the student's Psychological Type could, therefore, add another analytical dimension to the conversation between the advisor and their 'at-risk' student who is considering entering into certain types of interventions.

Cultural, gender and socio-economic variables have been studied on numerous occasions in relation to 'at-risk' post-secondary learners. I recognized the importance of these pieces of demographic information in supporting the identification of, and intervention for, 'at-risk' post-secondary learners. Instead of researching these variables, I refer to the large body of influential literature that exists within these areas that includes direct and indirect relationships between academic success and: ethnic minorities; remedial math, reading or writing courses; first generation post-secondary learners; students with disabilities; low socioeconomic status; delayed entry to post-secondary after high school; working full-time; single parents, financial instability; and finally, a lack of social involvement on their campus – just to name a few (e.g., Bell, Spencer, Iserman, & Logel, 2003; Gladieux & Swail, 2000; Nelson, 1996; Pritchard & Wilson, 2003; Sirin, 2005; Walton & Spencer, 2009; Warburton, Bugarin, & Nuñez, 2001). For this reason, this will not be the focus of my study. Instead, I would like to extend the literature on 'at-risk' post-secondary learners to look specifically at patterns in Psychological Type for exceptionally bright, but academically 'at-risk' students within a university setting. I look to explore if there are specific patterns in student preferences based on Jung's Theory of Psychological Type that correlate with academic success within certain university classrooms. Limited research has been conducted that specifically targets learners who come into their post-secondary education with an average of 85% or higher and then ends their first term of post-secondary studies with

averages between 30 – 49%. Therefore, identifying whether Jung's Theory of Psychological Type could be used as an indicator for underperforming exceptionally bright learners could therefore further inform screening approaches for this population. At my specific institution, this could impact whether these exceptionally bright, but academically 'at-risk' students choose: 1. to complete our optional Foundation Term, 2. to leave the institution for 8 months, or potentially, 3. to experience a different more customized intervention that suits their needs (e.g. working with a counselor).

Highlighting relationships between Psychological Type and academic success could also help to inform pro-active identification of 'at-risk' students, more customized intervention approaches, as well as, modes of classroom instruction / design at the post-secondary level. Upon the completion of this study, I note the importance of integrating my findings surrounding Psychological Type and academic success with other important cultural, gender and socio-economic variables. This integration would provide a more robust description of the student population and a richer standardized screening tool for both advisors and students to use. This will result in a more customized student-centered approach to supporting this population of post-secondary learners.

Definition of Common Terms

This section identifies frequent terminology used in this study and highlights what I define each term to mean.

Exceptionally bright. For the purpose of this study, this population will be identified as students who enter into university with a GPA of 85% or higher. This term has been defined based on entrance averages at the researched university (Common University Data Ontario, 2012). It should be noted that individual student's GPAs and the

standardization of grades across all students is beyond my control. While GPA may not be a perfect measure to define what an exceptionally bright learner means, post-secondary institutions use it consistently as the standard for which they admit their students. Therefore, I will use this same standard to define my population.

Exceptionally bright but academically 'at-risk' university learner. For the purpose of this study, this population will be identified as students who enter into university with a GPA of 85% or higher and are required to withdraw after their first or second term of university due to poor academic performance. This term has been defined based on entrance averages and progression rules at the researched university (Common University Data Ontario, 2012).

Academic success. For the purposes of this study, academic success will be defined as a student's 'continued enrollment / persistence to graduation' two terms after their successful completion of the Foundation Term. It should be noted that as an instructor, I do not define academic success to mean a student's ability to be retained at the particular institution and in a particular Faculty to degree completion; however, as a researcher, a purely retention based definition will be used to define academic success as it allows for more consistency when it comes to analyzing and reporting the data.

Psychological type. As theorized by Carl Jung (1921), Psychological Type identifies one's preferences towards information processing and decision-making into 8 psychological types (Jung, 2013).

MBTI. A self-assessment instrument to identify individual's Myers-Briggs Personality Type. This tool is a registered product of Consulting Psychologists Press (CPP), Inc. and was developed by Katherine Myers-Briggs in 1962. Theory surrounding

the MBTI stems from Carl Jung's Theory of Psychological Type. However, the MBTI creates a more tangible approach to defining how an individual processes information and makes decisions by categorizing an individual's tendencies into 4 dichotomous Personality Preferences: Extroversion versus Introversion; Sensing versus Intuition; Thinking versus Feeling; and, Judging versus Perceiving. When combined, the choices from the 4 dichotomous Personality Preferences makes up the individual's 4 letter Myers-Briggs Personality Type. In total there are 16 distinct Personality Types, all with unique traits of how an individual processes information and makes decisions ("Myers-Briggs Type Indicator," 2009).

Dissertation Outline

This dissertation includes five chapters: Chapter One contains background information on the identified problem, highlights the purpose, objectives and research questions and establishes the importance of the study. Chapter Two reviews the literature on retention and academic success in higher education and the use of Jung's Theory of Psychological Type and self-assessment tools to support the design and delivery of effective intervention approaches. It also highlights the need to continue to connect research to practice with more practical research studies that provide tangible solutions. Chapter Three contains a description of the research methods and the rational for choosing concurrent transformative mixed methods design for the study. It also explains the phases in my research process and the methods of data collection and analyses. Chapter Four contains the results of the quantitative analyses of 'at-risk' students' Psychological Type and academic success and the qualitative findings from semi-structured interviews with instructors and advisors who worked with the 'at-risk'

students. Many of the quantitative findings are presented with tables and figures. The qualitative findings from the semi-structured interviews are presented in themes. Finally, Chapter Five integrates the findings of the study with the literature noted in Chapter Two and the theoretical framework noted in Chapter One. This chapter also notes the practical and theoretical implications, suggestions for future research and the limitations of the study.

Summary

Whether measured by the type of learner or by the type of learning, Jung's Theory of Psychological Type may help to simplify conversations around learning, create more robust screening approaches and customize learning strategies and learning environments. In turn, this could help to create more effective academic interventions and create richer conversations between advisors and students around intervention choices for 'at-risk' students (Hirsch, 2013). In the proposed study, I aim to explore exceptionally bright but academically 'at-risk' students' Psychological Types in relation to their level of academic success upon their enrollment in a retention program at the researched university.

In Chapter Two, the literature on retention and success will be explored. Common intervention strategies for 'at-risk' post-secondary learners and key factors that have been identified which make an intervention strategy effective, will be highlighted. As well, important research surrounding Jung's Theory of Psychological Types and the heavily cited tools / approaches to research around this theory will be identified.

CHAPTER TWO

Literature Review

In this chapter, I will review the literature on retention and success; highlight common intervention strategies for 'at-risk' post-secondary learners and examine key factors that make an intervention strategy effective. I will also note important research surrounding Jung's Theory Psychological Type and identify the heavily cited tools / approaches to this research.

Retention and Success

Over the last century, university class sizes have increased resulting in less interaction among faculty, administrators and university students. In Ontario universities, 53% of first-year classes have over 60 students enrolled and 12% of first-year classes have an enrollment of over 250 students (Common University Data Ontario, 2012). This shift has created a range of factors that now are contributing to a student's level of academic success or failure at the post-secondary level. Students' access to pre-entry information, their understanding of the preparation and admission processes, their induction and transition support, their learning, teaching, assessment and curriculum development knowledge, their level of social engagement, and their utilization of student support services, including financial and academic services play important roles in student retention and success (Cuseo, 2007; Hattie, 2013; Kuh, Kinzie, Schuh, & Whitt, 2011; Tinto, 2010).

Retention in Higher Education

Retention research in higher education began in the 1930's as the study of student mortality. Student mortality was defined as a failure of students to graduate (Berger, Ramirez & Lyon, 2005). Throughout the next forty years the theory of student mortality continued to evolve with publications like Gekoski and Schwartz's (1961) "Student Mortality and Related Factors" and Feldman and Newcomb's (1973) book The Impact of College on Students. In 1975, Tinto's student integration model began to shape our current conversation around retention (Swail, 2004). In Tinto's model, the retention or attrition of students was first defined to include how a student's characteristics affected his/her likelihood to drop out, or be asked to withdraw from post-secondary education. As well, the model theorized that student retention was also connected to an individual's sense of belonging and commitment to their campus (Roberts & Styron, 2010). Tinto's model laid the foundation for forty years of research on student retention; with researchers supporting, revising, furthering and discrediting this social integration model (Roberts & Styron, 2010; Swail, 2004).

Today, current retention research continues to extend Tinto's initial thoughts around social connectedness, as well as, his more recent work on the psychological implications of retention, the individual student, the classroom, student persistence and learning behaviors (McCubbin, 2003). We are now taking a more individualized approach to the broad topic of student retention, and in turn, how we define student success. For example, the integration of a 'red light' 'green light' or 'yellow light' indicator into student's Learning Management System to signify to each student an individualized message of how they were doing in their course work (Arnold &Pistilli,

2012). This study tested this Course Signals Early Alert indicator with over 20000 students at Purdue University. Findings highlighted a significant increase in satisfactory grades and a decrease in unsatisfactory grades in courses that incorporated this Course Signals Early Alert indicator. Similarly, in a year-over-year comparison, there was a 6.41% decrease in students who received D's, F's, and WD's in courses that incorporated this Course Signals Early Alert indicator (Arnold &Pistilli, 2012). As well, Saklofske, Austin, Mastoras, Beaton, and Osborne's (2012) study of 156 students' personality, affect, emotional intelligence and coping mechanisms and how these factors influence their academic success. Analysis consisted of how students' answers to survey questions on the above identified topics at the beginning of their academic term related to their academic successes at the end of the term. The findings of this study not only highlighted the outcomes of academic success, but also, how different variables influenced student's stress management and life satisfaction.

Centralized (and sometimes de-centralized) Student Success Offices are becoming more prevalent in post-secondary environments. They support not only retention, but also, the key elements of a student's success – their satisfaction, their persistence, their purpose for learning, and their personal development (Kuh, Kinzie, Schuh, & Whitt, 2011). Tinto identifies that "the common usage of the term student retention implies that students are successful only when they stay and eventually graduate. [While] the term student success allows us to include the possibility that students may be successful even if they do not finish their course of study at a particular institution (e.g. transfer). More importantly, it enables us to take account of learning and success in individual courses and allows us to make the argument that student success, however defined, is built upon

success in one course at a time" (1999 p.1). As well, these Student Success Centres are helping us to think more intentionally about how to approach research and intervention for student success (Kuh, Kinzie, Schuh, & Whitt, 2011).

Conducting Effective Research on Student Success. In recent years numerous student success models have been established; however, these models will never produce perfect results (or in turn perfect retention) because students are unique (Kuh, Kinzie, Bridges, & Hayek, 2007; Singell & Waddell, 2010; Tinto, 1999). These imperfect results produce ongoing debates in the literature into what we 'should' and 'should not' use to help identify successful students (Hattie, 2013; Richardson, Abraham, & Bond, 2012; Robbins, Lauver, Le, Davis, Langley & Carlstrom, 2004). There are common variables among the different student success models including: 1) student demographics and pre-university academic and personal achievements, 2) institutional characteristics, 3) faculty, staff, and peer interaction, 4) student perception and engagement levels with the institution and with the classroom, 5) student persistence and attentiveness to their studies 6) student meta-cognitive awareness, and 7) student study skills and learning characteristics (Kuh, Kinzie, Bridges, & Hayek, 2007; Robbins et al., 2004). However, there are also discrepancies between the educational and psychological literature as to what should be included in models that aim to predict a student's success (Robbins et al., 2004). For example, whether learning style and Personality Type assessments can add value to student success research, or, whether these self-assessment style tools should be discredited due to a lack of empirical studies to support the validity and reliability of the results (Pashler et al., 2008; Felder, 2010; Riener & Willingham, 2010).

Research conducted at Queens University on behalf of the Canada Millennium Scholarship Foundation highlights why even well-validated student success models do not provide a blanket solution for all post-secondary institutions (Finnie, Childs, & Wismer, 2010a, 2010b, 2010c; Finnie & Martinello, 2010). Student success models which include predictive indicators and which categorize 'at-risk' learners using pre-defined algorithms must have targeted site-based research or they can be misleading. The Measuring the Effectiveness of Student Aid Project (the MESA Project), suggests one of the difficulties with our current data around 'at-risk' learners is that data was gathered and analyzed in other countries including the United States. The MESA Project briefs include only low-income students who were receiving government aid, were in their first year of post-secondary education and resided in Newfoundland and Labrador, Nova Scotia, New Brunswick, Ontario, Manitoba or British Columbia. However, the results suggest that many of the commonly cited predictive indicators including first generation, low income and visible minority students when paired with student achievement would produce faulty predictions of 'at-risk' learners in Canada (Finnie et al., 2010b). For example, a MESA research brief that contacted 3609 students once a year, by telephone, in their first, second and third years of post-secondary education and asked them about their family demographics/background as well as their preparation for, attitudes towards and study habits, grades, and success in post-secondary education. Findings suggest that while first generation students are less likely to know that they want to attend post-secondary schooling, once they do attend, they are no more likely than non-first generation students to leave without graduating (Finnie et al., 2010b). Similarly, another MESA research brief that contacted 3921 students once a year, by telephone, in their

first, second and third years of post-secondary education and asked them about their family demographics/background, attitudes towards post-secondary education, high school and post-secondary grades, and finally whether they left their post-secondary education before completing their degree. Findings suggest that both non-immigrant and immigrant visible minorities were far less likely to leave their post-secondary education in their first or second year than non-visible minorities including those who immigrated to Canada, as well as, those who were born in Canada (Finnie et al., 2010c). Interestingly, another MESA research brief that contacted 4011 students once a year, by telephone, in their first, second and third years of post-secondary education and asked them about their family demographics/background as well as there engagement levels and support networks while they pursued their post-secondary education. Findings suggest that engagement level, a feeling of connectedness to the institution and an understanding of how the degree would support students in their future careers were far greater indicators of which students were more likely to complete their degree than was first generation, visible minority or low income status (Finnie et al., 2010a). This third MESA project brief highlights that while there are differences in the student success literature around what goes into a student success model, the student's level of engagement, both within the university environment and within their academic studies appears to be foundational (Finnie et al., 2010a; Kuh, 2009; Kuh, Kinzie, Schuh, & Whitt, 2011; Pascarella, 2006; Quaye & Harper, 2014; Scott, 2006; Tinto, 2010).

Student success models will never produce perfect results (or in turn perfect retention) because students are unique; however, site-based research can help to improve their reliability. The integration of student engagement into these models is also a key

component. When assessing the key factors to improving student academic success levels there is a dynamic interplay between a student's level of engagement, his/her learning ability ***and*** the value of the teaching and administrative support surrounding them (Bryson & Hand, 2007). Therefore, when creating indicators to predict student academic success or stream students to appropriate interventions there should be a partnership between the national researcher who defines the indicators and the site-based administrator who identifies which indicators may work on his/her campus. As well, there should be a transparency and sense of empowerment created which engages both the advisor and the student in understanding these indicators and applying them to make informed choices surrounding their particular situation.

Creating Effective Interventions

A greater effort is now being placed on the creation of effective post-secondary interventions which promote institutional change and social engagement instead of just 'adding a course' in areas of identified weakness (Tinto, 1999). If you can enhance a student's level of engagement within his/her environment, you will in turn, improve the level of academic success (Horstmanshof & Zimitat, 2007). A student's level of engagement (or involvement) can be defined as the student's academic commitment, both time and energy, to activities which are educationally purposeful and meaningful (Astin, 1984). Likewise, a student's level of academic success is defined as the positive or negative shift in a student's overall term marks. To be successful academically, students must fully engage in their learning experience. The university classroom should be thought of as the introductory point to becoming knowledgeable in key disciplinary concepts. The learner must go beyond this. Students need to make connections between

the material and themselves, and where appropriate, asking questions to their professor and peers. This interactive learning is the basis for developing core disciplinary concepts that are pivotal in student academic success in university (Meyer & Land, 2005; Meyer & Land, 2013).

Faculty and administrators must share the responsibility in creating these interactive learning environments that are conducive to engaging their students (Kuh, Kinzie, Schuh, & Whitt, 2011). Effectively run learning opportunities and services on a university campus should not only encourage students to take part in the services and benefit from the activities, but also should provide an ideal forum for students to engage with other students sharing their experiences (Crosling, Heagney & Thomas, 2009; Crosling, Thomas, & Heagney, 2008).

The Council for Advancement of Standards in Higher Education (CAS) suggests that certain environmental conditions must be emphasized to create effective learning opportunities and services (2015). CAS identifies eight principles for post-secondary students and their institutions to foster and enhance student learning, development, achievement, and to promote good citizenship. These include: 1) supporting the 'whole' student, not just the students academic pursuits, 2) understanding that each student is unique and opportunities and services should be tailored appropriately, 3) leveraging the whole post-secondary environment as a place for learning, not just the classroom, 4) recognizing that students will access opportunities and services which they deem valuable, relevant and timely, 5) highlighting social and cultural resources which provide purposeful opportunities for students to learn and to develop holistically, 6) acknowledging that the student is primarily responsible for their own learning and

development, 7) celebrating the diversity of the societies and cultures within the institution, 8) creating balanced learning environments that provide both educational choices and challenges along with support to nurture a student's development (Council for Advancement in Standards, 2015). Some examples of these types of opportunities and services include the implementation of authentic curriculum content, appropriate orientation procedures, the integration of study skills into classroom curriculum and extracurricular activities, the inclusion of collaborative learning environments, and finally, formative assessment with timely and relevant feedback (Crosling et al., 2008).

Common intervention strategies. A number of learning opportunities and services have been cited in the literature and used on Ontario university campuses to assist 'at-risk' university learners. First year students are often supported with these strategies, because students who are placed on academic probation after their first year are at the highest risk of leaving university prior to their graduation (Bertram, Nelson, & Visanuvimol, 2011; Cuseo, 2007; Lewis & Lewis, 2007). Examples of these strategies include, allowing students to repeat terms without penalty, a greater focus on student services, the implementation of student learning communities, the creation of learning strategies and life skills courses, proactively engaging struggling students using learner dashboards and the use of self-assessment tools as a form of self-discovery.

Repeat terms. Many Canadian universities attempt to retain their students by giving students a 'second chance' at completing coursework. This approach allows individuals who are academically 'at-risk' the opportunity to retake a course or redo a term in which they struggled instead of simply removing them from their program. However, three meta-analyses of several hundred studies on this 'second chance'

approach have concluded that there is actually a negative effect on academic performance when students are asked to redo their coursework. These analyses also showed that any benefit that did result from the retention of these students was short lived. Finally, the analysis suggested that asking students to repeat their term brought about greater adjustment problems for the students both socially and emotionally (Hattie, 2013; Jimerson, 2001; Jimerson et al., 2006).

Student services. As student-faculty ratios continue to increase and the methods of teaching have shifted to accommodate the larger student population there is a greater reliance on student services staff to provide mentoring and support (Graham, 2010; Pin, Martin, & Andrey, 2011). Large class sizes, particularly in first year, are leading to students feeling isolated and anonymous. Instructors are struggling to identify the 'level' to teach material due to the increased student diversity in the classroom. Coupled with distractions from fellow peers and students feeling like passive listeners, these large classrooms are leading to an increase in 'at-risk' students who need support external to the classroom (Kerr, 2011). A greater importance has now been placed on staff in student services to provide study strategies, life skills and writing support for struggling students.

In 2005, student services expenditures in Ontario ranked among the lowest across all ten provinces in Canada and fifty states in the United States (Beach, Broadway, & McInnis, 2005). Since 2004/2005, student support expenditures per full time student has steadily increased from $519 per student per year to $855 per student per year in 2009/2010. Almost two-thirds of this funding is now going to salaries for support staff (Pin et al., 2011). As a key piece of the student support puzzle, there is now more focus placed on the role of the academic advisor (Cuseo, 2003). These individuals are

influential in helping struggling students decide to stay or leave an institution. As well, they provide appropriate recommendations around additional supports which may lead to the student's success (Bettinger, Boatman, & Long, 2013; Cuseo, 2003). Student services, including academic advisors, have been proven to increase student retention; however, as a whole, these services are undervalued by university administration (Graham, 2010). In turn, more intensive student support services like academic advising and counseling services often do not have the resources available to intensively support the large number of struggling first year students (Prebble et al., 2005). In recent years, hybrid versions of academic advising and counseling have emerged to help fill the ever-growing need for support. Some of the most successful models include peer mentoring opportunities, additional time to ask course specific questions, along with an advisor (often called a coach) to work with students individually around study strategies. While labor intensive, this type of 'enhanced advising' is proving to be effective for students who are in need of remediation; however, longitudinal results suggest most academic improvements did not last beyond the time of intervention (Bettinger et al., 2013).

Learning communities. Learning communities have been shown to help improve the social isolation of learning in a post-secondary environment (Tinto, 2003). As well, a number of sources have confirmed their effectiveness to help improve student retention (e.g,Freeman, Alston, & Winborne, 2008; Kuh, Kinzie, Schuh, & Whitt, 2011; Scrivener & Coghlan, 2012; Zhao & Kuh, 2004). While research has confirmed the effect first year learning communities can have on first year students' academic success, "it is difficult to determine which characteristics of the learning communities (i.e. integrated course content, coordinated assignments, academic skills training or mentoring) account for their

success due to the small number of studies and the heterogeneity of the programs" (Andrade, 2008 p.485). One specific type of learning community that has recently gained in popularity is Supplemental Instruction (SI). SI is a proactive approach to helping students in 'high risk' first year courses (Dawson, Meer, Skalicky, & Cowley, 2014). This student success initiative aims to improve student retention and grades in historically difficult courses by building a community around the particular course that offers both social and academic support (Arendale, 2002). SI is a voluntary weekly program offered to all students. Therefore, the program avoids the stigma of being labeled as 'remedial' while still supporting weaker and 'at-risk' students. 'Near peers' who have achieved a high grade in the course previously are chosen and trained to facilitate regularly scheduled, peer-led study sessions. These "SI Leaders" model appropriate learning strategies by attending all class lectures, taking effective notes and completing all assigned readings. The "SI leader" will then design different activities for the students to interact with during each study session. These sessions are also seen as an informal review time where students can compare notes, talk about readings, and learn new academic strategies while interacting with the course content from that week (Arendale, 2002; Dawson et al., 2014). SI courses are chosen based on: 1) having high enrolment, 2) being a foundational course required by many programs, 3) having consistently poor success rates either overall, or for certain student groups, 4) being perceived as 'a hard course' by students, 5) having the support from course instructors, 6) being identified as a prerequisite for subsequent courses, 7) having administrative support from the Faculty in which the course resides, and 8) having an appropriate course structure (including lectures and an appropriate evaluation format etc.) (Martin & Arendale, 1992).

Numerous studies have shown the positive impact SI has on student retention and student grades within the supported course (e.g., Dawson et al., 2014; Malm, Bryngfors, & Mörner, 2012; Price, Lumpkin, Seemann, & Bell, 2012). As well, students who attend SI on a regular basis have significantly higher first year academic performance levels than their peers who attend SI sporadically, or do not attend SI sessions at all (Malm et al., 2012). Similarly, academic performance improves for students with low, average and high levels of prior academic achievement. Finally, the skills taught in the SI sessions are transferable to other courses (Dawson et al., 2014; Malm et al., 2012; Price et. al., 2012).

A number of Canadian universities are currently utilizing SI programs. However, Canadian research on the effectiveness of SI is lacking. In reviewing the literature to date, Fayowski and MacMillan's (2008) study of the effectives of SI in a calculus class appears to be the only published study on SI in Canadian post-secondary institutions. While the results of this study also suggest a positive association between SI and student grades, the author's proposed methodology and inclusion of data does not align with other SI research studies. Canadian universities operate under different policies than American post-secondary schools. They provide different methods of instruction and different methods of assessment. Therefore, while American data provides some insight into the effectiveness of SI programs, student study skills and academic success rates may differ in Canadian universities with these types of learning communities due to the cultural and socioeconomic differences. (Graff, Davies, & McNorton, 2004).

Learning strategies and life skills seminars. 'At-risk' students who participated in learning and life skills seminars in their first year, on average, have higher grades and are less likely to be placed on academic probation than their 'at-risk' counterparts who do

not participate (Lizzio & Wilson, 2013; Williford, Chapman, and Kahrig, 2001; Salinitri, 2005). These students also reported increased confidence in their abilities and upon course completion were more likely to believe that they could be successful at the post-secondary level (DeAngelo, 2014; Mahon & Crowley, 2013). While studies do show an increase in academic success for most individuals who participate in learning strategy and life skills seminars, for some individuals, academic success declines with time (Barton & Donahue, 2009; Clark & Cundiff, 2011; Porter & Swing, 2006). New research is beginning to emerge on the integration of learning strategies and life skills content into the discipline-specific classroom. While limited, this literature suggests there may be merit to this approach and further research is warranted on how it could complement or replace first year seminars (Urciuoli & Bluestone, 2013).

Learner dashboards. Within the past ten years, a new class of 'personal informatics' applications have emerged in the form of 'Learner Dashboards' (Li, Dey, & Forlizzi, 2010; Verbert, Duval, Klerkx, Govaerts, & Santos, 2013). These tools typically support students by compiling the various pieces of their scholastic career and empowering learners to review and analyze their own self-knowledge. However, data is also beginning to emerge to suggest their usefulness for student achievement and retention (Li, Dey, Forlizzi, Höök, & Medynskiy, 2011; Verbert et al., 2013). The University of Purdue's Course Signals tool is a well-documented example of these Learner Dashboards. Course Signals utilizes readily available data collected from a variety of instructional tools including; Purdue's Content Management System, Student Information System, Library Systems, etc., to determine in real time which learners might be 'at-risk' based on identified predictive indicators. Pre-defined algorithms are utilized

to electronically analyze the data, highlight these ‘at-risk’ learners and then send targeted messaging out to direct them to the appropriate resources and interventions (Arnold, 2010).

The implementation of Course Signals has been shown to create a significant improvement in student achievement and retention levels at Purdue (Arnold & Pistilli, 2012). More specifically, retention rates of learners using Purdue’s Course Signals tool in at least one course graduated 20.87% higher than their peers who had not used the tool. Purdue’s recently released achievement and retention data for their 2008 student cohort showed even more impressive results. Students who had engaged in two or more courses that used Course Signals throughout their university career graduated with a 24.36% higher average than students who had not taken courses that included Course Signals (Tally, 2013).

Purdue’s early successes with the Course Signals tool has led to the development of further student success algorithms. These algorithms aim to provide more targeted information, additional personalized intervention messages and new strategies to assist in proactively identifying ‘at-risk’ learners (Arnold, 2010). Finally, preliminary research suggests students considered to be ‘at-risk’ identified by the pre-defined algorithms were faring better with academic achievement and retention when the Course Signals tool was added to difficult courses than their ‘better prepared’ peers who were not using Course Signals (Arnold & Pistilli, 2012).

Self-assessment tools. Whether self-assessments and the specific theories behind these psychometric tools have been scientifically validated, they are heavily used within educational practice to support self-discovery, identify student readiness and engagement

levels and improve intervention approaches for ‘at-risk’ post-secondary learners (Fredricks & McColskey, 2012; Willey & Gardner, 2010). Psychometric self-assessment tools are designed to provide students with various responses to a specific item or situation and ask students to select the response that best describes them. Often these types of self-assessment tools provide dichotomous choices to a question, or, ask for individuals to rate their preference on a Likert scale. Responses are then provided to the student in a feedback report (Fredricks & McColskey, 2012).

Self-assessments are critical for identifying students’ perceptions of themselves. This subjective assessment adds an extra analytical layer to educational research beyond just collecting objective data on behavior (e.g., test scores, attendance levels, etc.) (Appleton, Christenson, Kim, & Reschly, 2006; Garcia & Pintrich, 1996). As well, these assessments are particularly beneficial for identifying students’ emotional and cognitive levels of engagement. Engagement is not directly observable; therefore, other objective research methods that infer engagement from students’ behavior may not be accurate (Appleton et al., 2006; Fredricks & McColskey, 2012). Self-assessment methods are widely used in educational settings because they are practical, easy to administer, easy to interpret, can be delivered to varying size groups, have a low associated cost, and allow for comparisons of the results across classroom, faculty and university cohorts (Fredricks & McColskey, 2012). They have also been shown to promote reflection and critical thinking skills (Willey & Gardner, 2010).

While there are many benefits to using self-assessments within education, these tools should be used with an understanding that under certain conditions students may not always answer accurately (Fredricks & McColskey, 2012). When testing parameters are

outlined appropriately, these self-assessment tools have been proven to be as accurate as other assessment measures (or testing batteries) (Mabe & West, 1982; Sidney & Osberg, 1981). However, when assessing for specific factual knowledge or academic achievement the accuracy of self-assessment measures in relation to actual test results declines – particularly in students who are not 'good' at taking tests (Sundström, 2005; Ward, Gruppen, & Regehr, 2002). This does not necessarily mean that the tool is not reliable, but instead, that the administration of the tool and instructions and guidance given to the participant may produce skewed results. For example, without explicit instructions students may answer in the way they 'wish' they were or the way they think their teacher/parent etc. would want them to be. If the self-assessment is administered by an individual in a position of power (e.g., a teacher), or no anonymity is provided, the assessment may not reflect actual behavior or strategy use (Appleton et al., 2006; Garcia & Pintrich, 1996). Further, self-assessments are often worded broadly (e.g., I am energized by conversations with people) and, therefore, they should be integrated with additional research measures to contextualize the student's varying levels of engagement based on the task or situation (Fredricks & McColskey, 2012).

Psychological Type and Self-Assessment Tools

Self-assessment measures that use Jung's Theory of Psychological Type can support students to become self-aware around potential challenges that they may encounter due to their preferences towards information processing and decision-making. In particular, self-assessment facilitates the identification of potential road blocks for students as they transition from high school to post-secondary studies (Sanborn, 2013). The identification of "student characteristics, needs, behaviors, and experiences [are]

central to creating and sustaining successful transition initiatives" (Hunter, 2006 p. 9); Therefore, the inclusion of Psychological Type Theory and learning models and tools that relate to this theory can support students in their metacognitive awareness of their strengths and challenges surrounding learning at the post-secondary level (Sanborn, 2013).

Learning Models and Self-Assessment Tools related to Psychological Type. As theorized by Carl Jung (1921), Psychological Type identifies one's preferences towards information processing and decision-making (Jung, 2013). Noted in psychology literature as a Trait Theory, Jung's Psychological Type is identified in the Diagnostic and Statistical Manual – Five[3] under Personality Traits "prominent aspects of personality that are exhibited in a wide range of important social and personal contexts" (American Psychiatric Association, 2013). In psychology, personality is considered consistent; it relates to an individual's emotional, cognitive and behavioral patterns. There are several perspectives about the relationship between learning, personalities and other psychological constructs including trait theories, psychodynamic theories, behaviorist theories, cognitive and social cognitive theories and humanistic theories.

Jung's Theory of Psychological Type was first published in 1921 after almost 20 years of practical research work as a psychiatrist ("The Myers Briggs Foundation," 2015). It compiled an overview of Jung's discussions with his colleagues and the practical solutions they had employed while working with patients (Wankat & Oreovicz, 1993). Jung suggested that each individual had a basic orientation or attitude to the world.

[3] Mental health professionals use the DSM-5 to define and classify mental health disorders.

Either their energy flowed outwardly towards people or events (Extroversion, E) or their energy flowed inwardly towards ideas (Introversion, I). Similarly, individuals processed information through their senses (Sensing, S) or through their intuition (Intuition, N) and made decisions either based on logic and analysis (Thinking, T) or based on values and subjectivity (Feeling, F) (Wankat & Oreovicz, 1993). Today, Carl Jung's Theory of Psychological Type (1921) and the numerous theories/ learning models that also align with Trait Theories are utilized within educational research to understand individual differences in student learning and how these unique characteristics may influence academic success (e.g., Felder & Brent, 2005; Fourqurean, Meisgeier, & Swank, 1990; Kim, Lee, & Ryu, 2013; Kuh, 2009; Riding & Rayner, 2013; Sadler-Smith, 2001; Xie, 2015). For example, Holland's Person-Environment Theory (1959), Kolb's Theory of Experiential Learning (1984), Goldberg's Trait Theory (nicknamed "Big Five") (1990), as well as Katherine Briggs and Isabel Briggs Myers's extension of Psychological Type Theory to include Type Indicators (1962) are commonly used to simplify theories surrounding personality traits. As well, associated self-assessment tools including the Strong Interest Inventory (SII), the Index of Learning Styles (ILS), the NEO Five Factor Inventory (NEO-FFI) and the Myers-Briggs Type Indicator (MBTI) are often used both in educational research and practice.

Holland's Person-Environment Theory. Holland's Person-Environment Theory utilizes personality traits to help individuals understand potential career opportunities and career 'fit'. The theory looks to explain personal characteristics in relation to their environment (Kristof-Brown, Zimmerman, & Johnson, 2005). Holland's learning model suggests that our culture enables individuals to be categorized by their personality traits.

If an individual chooses a career that is more inline with their personality traits, they are more likely to be successful and have job satisfaction (Sanborn, 2013). Based upon a 66-item survey, Holland Codes' is utilized to help individuals choose appropriate vocations in relation to their personality traits from six model environments; realistic, investigative, artistic, social, enterprising, and conventional (Smart, Feldman, & Ethington, 2000). In 2004, the current version of the Strong Interest Inventory (SII) incorporated Holland Codes' into this self-assessment measure. This self-assessment measure, while originally created to assess vocational choices, has been used in numerous studies to measure and report learning characteristics and draw inferences for student success based on their discipline of study. Porter and Umbach's (2006) study examined students' major choice in post secondary studies based on their personality traits. Statistical analysis, using a number of controlling variables highlighted that personality traits, when situated in the framework of Holland Codes was extremely predictive of student major choice. Interestingly, when taking into account personality traits, the researchers also found that variables like SAT were not longer significantly related to a student's choice of major. Similarly, Allen & Robbins (2008) conducted a hierarchical logistic regression analysis using Holland Codes. Over 50,000 first year post-secondary students at 25 different institutions were studied. Findings suggest a student's academic performance and vocational interest in their major can both independently predict whether a student will stay in their entering major.

Kolb's Theory of Experiential Learning. Kolb's Theory of Experiential Learning heavily focuses on the individual's internal cognitive functions (Felder & Spurlin, 2005). It suggests we go through four developmental stages of learning and gravitate towards

one of four learning styles: Accommodating, Assimilating, Converging, and Diverging. Kolb's learning styles inventory (LSI) is a 12- item self-assessment instrument that helps a participant to understand their preferred learning style and their approaches to information processing and decision making (Evans et al., 2010). One common self-assessment instrument that stems from Kolb's theory and learning styles inventory include the Index of Learning Styles (ILS) (Felder & Spurlin, 2005). The ILS classifies students learning preferences into 4 dichotomous learning style dimensions: sensing or intuitive, visual or verbal, active or reflective, and sequential or global. It has been used in numerous studies to measure and report learning characteristics and draw inferences for teaching and learning. A study conducted at Iowa State University, which classified 129 undergraduate engineering students based on their preferences towards either sensing or intuitive, visual or verbal, active or reflective, and sequential or global and made recommendations for instruction within the Engineering classroom based on these preferences (Constant, 1997). As well, a study that classified the strength of the student preferences at Ryerson University in Ontario, identified that out of 87 students in an Engineering cohort only 27% identified a moderate to strong preference towards active learning, 15% identified a moderate to strong preference towards reflective learning, while 58% indicated a mild preference towards either of the preference pairs (Zywno & Wallen, 2001). As well, implication studies which highlights the uses of the ILS to support instructors in their understanding of the diversity of learning styles within their classroom and students to understand their learning strengths and weaknesses (Felder & Spurlin, 2005).

Goldberg's Trait Theory (nicknamed "Big Five"). Goldberg's Trait Theory was built on other personality trait research including Cattell's, Tatsuoka and Eber's Sixteen Personality Factor Questionnaire (16PF) (Eysenck,1991). The "Big Five" or Five Factor Inventory measures adult personality traits based on 5 domains: neuroticism, extraversion, openness to an experience, agreeableness, and conscientiousness. Questions are completed using a 5- point likert scale (Rosellini & Brown, 2011). This self-assessment measure is heavily used in educational psychology research and clinical practice. A study conducted by Farsides & Woodfield in 2003 identified that a student's openness to an experience is positively associated with their final grades, even when controlling for individual intelligence. However, in a study of 934 university students, the creativeness and innovation of open individuals was also shown to disadvantage students when they were required to reproduce content rather than extend content or creatively problem solve (De Fruyt & Mervielde, 1996). Similarly, numerous studies have identified the connection between the "Big 5" and time management, self-efficacy, and anxiety (e.g., Judge & Ilies, 2002; Shitole, 2015; McCrae & Costa 1994; McCrae & Costa, 1999; Schulze & Roberts, 2006; Zeidner, 1998; Chappell, Blanding, Silverstein, Takahashi, Newman, Gubi, & McCann, 2005; Keough, Bond, French, Richards, & Davis, 2004; Hembree, 1988; Seipp, 1991; Roberts, Schulze & MacCann, 2007; Lufi, Okasha & Cohen, 2004; Gall, 1988; Macan, Shahani, Dipboye, & Phillips, 1990; Britton & Tesser, 1991).

Katherine Briggs and Isabel Myers Type Indicators. As an extension to Jung's work on Psychological Type, Briggs and Myers created the notion of Personality Types and the MBTI self-assessment. Personality Types used Jung's research around an

individual's basic orientation or attitude to the world (E vs. I) and approach to processing information (S vs. N) and making decisions (T vs. F) and added a fourth dichotomy: an individual's orientation and organization to the outer world, or judging (J) and perceiving (P) preferences (Myers, 1998). As depicted in figure one, the MBTI self-assessment therefore classifies individuals' personality traits into16 distinct Personality Types based on these 4 dichotomous preferences: extraversion (E) or introversion (I), sensing (S) or intuition (N), thinking (T) or feeling (F), and judging (J) or perceiving (P) ("Myers-Briggs Type Indicator," 2009).

Figure 1: Myers-Briggs' MBTI Personality Preferences versus Jung's Psychological Types

(Shen et al., 2007).

While some empirical evidence exists which discredits the MBTI tool[4], it is considered one of the most scientifically validated Personality Type assessments. It has an estimated annual sale worldwide of 3.5 million dollars and is available in more than 21 languages. It has also been used and tested in a number of occupational settings ("Myers-Briggs Type Indicator," 2009, "The Myers Briggs Foundation," 2015; Shen et al., 2007). Over a

[4] These tools are heavily used in educational practices; however, some researchers discredit their accuracy citing a lack of empirical studies to support the validity and reliability of the results (Pashler et al., 2008; Riener & Willingham, 2010).

hundred million individuals have completed the MBTI self-assessment. At least three quarters of all individuals agree with all four of their 'results'. Most individuals agree with at least three of their 'results' and find the self-assessment at least provides clarity into why they may prefer certain things (Wilde, 2003 as seen in Shen et al., 2007). Within the field of teaching and learning, the MBTI self-assessment has been utilized on numerous occasions to research student characteristics, functioning, and academic success (e.g., Kapitány, Kiss, & Kun, 2014; Erdei, Kapitány, Kiss, & Kun, 2014; Felder & Brent, 2005; Kim, Lee, & Ryu, 2013; Kiss, Kotsis, & Kun, 2014; Shen et al., 2007). The MBTI self-assessment process is considered to be one of the most comprehensive assessments of learning style as it identifies the individuals learning preferences and how they process information rather than just the specific learning behaviours themselves (Jensen, Wood, & Wood, 2003). While the MBTI self-assessment is not designed to be a predictor, examining patterns in type distribution and preferences has been shown to lead to increased student success and persistence to graduation (Sanborn, 2013). When researched at the post-secondary level, the MBTI has also been shown to be beneficial in assisting staff and faculty in supporting students in their academic and institutional choices, their group work, and their overall academic success within a program (e.g., Felder & Brent, 2005; Felder, Felder, & Dietz, 2002; Montequín, Fernández, Balsera, & Nieto, 2013; Schaubhut & Thompson, 2008; Shen et al., 2007; Yeung, Read, & Schmid, 2012). Schaubhut and Thompson (2011) examined 107,000 post-secondary students enrolled in 59 different majors. The results of their study suggested personality traits (and specifically Personality Types as determined by the MBTI) could be helpful for students as they plan their post-secondary education – including vocational choices, and university

environment.

Understanding Trait Theory and Psychological Type Using the Myers-Briggs Type Indicator

Although it is not directly associated in psychology literature as a Trait Theory, the Myers-Briggs indicator can assess a student's learning preferences and processes rather than just their learning behaviors (Jensen, Wood & Wood, 2003). The Myers-Briggs Type Indictor is based on the premise that human behavior is not random. Instead, individuals have innate mental functions, and processes that guide them, and therefore, patterns will emerge when looking at a population (Jung, 2013). As such, Sanborn (2013) suggests that the MBTI can help to facilitate a deeper understanding of post-secondary learners' personality traits by providing students and administrators with a simple way to categorize students' functions surrounding learning and student success. The 93-item Form M is the most frequently used MBTI self-assessment on post-secondary campuses. This version of the MBTI self-assessment tool asks the individual dichotomous questions to help define their preferences for personal energy, acquiring information, making decisions and organizing one's world. Upon the completion of the self-assessment, the individual has a consultation session with a trained professional to discuss the results of the self-assessment tool. During the consultation the individual will have the opportunity to review their instrument results.

Interpreting preference. Based upon the individual's responses, a *preference* will be chosen for each dichotomous pair (E vs. I), (S vs. N), T vs. F), and (J vs. P). The term *preference* is used to describe the individual's innate tendency towards each dichotomous personality trait (Myers, 1998). In the CPP training manual, this type

preference is commonly described by asking participants to write their signature with their non-dominant hand; this experience is often awkward and uncomfortable for individuals. It is not impossible, but it is not their preferred way to write their name. This explains an individual's *preference* towards each dichotomous personality trait – we all have a preference for our daily functions, but when necessary, we can operate out of *preference* (Consulting Psychologists Press, 2015). The following sections explain each dichotomous preference pair and highlights recent literature surrounding each preference in relation to academic success.

Extraversion and Introversion. Where an individual acquires their energy is defined by their preference towards Extroversion (E) or Introversion (I). An extroverted individual draws their energy from engaging with other people, objects or events; an introvert individual draws their energy from independent, solitary creative pursuits (Sanborn, 2013). Extroverts (E) tend to focus outward and process information in a do-think-do pattern. Introverts (I) tend to focus inward and process information in a think-do-think pattern (Chang & Chang, 2000).

When considering Extroverts versus Introverts in their orientations to learning and studying, Extroverts tend to be active experiential learners, while Introverts tend to be reflective observational learners (Chang & Chang, 2000). Dunning (2008) suggests that Extroverts need to practise active listening and effective reading strategies to help them attend in lectures and/or stay focused while studying. Similarly, group studying / learning that includes movement, action and conversation can be particularly effective for Extroverts. Study strategies that include connections between theories, facts and personal experience have also been proven to be effective for extroverted learners (Sanborn,

2013). For Introverts, students must find time to process the information they are learning in quiet uninterrupted environments. Planning for Introverts is particularly important so that they can seek out information in advance to afford them the time to process the information before they need to respond (Sanborn, 2013). When working in groups, Dunning highlights that introverted students should be encouraged to include "nonverbal cues to demonstrate participation" to show engagement when they are not verbally contributing to a group conversation (p.17).

When considering Extroverts versus Introverts in their responses to different teaching practices, classroom environments and overall academic success Felder, Felder & Dietz (2002) identified that extroverted students with lower GPA's perform a full letter grade better in experiential learning classrooms, and co-op, than introverted students with similar GPA's. Similarly, during the forming stage of group work, extroverted students perform better than introverted students; however, as introverted students become comfortable with their group members they are also successful in group work (Felder & Brent, 2005). Similarly, Felder, Felder and Dietz's 2002 study of Engineering students and their MBTI type suggested that extroverted students found group homework helpful, while introverted students found lectures helpful. Finally, extroverted engineering students reacted more positively to group work than introverted engineering students; however, by their fourth year of studies introverted engineering students found group work more helpful than Extroverts.

Sensing and Intuition. How an individual takes in information is defined by their preference towards Sensing (S) or Intuition (I) (Chang & Chang, 2000). An individual who senses information accumulates knowledge through the use of their physical senses;

an individual who is intuitive uses their perception of or feel for a situation to accumulate their knowledge (Sanborn, 2013). Sensors (S) tend to be sequential, detail-oriented and focus on facts and procedures. Intuitors (N) tend to be conceptual, big picture thinkers and focus on meanings and possibilities (Chang & Chang, 2000).

When considering Sensors versus Intuitors in their orientation to learning and studying, Sensors learn best sequentially while Intuitors learn best through the creation of patterns. Sensors excel at memorization and use concrete examples to ground abstract thoughts. Dunning (2008) suggests that Sensors should summarize subject matter, find practical application for big picture ideas or themes and create "specific, short-term learning goals" (p. 18). Conversely, Intuitors excel at theoretical topics and use their imagination to craft abstract ideas. As abstract, conceptual learners, they are high in academic comfort and enjoy self-directed learning (Chang & Chang, 2000). Dunning (2008) suggests that Intuitors should focus on supporting ideas with facts, should be cognizant of their potential to be distracted by related information which leads them 'off topic' and can increase their retention of detail oriented information with academic aids like flash cards or summarized outlines.

When considering Sensors versus Intuitors in their responses to different teaching practices, classroom environments and overall academic success Felder and Brent (2005) identified that Sensors performed significantly better than Intuitors in course environments that included more practical information, or relied heavily on memorization. Conversely, Intuitors performed significantly better than Sensors in course environments that relied heavily on student's thinking abstractly. Drawing on this abstract thought, Felder, Felder and Dietz (2002) found that Intuitors were more likely to

attend graduate school than Sensors. As well, Intuitors rated their problem solving ability consistently higher than Sensors. However, academically weaker undergraduate students who had preferences towards Sensing were more likely to graduate than academically weaker undergraduate students who had preferences towards Intuition.

Thinking and Feeling. How an individual approaches decision-making is defined by their preference towards Thinking (T) or Feeling (F). An individual who has a preference towards thinking uses objective judgment to analyze information or situations based on standards and logic. An individual who has a preference towards feeling uses subjective judgment to analyze information and situations based on values and personal connections (Borg & Stranahan, 2002; Chang & Chang, 2000; Sanborn, 2013).

When considering students' preferences towards Thinking versus Feeling in their orientations to learning and studying, thinking preference individuals are motivated to learn because logically it seems like the 'right' thing do to. Similarly, Thinkers want to be seen as competent. Feeling preference individuals are motivated to learn by individuals encouraging them to learn. Similarly, Feelers are motivated when their personal values align with the topic (Sanborn, 2013). Dunning (2008) suggests that the logical and analytical thinker should craft questions and seek comments and answers without attempting to engage in a debate. While the credibility of information is important, students with preferences towards thinking should practice appreciation and listening to understand to improve their information processing (Sanborn, 2013). Thinkers often prefer to learn information though abstract conceptual or abstract sequential processes (Chang & Chang, 2000). For Feelers, information processing and learning are most successful for students when the information aligns with their individual perspectives.

Feelers often prefer to learn through practical experiences and through abstract random information (Chang & Chang, 2000).

When considering students' preferences towards Thinking versus Feeling in their responses to different teaching practices, classroom environments and overall academic success, Felder, Felder and Diez (2002) in their assessment of first-year Engineering students highlighted that Thinkers consistently outperformed Feelers in an impersonal environment like Engineering. As well, Feelers were more likely to drop out of Engineering even if they were academically successful.

Judging and Perceiving. How an individual navigates and organizes their 'outer world' is defined by their preference towards Judging (J) or Perceiving (P). Those who favor Judging prefer organization, structure and planning; those who favor Perceiving prefer independence, flexibility and spontaneity (Sanborn, 2013). Individuals who have a preference towards Judging see time in segments and aim to complete a specified task within a specific time segment. Judging individuals strive to maintain order and seek closure on any task they begin (Chang & Chang, 2000). Individuals who have a preference towards Perceiving see time as an uninterrupted flow and are open to changing tasks, incorporating new information and finding new possibilities (Borg & Stranahan, 2002; Chang & Chang, 2000).

When considering students' preferences towards Judging versus Perceiving in their orientations to learning and studying, students who identify with judging preferences thrive academically by focusing on task completion. Similarly, judging students excel in structured learning environments where specific goals are communicated (Sanborn, 2013). Dunning (2008) identifies that judging preference students should be cognizant to

avoid overscheduling, similarly, to also avoid completely open scheduling systems. Judging students should slow down when making decisions and "plan for inevitable interruptions to minimize academic stress" (p.22). Those who identify with perceiving preferences thrive academically in open learning environments that provide flexibility in learning approaches and academic deadlines (Sanborn, 2013). Dunning (2008) identifies that perceiving preference students should be cognizant that they will often not have enough time to create the openness and exploration they would like in their learning. Dunning advises that perceiving students must recognize the flow of their learning and they must put structure and organizational boundaries around this to ensure they do not run out of time.

When considering students' preferences towards Judging versus Perceiving in in their responses to different teaching practices, classroom environments, and overall academic success judging type students consistently outperformed their perceiving counterparts in post-secondary studies due to the heavy workload and time demands / constraints of the environment (DiRienzo, Das, Synn, Kitts, & McGrath, 2010; Felder, Felder & Diez, 2002; Felder & Brent, 2005; Williamson, 2002). Most judging students are abstract conceptual learners, they like structure and are motivated to learn in lectures. Also, they have a solid ability to retain facts and a high level of academic comfort. Conversely, most perceiving students are concrete experiential learners that excel in active, collaborative learning environments that are experiential (Chang & Chang, 2000; Felder, Felder & Diez, 2002). In a study of first year Engineering students, findings suggest that although Perceivers had similar SAT scores as their Judging counterparts, their orientation towards task completion and time management disadvantaged them in their first year of post-

secondary studies. The Judgers earned significantly higher grades, identified as having more motivation to study and sounder time-management and concentration strategies than the Perceivers.

Interpreting Type. Upon the completion of the MBTI self-assessment the individual's preferences are combined to form of their MBTI type. The interactions among their preferences can create 16 unique Personality Types as noted in figure two (Myers & Myers, 1995).

ISTJ	ISFJ	INFJ	INTJ
ISTP	ISFP	INFP	INTP
ESTP	ESFP	ENFP	ENTP
ESTJ	ESFJ	ENFJ	ENTJ

Figure 2*:* Myers-Briggs 16 different Personality Types as identified using the MBTI instrument (Myers & Myers, 1995).

The MBTI types are all of equal value – no type is better than another. Each type exhibits different preferences and has different strengths and challenges. As the final step in the assessment process, the individual is encouraged to determine their best-fit type; taking into consideration their environment, academics and knowledge of self ("The Myers Briggs Foundation," 2015). The following sections highlight certain Personality Types and combinations of Personality Preferences that have been noted in recent literature to be correlated with retention and academic success. For a detailed description of each of the 16 Personality Types see Appendix A.

ENFP Personality Type and NP preference combinations. The student population

within this study identified predominantly with either the ENFP Personality type or the NP preference combination. Literature highlights that ENFP's and the NP combination are most commonly the 'gifted' or 'academically talented' students, but also, are the most 'at-risk' of not completing an undergraduate degree (e.g., Clark, 2000; O'Brien, Bernold & Akroyd, 1998; Kim & Han, 2014; Rosati, 1997; Sak, 2004; Sanborn, 2013). As identified on the Form M self-assessment, ENFP's are "Warmly enthusiastic and imaginative. See life as full of possibilities. Make connections between events and information very quickly, and confidently proceed based on the patterns they see. Want a lot of affirmation from others, and readily give appreciation and support. Spontaneous and flexible, often rely on their ability to improvise and their verbal fluency (Consulting Psychologists Press, 2015)." ENFP's, along with their counterpart INFP's are often identified as being perceptive and inspiring (Nardi, 2001). They can intuitively respond to others' behaviors and emotions and can mediate between individuals with their exceptional communication skills (Sanborn, 2013).

When considering students who identified with ENFP and their orientations to learning and studying, ENFP's learn best through self-discovery and personal development and are most efficient in their learning when it is connected to their values and personal experiences (Sanborn, 2013). ENFP students value both constructive and positive feedback and want to be "recognized for the unique perspective they bring to an assignment or task" (Nardi, 2001 p.37).

When considering students who identified with ENFP and their responses to different teaching practices, classroom environments and overall academic success, Barrineau (2005) discovered that students who identified with P (Perceiving), NP (Intuition and

Perceiving) or ENFP (Extraverted Intuition with Feeling and Perceiving) were moderately more 'at risk' of attrition than students who identified with other Personality Types. Similarly, Sanborn (2013), identified a direct effect relationship between the ENFP Personality Type and her students' first-semester GPAs.

Connecting Research and Practice in Higher Education

Although these learning models and self-assessment tools cannot explain change or beliefs in an individual, they can help to simplify the complexity of a student's unique learning characteristics. As well, they can highlight how these preferences towards information processing and decision-making may influence student development and academic success (Sanborn, 2013). When speaking about retention and success in higher education, there is often a divide between the educational researcher and practitioner. The educational researcher conducts research on student success and retention and the site-based practitioner creates intervention approaches for their institution to implement. The two different professions do not frequently communicate, cite each other's literature, or build upon each other's findings. As researchers, our findings do not always result in pragmatic models that institutions can employ to improve their retention and inform their student success initiatives (Daniels & Pears, 2012; Farnsworth & Solomon, 2013, Tinto, 2010). As site-based practitioners, we do not always research our actual intervention approaches. Instead, we rely on anecdotal evidence and professional experience to decide whether an intervention is successful. The inclusion of Jung's Theory of Psychological Type and self-assessment tools like the MBTI helps to inform retention interventions. The simplicity and practicality of these self-assessment tools may help to bridge the gap between advisors and researchers who work in the field of retention and student success.

Research Statement

In the proposed study, I aim to research how exceptionally bright but academically ‘at-risk’ students’ Psychological Type may help to inform their level of academic success upon their enrollment in a retention program at the researched university. Practically, I aim to identify if patterns in students’ Psychological Type could help to create more effective academic interventions and create richer conversations between advisors and students around intervention choices for ‘at-risk’ students (Hirsch, 2013).

In Chapter Three, Methodology, I will explore the validity and reliability of the MBTI psychometric tool. I will identify my research processes and how the MBTI self-assessment tool, when used in conjunction with additional research methods, could help to identify patterns in students’ success based on their Psychological Type.

CHAPTER THREE:

Research Design and Methodology

The purpose of this study is to explore if there are identifiable patterns in exceptionally bright but academically 'at-risk' preferences towards information processing and decision-making and how those preferences may correlate with academic success within certain university classrooms. To inform this purpose, the following research objectives were identified:

Objective One

- *to identify patterns in learning and information processing for exceptionally bright but academically 'at-risk' students, based on their Psychological Type, in relation to the general English-Speaking Canadian population.*

Objective Two

- *to highlight relationships between the common patterns in learning and information processing for exceptionally bright but academically 'at-risk' students and their academic success.*

Objective Three

- *to specify types of intervention approaches that may be more beneficial to students who display certain patterns because they learn and process information in different ways.*

This chapter will describe the research design, research setting and population, methods of data collection and analysis and ethical considerations used in this study. The following research questions will inform this study:

- Research Question #1: Are their identifiable patterns in the data based on the students' Psychological Type for students enrolled in the Foundation Term[5] intervention strategy?
- Research Question #2: Does the student's Psychological Type relate to his/her level of academic success before, during and after engaging in the Foundation Term?
- Research Question #3: What perceptions do instructors have about the learning environment and learner preferences of Foundation Term students enrolled in their course?

Research Design – Concurrent Transformative Mixed Methods

This research was conducted using mixed methods and a transformative research design. Mixed methods research combines both quantitative and qualitative forms of inquiry. It aims to strengthen a research study rather than using only quantitative or only qualitative methods (Creswell & Plano Clark, 2011). Mixed methods research can be associated with a pragmatic worldview and is often used within the field of educational research (Johnson & Christensen, 2008; Johnson, Onwuegbuzie, & Turner, 2007; Mertens, 2014). Mixed methods research emerged from the field of Psychology in the late 1950's[6]; however, distinct methods for researchers to follow were not identified until

[5] The Foundation Term is a retention or intervention strategy unique to my institution. It is designed for first year students who have been required to withdraw from their faculty. The Foundation Term consists of three half-credit courses. Two courses are chosen by the student from their academic discipline (e.g., Science) along with the mandatory Strategies and Skills for Academic Success course.

[6] In 1959 Campbell & Fiske introduced the idea of "multiple operationalism" suggesting the need for more than one method to validate and explain the variation in a phenomena. While their research design is seen today as more of a multi-method approach, they are credited with identifying the first way to approach mixed methods research (Johnson, Onwuegbuzie, & Turner, 2007).

the late 1990's (Creswell, 2008). Tashakkori and Teddlie (1998) identified a number of mixed methods and mixed model designs for educational researchers. These included sequential or parallel equivalent status designs and sequential or parallel mixed models. In 1999, Creswell proposed convergence, sequential and instrument-building models for educational policy researchers (Creswell & Plano Clark, 2011).

Identifying intervention strategies around improving student preparedness and retention using either quantitative or qualitative methods of analysis produces numerous limitations that can be moderated with a mixed methods approach (Marr, Nicoll, von Treuer, Kolar, & Palermo, 2013). Creswell (2008) identifies a transformative mixed-methods design that aligns with a pragmatic approach to research. This approach identifies the researcher's theoretical lens to provide perspective, as well as, either a sequential or concurrent mixed methods design to build the research process. A concurrent embedded mixed methods strategy was used to facilitate my transformative mixed methods design. This allowed me to collect and analyze my qualitative and quantitative data simultaneously. In addition, it allowed me to embed my qualitative themes within my quantitative data based on my specific theoretical perspectives (see figure three) (Creswell, 2008).

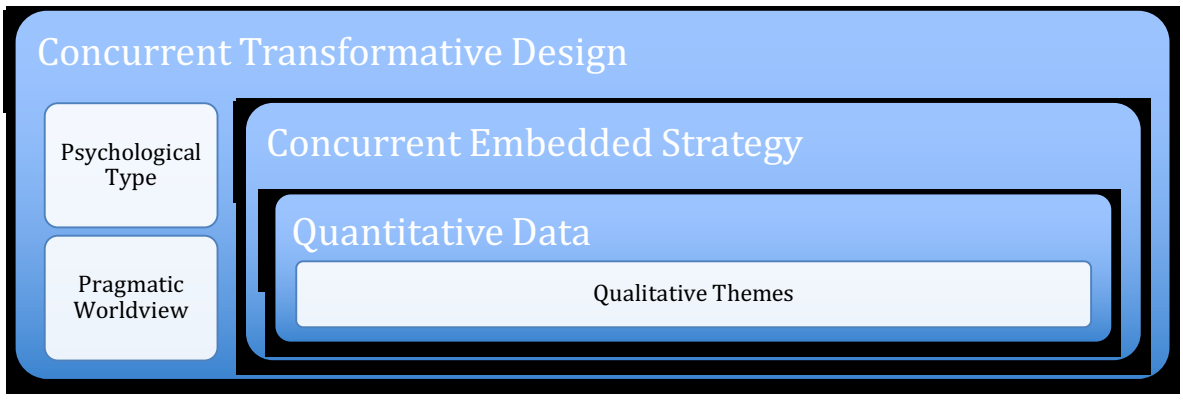

Figure 3: A visual depiction of my concurrent transformative design

A recent study on student preparedness and retention supports this research design. The authors identified the importance of engaging various stakeholders (e.g. staff and instructors) to acquire their perceptions and recommendations around models. They also highlighted the importance of integrating this data with quantitative results for a more robust analysis of intervention approaches (Marr et al., 2013). Therefore, my qualitative analysis was embedded within my quantitative analysis and together they informed the structure for my findings surrounding exceptionally bright but academically 'at-risk' university learners (Creswell, 2008).

Research Setting and Population

To assess whether there are specific patterns in student preferences based on Psychological Type and how these preferences may correlate with academic success within certain university classrooms data was collected on exceptionally bright but academically 'at-risk' students enrolled in a Foundation Term at the researched university. A Foundation Term is an intervention approach designed to support 'at-risk' students. In the Foundation Term the students take a total of three courses. Two courses are chosen from their discipline (e.g. Biology and Chemistry) along with one mandatory Strategies and Skills for Academic Success course. The foundational curriculum in the Strategies and Skills for Academic Success course remains constant. It includes modules on Time management, Study Strategies, Life Balance, Goal Setting etc. Students also complete the Myers Briggs Type Indicator (MBTI) self-assessment within the course. The results of the students' Personality Type (as noted by the MBTI self-assessment) are given to students during their module on Self-Awareness. Within the Strategies and Skills for Academic Success course there is also discipline-specific content that varies by

discipline (e.g. problem solving in a Mathematics section versus engineering design processes in a Engineering section). Therefore, the 'at-risk' students are broken into four distinct Foundation Terms: Engineering, Math, Science/Health/Kinesiology, and Arts/Environment/Recreation and Leisure (see figure four).

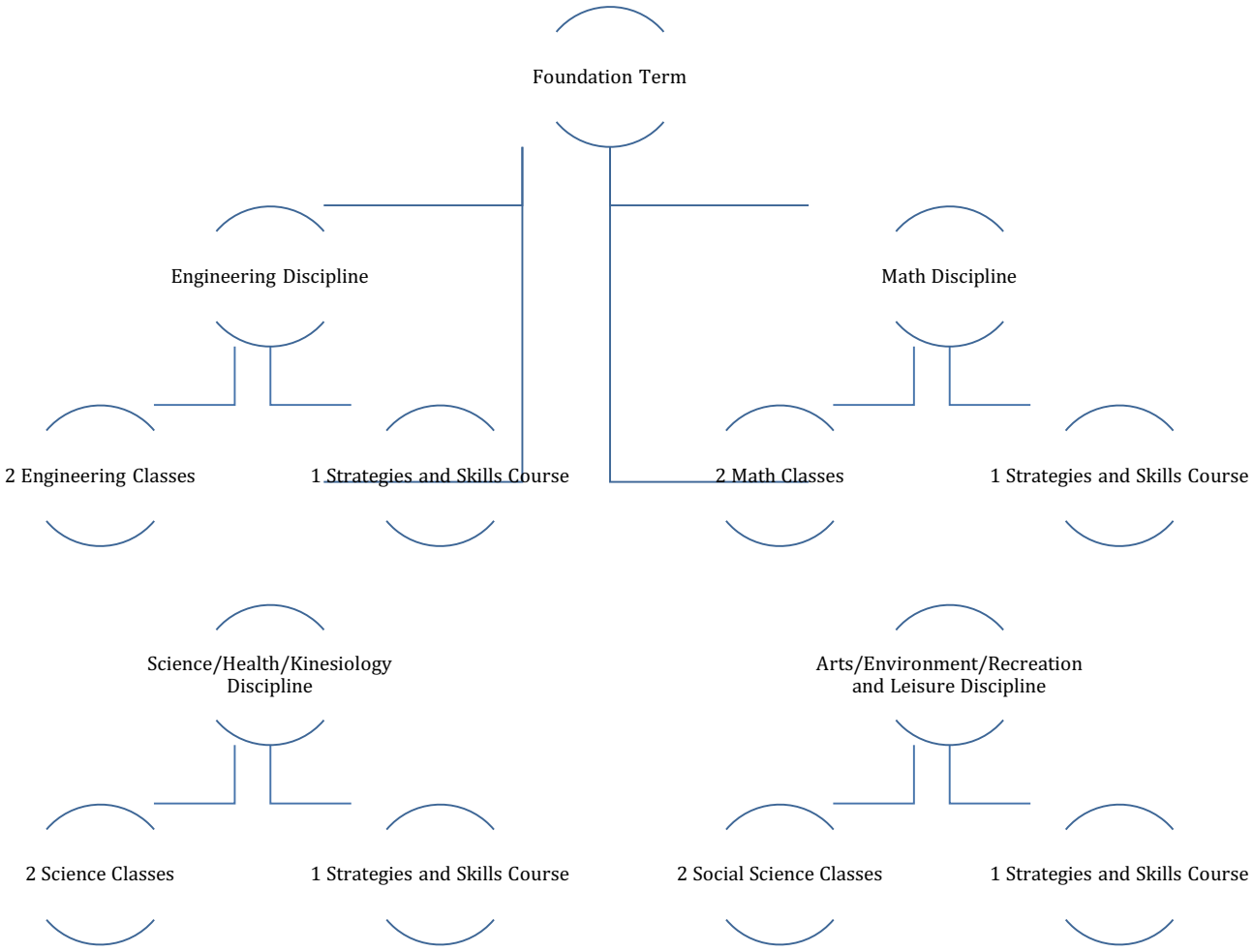

Figure 4: Discipline-specific Foundation Terms

As the Foundation Term is a specific intervention strategy for academically 'at-risk' students that is only offered at the researched university this research setting and population was defined as a case study. It created a tangible scope for my project and aligned with my opinions around the use of site-based research to produce valid, reliable

and replicable results (Bryman, Teevan, & Bell, 2009; Creswell, 2008). Finally, completing a case study bound the project to a specific time period, population and activity while still allowing me the flexibility to explore in depth characteristics of exceptionally bright but academically 'at-risk' university learners at my place of employment (Creswell, 2011).

My quantitative data set included 613 exceptionally bright but academically 'at-risk' students[7] who were enrolled in a Foundation Term after failing their first-year of post-secondary at the researched university (population >30,000). This included every student who has ever opted for the Foundation Term between Fall of 2011 and Fall of 2014. The 'at-risk' students were advised to opt for to their Foundation Term based solely on grades collected from their first year of studies. Students enrolled in this Foundation Term did not meet the university and department standards to continue after their first and/or second term. Consequently, these students had 'technically flunked out' of the researched university. On average these students have failed three courses and have experienced a 40% downward shift in their GPA over a one-year period.

My qualitative data set included nine participants who were purposely selected based on their close relationship with students who participated in the Foundation Term. Three participants were instructors in the Strategies and Skills for Academic Success course and two were advisors who worked with these students one-on-one. Four participants were both instructors and advisors.

[7] As noted in Chapter 1, this population will be identified as students who enter into university with a GPA of 85% or higher and are required to withdraw after their first or second term of university due to poor academic performance.

Research Tool

Personality Types were identified using the MBTI self-assessment[8] instrument that was completed by students as apart of their Strategies and Skills for Academic Success course. The MBTI is considered one of the most scientifically validated Personality Type assessments. It has an estimated annual sale worldwide of 3.5 million dollars and is available in more than 21 languages. It has also been used and tested in a number of occupational settings ("Myers-Briggs Type Indicator," 2009, "The Myers Briggs Foundation," 2015; Shen et al., 2007). More than one hundred million individuals have completed the MBTI self-assessment. At least three-quarters of all individuals agree with all four of their 'results'. Most individuals agree with at least three of their 'results' and find the self-assessment at least provides clarity into why they may prefer certain learning approaches (Wilde, 2003 as seen in Shen et al., 2007).

The MBTI is considered a self-assessment instrument NOT a psychological assessment. It is used to help identify patterns in individual's behaviours by assessing their use of perception and judgement ("The Myers Briggs Foundation," 2015). Misinterpretation and misuse of this self-assessment instrument have increased as the assessment has gained in popularity. While some empirical evidence exists which discredits the MBTI tool[9], numerous assessments of the tools reliability, validity, and

---

[8] The MBTI is the most widely used Personality Type assessment and is commonly associated with Carl Jung's Theory of Psychological Type (Furnham, Jensen, & Crump, 2008).

[9] These tools are heavily used in educational practices; however, some researchers discredit their accuracy citing a lack of empirical studies to support the validity and reliability of the results (Pashler et al., 2008; Riener & Willingham, 2010).

factor analysis support its credibility (e.g., Capraro & Capraro, 2002; Pittenger, 2005; Reynierse & Harker, 2005).

Within the field of teaching and learning, the MBTI self-assessment has been utilized on numerous occasions to research student characteristics, functioning and academic success (e.g., Kapitány, Kiss, & Kun, 2014; Erdei, Kapitány, Kiss, & Kun, 2014; Felder & Brent, 2005; Kim, Lee, & Ryu, 2013; Kiss, Kotsis, & Kun, 2014; Shen et al., 2007). When used appropriately, the tool has shown considerable value for educational researchers and practitioners (Evans, Forney, Guido, Patton, & Renn, 2010; Hammer, 1996; VanSant, 2003; Sanborn, 2013).

In 1975 the Consulting Psychologists Press (CPP) took over the publication of the MBTI. The Center for Applications in Psychological Type (CAPT) was also established to maintain MBTI records and conduct research, development and training around this instrument (Shen et al., 2007). The MBTI assessment process is now considered to be one of the most comprehensive assessments of learning style because it identifies the individual's learning preferences and how they process information rather than just the specific learning behaviours (Jensen, Wood, & Wood, 2003). The MBTI has also been shown to be beneficial in assisting staff and faculty in supporting students in their academic and institutional choices, their group work and their overall academic success within a program when researched at the post-secondary level (e.g., Felder & Brent, 2005; Felder, Felder, & Dietz, 2002; Montequín, Fernández, Balsera, & Nieto, 2013; Schaubhut & Thompson, 2008; Shen et al., 2007; Yeung, Read, & Schmid, 2012).

Research Process and Outcomes

A concurrent, transformative, mixed methods research design was used for the analysis of this study. This approach is pragmatic by nature. It supports the integration of a theoretical framework to develop a broader perspective around a topic. It allows for flexibility in the design of the research methods (Creswell, 2008). My research objectives were divided into three research phases to conduct this analysis. These data were analyzed to inform both research process and research outcomes in the three phases (Creswell, 2008).

Phase One. In Phase One, my quantitative outcomes of research question one informed the process of how I conducted my quantitative analysis of research question two. Phase One aimed to:

1. *Identify patterns in learning and information processing for exceptionally bright but academically 'at-risk' students based on their Psychological Type in relation to the general English-Speaking Canadian population*, and
2. *Highlight relationships between the common patterns in learning and information processing for exceptionally bright but academically 'at-risk' students and their academic success*.

Quantitative methods of analysis were chosen for Phase One of this study because pattern identification and statistical methods have been used successfully in numerous studies to assess for relationships between MBTI type and academic success (e.g. Kapitány, Kiss, & Kun, 2014; Erdei et al., 2014; O'Brien, Bernold, & Akroyd, 1998). Phase One identified patterns in my data and tested for statistical associations between students' MBTI types and their academic success levels.

Phase Two. In Phase Two, research question three informed my qualitative research outcomes. Phase Two began *to specify types of intervention approaches that may be more beneficial to students who display certain patterns because they learn and process information in different ways*. This phase allowed me to review instructors' perceptions around the prevalent learner preferences of the students enrolled in their Strategies and Skills for Academic Success course. As well as, how the classroom environment and the instructor's teaching style may have influenced students' success levels.

Phase Three. In Phase Three, quantitative methods of analysis informed the practical implications of my study. As a result, Phase Three extended the analysis of research objective three, *to specify types of intervention approaches that may be more beneficial to students who display certain patterns because they learn and process information in different ways*.

In Phase Three, the results of Phase One and Phase Two were not compared directly. Instead, they resided side by side to inform the broader perspective of characteristics of exceptionally bright but academically 'at-risk' university learners at the researched university. This is one of the key strengths of concurrent embedded mixed methods as "it can provide an overall composite assessment of the problem" (Creswell, 2008 p. 214).

Figure five shows a more detailed visual depiction of my concurrent transformative design using a concurrent embedded strategy.

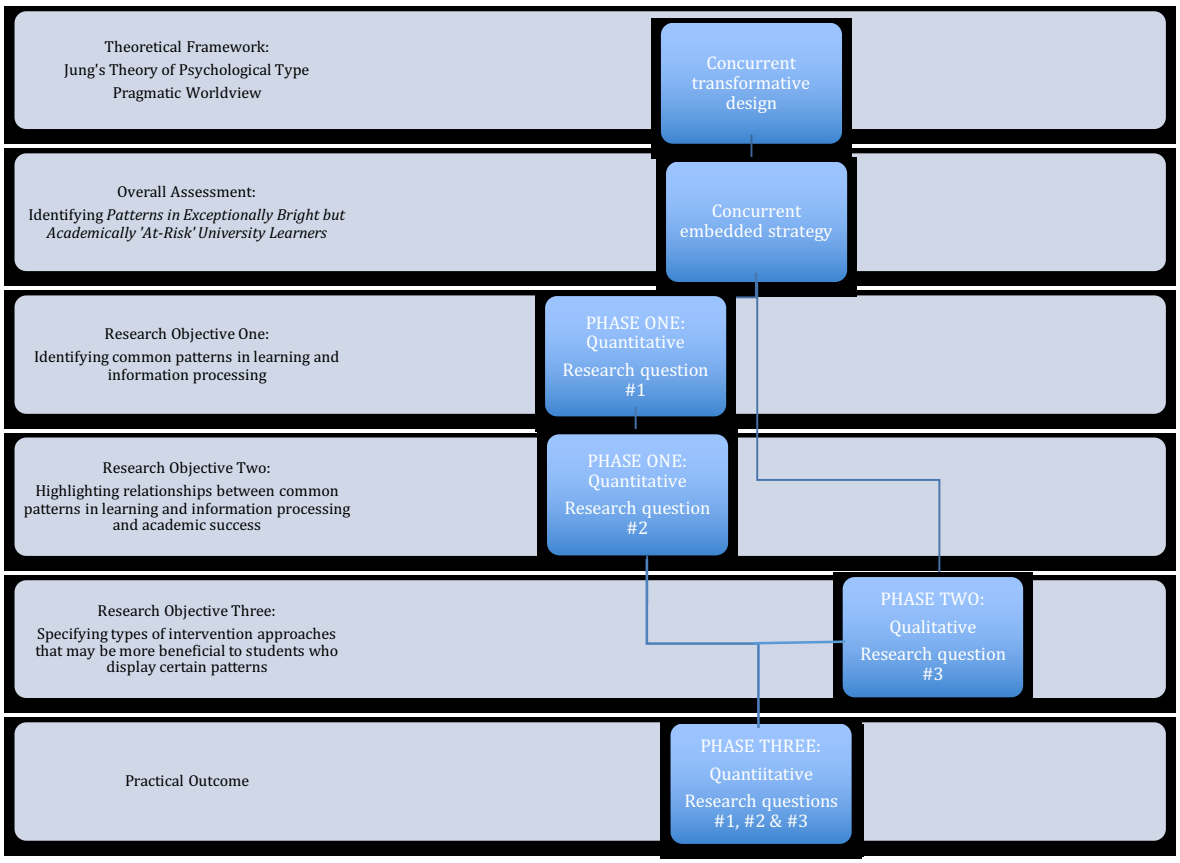

Figure 5: A detailed visual depiction of the concurrent transformative design using a concurrent embedded strategy

Data Collection

As noted in the above section on research processes, my quantitative and qualitative data were collected simultaneously. My quantitative data were originally collected for program evaluation purposes on a 'Foundation Term' between Fall 2011 and Fall 2014 at the researched university. These data were collected by an employee within my central support unit and were given to me in its raw form. It contains record level student data including term grades, student standing (e.g., conditional) and students

MBTI type (e.g. ENFP). The data sets were de-identified by the data analyst within my central support unit as per my data sharing agreement. To complete this de-identification, the student ID's, gender and other identifying demographic information were stripped from the data sets and were replaced by pseudo-ID's. This allowed me to manipulate the variables based on the student's pseudo-ID while still maintaining the accuracy of the data.

My qualitative data were originally collected for program evaluation purposes on a 'Foundation Term' in Winter 2015. This data set includes nine semi-structured interviews conducted with advisors and instructors at the researched university. These data were collected by an employee within my central support unit and were given to me in its raw form. Any identifiable demographic information was removed from this data set to secure the anonymity of the respondents and the students within their classes. These interviews were conducted with individuals who work in varying faculties and central support units within the university. A part of each of their roles within the university is to work with the Foundation Term students before, during and after the intervention term. Each participant was sought out via email and asked to participate in an interview on the Foundation Term conducted by an employee within my central support unit. In the email the scope of the interview was defined to participants as one part of a program evaluation strategy for the Foundation Term. The overarching objective of this strategy was to answer the question 'What is the Strategies and Skills for Academic Success course supposed to accomplish (purpose, learning goals, etc.)?'. The goal of this program evaluation was also identified to participants. Specifically, to have identified a common understanding of the learning goals and purpose of the *Strategies*

and Skills for Academic Success course that take into account the situational factors impacting the course and expectations that stakeholders have of the course. Upon the participant accepting the interview request, an interview time was booked and a copy of the interview question guide was given in advance for the participant to review (see Appendix B). The interview questions were developed using Fink's (2003) handbook A Self-Directed Guide to Designing Courses for Significant Learning. This guide was chosen as it speaks to the importance of differentiated instructional strategies to increase learning and information processing and was the recommended method of assessment from the researched universities Centre for Teaching and Learning. The participants were guided through the semi-structured questions sequentially with the interviewer reading each question to the participant. Any clarification on terms or question wording on the question guide was noted by the interviewer. Data were collected within the interview manually using a computer or paper and pen to capture the participant's comments. Upon completion of the data collection each transcript was assigned a pseudonym to protect participant confidentiality.

I acquired the quantitative data sets and qualitative interview transcripts through a data sharing agreement between my place of employment and the University of Windsor.

Data Analysis

A concurrent transformative mixed methods design was used to analyze my data. Quantitative results were analyzed using both descriptive and inferential statistical methods. My qualitative results were analyzed using processes suggested by Creswell (2008). Creswell suggests qualitative analysis should begin by validating the accuracy of the information. This includes reviewing raw data, organizing and preparing the data for

analysis, re-reading through all the data and then beginning to code the data. The next step is identifying and documenting themes and descriptions. Finally, themes and descriptions should be interpreted. As noted in the above section on research processes, my quantitative and qualitative data were simultaneously analyzed.

Quantitative analysis was conducted using a quasi-experimental time series design (Creswell, 2008). I calculated and analyzed each student's term grade point average and student standing before, during and after their participation in the Foundation Term in relation to their MBTI self-assessment tool results (see figure six).

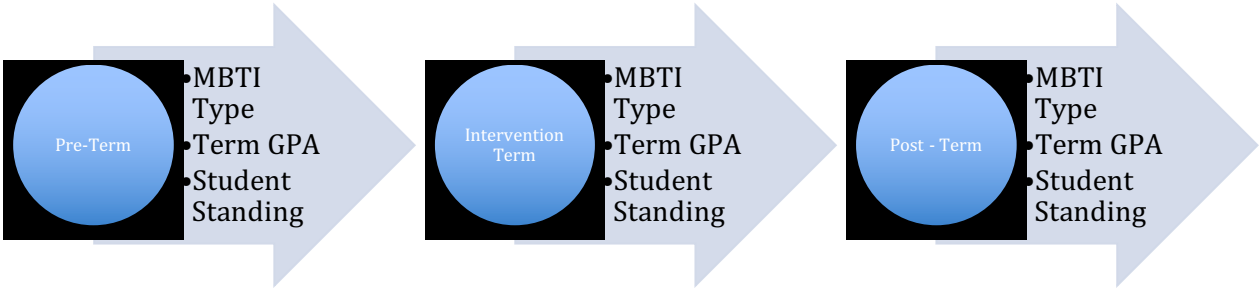

Figure 6: Quantitative analysis was conducted using a Quasi-experimental time series design

The data collected from the MBTI self-assessment tool (Form M) was analyzed both at the type (eg., ENFP) and preference level (eg., N). Tests for statistical associations and direct effect between these variables and a student's level of academic success before, during and after their completion of the Foundation Term were conducted as noted in table one. Based on the discipline the student was enrolled, a control variable was utilized to re-test both type and preference level data in relation to academic success levels as noted in table one. The Statistical Package for the Social Sciences (SPSS)

software package, version 22 was used to investigate the relationships between the dependent and independent variables.

Analysis	Normal Population		Sample Population	Potential Tests to Apply
MBTI Type	Canadian English Speaking MBTI Types		MBTI Types of Students in Strategies and Skills for Academic Success course	Binomial Distribution
MBTI Type	Canadian English Speaking MBTI Types		MBTI Types of Students in Strategies and Skills for Academic Success course Control: Discipline of Study (e.g., Engineering)	Chi-Square
Analysis	**Independent Variable(s)**		**Dependent Variable**	**Potential Tests to Apply**
MBTI type in relation to term GPA and student standing	MBTI Type (e.g., ENFP)		Student term averages (e.g., After the Foundation Term)	Kruskal-Wallis H
MBTI preference in relation to term GPA and student standing	MBTI preference (e.g., P)		Student term averages (e.g., After the Foundation Term) OR Student Standing (e.g., remains a student)	Mann-Whitney U
MBTI type in relation to term GPA and student standing- controlling for discipline of study	MBTI Type (e.g., ENFP) Control: Discipline of Study (e.g., Engineering)		Student term averages (e.g., After the Foundation Term) OR Student Standing (e.g., remains a student)	Chi-Square
MBTI type or preference AND Grade in Strategies and Skills for Academic Success course in relation to student standing	MBTI preference MBTI type	Grade in Strategies and Skills for Academic Success course	Student Standing (e.g., remains a student)	Binary Logistic Regression

Table 1: Statistical tests used to analyze the data sets

My qualitative analysis was guided by an approach presented by Creswell (2008). After validating the accuracy of the transcripts, I began by organizing my data into separate spreadsheets using Microsoft Excel. I then read through all the transcripts once

without completing any analysis to gain an overall sense of the information. Next, I began to code my data by applying highlighted fields to ideas within the transcripts and copying these fields into different cells within the spreadsheet. Each code was given its own cell within its own column on

the excel spreadsheet. I then summarized similar codes into an overarching code. These overarching codes were included in the first column of the spreadsheet. Each was given its own row. These overarching codes were used to anchor similar codes within the spreadsheet. I then ordered the other codes to fit within the overarching codes row (see figure seven for a practical example).

	Program fit			Program didn't meet their expecations (didn't like classes)
	Health issues			External circumstances (e.g. health, death in family).
	Not bad, but not quite good enough			Didn't fail their courses but average isn't high enough to be in good standing.
Is UNIV the right fit?	Didn't ask for help or petition.			Not seeking help or not petitioning

Figure 7: An example of qualitative coding processes within Excel

I then begin to analyze these overarching codes and sort them into common themes in a second Microsoft Excel spreadsheet. Beside each theme, I wrote a brief description to ensure the meaning of the theme was not misinterpreted. Based on my pragmatic world view, my theoretical understanding of how learning occurs and my beliefs around how Jung's Theory of Psychological Type influences our learning processes, I then began to relate and describe the data into general themes. Finally, I interpreted the meaning of these general themes and created descriptions (see figure eight).

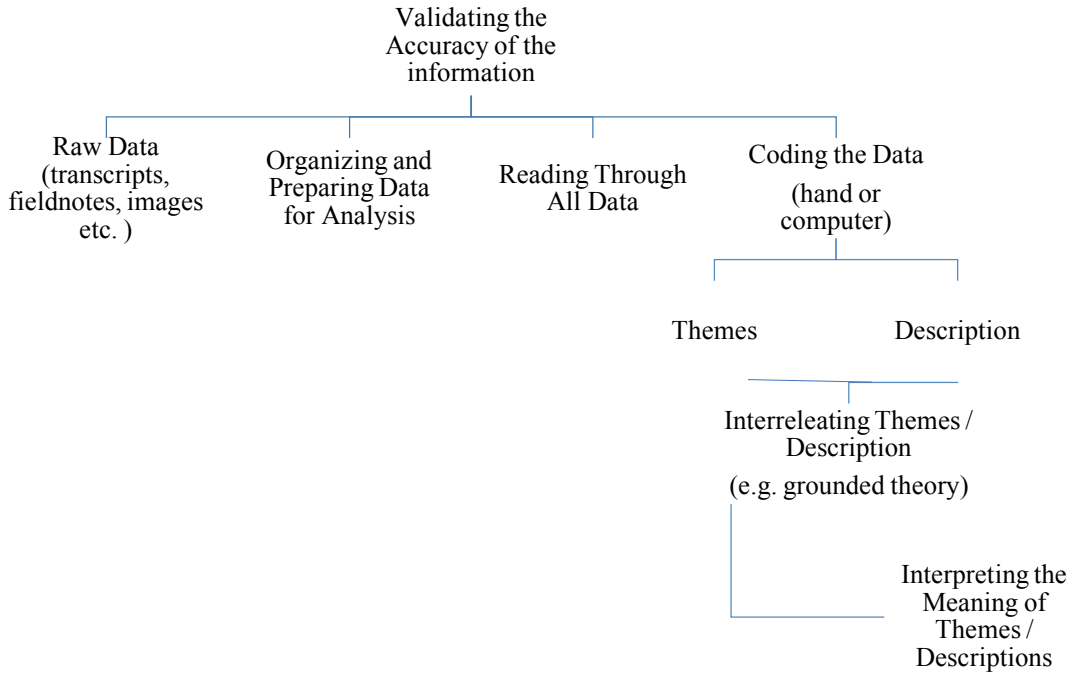

Figure 8: A procedural overview of "Data Analysis in Qualitative Research" (Creswell, 2011 pg. 185).

Upon completion of my quantitative and qualitative analysis I embedded my quantitative data into my qualitative data by using the overarching themes from my qualitative analysis to create the headings of the model as noted in figure eight. My quantitative analysis around the students MBTI characteristics were then categorized under these 'themes' to provide an extension of the MBTI type model.

Assumptions of the Data

This study is based on the assumptions that students who have been identified to be a part of the Strategies and Skills class are academically 'at-risk' of failure and have freely chosen to enter into this intervention. My analysis was conducted with the use of secondary data, therefore, it is my assumption that these data were collected fairly from

the students, instructors and advisors and entered correctly and coded impartially. Similarly, the study was conducted with an assumption that different intervention approaches produced greater success rates for different exceptionally bright but academically 'at-risk' learners. It is assumed, certain self-assessment tools and the students' Psychological Type identified in those tools were valid and reliable. Thus the assumption was made that these tools provided a more holistic approach to informing intervention strategies for exceptionally bright but academically 'at-risk' post-secondary learners[10].

Limitations of the Data

The secondary data that was analyzed for this study came from a specific retention effort at the researched university. While the data set consisted of over 600 learners, when categorized by discipline (e.g. Engineering Students) the sample sizes become much smaller. Therefore, a generalization of the findings was limited to this specific institution and this specific population of students. Finally, the usefulness of self-assessment tools may have implications for identifying other indicators for exceptionally bright but academically 'at-risk' students but caution should be used in making broad sweeping generalizations based on the site-based results.

[10] Self-assessment tools that identify Psychological Type can help to provide useful information to individuals on 'the why' behind some of their thoughts and actions (Felder, 2010). These tools are heavily used in educational practices; however, some researchers discredit their accuracy citing a lack of empirical studies to support the validity and reliability of the results (Pashler et al., 2008; Riener & Willingham, 2010).

Ethics Considerations

Secondary data sets were used for both the quantitative and qualitative analysis in this study as described in the data collection section of this chapter. The data I used for this study was obtained for quality assurance and program evaluation purposes at the university where I am employed. No consent was required at the time of data collection.

The original quantitative data were collected between Fall 2011 and Fall 2014 by populating a database that compiled student marks, surveys, assignments, course evaluations and MBTI self-assessment results from students who were enrolled in the Foundation Term. The original data were collected and analyzed to assess the success rates of this retention program. The MBTI self-assessment tool used within the *Strategies and Skills for Academic Success course* informed students that their responses might be used for research purposes. Due to the large sample size (600+), the anonymity of the students was protected. As well, in light of the above research design and methods there was a very low risk to participants. Finally, all quantitative data were de-identified by a data analyst and names and other identifying traits were removed before I acquired these data.

An employee within my central support unit collected the original qualitative data in the Winter of 2015. To protect the confidentiality of the participants, this individual de-identified the interview transcripts and assigned pseudo names to each participant's transcript data. This means that all participants in this study will remain anonymous to all researchers as well as anyone associated with this research from the University of Windsor.

To conduct my research, a data sharing agreement was completed and approved between the university where the data resides and myself as a University of Windsor researcher. A Research Ethics Board application was completed and approved through the University of Windsor to obtain clearance to work with secondary data that involves human participants.

Summary of Research Design and Methodology

This chapter provided the research design, research setting and population, methods of data collection and analysis and ethical considerations used in this study. The development of this research methodology was guided by the need to provide simple analysis and practical recommendations.

A particular population of underperforming exceptionally bright learners who were enrolled in a Foundation Term between Spring 2011 and Fall 2014 at the researched university were identified. The MBTI standardized self-assessment tool was used to categorize and quantitatively measure student success based on identifiable patterns in Psychological Type. Qualitative data collection and analysis methods were also identified to highlight themes that emerged from the semi-structured interviews conducted with instructors and advisors.

Using a Concurrent Embedded Mixed Methods Design this research study informed two practical outcomes:

1. Identify if academic success or failure in this particular population of students can be predicted based on their Psychological Type (as identified using the MBTI self-assessment tool). This could help to inform pro-active identification of this specific population of ‘at-risk’ students.

2. Highlight the relationship between Psychological Type and academic success in this particular population of students. This could help to inform more customized intervention approaches, as well as, modes of classroom instruction / design at the post-secondary level.

A case study design was identified because it aligned with my opinions around the use of site-based research to produce valid, reliable and replicable results. This approach allowed me to customize the research findings to my specific institution, making the results more tangible and recommendations easier to implement for administrators, staff and students. However, the findings of this study can be used to inform other institutions research processes and approaches to understanding different populations of students on their campuses. As well, recommendations can be used as a starting point for other researchers or practitioners to begin to identify patterns in Psychological Type at their own institution. Finally, findings from this study may be transferable to other institutions, but further research is required to confirm these generalizations upon the completion of this study.

CHAPTER FOUR

Results

The purpose of this study was to explore if there are specific patterns in student preferences based on Psychological Type and how those preferences may correlate with academic success within certain university classrooms. This chapter presents three phases of data analyses and findings. In Phase One, both descriptive and inferential statistics were used. This quantitative analysis categorized, summarized, compared and established whether there were statistically significant differences between the studied groups (e.g., students who identified with Judging versus Perceiving). In Phase Two, semi-structured interviews were conducted to provide a better understanding of the initial quantitative results, and more specifically, the reasons behind why certain students may be more academically successful than their peers after participating in a Foundation Term. In Phase Three, binary logistic regressions were conducted to link Phase One and Phase Two of this study and highlight the potential of a predictive model.

Phase One

Both descriptive and inferential statistics were used in this quantitative phase. Table two highlights these different statistical tests. The purpose of this table is to provide a simplified description to the reader of the quantitative tests used in Phase One of this analysis. Details within the table outline why these tests were used, where they were used, how the results of these tests can be interpreted, and finally, how the results of these tests were used.

Statistical Test		
Binomial Distribution	**Why is this test used?**	Binomial Distributions are used to determine the probability of one of two different outcomes occurring. When testing the sample population, binomial distribution tests the number of 'successes' achieving the normal population based on the number of attempts. This calculates the probability of the outcome occurring.
	Where is this test used?	This test was used to assess each sample population investigated in Research Question #1. *Normal Population:* Psychological Type and Preferences of English Speaking Canadian Population *Sample Population:* Psychological Type and Preferences of Students enrolled in the Foundation Term
	How are the results of this test interpreted?	To interpret the results of the Binomial Distribution the sample population of Foundation Term students' Psychological Type and Preferences were compared to the normal population of Psychological Type and Preferences of English speaking Canadians).
	How are the results of this test used?	The distributions of Psychological Type and Preferences within the normal population were biased. This means there was not an equal chance of achieving the identified outcome. The sample population's number of 'successes' was calculated to assess the probability of the normal population outcome.
Chi-Square	**Why is this test used?**	The Chi-Square test identifies whether there is an association between two nominal or dichotomous variables.
	Where is this test used?	This test was used to assess each sample population by discipline investigated in Research Question #1. *Sample Population:* Psychological Type and Personality Preferences categorized by discipline of study of students enrolled in the Foundation Term.
	How are the results of this test interpreted?	To interpret the results of the Chi-Square test, Foundation Term students' Psychological Type and Preferences were broken down by their discipline of study. The observed count of students' Psychological Type and Preferences were compared to the expected count. Statistical significance was also assessed using this test to indicate whether the visual patterns evident between observed count and expected count were due to chance. Statistically significant results ($p=<0.05$) would suggest that the observed counts differ from the expected counts and that the likelihood of these counts being due to chance was lower than 5%.
	How are the results of this test used?	To assess the association between students Psychological Type and/or Personality Preferences and students' discipline of study while enrolled in the Foundation Term, the expected and observed counts were compared for each group.
Cramer V	**Why is this test used?**	As a follow up to the Chi-Square test, Cramer V tests the strength of the identified association. Therefore, it measures the effect size of the association.
	Where is this test used?	This test was used to assess each sample population by discipline investigated in Research Question #1. *Sample Population:* Psychological Type and Preferences were categorized by discipline of study of students enrolled in the Foundation Term.

	How are the results of this test interpreted?	To interpret the results of the Cramer V test, the identified association between students' Psychological Type and discipline of study is measured on a scale from 0 to +1. An effect size of 0 to .10 suggests a weak strength of the association. An effect size of .11 to .30 suggests a moderate strength of the association. An effect size of .31 to .50 suggests a strong strength of the association.
	How are the results of this test used?	To assess the strength of the association between students Psychological Type and/or Preferences and students' discipline of study while enrolled in the Foundation Term, the size of the differences between the expected and observed counts were compared. The results of Cramer V tell us how strongly the students' discipline of study is associated with the students' Psychological Type and/or Preference.
Post-hoc	**Why is this test used?**	As a follow up to the Chi-Square test and Cramer V, the Post-hoc test identifies the standard residuals (z-scores) of the differences between the observed counts and the expected counts and highlights which specific group or groups produced the statistically significant results.
	Where is this test used?	This test was used to assess each sample population by discipline investigated in Research Question #1. *Sample Population:* Psychological Type and Preferences were categorized by discipline of study of students enrolled in the Foundation Term
	How are the results of this test interpreted?	To interpret the results of the Post-hoc test, the differences between the observed counts and the expected counts between students' Psychological Type and their discipline of study are converted to a z-score and compared to an alpha of 0.05 (+/- 1.96). If the z-score is positive and greater than an alpha of 0.05, the sample population is over-represented. If the z-score is negative and greater than an alpha of 0.05, the sample population is under-represented.
	How are the results of this test used?	The standard residual (z-scores) output is used to assess the specific groups that produced the statistically significant association between students' Psychological Type and/or Preferences and students' discipline of study while enrolled in the Foundation Term.
Test of Normality	**Why is this test used?**	Tests of normality are used to determine whether dependent variables are approximately normally distributed for each group of an independent variable. The use of visual inspection of graphs and a numerical test for normality allows you to get a "feel" for the data's distribution. The Shapiro-Wilk's test for normality is a common numerical method to assess normal distribution.
	Where is this test used?	A: This test was used to assess each continuous dependent variable used in Research Question #2. *Independent variable:* Personality Preference Pairs (e.g. Judging versus Perceiving) *Dependent variable:* Student term averages (e.g., After the Foundation Term)

		B: This test was used to assess the continuous dependent variables used in the quantitative analysis for 'Linking Results from Research #1, Research #2, and Research #3 Together.' *Independent variable:* Persistence at University (Students continue in their degree after the Foundation Term / persist to graduation versus no longer are registered at the University) *Dependent variable:* Student's grades in the Strategies and Skills for Academic Success course during the Foundation Term
	How are the results of this test interpreted?	A: To interpret the results of the Shapiro-Wilk's test for normality, students' term averages were compared based on Personality Preference to determine whether the data were normally distributed. Testing the null hypothesis, which assumes normality for each distribution of the student's term averages, completed this interpretation. Therefore, statistically significant results ($p=<0.05$) would suggest that the patterns evident in each distribution are normally distributed.
		B: To interpret the results of the Shapiro-Wilk's test for normality, students' grades in the Strategies and Skills for Academic Success course were compared based on their persistence at university to determine whether the data were normally distributed. Testing the null hypothesis, which assumes normality for each distribution of the students' term averages, completed this interpretation. Therefore, statistically significant results ($p=<0.05$) would suggest that the patterns evident in each distribution are normally distributed.
	How are the results of this test used?	A: The students' term averages were not normally distributed for each group of Personality Preference pairs. Therefore, non-parametric tests were used for all follow up statistical tests.
		B: The students' grades in the Strategies and Skills for Academic Success course were normally distributed for both students who continued in their degree after the Foundation Term / persist to graduation and students who were no longer registered at the university. Therefore parametric tests were used for all follow up statistical tests.
Kruskal-Wallis H	**Why is this test used?**	The Kruskal-Wallis H test is a non parametric alternative to one-way ANOVA. This test is used to determine if there is a statistically significant difference in the dependent variable between more than two groups of an independent variable.
	Where is this test used?	This test was used to determine identifiable patterns in the data set based on students' Psychological Type (e.g., ENFP) in Research #2. *Independent variable:* Psychological Type (e.g., ENFP) *Dependent variable:* Student term averages (e.g., After the Foundation Term)

	How are the results of this test interpreted?	To interpret the results of the Kruskal-Wallis H test, first students' term averages were compared based on their Psychological Type. Comparing the mean ranks of each distribution helped to interpret which group of students had higher term averages based on their Psychological Type. Statistical significance was also assessed using this test to indicate whether the visual patterns evident in each distribution differed from the predicted normal distribution. Statistically significant results (p=<0.05) would suggest that the patterns evident in each distribution differ from what would be expected of the normal distribution and that the likelihood of these patterns being due to chance were under 5%.
	How are the results of this test used?	The distribution of scores for each Personality Type (e.g., ENFP) had a different shape. Therefore, interpretation of the Kruskal-Wallis H test was used to determine whether there were differences in the distributions of student term averages based on Psychological Type.
Mann-Whitney U	**Why is this test used?**	The Mann-Whitney U test is a non-parametric alternative to the independent-samples t-test. This test is used to determine if there is a difference between two groups when the independent variable is dichotomous and the dependent variable is either continuous or ordinal in nature.
	Where is this test used?	This test was used to determine identifiable patterns in the data set based on student's Personality Preferences towards Extraversion versus Introversion; Sensing versus Intuition; Feeling versus Thinking; and, Judging versus Perceiving in Research #2. *Independent variable:* Personality Preference Pairs (e.g. Judging vs. Perceiving) *Dependent variable:* Student term averages (e.g., After the Foundation Term)
	How are the results of this test interpreted?	To interpret the results of the Mann-Whitney U test, students' term averages were first compared based on their Personality Preference (e.g. Judging versus Perceiving). Comparing the mean ranks of each distribution helped to interpret which group of students had higher term averages based on their Personality Preference. Statistical significance was also assessed using this test to indicate whether the visual patterns evident in each distribution differed from the predicted normal distribution. Statistically significant results (p=<0.05) would suggest that the patterns evident in each distribution differ from what would be expected of the normal distribution and that the likelihood of these patterns being due to chance were under 5%.
	How are the results of this test used?	The distribution of scores for each Personality Preference variable (e.g. Judging versus Perceiving) had a different shape. Consequently, interpretation of the Mann-Whitney U test was used to determine whether there were differences in the distributions of student term averages based on Personality Preference.

Table 2: Descriptions of statistical tests used in these analyses

As noted below in table three, the dependent variables for the study were students' averages: before, during and after participation in the Foundation Term. Students' continuation in their university studies / persistence to graduation upon completing the Foundation Term were also measured. Each of these dependent variables were measured using a continuous scale except for students' continuation in their university studies / persistence to graduation which was measured dichotomously.

The independent variables were – Psychological Type (as defined by the MBTI assessment tool)[11], Personality Preference (as defined using the different parings from the MBTI assessment tool), discipline of study during the Foundation Term, and grade in the *Strategies and Skills for Academic Success course* during the Foundation Term. Psychological Type and discipline of study during the Foundation Term were measured categorically. Personality Preferences were measured on a dichotomous scale. Students' grades in the *Strategies and Skills for Academic Success course* during the Foundation Term were measured on a continuous scale.

[11] See Appendix A for a copy of the MBTI tool

Independent Variables	Dependent Variables	Measure
Psychological Type		Categorical
Personality Preference		Dichotomous
Discipline of study during the Foundation Term		Categorical
Grade in Strategies and Skills for Academic Success course during the Foundation Term		Continuous
	Average before participation in Foundation Term	Continuous
	Average during participation in Foundation Term	Continuous
	Average after participation in the Foundation Term	Continuous
	Continuation in university / persistence to graduation	Dichotomous

Table 3: Identification of variables used in these analyses

Some of the data analyses are summarized in tabular forms due to the large scale of variables / data.

Results from the MBTI Self-Assessment Tool

Four hundred and twenty participants completed the MBTI self-assessment tool during their second or third week of the Foundation Term. The self-assessment tool was completed during class time in the Strategies and Skills for Academic Success course and students were asked to submit their results to an electronic drop box. Follow up appointments were completed with each of the students to debrief their preferences towards Psychological Type and Personality Preferences.

Population. Forty-three percent of the population in my data set comes from the Arts discipline; 27% comes from the Science discipline; 25% comes from the Engineering discipline; and 6% comes from the Math discipline. These data points included 178 Arts respondents, 104 Engineering respondents, 112 Science respondents and 25 Math respondents. It should be noted that the small proportion of Math students

occurred because the Foundation Term has only been offered once to this discipline. Gender, ethnicity, socio-economic status etc. were not identified in the data set as discussed in Chapter One.

Research Question #1

When looking for identifiable patterns in the data surrounding students enrolled in the Foundation Term based on Psychological Type, analysis was completed to assess both Psychological Type as a whole, as well as Psychological Type based on a specific Personality Preference.

Patterns based on Psychological Type. Out of 420 students enrolled in a Foundation Term, 29% (n=123) of students identified with either the ENFP type or the ENTP type. In comparison, data collected from Psychometrics Canada suggests 17.1% (n=9988) of English speaking Canadian sample population identified with either ENFP type or ENTP type. Binomial distribution of the above noted Psychological Types suggests that students' preferences towards

ENFP and ENTP differs significantly at p=0.01 from that of the English speaking Canadian population. Similarly, binomial distribution suggests that students' preferences towards ISTJ also differs significantly at p=0.01 from that of the English speaking Canadian population. All other Psychological Types do not differ between the observed value and the expected value as noted in table four.

* There is a statistically significant difference between the observed value and the expected value for this Psychological Type at a p value of <.01

Type	Foundation Term %	Canadian Population %
ENFP	19%*	9.6%
ENTP	10%*	7.5%
INTP	8%	5.7%
ISFJ	8%	6.2%
ISTJ	7%*	14.8%
INFP	6%	5.7%
ESFJ	6%	6.4%
ESTJ	6%	11.4%
INTJ	5%	4.4%
ESFP	5%	4.9%
INFJ	4%	2.8%
ENTJ	4%	5.8%
ESTP	4%	2.2%
ISTP	4%	5.0%
ISFP	3%	3.6%
ENFJ	3%	4.1%

Table 4: Comparison of Psychological Type of students enrolled in the Foundation Term versus a sample of the English speaking Canadian population (Myers-Briggs Type Indicator ® (MBTI®) Instrument in French and English Canada., 2008).

Patterns based on Personality Preference. When breaking down students' Psychological Types down by a specific Personality Preference, there are different trends that emerged from the data.

Extraversion versus Introversion. As a whole, 56% of students identified with E type preferences and 44% of students identified with I type preferences. Data collected from Psychometrics Canada suggests that 51.9% of the English speaking Canadian population identified with E type preferences and 49.1% identified with I type preferences (2008). Binomial distribution using the above noted population distribution suggested that students' preferences towards Extraversion or Introversion did not differ significantly than that of the English speaking Canadian population. Therefore, there is no statistical difference in Foundation Term students' Personality Preferences towards Extraversion or Introversion in comparison to the overall English speaking Canadian population.

From the students who were enrolled in the Foundation Term, 49% of students who identified with Extraversion came from the Arts discipline, 28% came from Science, 16% came from Engineering, and 7% came from Math. Conversely, 36% of students who identified with Introversion came from Engineering, 34% came from Arts, 26% came from Science, and 4% came from Math.

When we break down students' preferences by discipline, additional trends emerged. Within the discipline, 68% of Math students identified with Extroversion type preferences, 64% of Arts students, 57% of Science students and 37% of Engineering students. Conversely, 63% of Engineering students identified with Introversion type preferences; 43% of Science students, 36% of Arts students, and 32% of Math students also identified with this type.

Upon the completion of a Chi-Square analysis on the Foundation Term data set, the above observed differences were statistically significant at a p value of <.01. Therefore, when sorting Foundation Term students' preferences towards Extraversion or Introversion by discipline, there are identifiable patterns in the observed data that differ from what would be expected if the data were normally distributed. This means there is an association between students' preferences towards extraversion or introversion and their discipline within the Foundation Term. When reviewing the Cramer V output from SPSS, the strength of this association is moderate at .230.

Post-hoc analysis revealed that it is Engineering students' preferences that differ from the expected data and what should be the predicted proportions of the population. Engineering students who identified with Extraversion were *under-represented* in the actual sample compared to the expected frequency at -2.6 or an alpha of 0.01. Similarly,

Engineering students who identified with Introversion were *over-represented* in the actual sample compared to the expected frequency at 2.9 or an alpha of 0.01.

Sensing versus Intuition. As a whole, 41% of students identified with S type preferences and 59% of students identified with N type preferences. Data collected from Psychometrics Canada suggested that 54.5% of the English speaking Canadian population identifies with S type preferences and 45.5% identifies with N type preferences (2008). Binomial distribution using the above noted population distribution suggested that students' preferences towards Sensing or Intuition differed significantly at p=0.01 from that of the English speaking Canadian population. Therefore, Foundation Term students' preferences towards Sensing or Intuition, differ from the overall English speaking Canadian population.

From the students who were enrolled in the Foundation Term, 43% of students who identified with Sensing in the data set came from the Arts discipline, 29% came from Science, 23% came from Engineering, and 5% came from Math. Conversely, 41% of students who identified with Intuition in the data set came from Arts, 26% of students came from Engineering, 26% came from Science, and 7% came from Math. When we break down these numbers by discipline, additional trends emerged.

By discipline, 44% of Science students, 43% of Arts students, 38% of Engineering students and 32% of Math students identified with Sensing type preferences. Conversely, 68% of Math students, 62% of Engineering students, 57% of Arts students and 56% of Science students identified with Intuition type preferences.

Upon the completion of a Chi-Square analysis of the Foundation Term data set, the above observed differences are not statistically significant at a p value of <.05. Therefore,

when looking at students' preferences towards Sensing or Intuition, there are not identifiable patterns in the observed data that differ from the expected data and what should be the predicted proportions of the population. This means there is no association between students' preferences towards Sensing or Intuition and their discipline within the Foundation Term. The data is distributed as expected across the sample.

Feeling versus Thinking. As a whole, 53% of students identified with Feeling type preferences and 47% of students identified with Thinking type preferences. Data collected from Psychometrics Canada suggested that 56.7% of the English speaking Canadian population identified with Thinking type preferences and 43.3% identified with Feeling type preferences (2008). Binomial distribution using the above noted population distribution suggested that students' preferences towards Feeling or Thinking differed significantly at $p<0.01$ to that of the English speaking Canadian population. Therefore, Foundation Term students' preferences towards Feeling or Thinking differ from the overall English speaking Canadian population.

From the students who were enrolled in the Foundation Term, 51% of students who are Feeling in the data set came from the Arts discipline, 28% came from Science, 15% came from Engineering, and 7% came from Math. Conversely, 36% of students who are Thinking in the data set came from Engineering, 33% came from Arts, 25% came from Science, and 7% came from Math.

When we break down students' preferences by discipline, additional trends emerge. Within the discipline, 64% of Arts students identified with Feeling type preferences; 56% of Science students, 48% of Math students, and only 32% of Engineering students also identified with this type. Conversely, 68% of Engineering

students identified with Thinking type preferences; 52% of Math students, 44% of Science students, and 36% of Arts students also identified with this type.

Upon the completion of a Chi-Square analysis on the Foundation Term data set, the above observed differences are statistically significant at a p value of <.01 suggesting that we can reject the null hypothesis. Therefore, when sorting Foundation Term students' preferences towards Feeling or Thinking by discipline, there are identifiable patterns in the observed data that differ from what would be expected if the data were normally distributed. This means there is an association between students' preferences towards Feeling or Thinking and their discipline within the Foundation Term. When reviewing the Cramer V output from SPSS, the strength of this association is moderately strong at .260.

Post-hoc analysis revealed that both Arts and Engineering students differ from the expected data and what should be the predicted proportions of the population. Post-hoc analysis reveals that Arts students who identified with Thinking were *under-represented* in the actual sample compared to the expected frequency at -2.2 or an alpha of 0.05. Similarly, Arts students who identified with Feeling were *over-represented* in the actual sample compared to the expected frequency at 2.0 or an alpha of 0.05. As well, post-hoc analysis revealed that Engineering students who identified with Feeling were *under-represented* in the actual sample compared to the expected frequency at -3.0 or an alpha of 0.01. Similarly, Engineering students who identified with Thinking were *over-represented* in the actual sample compared to the expected frequency at 3.2 or an alpha of 0.01.

Judging versus Perceiving. As a whole, 42% of students identified with Judging type preferences and 58% of students identified with Perceiving type preferences. Data collected from Psychometrics Canada suggested that 55.9% of the English speaking Canadian population identified with Judging type preferences and 44.1% identified with Perceiving type preferences (2008). Binomial distribution using the above noted population distribution suggests that students' preferences towards Judging or Perceiving differs significantly at $p<0.01$ to that of the English speaking Canadian population. Therefore, Foundation Term students' preferences towards Judging or Perceiving also differ from the overall English speaking Canadian population.

From the students who were enrolled in the Foundation Term, 37% of students who are Judging in the data set came from the Arts discipline, 31% came from Engineering, 26% came from Science, and 6% came from Math. Conversely, 46% of students who are Perceiving in the data set came from Arts, 28% came from Science, 21% of students came from Engineering, and 6% came from Math.

When we break down students' preferences further by discipline, additional trends emerge. Within the discipline 52% of Engineering students identified with Judging type preferences, 44% of Math students, 40% of Science students, and only 36% of Arts students also identified with this type. Conversely, 64% of Arts students identified with Perceiving type preferences, 60% of Science students, 56% of Math students and 48% of Engineering students also identified with this type.

Upon the completion of a Chi-Square analysis of the Foundation Term data set, the above observed differences are not statistically significant at a p value of $<.05$. Therefore, when looking at students' preferences towards Judging or Perceiving, there are not

identifiable patterns in the observed data that differ from the expected data and what should be the predicted proportions of the population. This means there is no association between students' preferences towards Judging or Perceiving and their discipline within the Foundation Term. The data is distributed as expected across the sample.

Summary of Initial Findings Surrounding Research Question #1

Research question #1 explored the following: *Are their identifiable patterns in the data based on the students' Psychological Type for students enrolled in the Foundation Term intervention strategy? If so, do these patterns vary by their discipline of study?*

Findings identified:

- Statistically significant patterns in students' preferences towards the ENFP, ENTP and ISTJ Psychological Types when comparing the distribution of the English speaking Canadian population to students enrolled in the Foundation Term intervention strategy.
- Statistically significant patterns in students' preferences towards Sensing or Intuition, Feeling or Thinking and Judging or Perceiving when comparing the distribution of the English speaking Canadian population to students enrolled in the Foundation Term intervention strategy.
- Statistically significant patterns were not observed between the Canadian data and the students' preferences towards Extraversion or Introversion.

When sorting Foundation Term students' preferences by discipline, findings identified:

- Statistically significant results within the Arts and Engineering disciplines in the Foundation Term.

- Within Arts, students' preferences towards Feeling were overrepresented.
- Within Engineering, students' preferences towards Introversion and/or Thinking were overrepresented.

- Statistically significant results were not apparent for students' preferences towards Sensing or Intuition and Judging or Perceiving.

A summary of the Foundation Term students' preferences by discipline is noted in table 5.

	Extroversion (E)	**Introversion (I)**
Arts Discipline (AHS – REC, ARTS, ENV)	64%	36%
Engineering	37%	63%
Math	68%	32%
Science (AHS – HLTH,KIN, SCI)	57%	43%
	Sensing (S)	**Intuition (N)**
Arts Discipline (AHS – REC, ARTS, ENV)	43%	57%
Engineering	38%	62%
Math	32%	68%
Science (AHS – HLTH,KIN, SCI)	44%	56%
	Thinking (T)	**Feeling (F)**
Arts Discipline (AHS – REC, ARTS, ENV)	36%	64%
Engineering	68%	32%
Math	52%	48%
Science (AHS – HLTH,KIN, SCI)	44%	56%
	Judging (J)	**Perceiving (P)**
Arts Discipline (AHS – REC, ARTS, ENV)	36%	64%
Engineering	52%	48%
Math	44%	56%
Science (AHS – HLTH,KIN, SCI)	40%	60%

Table 5: A summary of the Foundation Term students' preferences by discipline

Research Question #2

Does the student's Psychological Type relate to his/her level of academic success before, during and after engaging in the Foundation Term?

When exploring the relationship between students' Psychological Type in relation to their academic success, analysis was completed to assess both Psychological Type as a whole, before, during, and after students participated in the Foundation Term, as well as Psychological Type based on preference, before during and after students participated in the Foundation Term.

Patterns based on Psychological Type: Before participation in Foundation Term. A Kruskal-Wallis H test was conducted to determine if there were differences in students' averages before they participated in the Foundation Term between groups that differed by their Psychological Type: the "ENFP" (n = 38), "ENTP" (n = 19), "INTP" (n = 22), "ISFJ" (n = 19), "ISTJ" (n = 21), "INFP" (n = 10), "ESFJ" (n = 10), "ESTJ" (n = 8), "INTJ" (n = 17), "ESFP" (n = 4), "INFJ" (n = 8), "ENTJ" (n = 13), "ESTP" (n = 7), "ISTP" (n = 10), "ISFP" (n = 5), and "ENFJ" (n = 3) groups were analyzed. Distributions of students' averages before they participated in the Foundation Term were not similar for all groups, as assessed by visual inspection of a boxplot. This means the dependent variable does not have similarly shaped distributions for all groups of the independent variable. Therefore, we cannot make inferences about differences in medians between groups. As an alternative, differences in mean ranks were investigated. Students' averages before they participated in the Foundation Term scores included the lowest mean rank, ENFJ (mean rank = 65.67), to the highest mean rank, ISFJ (mean rank = 139.76) based on Psychological Type. However, these differences were not statistically significant, $\chi 2(15) = 15.522$, $p = .415$. A detailed description of all Psychological Types based on ranking is listed in table six.

	Psychological Type	N	Mean Rank
Average before participating in the Foundation Term	ENFP	38	84.13
	ENTP	19	116.13
	INTP	22	122.25
	ISFJ	19	139.76
	ISTJ	21	98.83
	INFP	10	109.80
	ESFJ	10	151.05
	ESTJ	8	102.81
	INTJ	17	70.79
	ESFP	4	68.75
	INFJ	8	129.44
	ENTJ	13	125.38
	ESTP	7	112.50
	ISTP	10	111.75
	ISFP	5	100.80
	ENFJ	3	65.67
	Total	214	

Table 6: Mean rank based on Psychological Type before the Foundation Term versus a sample of the English speaking Canadian population

Patterns based on Personality Preference: Before participation in the Foundation Term. When breaking down students' Psychological Type down by Personality Preference, there are different trends that emerged from the data.

Extraversion versus Introversion. A Mann-Whitney U test was run to determine if there were differences in students' averages before they participated in the Foundation Term between students who identified with Extraversion or Introversion. Distributions of students' averages for students who identified with Extraversion and students who identified with Introversion were not similar, as assessed by visual inspection of the histograms. This means the dependent variable does not have similarly shaped

distributions for both groups of the independent variable. Therefore, we cannot make inferences about differences in medians between groups (see figure nine).

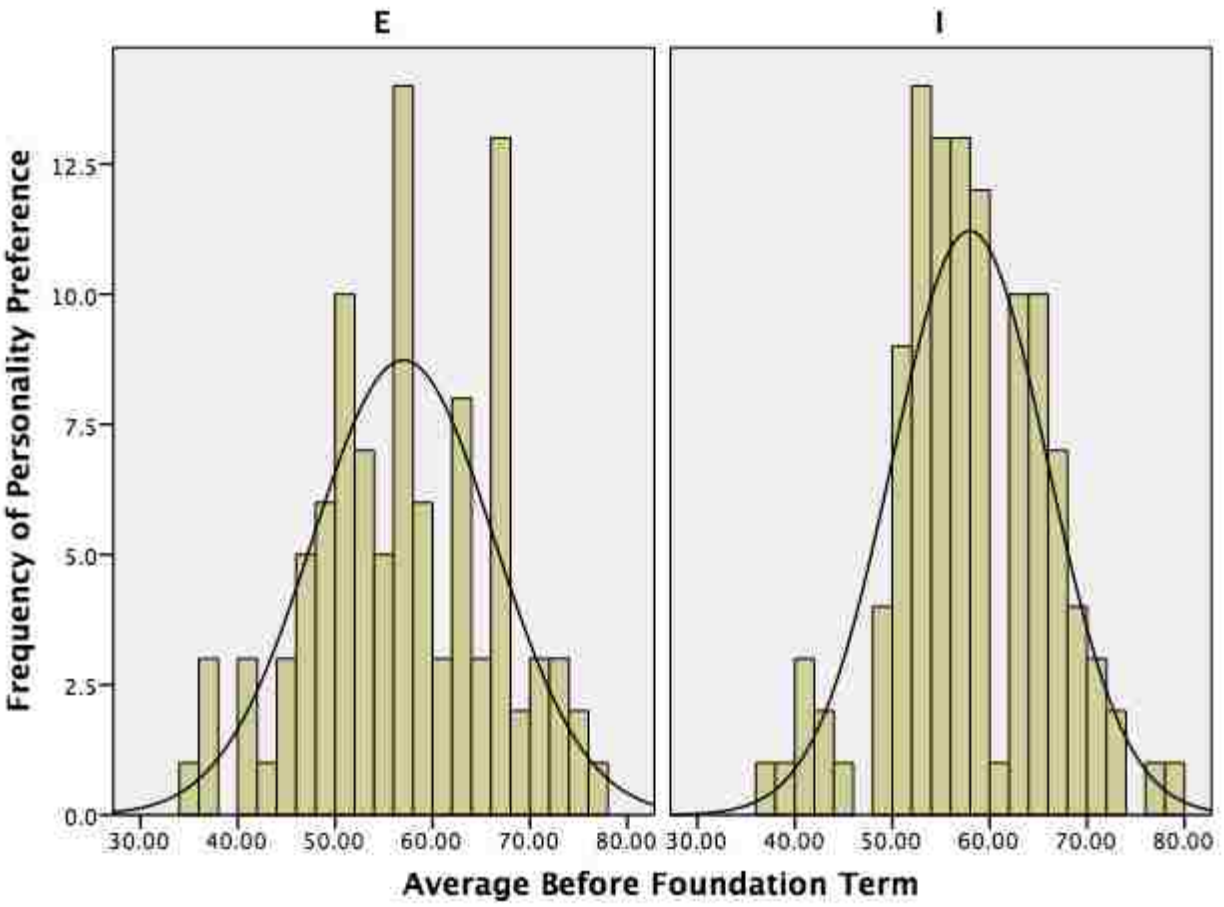

Figure 9: Patterns based on Psychological Type: Average before participation in Foundation Term – Extroversion versus Introversion

Instead, we investigated differences in mean ranks. Before they participated in the Foundation Term, students who identified with Extraversion had averages which produced a mean rank = 94.22. Students who identified with Introversion had averages which produced a mean rank = 91.91. Distribution of the averages between Extraversion

and Introversion were not significantly different statistically, $U = 4156.5$, $z = -.293$, $p = .770$.

Sensing versus Intuition. A Mann-Whitney U test was run to determine if there were differences in student's averages before they participated in the Foundation Term between students who identified with Sensing or Intuition. Distributions of students' averages for students who identified with Sensing and students who identified with Intuition were not similar, as assessed by visual inspection of the histograms. This means the dependent variable does not have similarly shaped distributions for both groups of the independent variable. Therefore, we cannot make inferences about differences in medians between groups (see figure ten).

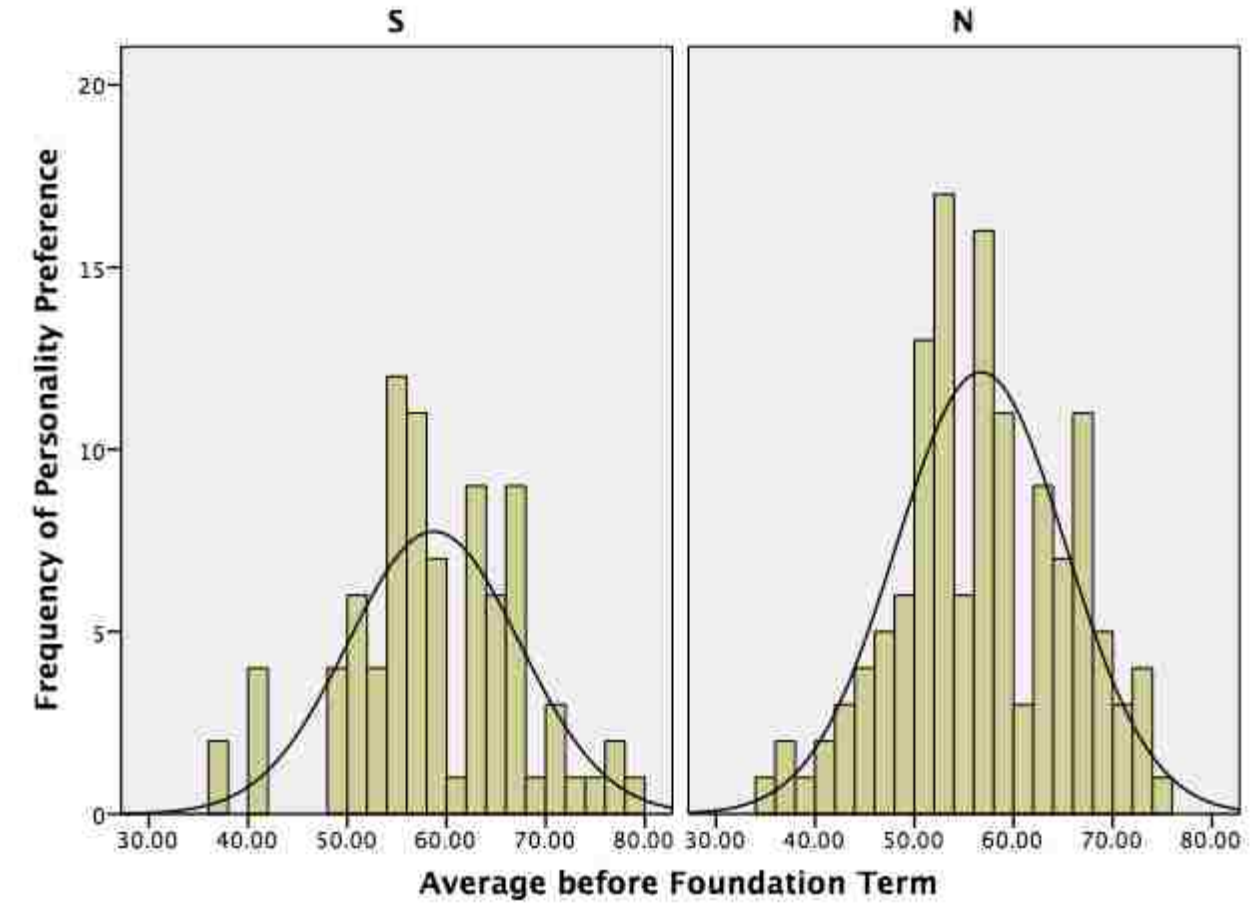

Figure 10: Patterns based on Psychological Type: Average before participation in Foundation Term – Sensing versus Intuition

Instead, we investigated differences in mean ranks. Before they participated in the Foundation Term, students who identified with Sensing had averages which produced a mean rank = 89.44. Students who identified with Intuition, had averages which produced a mean rank = 98.34. Distribution of the averages between Sensing and Intuition were not significantly different statistically, $U = 37127$, $z = -1.107$, $p = .268$.

Feeling versus Thinking. A Mann-Whitney U test was run to determine if there were differences in students' averages before they participated in the Foundation Term

between students who identified with Feeling or Thinking. Distributions of students' averages for students who identified with Feeling and students who identified with Thinking were not similar, as assessed by visual inspection of the histograms. This means the dependent variable does not have similarly shaped distributions for both groups of the independent variable. Therefore, we cannot make inferences about differences in medians between groups (see figure eleven).

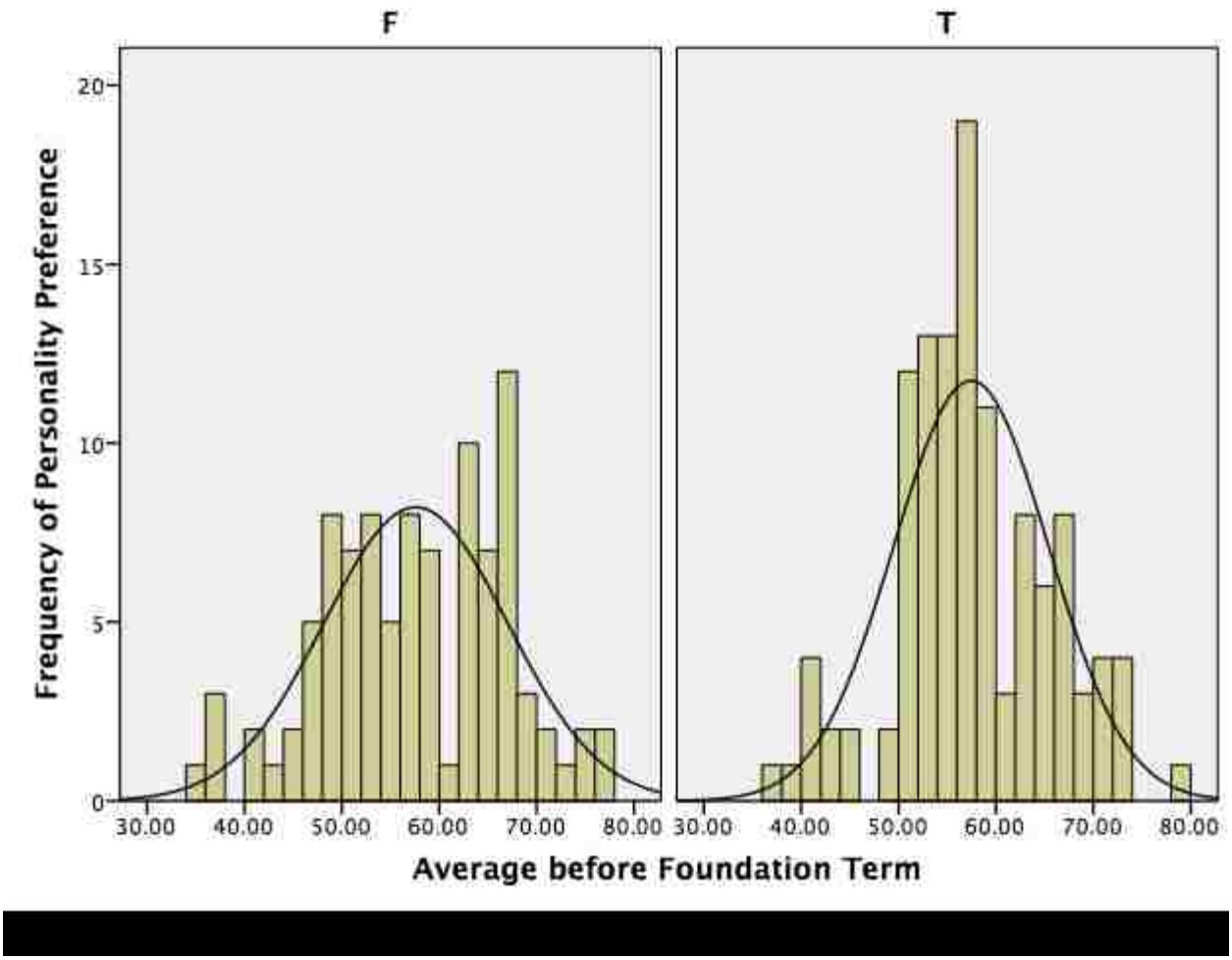

Figure 11: Patterns based on Psychological Type: Average before participation in Foundation Term – Thinking versus Feeling

Instead, we investigated differences in mean ranks. Before they participated in the Foundation Term, students who identified with Feeling had averages which produced a mean rank = 97.93. Students who identified with Thinking had averages which produced a mean rank = 89.08. Distribution of the averages between Feeling and Thinking were not significantly different statistically, $U = 3819$, $z = -1.117$, $p = .264$.

Judging versus Perceiving. A Mann-Whitney U test was run to determine if there were differences in students' averages before they participated in the Foundation Term between students who identified with Judging or Perceiving. Distributions of students' averages for students who identified with Judging and students who identified with Perceiving were not similar, as assessed by visual inspection of the histograms. This means the dependent variable does not have similarly shaped distributions for both groups of the independent variable and therefore we cannot make inferences about differences in medians between groups (see figure twelve).

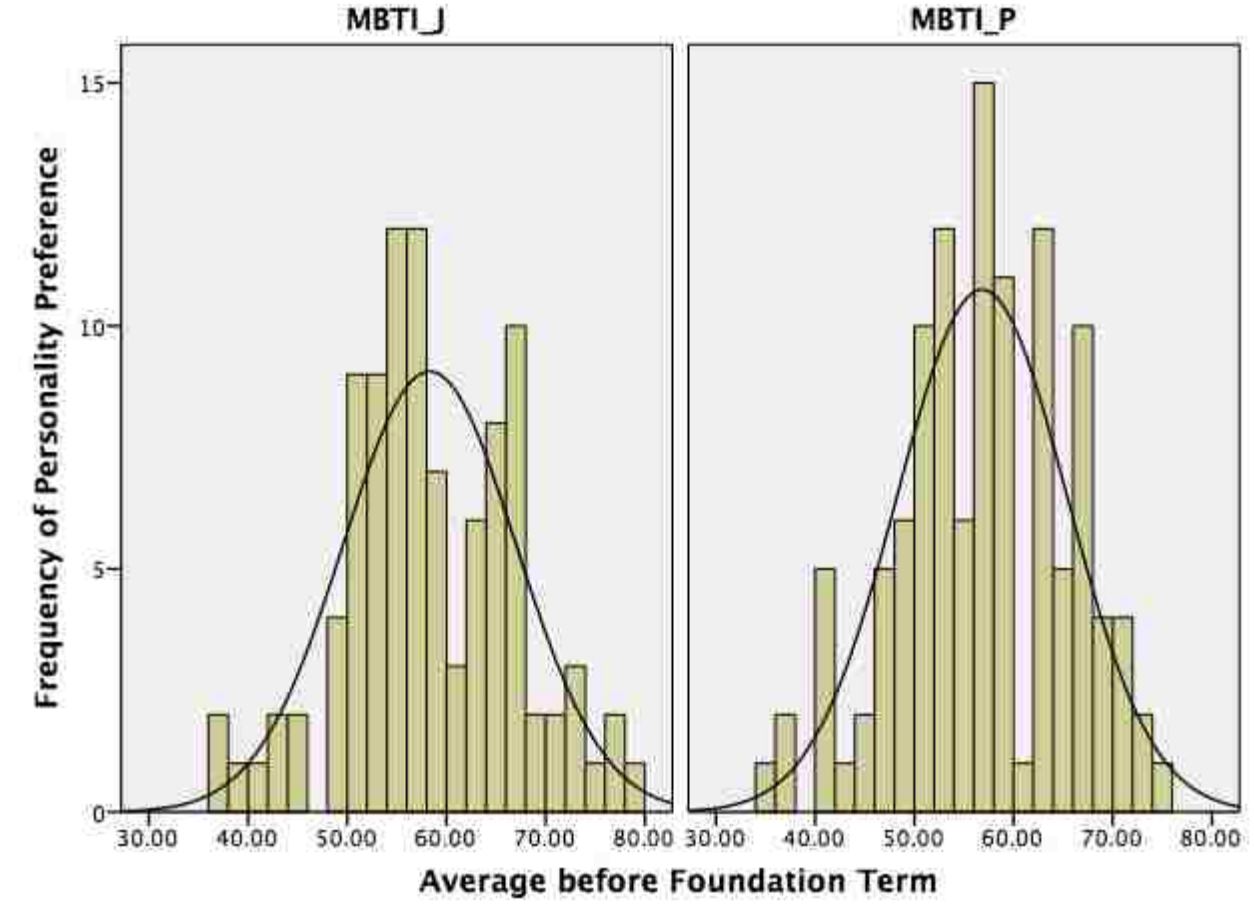

Figure 12: Patterns based on Psychological Type: Average before participation in Foundation Term – Judging versus Perceiving

Instead we investigated differences in mean ranks. Before they participated in the Foundation Term, students who identified with Judging had averages which produced a mean rank = 97.19. Students who identified with Perceiving had averages which produced a mean rank = 89.20. Distribution of the averages between Judging and Perceiving were not significantly different statistically, $U = 3899$, $z = -1.014$, $p = .310$.

Summary of Psychological Type and Personality Preference in relation to Average Before the Foundation Term

Kruskal-Wallis H, and Mann-Whitney U tests were conducted to determine if there were differences in student's averages before they participated in the Foundation Term between Psychological Types, and between Personality Preferences. No statistically significant differences were observed between groups of Psychological Types, or between Personality Preferences. This means there is no direct association between the different Psychological Types or Personality Preferences and higher or lower averages for students before they enrolled in the Foundation Term.

Patterns based on type: During participation in Foundation Term. A Kruskal-Wallis H test was also conducted to determine if there were differences in students averages during their participation in the Foundation Term between groups that differed in their Psychological Type: the "ENFP" (n = 72), "ENTP" (n = 35), "INTP" (n = 33), "ISFJ" (n = 30), "ISTJ" (n = 26), "INFP" (n = 26), "ESFJ" (n = 20), "ESTJ" (n = 20), "INTJ" (n = 21), "ESFP" (n = 17), "INFJ" (n = 16), "ENTJ" (n = 16), "ESTP" (n = 14), "ISTP" (n = 14), "ISFP" (n = 12), and "ENFJ" (n = 11) groups were analyzed. Distributions of students averages before they participated in the Foundation Term were not similar for all groups, as assessed by visual inspection of a boxplot. This means the dependent variable does not have similarly shaped distributions for all groups of the independent variable. Therefore, we cannot make inferences about differences in medians between groups (see figure thirteen).

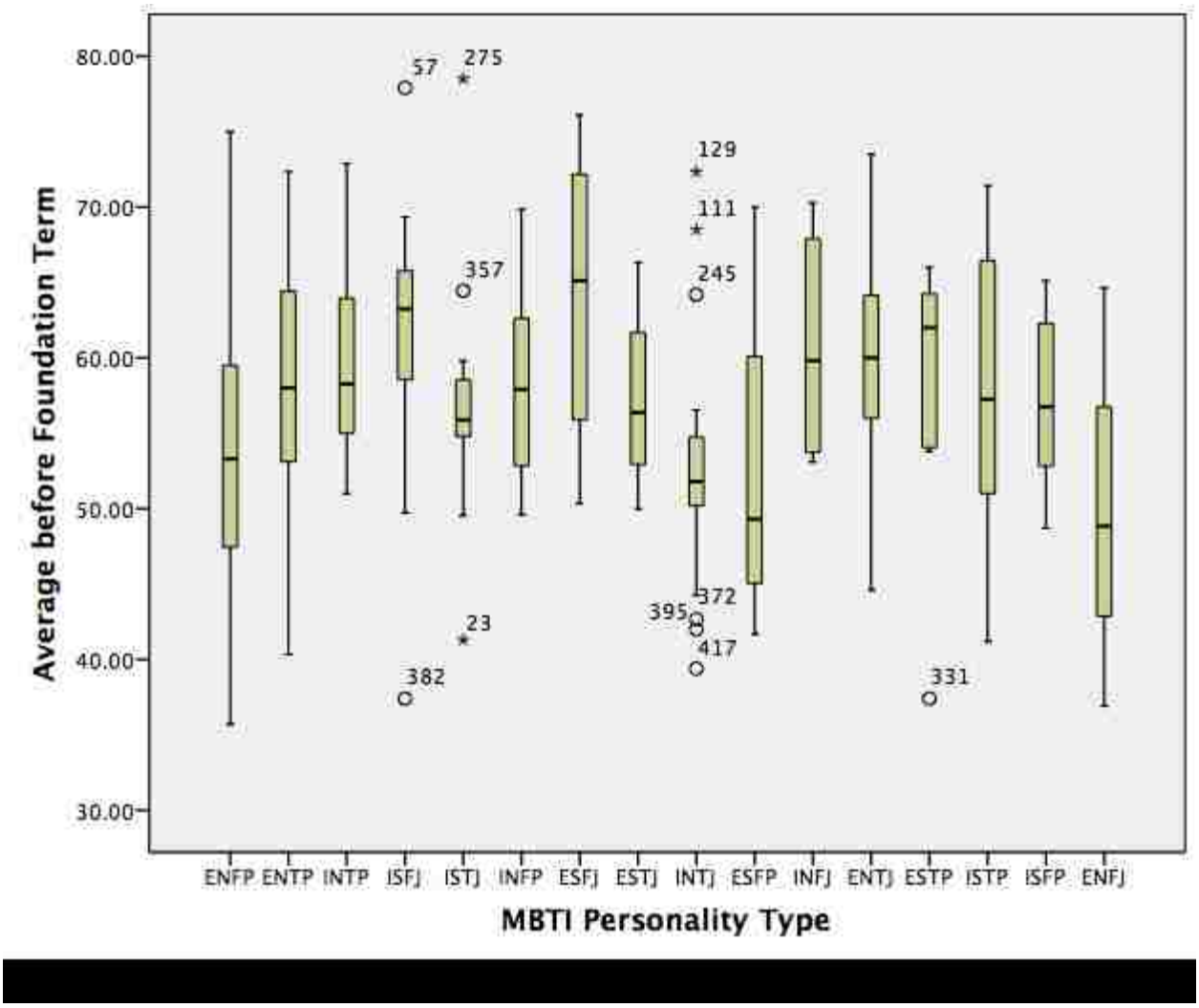

Figure 13: Patterns based on Psychological Type: Average before participation in Foundation Term – MBTI Personality Type

Instead, we investigated differences in mean ranks. Students' average scores during participation in the Foundation Term included from the lowest mean rank, ENFP (mean rank = 161.48), to the highest mean rank, ESFJ (mean rank = 241.13) based on Psychological Type. These differences were statistically significant between groups, $\chi 2(15) = 28.768$, $p = .018$. A detailed description of all Psychological Types based on ranking is listed in table seven.

	Psychological Type	N	Mean Rank
Average during participation in the Foundation Term	ENFP	72	161.48
	ENTP	35	189.11
	INTP	33	200.47
	ISFJ	30	204.15
	ISTJ	26	220.13
	INFP	26	186.92
	ESFJ	20	241.13
	ESTJ	20	205.88
	INTJ	21	216.79
	ESFP	17	167.44
	INFJ	16	226.63
	ENTJ	16	192.53
	ESTP	14	165.07
	ISTP	14	197.25
	ISFP	12	147.38
	ENFJ	11	189.14
	Total	383	

Table 7: Mean rank based on Psychological Type during the Foundation Term

Pairwise comparisons of the different Psychological Types were performed using Dunn's (1964) procedure with a Bonferroni correction for multiple comparisons. Adjusted *p*-values from this post hoc analysis revealed no statistically significant differences between the students' averages during their participation in the Foundation Term and the different groups of Psychological Types. This means that while overall there appears to be statistically significant differences between students' averages during the Foundation Term and their Psychological Type, further analysis reveals there is no direct association between the different Psychological Type groups and a higher or lower average.

Patterns based on Personality Preference: During Participation in the Foundation Term. When breaking down students' Psychological Types down by Personality Preference, there are different trends that emerge from the data.

Extraversion versus Introversion. A Mann-Whitney U test was run to determine if there were differences in students' averages during their participation in the Foundation Term between students who identified with Extraversion or Introversion. Distributions of students' averages for students who identified with Extraversion and students who identified with Introversion were not similar, as assessed by visual inspection of the histograms. This means the dependent variable does not have similarly shaped distributions for both groups of the independent variable. Therefore, we cannot make inferences about differences in medians between groups (see figure fourteen).

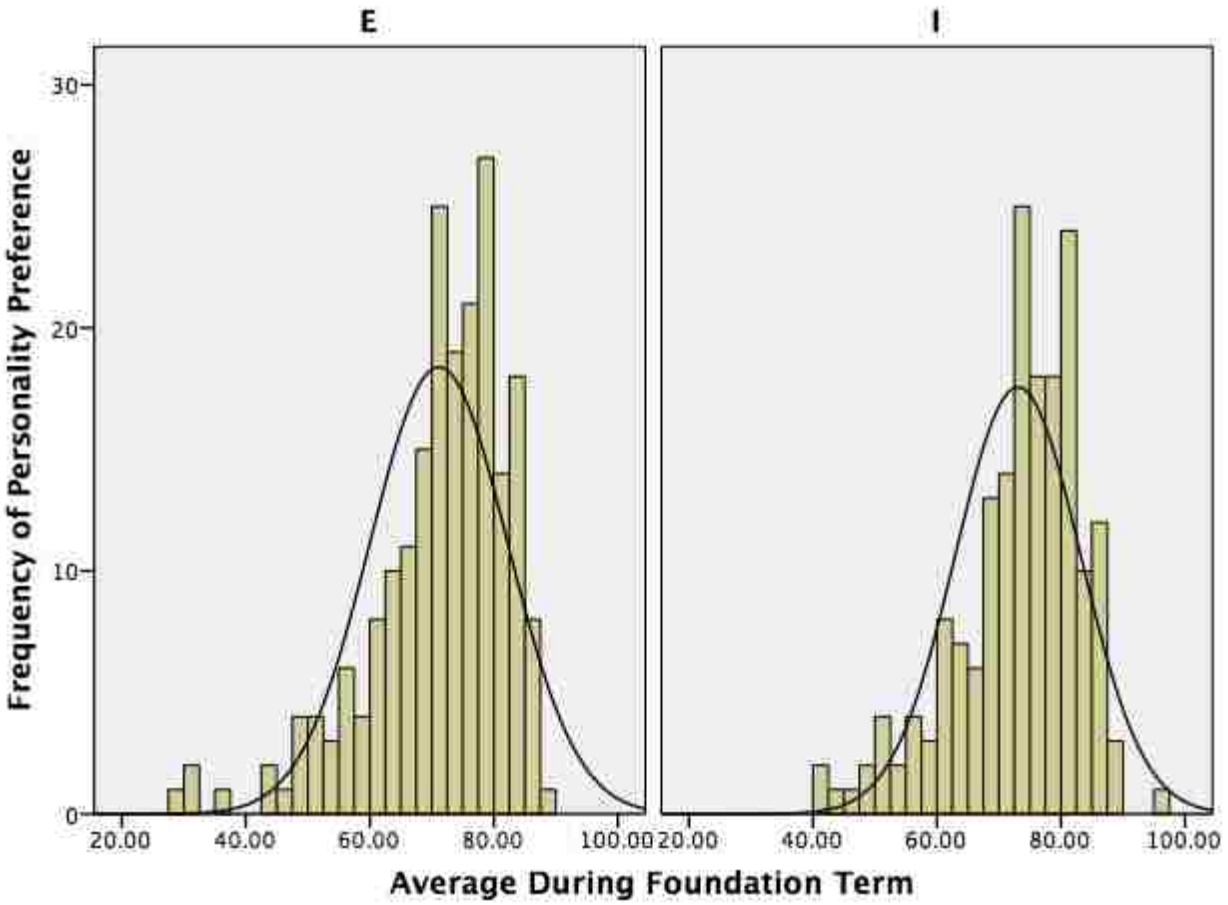

Figure 14: Patterns based on Psychological Type: Average during participation in Foundation Term – Extroversion versus Introversion

Instead we investigated differences in mean ranks. During the Foundation Term, students who identified with Extraversion (mean rank = 82.39) had statistically significant lower averages than students who identified with Introversion (mean rank = 102.42), $U = 5186$, $z = 2.539293$, $p = .011$.

Sensing versus Intuition. A Mann-Whitney U test was run to determine if there were differences in students' averages during their participation in the Foundation Term between students who identified with Sensing or Intuition. Distributions of students'

averages for students who identified with Sensing and students who identified with Intuition were not similar, as assessed by visual inspection of the histograms. This means the dependent variable does not have similarly shaped distributions for both groups of the independent variable. Therefore, we cannot make inferences about differences in medians between groups (see figure fifteen).

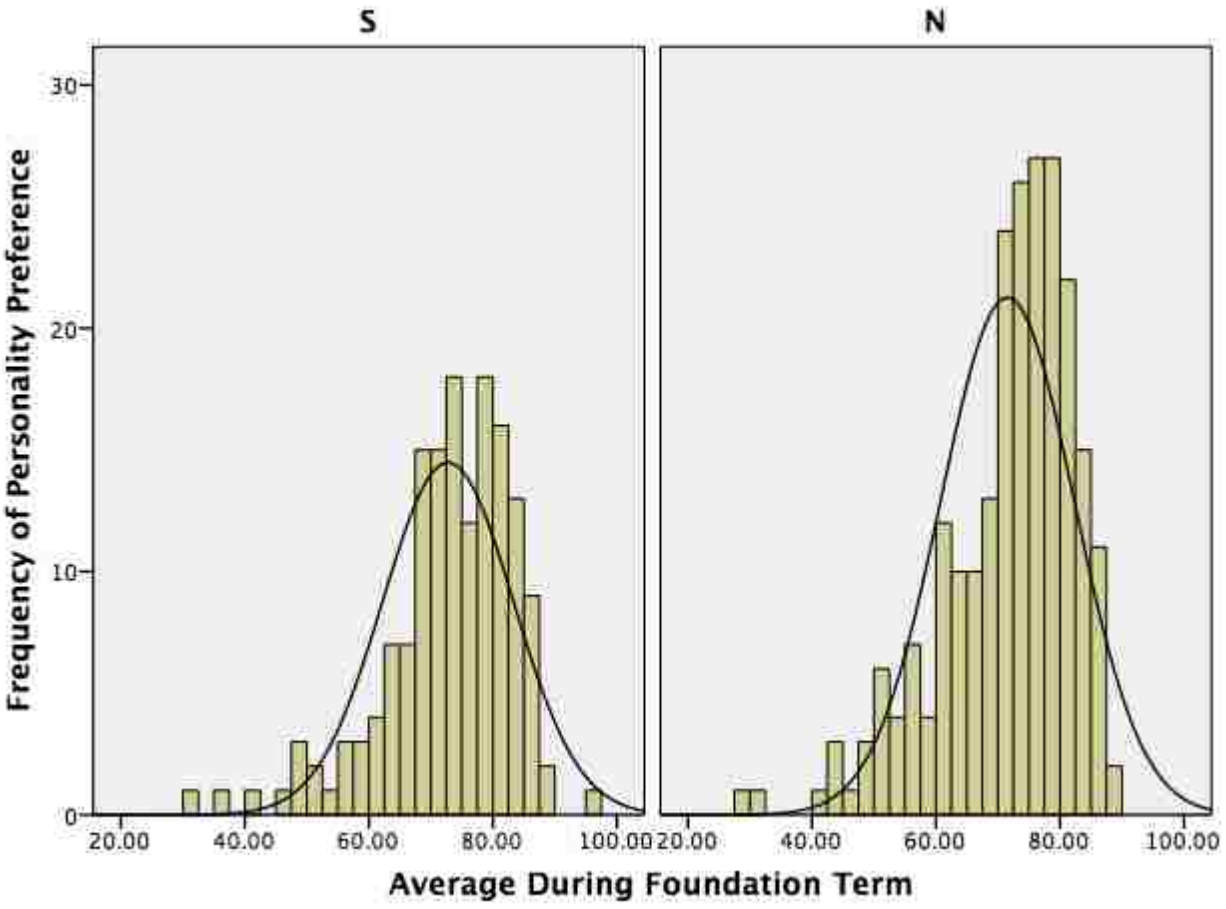

Figure 15: Patterns based on Psychological Type: Average during participation in Foundation Term – Sensing versus Intuition

Instead, we investigated differences in mean ranks. During their participation in the Foundation Term, students who identified with Sensing had averages which produced a mean rank = 92.64. Students who identified with Intuition had averages which produced a mean rank = 93.53. Distribution of the averages between Sensing and Intuition were not significantly different statistically, $U = 4067.5$, $z = -.111$, $p = .912$.

Feeling versus Thinking. A Mann-Whitney U test was run to determine if there were differences in students' averages during their participation in the Foundation Term between students who identified with Feeling or Thinking. Distributions of students' averages for students who identified with Feeling and students who identified with Thinking were not similar, as assessed by visual inspection of the histograms. This means the dependent variable does not have similarly shaped distributions for both groups of the independent variable. Therefore, we cannot make inferences about differences in medians between groups (see figure sixteen).

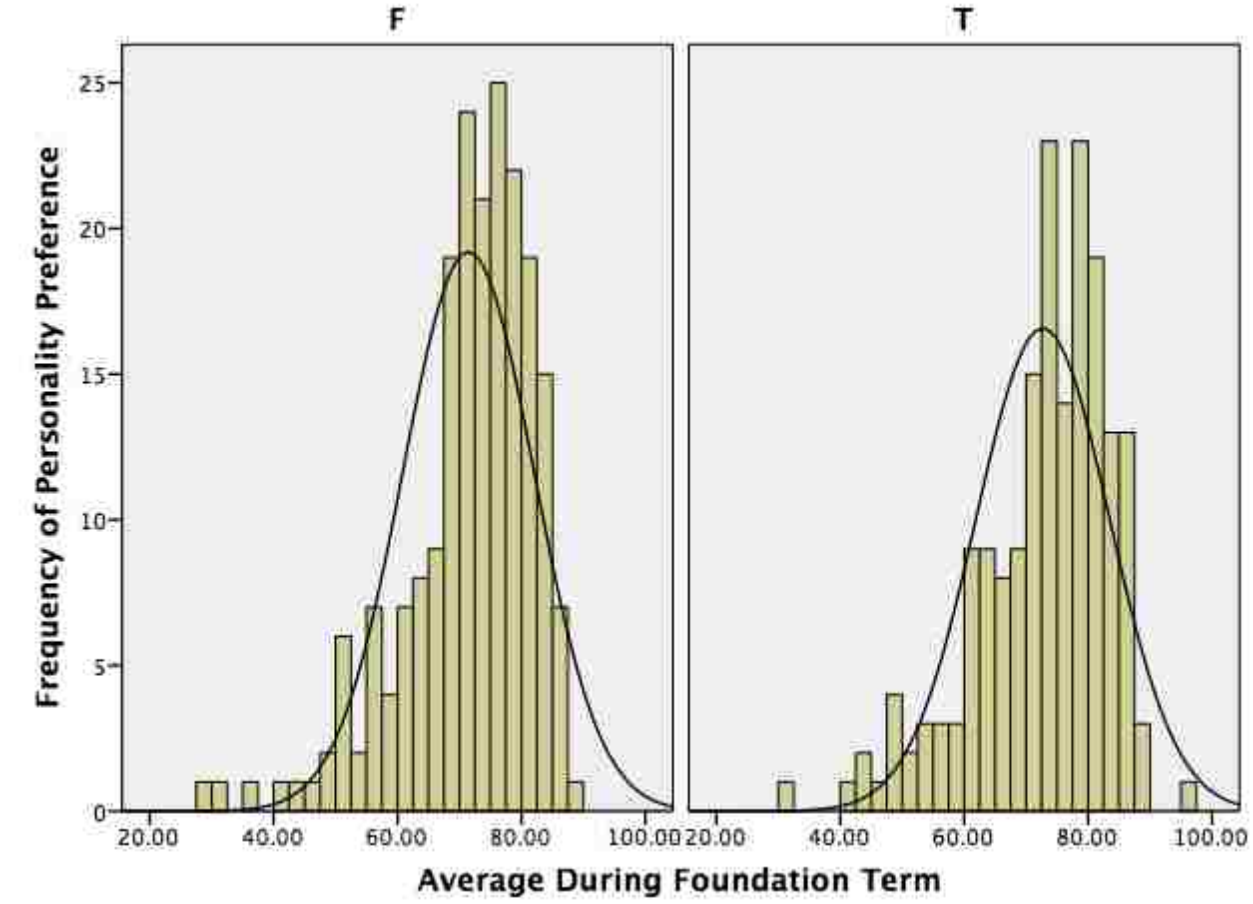

Figure 16: Patterns based on Psychological Type: Average during participation in Foundation Term – Feeling versus Thinking

Instead, we investigated differences in mean ranks. During their participation in the Foundation Term, students who identified with Feeling had averages which produced a mean rank = 85.41. Students who identified with Thinking had averages which produced a mean rank = 99.04. Distribution of the averages between Feeling and Thinking were not significantly different statistically, $U = 4845$, $z = 1.719$, $p = .086$.

Judging versus Perceiving. A Mann-Whitney U test was run to determine if there were differences in students' averages during their participation in the Foundation Term between students who identified with Judging or Perceiving. Distributions of students' averages for students who identified with Judging and students who identified with Perceiving were not similar, as assessed by visual inspection of the histograms. This means the dependent variable does not have similarly shaped distributions for both groups of the independent variable. Therefore, we cannot make inferences about differences in medians between groups (see figure seventeen).

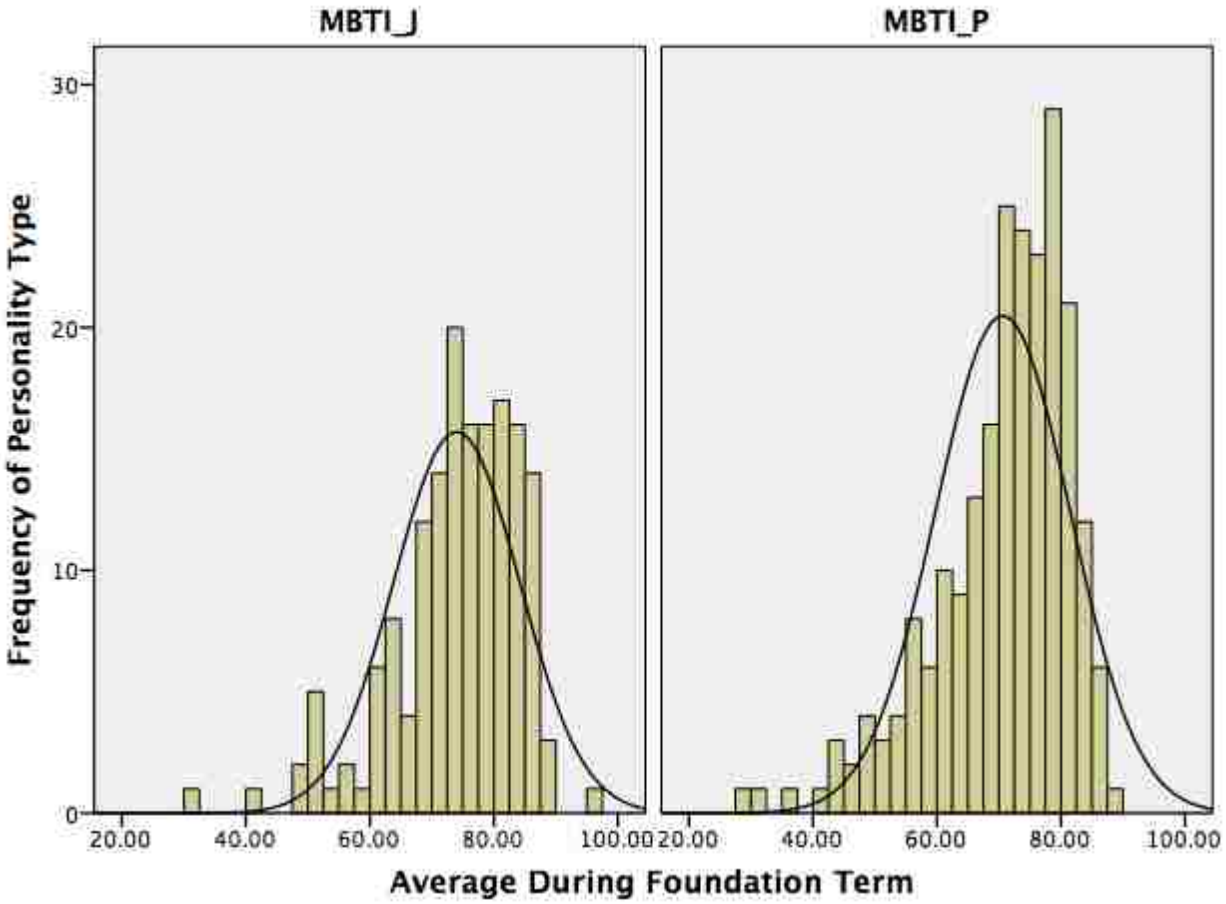

Figure 17: Patterns based on Psychological Type: Average during participation in Foundation Term – Judging versus Perceiving

Instead, we investigated differences in mean ranks. During the Foundation Term, students who identified with Judging (mean rank = 104.74) had statistically significant higher averages than students who identified with Perceiving (mean rank = 82.35), U = 3234.5 z = -2.842, p = .004.

Summary of Psychological Type and Personality Preference in Relation to Average During the Foundation Term

Kruskal-Wallis H, and Mann-Whitney U tests were conducted to determine if there were differences in students' averages during their participation in the Foundation Term between Psychological Types, and between Personality Preferences. Statistically significant differences were observed between groups of Psychological Types; however, no specific groups could be identified as being significantly different during post hoc analysis. Statistically significant differences were also observed between Personality Preferences. During the Foundation Term, students who identified with Extraversion and/or Perceiving had statistically significant lower averages than students who identified with Introversion and/or Judging. This means there is a direct association between the different Psychological Type groups and, more specifically, certain Personality Preferences and higher or lower averages for students during their enrollment in the Foundation Term.

Patterns based on Psychological Type: After participation in Foundation Term. Kruskal-Wallis H test was also conducted to determine if there were differences in students' averages after their participation in the Foundation Term between groups that differed in their Psychological Type: the "ENFP" (n = 65), "ENTP" (n = 37), "INTP" (n = 26), "ISFJ" (n = 29), "ISTJ" (n = 26), "INFP" (n = 22), "ESFJ" (n = 24), "ESTJ" (n = 20), "INTJ" (n = 18), "ESFP" (n = 15), "INFJ" (n = 15), "ENTJ" (n = 15), "ESTP" (n = 13), "ISTP" (n = 14), "ISFP" (n = 9), and "ENFJ" (n = 9) groups were analyzed. Distributions of students' averages before they participated in the Foundation Term were not similar for all groups, as assessed by visual inspection of a boxplot. This means the dependent

variable does not have similarly shaped distributions for all groups of the independent variable. Therefore, we cannot make inferences about differences in medians between groups (see figure eighteen).

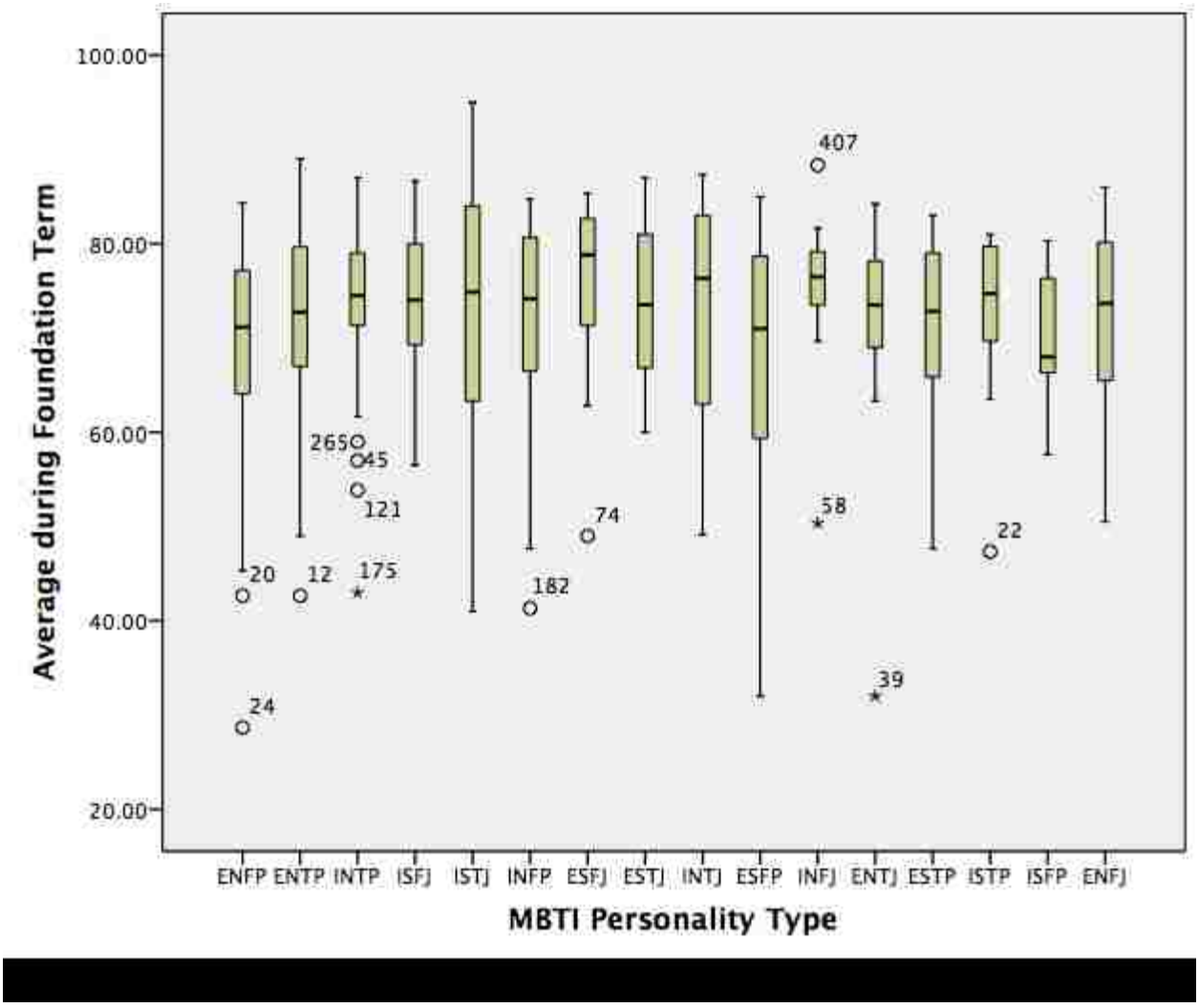

Figure 18: Patterns based on Psychological Type: Average during participation in Foundation Term – MBTI Personality Type

Instead, we investigated differences in mean ranks. Students' averages after they participated in the Foundation Term scores increased from the lowest mean rank, ENFP (mean rank = 145.95), to the highest mean rank, ESFJ (mean rank = 235.35) based on Psychological Type. These differences were statistically significant between groups,

$\chi 2(15) = 25.768$, $p = .041$. A detailed description of all Psychological Types based on ranking is listed in table eight.

	Psychological Type	N	Mean Rank
Average after participation in the Foundation Term	ENFP	65	145.95
	ENTP	37	178.27
	INTP	26	180.48
	ISFJ	29	188.90
	ISTJ	26	197.58
	INFP	22	166.32
	ESFJ	24	235.35
	ESTJ	20	176.18
	INTJ	18	163.42
	ESFP	15	209.10
	INFJ	15	206.83
	ENTJ	15	154.23
	ESTP	13	157.54
	ISTP	14	157.32
	ISFP	9	184.17
	ENFJ	9	253.33
	Total	357	

Table 8: Mean rank based on Psychological Type after the Foundation Term

Pairwise comparisons of the different Psychological Types were performed using Dunn's (1964) procedure with a Bonferroni correction for multiple comparisons. Adjusted *p*-values from this post hoc analysis revealed statistically significant differences between the students' averages after their participation in the Foundation Term for students who identified with ENFP (145.95) and students who identified with ESFJ (235.35) (p=.025). No other statistically significant differences were observed between any other group combinations of Psychological Types. This means that while overall there appears to be statistically significant differences between students' averages after the Foundation Term and their Psychological Type, further analysis reveals the direct

association occurs between the lowest ranked ENFP group and the highest ranked ESFJ group.

Patterns based on Personality Preference: After participation in the Foundation Term. When breaking down students' Psychological Types down by Personality Preference, different trends emerge from the data.

Extraversion versus Introversion. A Mann-Whitney U test was run to determine if there were differences in students' averages after their participation in the Foundation Term between students who identified with Extraversion or Introversion. Distributions of students' averages for students who identified with Extraversion and students who identified with Introversion were not similar, as assessed by visual inspection of the histograms. This means the dependent variable does not have similarly shaped distributions for both groups of the independent variable. Therefore, we cannot make inferences about differences in medians between groups (see figure nineteen).

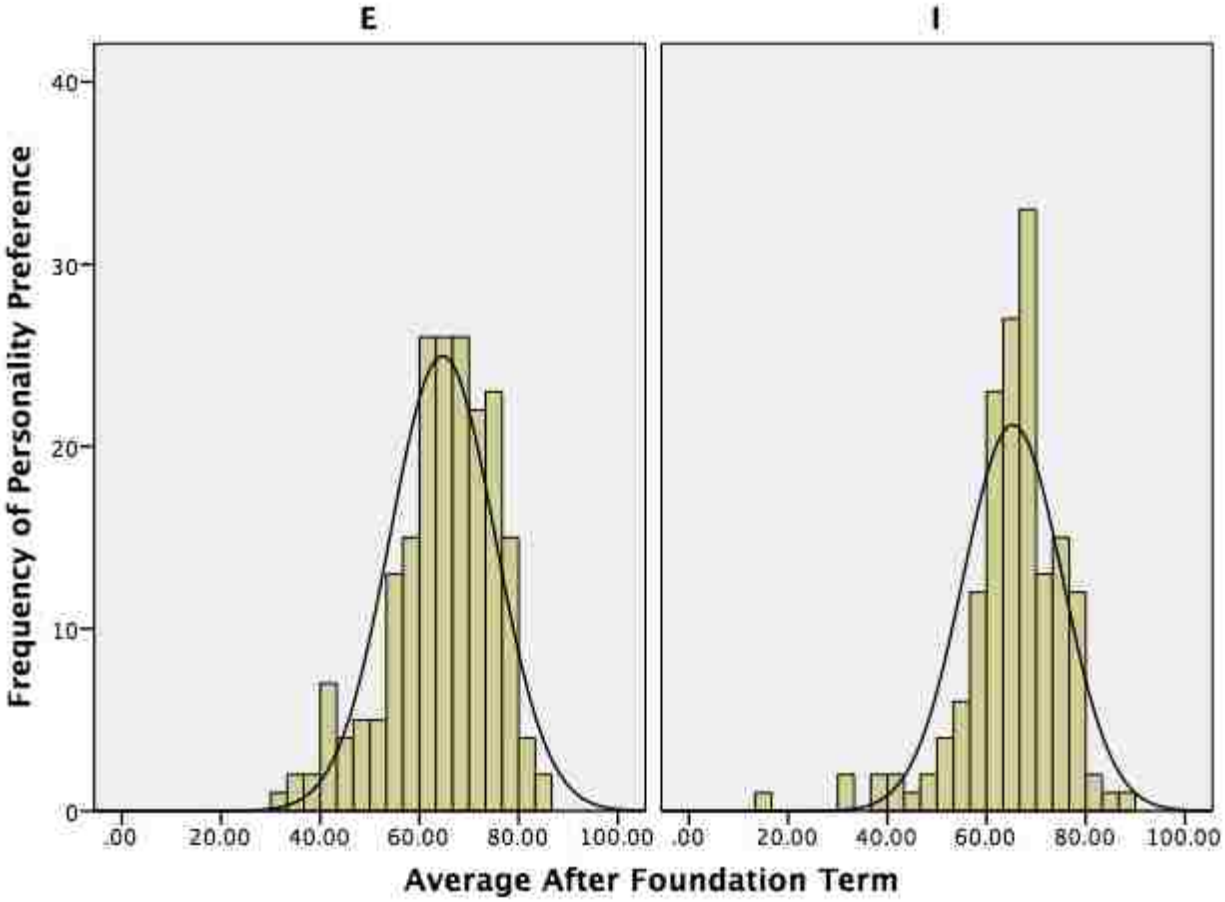

Figure 19*:* Patterns based on Psychological Type: Average after participation in Foundation Term – Extraversion versus Introversion

Instead, we investigated differences in mean ranks. After their participation in the Foundation Term, students who identified with Extraversion had averages which produced a mean rank = 85.48. Students who identified with Introversion had averages which produced a mean rank = 99.67. Distribution of the averages between Extraversion and Introversion were not significantly different statistically, $U = 4917$, $z = 1.799$, $p = .072$.

Sensing versus Intuition. A Mann-Whitney U test was run to determine if there were differences in students' averages after their participation in the Foundation Term between students who identified with Sensing or Intuition. Distributions of students' averages for students who identified with Sensing and students who identified with Intuition were not similar, as assessed by visual inspection of the histograms. This means the dependent variable does not have similarly shaped distributions for both groups of the independent variable. Therefore, we cannot make inferences about differences in medians between groups (see figure twenty).

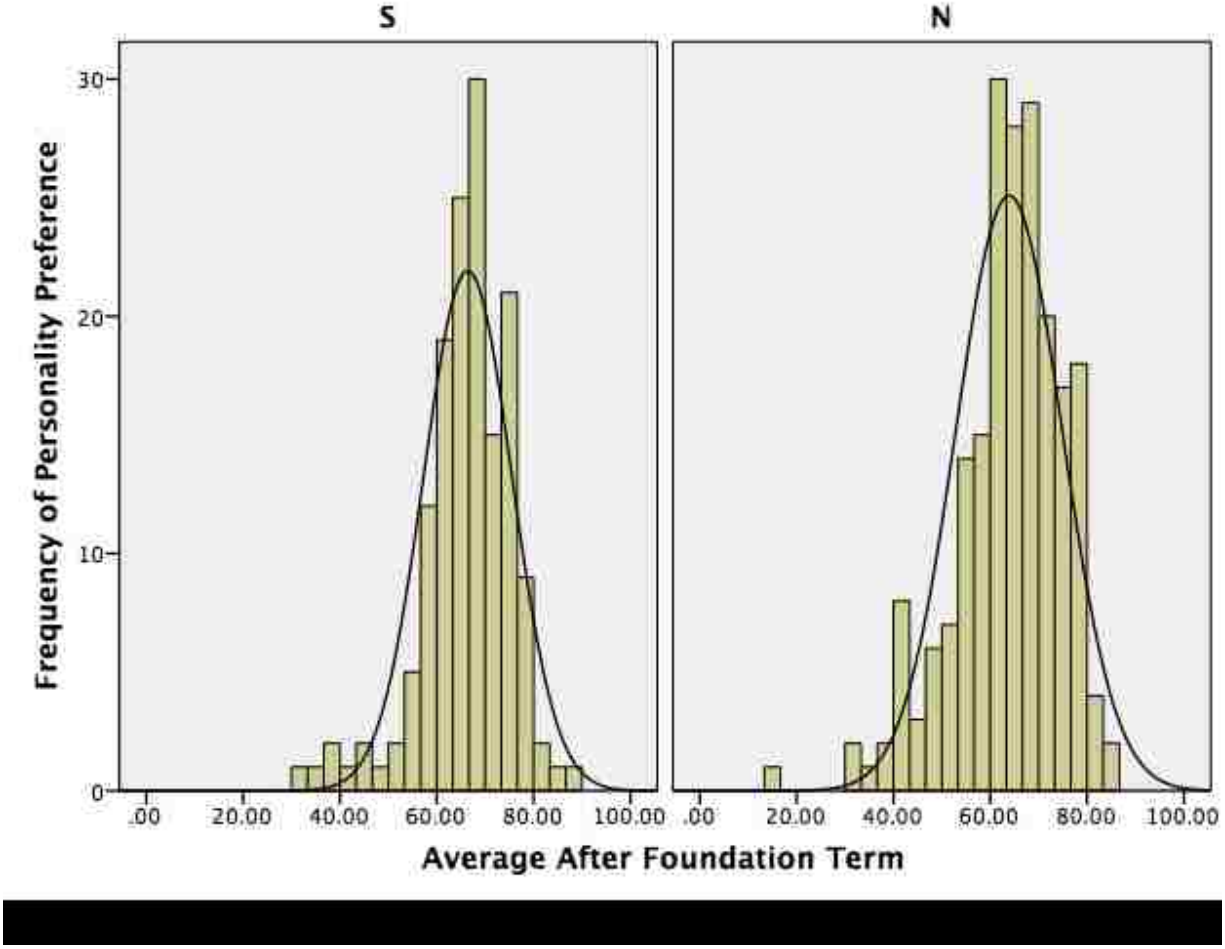

Figure 20: Patterns based on Psychological Type: Average after participation in Foundation Term – Sensing versus Intuition

Instead, we investigated differences in mean ranks. After their participation in the Foundation Term, students who identified with Sensing had averages which produced a mean rank = 89.13. Students who identified with Intuition had averages which produced a mean rank = 98.81. Distribution of the averages between Sensing and Intuition were not significantly different statistically, $U = 3677$, $z = -1.205$, $p = .228$.

Feeling versus Thinking. A Mann-Whitney U test was run to determine if there were differences in students' averages after their participation in the Foundation Term between students who identified with Feeling or Thinking. Distributions of students' averages for students who identified with Feeling and students who identified with Thinking were not similar, as assessed by visual inspection of the histograms. This means the dependent variable does not have similarly shaped distributions for both groups of the independent variable. Therefore, we cannot make inferences about differences in medians between groups (see figure twenty-one).

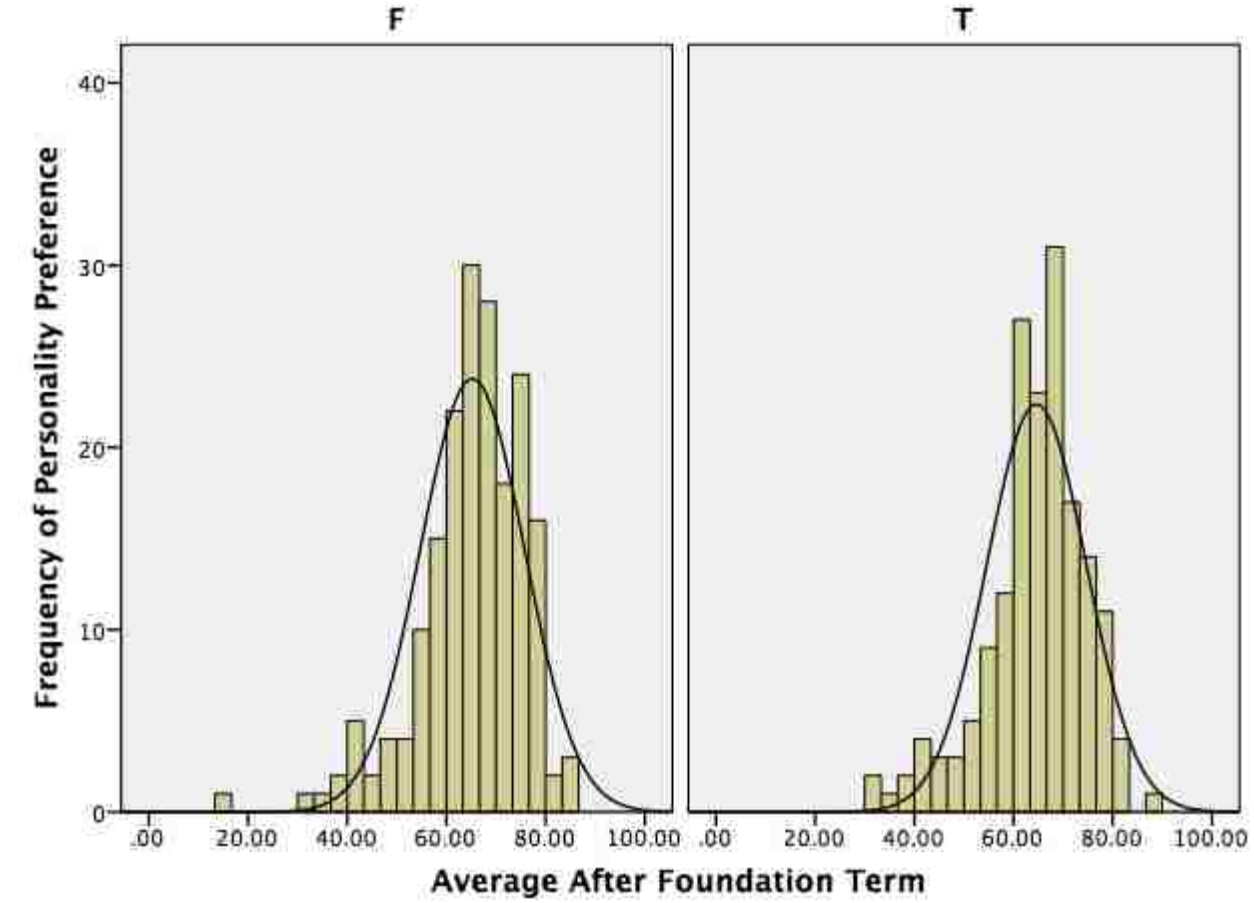

Figure 21: Patterns based on Psychological Type: Average after participation in Foundation Term – Feeling versus Thinking

Instead, we investigated differences in mean ranks. After their participation in the Foundation Term, students who identified with Feeling had averages which produced a mean rank = 95.72. Students who identified with Thinking had averages which produced a mean rank = 90.83. Distribution of the averages between Feeling and Thinking were not significantly different statistically, $U = 4000$, $z = -.616$, $p = .538$.

Judging versus Perceiving. A Mann-Whitney U test was run to determine if there were differences in students' averages after their participation in the Foundation Term

between students who identified with Judging or Perceiving. Distributions of students' averages for students who identified with Judging and students who identified with Perceiving were not similar, as assessed by visual inspection of the histograms. This means the dependent variable does not have similarly shaped distributions for both groups of the independent variable. Therefore, we cannot make inferences about differences in medians between groups (see figure twenty-two).

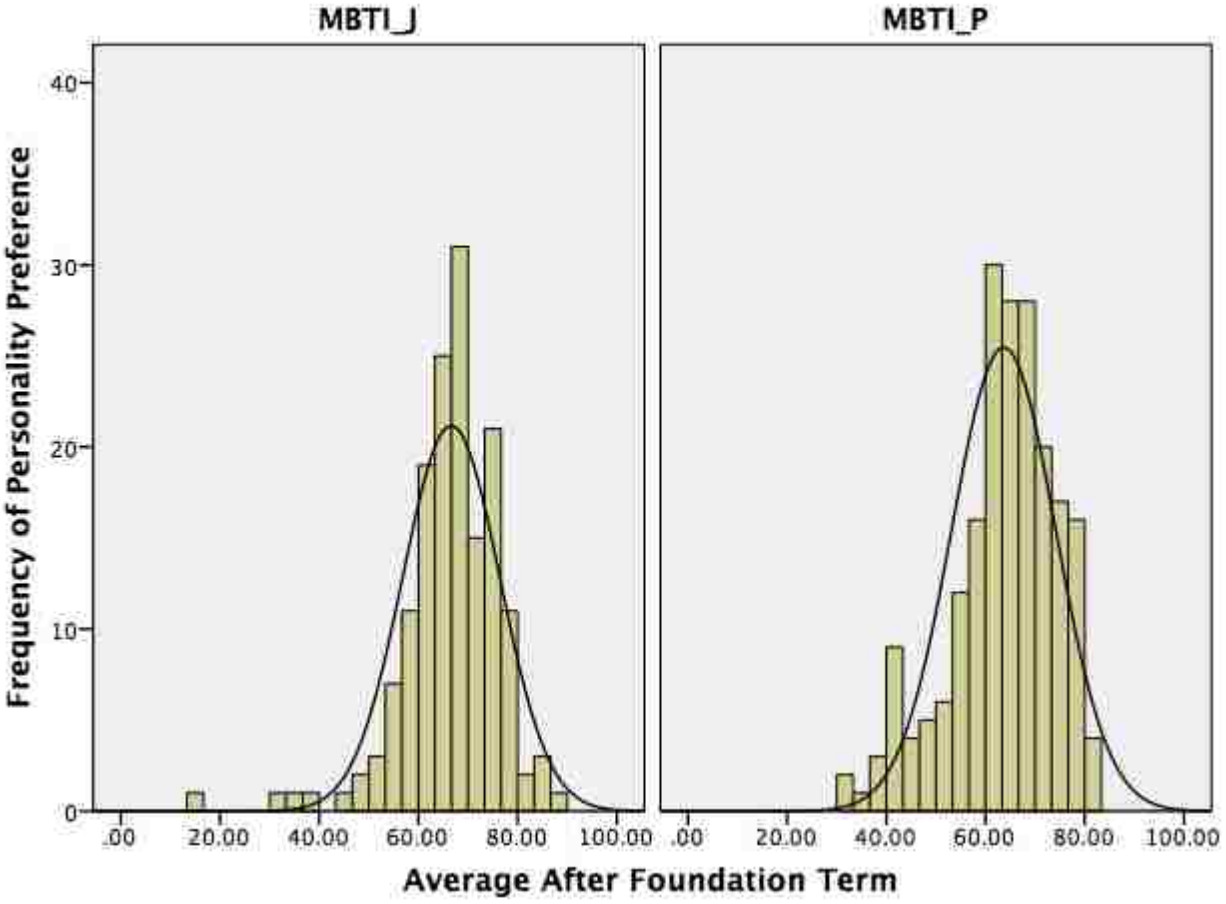

Figure 22: Patterns based on Psychological Type: Average after participation in Foundation Term – Judging versus Perceiving

Instead, we investigated differences in mean ranks. After the Foundation Term, students who identified with Judging (mean rank = 103.10) had statistically significant higher averages than students who identified with Perceiving (mean rank = 83.84), U = 3397 z = -2.443, p = .015.

Summary of Psychological Type and Personality Preference in Relation to Average After the Foundation Term

Kruskal-Wallis H, and Mann-Whitney U tests were conducted to determine if there were differences in students' averages after their participation in the Foundation Term between Psychological Types, and between Personality Preferences. Statistically significant differences were observed between groups of Psychological Types. Specifically, during post hoc analysis, the ENFP group had statistically significantly lower averages than the ESFJ group. Statistically significant differences were also observed between Personality Preferences. After the Foundation Term, students who identified with Perceiving had statistically significantly lower averages than students who identified with Judging. This means there is a direct association between the different Psychological Type groups and, more specifically, certain Personality Preferences and higher or lower averages for students after their enrollment in the Foundation Term.

Summary of Initial Findings Surrounding Psychological Type in Relation to Average Before, During and After the Foundation Term

When comparing students' averages before they participated in the Foundation Term with their Psychological Type and Personality Preferences, the observed differences were not statistically significant. Therefore, differences in students' averages

before the Foundation Term are most likely due to chance, and are not associated with students' Psychological Type or Personality Preference.

During the Foundation Term, the distribution suggests that ENFP students appear to have the lowest average, while ESFJ appear to have the highest average. Overall, observed differences were statistically significant between groups but post hoc analysis revealed no direct association between specific Psychological Type groups and a higher or lower average. However, observed differences in Judging and Perceiving Personality Preferences were found to be statistically significant. Therefore, students who identified with Judging had higher averages during their Foundation Term in comparison to students who identified with Perceiving.

Finally, after the Foundation Term, students who identified with ENFP had statistically significantly lower averages than students who identified with ESFJ. Similarly, students who identified with Perceiving had statistically significantly lower averages than students who identified with Judging. Therefore, students who identified with ENFP and / or Perceiving type preferences had statistically significantly lower averages than students who identified with ESFJ and / or Judging type preferences.

Patterns based on type: Student Status After Participation in Foundation Term. As established through the results of Research Question one, out of the 16 different Psychological Types ENFP makes up 19% of the data set. As well, binomial distribution identified this Psychological Type as differing significantly than that of the English speaking Canadian population. Finally, ENFP was identified as having the lowest average both during and after the Foundation Term. Therefore, this Psychological Type will be the focus of the following analysis of student status: whether students continue in

their degree after the Foundation Term / persist to graduation – defined as 'here' or, withdraw from the university – defined as not here.

Of the students who identified with ENFP, 50% are no longer at the university. This makes up 31% of the total amount of students who participated in the Foundation Term and are no longer at the university. In total ENFP's who are no longer at the university make up 9.5% of the overall data set. Of the students who identified with ENFP, 50% remain at the university (or have graduated). This makes up 14% of the total amount of students who participated in the Foundation Term and remain at the university (or have graduated). In total ENFP's who remain at the university (or have graduated) make up 9.5% of the overall data set. For a detailed description of the distribution of the additional 15 Psychological Types see table 9.

			Here / Not Here		
			Not Here	Here or Graduated	Total
MBTI Type	ENFP	% within MBTI Type	50.0%	50.0%	100.0%
		% within Here/Not Here	30.8%	13.8%	19.1%
		% of Total	9.5%	9.5%	19.1%
	ENTP	% within MBTI Type	34.9%	65.1%	100.0%
		% within Here/Not Here	11.5%	9.7%	10.3%
		% of Total	3.6%	6.7%	10.3%
	INTP	% within MBTI Type	36.4%	63.6%	100.0%
		% within Here/Not Here	9.2%	7.3%	7.9%
		% of Total	2.9%	5.0%	7.9%
	ISFJ	% within MBTI Type	12.1%	87.9%	100.0%
		% within Here/Not Here	3.1%	10.0%	7.9%
		% of Total	1.0%	6.9%	7.9%
	ISTJ	% within MBTI Type	27.6%	72.4%	100.0%
		% within Here/Not Here	6.2%	7.3%	6.9%
		% of Total	1.9%	5.0%	6.9%
	INFP	% within MBTI Type	34.6%	65.4%	100.0%
		% within Here/Not Here	6.9%	5.9%	6.2%
		% of Total	2.1%	4.1%	6.2%

	ESFJ	% within MBTI Type	16.0%	84.0%	100.0%
		% within Here/Not Here	3.1%	7.3%	6.0%
		% of Total	1.0%	5.0%	6.0%
	ESTJ	% within MBTI Type	17.4%	82.6%	100.0%
		% within Here/Not Here	3.1%	6.6%	5.5%
		% of Total	1.0%	4.5%	5.5%
	INTJ	% within MBTI Type	27.3%	72.7%	100.0%
		% within Here/Not Here	4.6%	5.5%	5.3%
		% of Total	1.4%	3.8%	5.3%
	ESFP	% within MBTI Type	26.3%	73.7%	100.0%
		% within Here/Not Here	3.8%	4.8%	4.5%
		% of Total	1.2%	3.3%	4.5%
	INFJ	% within MBTI Type	18.8%	81.3%	100.0%
		% within Here/Not Here	2.3%	4.5%	3.8%
		% of Total	0.7%	3.1%	3.8%
	ENTJ	% within MBTI Type	25.0%	75.0%	100.0%
		% within Here/Not Here	3.1%	4.2%	3.8%
		% of Total	1.0%	2.9%	3.8%
	ESTP	% within MBTI Type	43.8%	56.3%	100.0%
		% within Here/Not Here	5.4%	3.1%	3.8%
		% of Total	1.7%	2.1%	3.8%
	ISTP	% within MBTI Type	13.3%	86.7%	100.0%
		% within Here/Not Here	1.5%	4.5%	3.6%
		% of Total	0.5%	3.1%	3.6%
	ISFP	% within MBTI Type	41.7%	58.3%	100.0%
		% within Here/Not Here	3.8%	2.4%	2.9%
		% of Total	1.2%	1.7%	2.9%
	ENFJ	% within MBTI Type	18.2%	81.8%	100.0%
		% within Here/Not Here	1.5%	3.1%	2.6%
		% of Total	0.5%	2.1%	2.6%
Total		% within MBTI Type	31.0%	69.0%	100.0%
		% within Here/Not Here	100.0%	100.0%	100.0%
		% of Total	31.0%	69.0%	100.0%

Table 9: Psychological Type in relation to student status (Here or Not Here)

Chi-Square analysis of the Foundation Term data set identifies that the above observed differences are statistically significant at a p value of <.01. Therefore, when looking at students' Psychological Type, there are identifiable patterns in the observed

data that differ from the expected data and what should be the predicted proportions of the population. This means that upon the completion of the Foundation Term there is an association between students' Psychological Type and whether they remain a student at the University. The Cramer V output from SPSS suggests the strength of this association is moderately strong at .273.

When looking at the data distribution of Psychological Type across the sample, Post-hoc analysis reveals that the data patterns for students who remain at the university (or have graduated from the University) differs from the expected data patterns ***specifically*** for students who identified with ENFP. All other Psychological Types are consistent with the expected data patterns. Similarly, for students that are no longer at the university the data distribution of Psychological Types differs from the expected data patterns ***specifically*** for students who identified with ENFP. All other Psychological Types are consistent with the expected data patterns.

Post-hoc analysis reveals that students who identified with ENFP and remained at the university (or have graduated from the university) were *under-represented* in the actual sample compared to the expected frequency at -2.0 or an alpha of <0.05. Similarly, students who identified with ENFP and were no longer at the university were *over-represented* in the actual sample compared to the expected frequency at 3.0 or an alpha of <0.01. This means that students who identify with ENFP are less likely to continue to be a student (or to graduate) at the university after the completion of the Foundation Term.

Patterns based on Preference: Student Status After Participation in Foundation Term. When we break students' Psychological Type down by preference, additional trends emerge.

Extraversion versus Introversion. From the students who were enrolled in the Foundation Term, 19% of students who identify with Extraversion in the data set are no longer at the university while 36% remain at the university (or have graduated). In comparison, 12% of students who identify with Introversion in the data set are no longer at the university while 33% remain at the university (or have graduated).

When looking specifically at the students who remain at the university (or have graduated), 53% of the students identify with Extraversion. In comparison, 47% of the students identify with Introversion. When looking specifically at the students who are no longer at the university, 62% of the students identify with Extraversion. In comparison, 38% of the students identify with Introversion.

Chi-Square analysis of the Foundation Term data set identifies that the above observed differences are not statistically significant at a p value of $<.05$ suggesting that we cannot reject the null hypothesis. Therefore, when looking at students' preferences towards Extraversion or Introversion, there are not identifiable patterns in the observed data that differ from the expected data and what should be the predicted proportions of the population. This means that upon the completion of the Foundation Term there is not an association between students' preferences towards Extraversion or Introversion and whether they remain a student.

Sensing versus Intuition. From the students who were enrolled in the Foundation Term, 9% of students who identify with Sensing in the data set are no longer at the university while 32% remain at the university (or have graduated). In comparison, 22% of students who identify with Intuition in the data set are no longer at the university while 37% remain at the university (or have graduated).

When looking specifically at the students who remain at the university (or have graduated), 46% of the students identify with Sensing. In comparison, 54% of the students identify with Intuition. When looking specifically at the students who are no longer at the university, 30% of the students identify with Sensing. In comparison, 70% of the students identify with Intuition.

Chi-Square analysis of the Foundation Term data set identifies that the above observed differences are statistically significant at a p value of <.01. Therefore, when looking at students' preferences towards Sensing or Intuition, there are identifiable patterns in the observed data that differ from the expected data and what should be the predicted proportions of the population. This means that upon the completion of the Foundation Term there is an association between students' preferences towards Sensing or Intuition and whether they remain a student at the university. However, the Cramer V output from SPSS suggest the strength of this association is weak at .151.

When looking at the data distribution of Sensing versus Intuition across the sample, Post-hoc analysis reveals that the data patterns for students who remain at the university (or have graduated from the university) are consistent with the expected data patterns. Similarly, for students who are no longer at the university and identify with Intuition expected data patterns are observed. However, for students that are no longer at the university and identify with Sensing, the data distribution differs from the expected data patterns. Post-hoc analysis reveals that students who identified with Sensing were *under-represented* in the actual sample compared to the expected frequency at -2.0 or an alpha of <0.05. This means that students who identify with Sensing are more likely to continue to be a student (or to graduate) at the university after the completion of the Foundation

Term than the expected value. It should be again noted though that this association is weak.

Feeling versus Thinking. From the students who were enrolled in the Foundation Term, 17% of students who identify with Feeling in the data set are no longer at the university while 36% remain at the university (or have graduated). In comparison, 14% of students who identify with Thinking in the data set are no longer at the university, while 33% remain at the university (or have graduated).

When looking specifically at the students who remain at the university (or have graduated), 52% of the students identify with Feeling. In comparison, 48% of the students identify with Thinking. When looking specifically at the students who are no longer at the university, 55% of the students identify with Feeling. In comparison, 45% of the students identify with Thinking.

Chi-Square analysis of the Foundation Term data set identifies that the above observed differences are not statistically significant at a p value of $<.05$. Therefore, when looking at students' preferences towards Feeling or Thinking, there are not identifiable patterns in the observed data that differ from the expected data and what should be the predicted proportions of the population. This means that upon the completion of the Foundation Term there is not an association between students' preferences towards Feeling or Thinking and whether they remain a student.

Judging versus Perceiving. From the students who were enrolled in the Foundation Term, 8% of students who identify with Judging in the data set are no longer at the university while 33% remain at the university (or have graduated). In comparison, 23%

of students who identify with Perceiving in the data set are no longer at the university while 36% remain at the university (or have graduated).

When looking specifically at the students who remain at the university (or have graduated), 48% of the students identify with Judging. In comparison, 52% of the students identify with Perceiving. When looking specifically at the students who are no longer at the university, 27% of the students identify with Judging. In comparison, 73% of the students identify with Perceiving.

Chi-Square analysis of the Foundation Term data set identifies that the above observed differences are statistically significant at a p value of <.01. Therefore, when looking at students' preferences towards Judging or Perceiving, there are identifiable patterns in the observed data that differ from the expected data and what should be the predicted proportions of the population. This means that upon the completion of the Foundation Term there is an association between students' preferences towards Judging or Perceiving and whether they remain a student at the university. The Cramer V output from SPSS suggests the strength of this association is moderate at .202.

When looking at the data distribution of Judging versus Perceiving across the sample, Post-hoc analysis reveals that the data patterns for students who remain at the university (or have graduated from the university) are consistent with the expected data patterns. However, for students that are no longer at the university the data distribution of Judging versus Perceiving differs from the expected data patterns. Post-hoc analysis reveals that students who identified with Judging were *under-represented* in the actual sample compared to the expected frequency at -2.6 or an alpha of <0.01. Conversely, students who identified with Perceiving were *over-represented* in the actual sample compared to

the expected frequency at 2.2 or an alpha of <0.05. This means that students who identify with Judging are more likely to continue in their degree after the Foundation Term / persist to graduation, while students who identify with Perceiving are less likely to continue in their degree after the Foundation Term / persist to graduation.

Summary of Initial Findings Surrounding Student Status

Students who identify with the Psychological Type ENFP are less likely to continue in their degree after the Foundation Term / persist to graduation than the expected number of students. Similarly, students who identify with preferences towards Judging are more likely to continue to be a student (or to graduate) upon the completion of the Foundation Term than the expected number of students. Conversely, students who identify with preferences towards Perceiving are less likely to continue to be a student (or to graduate) upon the completion of the Foundation Term than the expected number of students.

Summary of Initial Findings Surrounding Research Question #2

Research Question #2 explored the following: *Does the student's Psychological Type relate to his/her level of academic success before, during and after engaging in the Foundation Term?*

Findings identified:

- Differences in students' averages before the Foundation Term are most likely due to chance, and are not associated with students' Psychological Type or Personality Preference.
    - When categorized by their Psychological Type and Personality Preferences students' averages were within the normal range of the mean.

Therefore, there is no direct association between the different Psychological Types or Personality Preferences and higher or lower averages for students before they enrolled in the Foundation Term.

- Differences in students' averages during and after engaging in the Foundation Term highlight statistically significant associations between specific Psychological Types and certain Personality Preferences and higher or lower averages.
    - Students who identified with ENFP and / or Perceiving type preferences had statistically significantly lower averages than students who identified with ESFJ and / or Judging type preferences.
    - Students who identified with the Psychological Type ENFP and / or Perceiving type preferences were also less likely to continue in their degree after the Foundation Term / persist to graduation than the expected number of students.

Phase Two

As a part of my mixed methods design described in Chapter Three, Phase Two employed qualitative methodology to provide a better understanding of the initial quantitative results. More specifically, this phase explored the reasons behind why certain students may be more academically successful than their peers after participating in the Foundation Term (Teddlie & Tashakkori , 2009). To further this understanding, Research Question #3 was employed to explore the following: *What perceptions do instructors have about the learning environment and learner preferences of Foundation Term students enrolled in their course?*

Semi-structured interviews were conducted with instructors who taught students during their Foundation Term and advisors who worked one-on-one with students during and after their Foundation Term to investigate Research Question #3. Their perceptions of the causes of why these students enrolled in the Foundation Term, what these students needed to learn from the Foundation Term and the challenges of administering the Foundation Term were explored.

Participants were purposefully selected based on their close relationship with students who participated in the Foundation Term. Three participants were instructors in their Strategies and Skills for Academic Success course and two were advisors who worked with these students one-on-one. Four participants had been both an instructor and an advisor. Each individual who participated in the semi-structured interviews was assigned a fictitious name for confidentiality. Table ten presents further background information about the participants.

Name[12]								
Leslie	Elsa	Sarah	Cathy	Lina	Loretta	Isable	Theresa	Julia
Gender								
Female	Female	Female	Female	Female	Female	Female	Female	Female
Age Range								
45 - 54	25-34	25-34	35-44	25-34	25-34	35-44	25-34	25-34
Highest Level of Education								
Doctorate	Masters	Masters	Masters	Masters	Doctorate	Doctorate	Masters	Masters
Education Background								
Mathematics & Psychology	Psychology	Applied Health Sciences	Social Development	Psychology	Science	Science	Social Work	Applied Health Sciences
Years Employed in a Post-Secondary Institution								
10	5	7	12	4	1	2	5	7
Years Teaching the Strategies and Skills for Academic Success course								
4	1	3	-	1	1	2	-	4
Disciplines Taught in the Strategies and Skills for Academic Success course								
Arts	Arts	Arts Math Engineering Science	-	Arts	Science	Science	-	Arts Math Engineering Science
Years Advising in Foundation Term								
-	2	1	4	1	-	-	4	-
Discipline of Advising in the Foundation Term								
-	Science Arts Engineering Math	Science Arts Engineering	Science Arts Engineering Math	Science Arts Engineering	-	-	Science Arts Engineering Math	-

Table 10: Summary of Background Information about Participants

As noted in Chapter Three, the interview questions were developed using Fink's (2003) handbook A Self-Directed Guide to Designing Courses for Significant Learning. The semi-structured qualitative research questions that were addressed within the interviews were:

1. What are the reasons students would be in the Foundation Term (why did they not meet academic program criteria in first year)?
2. What prior knowledge and experience do students have about the course content in the Strategies and Skills for Academic Success course?

[12] All participants have been given a pseudonym.

3. What is the special pedagogical challenge of the Foundation Term, and more specifically, the Strategies and Skills for Academic Success course (what is the challenge of trying to teach this subject to these students)?
4. What key information and ideas (facts, terms, concepts, principles, perspectives) are important for students to understand and remember from the Strategies and Skills for Academic Success course?
5. What connections should students recognize and make among ideas within the Strategies and Skills for Academic Success course?
6. Not all the topics in the Strategies and Skills for Academic Success course are academic. In your opinion, which life skills topics do you think are valuable to include in this course?
7. What skills are important for students to have the opportunity to apply while in the Foundation Term?
8. What would you like for these students to learn about regarding how to be good students, how to learn about a particular subject, how to become a self-directed learner?
9. What else do you want us to keep in mind?

As I am an instructor of the Strategies and Skills for Academic Success course, a third party conducted interviews with participants. Participants' responses to the above questions were manually recorded and transcribed. The initial analysis and coding of the transcripts were then completed by the same individual using thematic analysis as outlined by Braun and Clarke (2006). I conducted a secondary thematic analysis of the transcripts and results were recorded. The results were compared. The different themes

that emerged were identified. Similar themes were collapsed where appropriate and an overall summary of how many instructors and how many advisors identified with each theme were recorded.

Results from Instructor and Advisor Interviews

The following section summarizes the major themes that emerged in relation to the corresponding semi-structured interview questions. These major themes were identified based on trends that emerged in participants' responses to the identified interview question.

Question One. Question one asked instructors and advisors *"What are the reasons students would be in the Foundation Term (why did they not meet academic program criteria in first year)?"* Four themes emerged from the data. The themes were:

- A spectrum of academic strategies,
- A spectrum of life skills,
- Program and/or university 'fit', and,
- External challenges

A spectrum of academic strategies. Of the participants interviewed, all instructors and advisors noted that students who were enrolled in the Foundation Term displayed a spectrum of academic strategies. Common points identified suggest that that these students had "poor study habits", underdeveloped academic strategies that did not allow them to keep up with the university pace and that these students did not know how to study – or had never had to previously before. Similarly, numerous participants specifically noted that the gap in learning strategies students needed to excel in high school versus university, was simply too large. For example, Leslie suggested that her

students' academic strategies were "not bad, but not good enough". Similarly, another instructor noted that the students lack of academic strategies stemmed from "Not knowing how to study, not having a history of studying because they didn't have to, [and therefore], not understanding the effort required [or how to] organize and structure their time". Many instructors and advisors also noted that students had no routine and did not know what they had to do to complete their tasks successfully and on time. However, Cathy, a longstanding advisor on this university campus, did note that, some [students] are close to passing or being in good standing." She questions whether students "need to be in the Strategies and Skills class for a whole term?" Asking, "would being in an intervention for a whole term make things worse for them?"

A spectrum of life skills. Of the participants interviewed, most noted that students who were enrolled in the Foundation Term displayed a spectrum of life skills. There was consistency among both instructor and advisor answers around students' lack of motivation, procrastination tendencies, inability to control impulsive decisions, unrealistic thinking and unattainable planning impacted their students' academic success. Julia noted that many of her students were "Missing the internal motivation to be successful and if things were going well some students would self-sabotage – and figure out ways so it would not go well." Similarly, Lina noted, "there was an Imposter Syndrome [among her students], and the feeling like they don't deserve to be here." Theresa, an advisor who supported students during the Foundation Term, noted that many students she worked with also struggled with Perfectionism.

Program and/or university 'fit'. Of the participants interviewed, half noted that students who were enrolled in the Foundation Term may not have been suited for their

program and/or may not have been suited for university studies. Elsa noted that they had had several students who suggested their "Program didn't meet their expectations [and that they] didn't like classes". Similarly, Leslie identified that some students qualified for the Foundation Term and chose to enroll "when they should just say "no". They may take part in some/most of term and then finally tap-out…perhaps [that's when they] gain [the] courage to tell parents." Sarah, who was both an advisor and instructor in the Foundation Term noted that many students were "questioning their program or Faculty fit."

External challenges. Of the participants interviewed, half noted that students who were enrolled in the Foundation Term might have been affected by external challenges. Common points identified potential mental or physical challenges, personal circumstances like family and/or friend stressors, or financial instability. Participants noted that these external challenges were often coupled with a student's inability to ask for help; feelings of hopelessness; and poor problem solving skills. Ultimately student's just "give up" academically. For example, Sarah noted students often said, "Something was going on in personal life that took up time or decreased capacity to cope." Julia added that often when these external challenges emerged, her students were, "missing critical problem solving skills – so they would just give up." Finally, Leslie highlighted, that often students ended up in the Foundation Term due to "Something beyond their control." She suggested, "For these students it may be more about connecting to resources and asking for help or asking for an exception." She also questioned, for these students; "Do they need the Strategies and Skills for Academic Success course? Do they need the Foundation Term? Or, is this an example of system failure?"

Question Two. Question two asked instructors only "*What prior knowledge and experience do students have about the course content in the Strategies and Skills for Academic Success course?"* One theme emerged from the data. This theme was: common sense.

Common sense. Of the instructors interviewed, most noted that students' prior knowledge and experience in relation to the course content of the Strategies and Skills for Academic Success course was influenced by common sense. Julia noted, "They know the content. The goal is behaviour change because they don't do it. A lot of the information is common knowledge. This course teaches ways to implement this, but the students know the overarching topic already." Similarly, Elsa stated, "All students know some [of the content]. They know what they should do, but don't know how. If they used some of the skills in the past, they may not have used them in a way compatible with university success." Leslie identified how student's common sense can also be detrimental. She commented that "A bunch [of students] think they know [the content] but are incorrect about certain areas, for example, how well everyone else around them is doing and [the best practices around] sleep." Finally, Sarah suggested "Some content is a reminder of best practices they have heard before, but content should build on these reminders with: examples of how to apply, opportunity to apply and support for why [each piece of] content is useful."

Question Three. Question three asked instructors and advisors *"What is the special pedagogical challenge of the Foundation Term, and more specifically, the Strategies and Skills for Academic Success course (what is the challenge of trying to*

teach this subject to these students)?" Three themes emerged from the data. The themes were:

- Gaining student buy-in,
- Differentiating support, and
- Creating opportunities for application and practice

Gaining student buy-in. Of the participants interviewed, most noted that a special pedagogical challenge of the Foundation Term, and more specifically, the administration processes surrounding the Strategies and Skills for Academic Success course, was gaining student buy-in. Common points identified around gaining students buy-in was articulated by Lina who suggested "students know why they messed up and think they can fix things themselves". She also identified that students are not always "pleased to be enrolled in the course", and do not "embrace the learning goals". Loretta noted, "Some of the students don't care, or think the course is stupid. Some think they know it all already or it doesn't apply to them." Theresa also highlighted the difficulty of "encouraging students' to try something different" when many students think they "just need to work harder this time".

Differentiating support. Of the participants interviewed, most also noted that a special pedagogical challenge of the Foundation Term, and more specifically the administration processes surrounding of the Strategies and Skills for Academic Success course, was differentiating support. Isabel noted, "the strategies are not one size fits all. They need to be meaningful to each "bucket" of students. And to students from different disciplines." Similarly, common points mentioned by most participants included the individualized nature of student's needs, the different levels of complexity of student's

needs and maintaining student's interest around topics that didn't seem to 'apply'. Cathy, an advisor working with the Foundation Term students, noted there is "A range of circumstances as to why [students are] there. A range of ability levels and complexity of issues. Can [each] student articulate what went wrong, and what will now look different?"

Creating opportunities for application and practice. Of the participants interviewed, half noted that a special pedagogical challenge of the Foundation Term, and more specifically the administration processes surrounding the Strategies and Skills for Academic Success course, was creating opportunities for application and practice. Based on the diversity in the classroom, Julia noted, "Talking is one perspective and we need to be able to put it into personalized practice and provide feedback. Currently, the course is not as experiential as some students need." Similarly, Sarah highlighted the challenges around "creating opportunities for students to apply learning and make connections to their course work [in their discipline-specific courses]." Elsa suggested that the current curriculum does not always allow for differentiated support. That there is "Too much talking and not enough doing." That we must look to "Provide opportunity for students to practise everything." Finally, Theresa, who worked in an advisor role with students throughout the Foundation Term noted that students found it difficult "to apply a lot of different/new strategies."

Question Four. Question four asked instructors and advisors *"What key information and ideas (facts, terms, concepts, principles, perspectives) are important for students to understand and remember from the Strategies and Skills for Academic Success course?"* Three themes emerged from the data. The themes were:

- time management and procrastination,
- critical thinking and problem solving, and,
- stress management and resiliency

Time management and procrastination. Of the participants interviewed, all noted that a key idea for students to understand and remember from the Strategies and Skills for Academic Success course was time management and procrastination. For example, Leslie emphasized the importance of students "Improved and personalized time management and test preparation skills." Similarly, Sarah suggested the key idea or take away was to learn, "How to stay organized and manage their time." Sarah, speaking to students' tendencies to procrastinate, also stated, "We need to work with students to understand why we procrastinate. For example, work takes too long, work is too hard, you get distracted or disinterested and students need to take away strategies to offset [this procrastination]". She continued around "Motivation and self-discipline and the role of mindset or attitude, personal goals and creating new habits to tackle procrastination." Similarly, Theresa, an advisor, spoke to the "Importance of hard work versus instant gratification." Cathy, another advisor, identified that students need to take away "How to become an engaged learner (learning how to learn). [As well as], good study practices and how to manage their time and procrastination so they can be engaged and learn."

Critical thinking and problem solving. Of the participants interviewed, half noted that a key idea for students to understand and remember from the Strategies and Skills for Academic Success course was critical thinking and problem solving. For example, Sarah identified that students need to understand "How to think critically about course content. How to make connections within a course, get to a deeper level of understanding, and

pick out key pieces of information to study." Similarly, Cathy noted the importance of "Critical thinking and analysis. Understanding how they approach academics, [and how to effectively] ask questions. " Leslie highlighted the importance of "Practiced approaches to critical reading, scholarly research and clear communication that are appropriate to post-secondary education." While Julia suggested "Discipline-specific perspectives and what you need to know with tangible strategies to assist core courses" was important. Similarly, Julia also noted the importance of "students asking "Why" are they learning/doing the different assignments and strategies to increase their understanding. Ensur[ing] they know why the course is put together the way it is and then connecting it to the real world."

Stress management and resiliency. Of the participants interviewed, half noted that a key idea for students to understand and remember from the Strategies and Skills for Academic Success course was stress management and resiliency. Sarah identified the importance of "Challenging thinking, identifying emotions and changing behaviours." She continued that the "Role of health in memory and academics leads to a holistic approach to success. Sleep, nutrition, physical activity, social engagement and life balance supports students stress management." Leslie spoke to stress management and resiliency by suggesting the importance of "Developed personal wellness strategies and self-awareness to support [student's] academic skills." Lina reiterated this message stating that there must be an "Increase [in students understanding the] connections between self-awareness and strategies. Understanding their unique reason for being there and struggling … everyone is different. Just because you didn't do well, doesn't mean you are not intelligent or can't do well again." Finally, Theresa identified the importance

of students in the Foundation Term "Understanding what failure means and what it doesn't [can] Empower [students so] that they can be successful."

Question Five. Question five asked instructors and advisors *"What connections should students recognize and make among ideas within the Strategies and Skills for Academic Success course?"* Two themes emerged from the data. These themes were:

- The importance of metacognition and self-reflection, and,
- Holistic and individualized learning

***The importance of metacognition and self-reflection*.** Of participants the interviewed, half noted that students should make key connections from the Strategies and Skills for Academic Success course around metacognition and self-reflection. For example, Leslie stated " I think metacognition is the most important piece and I've seen a lot of students make big academic leaps when they get it. It's the key to making their education an active rather than passive experience." Similarly, Isabel suggested that metacognition helps "students make the connection in each module between the content and their own study skill's styles, personality and goal setting." Lina showed the connection between metacognition and reflection noting the importance of "Self-awareness and how this connects to strategies for success. Not just identifying the issue but being able to think critically about why it is an issue and what to try. Self-reflection is key." Similarly, Sarah discussed how "Metacognition is an idea that is weaved throughout the course - the importance of self-reflection and personalizing learning and strategies. Also that self-reflection is not just a skill useful for self-awareness but also in academic learning…. Learning needs to be personalized." Finally, Lina identified how being transparent and showing ""Why" are they learning and doing the different

assignments and strategies…increase their understanding. Ensure[ing] they know why the course is put together the way it is and then when [they enter] in a [discipline-specific course] subject, this reinforces the why.

Holistic and individualized learning. Of the participants interviewed, over half noted that students should make key connections from the Strategies and Skills for Academic Success course that learning is holistic and individualized. For example, Leslie stated, "Note-taking should tie directly to memory. Study skills should tie to memory and sleep. Active listening and savvy textbook reading should tie to memory. Let's face it, I think everything ties to memory, and that might be because my doctorate is in psych, but it might also be because the whole course is about learning, which is definitely about memory…. I think there's [also] a useful link between personal values, motivation and resilience. I think it is useful for students to discover and reinforce the ways in which they can transfer skills from their personal lives and extra-curriculars to the classroom." Similarly Loretta noted that students need to "Attend lectures to get notes to study and do well, each step plays a role in success [and we must] explain why each role is important." Julia also noted the importance of purposefully modeling how to relate different concepts stating, "We need to be more intentional around showing connection points. Multiple concepts are connected, [we need to] tell them how and what are the links." Lina echoed this point suggesting the importance of "Making connections between what is learned and application. The why behind why you are doing something, how to do it and the results." Finally, Sarah noted specifically how "Time management and organization are skills that assist in multiple academic strategies."

Question Six. Question six asked instructors and advisors *"Not all the topics in the Strategies and Skills for Academic Success course are academic. In your opinion, which life skills topics do you think are valuable to include in this course?"* Two themes emerged from the data. The themes identified were: Communication and self-awareness.

***Communication*.** Of the participants interviewed, three-quarters noted that the Strategies and Skills for Academic Success course should incorporate life skills topics including communication. For example, Loretta spoke to students' inability to ask for help suggesting students, "Communication skills, their ability to ask questions, ask for help, talk with peers and write [effectively] was lacking." Conversely, Lina spoke to students' social skills suggesting, "Some are too social and that is their problem". She further identified that based on the differentiation in the types of students in the classroom "Perhaps this is a topic more for 1:1 coaching." Even with this disconnect between too little communication and too much communication, almost all instructors and advisors specifically stated the importance of communication that supported students in asking for help when they need it. As well, they need to understand where to get help and campus resources when they need assistance.

***Self-awareness*.** Of the participants interviewed, over half noted that the Strategies and Skills for Academic Success course should incorporate life skills topics including self-awareness. For example, Sarah spoke about having students take time for self-reflection and self-awareness. She continued to suggest that students needed to understand their "Own strengths and weaknesses, how to manage [their] stress and how [they] best learn." Similarly, Cathy suggested the importance of students being in control of their own learning. Students must be aware that they learn differently, student be

aware “How they are asking for help? [What are their] values? [What are their] family and self-expectations? It is time to enter adulthood.” Finally, Theresa noted the connection between “Mood and the importance of attitude and self-regard.”

Question Seven. Question seven asked instructors and advisors *“What skills are important for students to have the opportunity to apply while in the Foundation Term?”* One theme emerged from the data. The theme was the application and transferability of the Strategies and Skills for Academic Success course curriculum.

Application and transferability of the Strategies and Skills for Academic Success course curriculum. Of the participants interviewed, almost all noted that the importance of application and transferability of the material in the Strategies and Skills for Academic Success course. Consistent statements within this theme included comments around the application and transferability of the following content: Note-taking, Study Skills, Time Management, Addiction and Stress Management, Reading and Discipline Specific Critical Analysis, and finally, Applying and Reinforcing Life Skills. For example, Leslie noted around Addition and Stress Management, “Do we have any not-preachy-after-school-special way to touch on alcohol and substance abuse? I don't know how much of a risk factor those are, but it is definitely a factor for some. It would be naive to think nobody's in the Foundation Term because of booze or drugs, or to think nobody in the Foundation Term has tried solving their academic problems by self-medicating”. Lina continued on the importance of application and transferability with regards to study skills stating, “They need test prep and test-taking, but I don't think we're really delivering on that yet.” Similarly, Isabel noted the importance of the curriculum around Life Skills, Time Management, and Study Skills. “Prioritizing and goal setting -

and relate this to why they fail are extremely important to their success. From here provide them with unique opportunities to apply unique time management and study skills to help themselves improve." Lina spoke about a number of topics within the Strategies and Skills for Academic Success course and states "All of them [are important]. If we teach it, they apply it. But again, not all will truly benefit based on individual issues; for example, the student who does great notes but didn't attend class. For the students where execution is a problem, it's part of the buy-in getting to practice the skills." Similarly, talking about the sections of curriculum in the Strategies and Skills for Academic Success course, Julia stated that "All of them [need to be applied]. If it's in the course, it should be a skill they can try. If not individualized then what's the purpose?"

Question Eight. Question eight asked instructors and advisors *"*What would you like for these students to learn about regarding how to be good students, how to learn about a particular subject, how to become a self-directed learner?*"* Two themes emerged from the data. The themes identified suggested students should:

- Apply what they learn– often!, and,
- Keep trying.

Apply what they learn – often!. Of the participants interviewed, half noted that students need to apply what they learn – often! Isabel suggested that good students should practise what we have taught them often, "practise consistently, involve self-reflection after practising, set goals, make plans on how to achieve them, revisit them at mid-term and then achieve them." Cathy stated the importance of students exhibiting patience. She identified that students need "Patience with their academics. They need to do work and

sometimes leave it and come back to it. Academics do not produce instant gratification, it is delayed." Similarly, Sarah noted that learning does not always feel good. She suggested students must "Learn, apply, reflect. To learn something you are introduced to an idea, you apply it, you review it or reflect on it. This is the cycle for study strategies, as well as, learning in courses. Learning doesn't always feel good or happen over night." Finally, Julia noted "Becoming a self-directed learner is the goal of the course. Our role as instructors is helping students to create behavior change so that they begin to apply what they learn. The student's role is to find the individualized strategies that work for them and then continue to apply them beyond the Foundation Term- becoming self-directed in their learning."

Keep trying. Of the participants interviewed, half noted that students must keep trying when things don't go well. For example, Tanya suggests that she often reminds students that "It takes more than one try to become successful at something…Comparison isn't helpful. Set your own goals; define your own journey… remember short term and long term thinking." Similarly, Cathy suggests that students should "Learn to anticipate the next step. For example, the consequences of how they plan their time today on how it will impact them tomorrow." Finally, Sarah notes that students should "Be able to problem solve when they hit an obstacle or things don't look the way they thought they would and ask the question what will further my learning when I'm stuck?"

Question 9. Question 9 asked instructors and advisors *"*What else do you want us to keep in mind?*"* Two themes emerged from the data. The themes questioned:

- is the Foundation Term the right 'fit' for everyone?, and,
- is the length and structure of the Foundation Term appropriate?.

Is the Foundation Term the right 'fit' for everyone?. Of the participants interviewed, half questioned if the Foundation Term was the right 'fit' for everyone? Julia identified that she "questions the current design of the Foundation Term. What are the problems we are trying to solve in the [Strategies and Skills] class and what are the learning outcomes? Are they right? I think this would help to determine the content and the students who should be in the course." Cathy suggests a potential strategy to ensure 'fit' by having students "Do a motivation for change assessment before the Foundation Term. If a student is not ready to be here, do not offer [the Foundation Term], or don't make it the first thing you offer." Leslie adds questions around the role of the advisor in supporting students in the Foundation Term when she states, "What is the expectation of amount of communication between academic advisors and students throughout the Foundation Term?" She asks, "Can we pre-test/post-test on five to eight dimensions of learning to ensure students are being successful. Students then need to bring learning dimensions up to a certain level by end of the term. Students would set goals [based on these five to eight dimensions of learning] and prove to us they improved somehow."

Is the length and structure of the Foundation Term appropriate?. Of the participants interviewed, half questioned if the length and structure of the Foundation Term was appropriate. For example, Cathy notes how individuals are currently 'signed up' for the Foundation Term and asks us to "Consider the pressure the Foundation Term contract adds to the student experience. [As well,] the pressure that is added to the student experience after the Foundation Term. These students have struggled with transition, were brought down to three courses, and now have another big transition back to full course load. Is there some way to address the pressure in these situations and

manage it better?" Theresa shared similar thoughts around the number of courses in the Foundation Term stating, "The three course schedule is helpful for some and harmful for others. Can some students take five courses and provide a more individualized approach to why students are in Foundation Term? Do they all need to learn everything? Can they miss some topics not relevant to them and instead engage in some independent study?"

Sarah suggests a strategy that may help with this individualization in the classroom, by having "students identify why they are in the Foundation Term and linking that to goal setting at beginning of term in the Strategies and Skills for Academic Success course." That way students would have a concrete examples of "what they need to work on" throughout the term.

Summary of Phase Two

Phase Two explored the reasons behind why certain students may be more academically successful than their peers after participating in the Foundation Term. Semi-structured interviews were conducted with instructors who taught these students in the Strategies and Skills for Academic Success course and advisors who worked these students before, during and after the Foundation Term. After reviewing the major themes, two overarching areas emerged: Areas for Growth in Student Learning and Administrative Challenges of the Foundation Term. Figure twenty-three shows a compilation of the major themes based on these overarching areas.

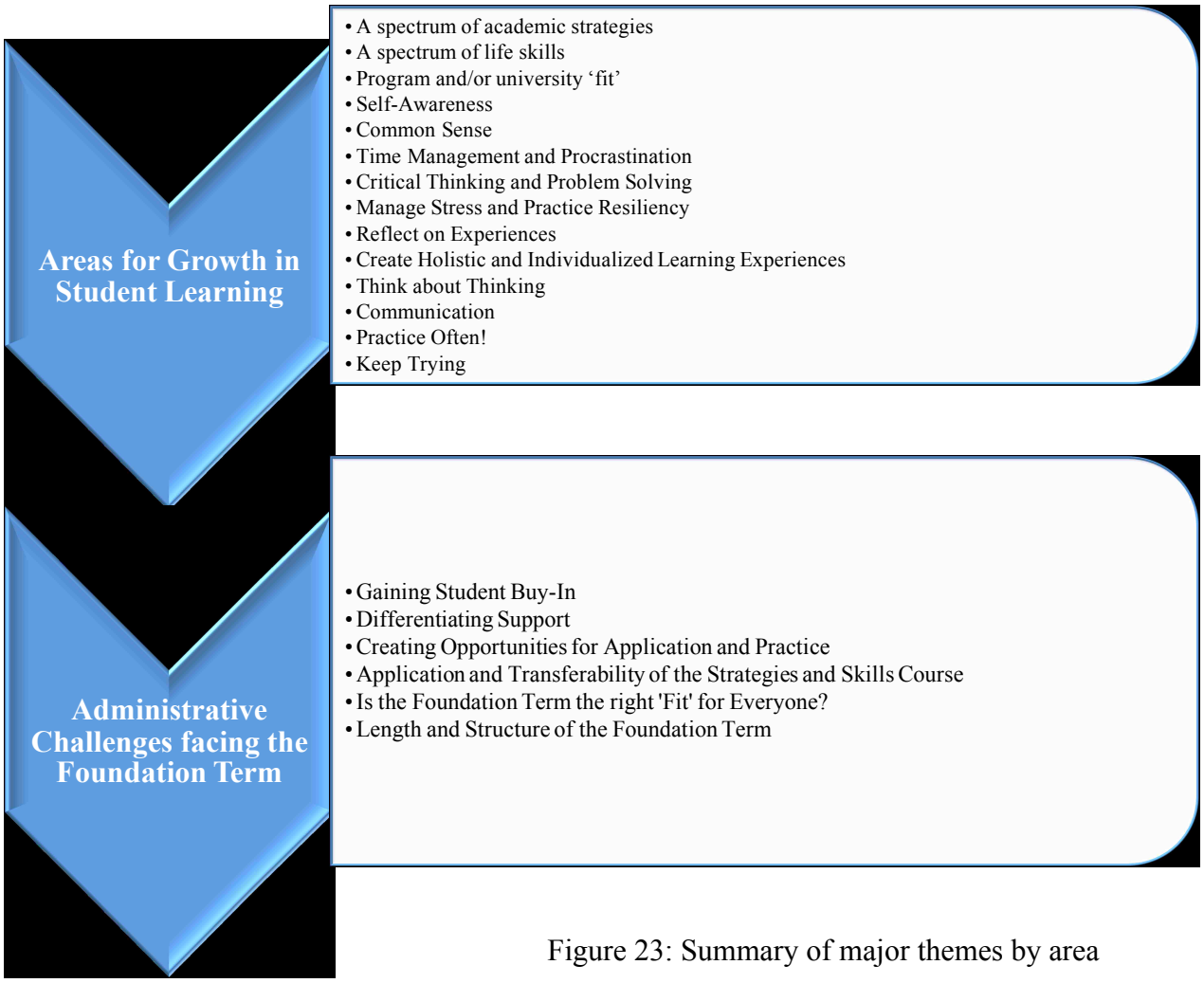

Figure 23: Summary of major themes by area

Phase Three

The results of Phases One and Two of this study explored the relationship between students' Psychological Type in relation to their academic success. In Phase One, analysis of Research Question #1 and Research Question #2 was completed to assess both Psychological Type as a whole, before, during, and after students participated in the Foundation Term as well as Psychological Type based on preference, before during and after students participated in the Foundation Term. Findings from Research Question #1 and Research Question #2 suggest statistically significant associations between students identified Psychological Type, Personality Preference and their academic

success during and after their participation in a Foundation Term. In Phase Two, analysis of Research Question #3 was completed qualitatively to provide a better understanding of the initial quantitative results. Instructors and advisors were asked why students enrolled in the Foundation Term, what students needed to learn from the Foundation Term and the challenges of administering the Foundation Term. The themes identified in Research #3 begin to explain the reasons behind why certain students may be more academically successful than their peers after participating in the Foundation Term.

Phase Three further explored why students who identify with certain Psychological Types or specific Personality Preferences may be more academically successful than their peers after participating in the Foundation Term. Three binary logistic regressions were performed to ascertain the impact of the ENFP Psychological Type, the Intuition / Perceiving Personality Preference combination, the Perceiving Personality Preference and students' grades in the Strategies and Skills for Academic Success course on the likelihood that students continue in their degree after the Foundation Term / persist to graduation. When ascertaining the impact of the ENFP Psychological Type and students' grades in the Strategies and Skills for Academic Success course, the logistic regression model was statistically significant, $\chi^2(3) = 77.454$, $p < .0001$. The model explained 24.2% (Nagelkerke R^2) of the variance in students' continuance in their degrees after the Foundation Term / persistence to graduation and correctly classified 74.3% of cases. Sensitivity was 91.2%, specificity was 35.2%, positive predictive value was 91.3% and negative predictive value was 64.8%. Of the predictor variables, all were statistically significant (as shown in table eleven).

	B	S.E.	Wald	df	Sig.	Exp(B)
Psychological Type [a.]	1.044	.278	14.145	1	.000	2.840
Strategies and Skills for Academic Success course Grade	.078	.011	48.618	1	.000	1.082
Constant	-6.050	.909	44.318	1	.000	.002

a. Psychological Type is for ENFP compared to all other types combined

Table 11: Binary Logistic Regression predicting persistence at university based on Psychological Type and grade in Strategies and Skills for Academic Success course

When ascertaining the impact of the NP Personality Preference combination and students' grades in the Strategies and Skills for Academic Success course, the logistic regression model was statistically significant, $\chi^2(3) = 77.102$, $p < .0001$. The model explained 24.1% (Nagelkerke R^2) of the variance in students' continuance in their degrees after the Foundation Term / persistence to graduation and correctly classified 74.8% of cases. Sensitivity was 90.6%, specificity was 38.4%, positive predictive value was 90.5% and negative predictive value was 61.6%. Of the predictor variables, all were statistically significant (as shown in table twelve).

	B	S.E.	Wald	df	Sig.	Exp(B)
NP Personality Preference combination [a.]	.871	.238	13.423	1	.000	2.390
Strategies and Skills for Academic Success course Grade	.076	.011	46.636	1	.000	1.079
Constant	-5.510	.873	39.868	1	.000	.004

a. Personality Preference Combination is for NP compared to SJ Combination

Table 12: Binary Logistic Regression predicting persistence at university based on the NP Personality Preference combination and grade in Strategies and Skills for Academic Success course

When ascertaining the impact of the Perceiving Personality Preference and students' grades in the Strategies and Skills for Academic Success course, the logistic regression model was statistically significant, $\chi^2(3) = 74.720$, $p < .0001$. The model explained 23.5% (Nagelkerke R^2) of the variance in students' continuance in their degrees after the Foundation Term / persistence to graduation and correctly classified 74.5% of cases. Sensitivity was 91.6%, specificity was 35.2%, positive predictive value was 90.6% and negative predictive value was 64.8%. Of the predictor variables, all were statistically significant (as shown in table thirteen).

	B	S.E.	Wald	df	Sig.	Exp(B)
Personality Preference J and P [a.]	.831	.253	10.786	1	.001	2.298
Strategies and Skills for Academic Success course Grade	.075	.011	44.966	1	.000	1.078
Constant	-6.050	.909	44.318	1	.000	.002

a. Preference is for Perceiving compared to Judging

Table 13: Binary Logistic Regression predicting persistence at university based on Personality Preference and grade in Strategies and Skills for Academic Success course

Students who identified with any other Psychological Type besides ENFP, had 2.84 times higher odds of continuing to be enrolled at the researched university / persisting to graduation than students who identified with the ENFP Psychological Type. Students who identified with the Sensing / Judging Personality Preferences combination had 2.39 times higher odds of continuing to be enrolled at the researched university / persisting to graduation than those who identified with Intuition / Perceiving Personality Preferences combination. Similarly, students who identified with Judging Personality Preferences had 2.298 times higher odds of continuing to be enrolled at the researched university / persisting to graduation than those who identified with Perceiving Personality Preferences. Finally, higher grades in the Strategies and Skills for Academic Success

course during the Foundation Term was also associated with an increased likelihood of continuing to be enrolled at the researched university / persisting to graduation. Derivation from linearity confirms there is a linear relationship between grades in the Strategies and Skills for Academic Success course and whether students continue to be enrolled at the researched university / persist to graduation. Therefore, we can confirm the above results of the binary logistic regressions and state that these models are predictive.

Summary of Phase Three

As a follow up to the findings in Phase One and Two, Phase Three looked to identify the impact of the ENFP Psychological Type, the Perceiving Personality Preference and students' grades in the *Strategies and Skills for Academic Success course* on the likelihood that students continue in their degree after the Foundation Term / persist to graduation. Three binary logistic regressions were performed and simplified findings from Phase Three are presented in table fourteen, table fifteen, table sixteen and figure twenty-four.

	Model Predicted Value	***Incorrect Predictions***	***Correct Predictions***	***True Predictive Value***
Not Here	125 students are predicted to be 'not here'	The model unsuccessfully predicted 44 students 'not here'	The model successfully predicted 81 students 'not here'	**The model successfully predicts 64.8% of students who are not here**
Here	287 students are predicted to be 'here'	The model unsuccessfully predicted 25 students 'here'	The model successfully predicted 262 students 'here'	**The model successfully predicts 91.3% of students who are here**
Model Summary	**412 students were tested to assess the direct effects of Psychological Type and Strategies and Skills for Academic Success course grade on whether students where 'here' or 'not here'**	**The model produced unsuccessful predictions 26% of the time**	**The model produced successful predictions 74% of the time**	

Table 14: Predictive power of the regression model that ascertains effect of ENFP Psychological Type and Grade in Strategies and Skills for Academic Success course: Will students remain here or not?

	Model Predicted Value	***Incorrect Predictions***	***Correct Predictions***	***True Predictive Value***
Not Here	125 students are predicted to be 'not here'	The model unsuccessfully predicted 48 students 'not here'	The model successfully predicted 77 students 'not here'	**The model successfully predicts 61.6% of students who are not here**
Here	287 students are predicted to be 'here'	The model unsuccessfully predicted 27 students 'here'	The model successfully predicted 260 students 'here'	**The model successfully predicts 90.5% of students who are here**
Model Summary	**412 students were tested to assess the direct effects of Psychological Type and Strategies and Skills for Academic Success course grade on whether students where 'here' or 'not here'**	**The model produced unsuccessful predictions 26% of the time**	**The model produced successful predictions 74% of the time**	

Table 15: Predictive power of the regression model that ascertains effect of NP Personality Preference combination and Grade in Strategies and Skills for Academic Success course: Will students remain here or not?

	Model Predicted Value	***Incorrect Predictions***	***Correct Predictions***	***True Predictive Value***
Not Here	125 students are predicted to be 'not here'	The model unsuccessfully predicted 44 students 'not here'	The model successfully predicted 81 students 'not here'	**The model successfully predicts 64.8% of students who are not here**
Here	287 students are predicted to be 'here'	The model unsuccessfully predicted 24 students 'here'	The model successfully predicted 263 students 'here'	**The model successfully predicts 91.6% of students who are here**
Model Summary	**412 students were tested to assess the direct effects of Psychological Type and Strategies and Skills for Academic Success course grade on whether students where 'here' or 'not here'**	**The model produced unsuccessful predictions 25% of the time**	**The model produced successful predictions 75% of the time**	

Table 16: Predictive power of the regression model that ascertains effect of 'P'

Personality Preference and Grade in Strategies and Skills for Academic Success course:

Will students remain here or not?

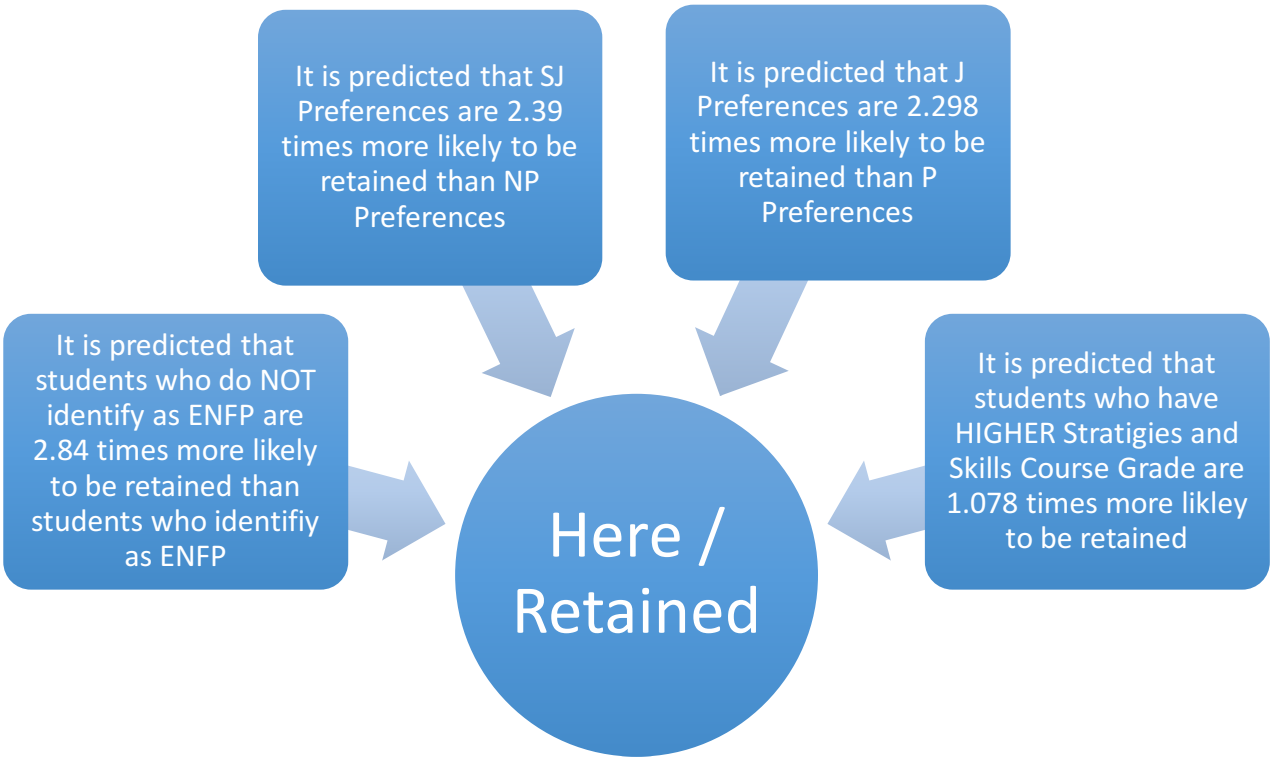

Figure 24: Simplified output of the impact of Psychological Type, Personality Preference, and grade in the Strategies and Skills for Academic Success course on retention

CHAPTER FIVE

Discussion and Conclusions

This study utilized a three-phase, sequential, exploratory, mixed methods design to investigate why students who identify with certain Psychological Types or specific Personality Preferences may be more academically successful than their peers after participating in a particular intervention strategy at the researched university. The first phase of this study explored specific patterns in students' preferences based on Psychological Type. Descriptive and inferential statistics were obtained from a sample of 420 students enrolled in a Foundation Term who completed the MBTI self-assessment. In the second phase, face-to-face interviews were conducted with nine participants to provide a better understanding of the initial quantitative results, and more specifically, which students may be more academically successful than their peers after participating in the Foundation Term. Finally, in the third phase, a binary logistic regression was conducted to link phases one and two of this study to a specific university classroom and highlight the potential of a predictive model.

This chapter contains the discussion of the major findings from the three phases of this research study and relates these findings to the literature and theoretical framework introduced in Chapter Two. Next, it highlights potential implications/recommendations for practice. Finally, the chapter will conclude with the limitations of the study and suggestions for future research.

Summary of Findings

This study utilized a three-phase, sequential, exploratory, mixed methods design. In Phase One two research questions were explored quantitatively. Research question #1 investigated the following: *Are their identifiable patterns in the data based on the students' Psychological Type for students enrolled in the Foundation Term intervention strategy? If so, do these patterns vary by their discipline of study?* Research Question #2 built on the initial identified patterns by exploring the following: *Does the student's Psychological Type relate to his/her level of academic success before, during and after engaging in the Foundation Term?*

The results of Phase One identified statistically significant patterns in students' preferences towards the ENFP, ENTP, and ISTJ Psychological Types, when comparing the distribution of the English speaking Canadian population to students enrolled in the Foundation Term intervention strategy. Similarly, statistically significant patterns were observed in students' preferences towards Sensing or Intuition, Feeling or Thinking and Judging or Perceiving when comparing the distribution of the English speaking Canadian population to students enrolled in the Foundation Term intervention strategy. Statistically significant patterns were not observed between the Canadian data and the student's preferences towards Extraversion or Introversion.

The sample population studied in this research consisted of exceptionally bright students who achieved an 85% or higher entrance average to their post-secondary studies and then failed in their first post-secondary semester. Consequently, the sample population may have differed from that of the English speaking Canadian population due to a number of factors including students' persistence to post-secondary education and

degree choice. Literature that speaks directly to these exceptionally bright, but academically 'at-risk' post-secondary learners is sparse; however, there are numerous studies that relate Psychological Type and Personality Preferences to students who are considered 'gifted' or 'honours', both at the secondary and post-secondary level (e.g. Chaing, 1991; Clark, 2000; Gallagher, 1990; Geiger, 1992; Hawkins, 1997; Jackson, 1989; McCarthy, 1975; Sak, 2004). In 2004, Sak completed a literature review that compiled the results of 19 studies of 'gifted' and 'honours' students' Psychological Types and Personality Preferences (n=5723). When comparing the results from the present study with Sak's (2004) findings, there are some differences in the exceptionally bright, but academically 'at risk' students' preferences. Table seventeen summarizes these differences between the current study findings surrounding Personality Preferences and Sak's (2004) literature review on 'Gifted' and 'Honours' students.

Psychological Type	**Present Study on Exceptionally Bright But Academically 'At-Risk' students**	**Sak (2004) study on 'gifted' and 'honours' students**
ENFP	19%*	16%
ENTP	10%*	11%
ISTJ	7%*	7%
Personality Preference	**Present Study on Exceptionally Bright But Academically 'At-Risk' students**	**Sak (2004) study on 'gifted' and 'honours' students**
Extraversion	56%*	51%
Introversion	44%* (ENG over-represented)	49%
Sensing	41%	29%
Intuition	59%	71%
Thinking	47%* (ENG over-represented)	54%
Feeling	53%* (Arts over-represented)	46%
Judging	42%	40%
Perceiving	58%	60%

* Identifies statistically significant differences from the present study which have been noted in comparison to the English Speaking Canadian Population at p=<0.01. See Phase One in Chapter Four for more information.

Table 17: Comparison between current study findings surrounding Personality Preferences and literature on 'gifted' and 'honours' students

As noted in Chapter Four, when the Foundation Term students' Personality Preferences were sorted by discipline, statistically significant results were evident within the Arts and Engineering disciplines in the Foundation Term. Within Arts, students' preferences towards Feeling were overrepresented. Within Engineering, students' preferences towards Introversion and/or Thinking were overrepresented. Statistically significant results were not apparent for students' preferences towards Sensing or Intuition and Judging or Perceiving. These identified differences by discipline; along with 48% of the sample population being from the Arts discipline, may help to describe some of this variability in comparison to Sak's review of the literature. As well, Sak's (2004) study identified students who were enrolled in an 'honours' or a 'gifted' program, while the current study sample consists of exceptionally bright students who have failed in their first year of post-secondary education.

Although there was variability in the distributions of Psychological Types and Personality Preferences between Sak's review of the literature and the current study, there were also commonalities. Interestingly, both studies highlight significant differences between the sample population of students who identify with ENFP or ENTP Psychological Types and the normal population who identify with the same type. As noted in Chapter Four, students who identified with ENFP and / or Perceiving type preferences had statistically significantly lower averages than students who identified with ESFJ and / or Judging type preferences. Students who identified with the Psychological Type ENFP and / or Perceiving type preferences were also less likely to continue in their degree after the Foundation Term or persist to graduation, than the expected number of students. Literature surrounding the ENFP Psychological Type and

the N and P combination of Personality Preference supports these findings; highlighting that ENFP's and the N/P combination are most commonly the 'gifted' or 'academically talented' students, but also, are the most 'at-risk' of not completing an undergraduate degree (e.g., Clark, 2000; O'Brien, Bernold & Akroyd, 1998; Kim & Han, 2014; Rosati, 1997; Sak, 2004; Sanborn, 2013).

Similarly, the identified associations between Psychological Types, Personality Preference and academic success that are highlighted in this study are consistent with numerous other studies. For example, DiRienzo, Das, Synn, Kitts, and McGrath (2010), found that students that identified with J (Judging) preferences generally had higher GPAs. Similarly, Barrineau (2005) discovered that students who identified with P (Perceiving), NP (Intuition and Perceiving) or ENFP (Extraverted Intuition with Feeling and Perceiving) were moderately more 'at risk' of attrition than students who identified with other Personality Preferences or Psychological Types. Finally, Sanborn (2013), identified a direct effect relationship between the ENFP Psychological Type and her students first-semester GPAs'. Similar to the findings of this study, DiRienzo, Das, Synn, Kitts, and McGrath (2010) and Sanborn's (2013) study also found that students level of academic success, based on their Personality Preferences and Psychological Type, as a whole was consistent across STEM and ARTS disciplines.

Phase Two helped to further the initial quantitative understanding of why certain students may be more academically successful than their peers after participating in the Foundation Term. Research Question #3 was employed to qualitatively investigate the following: *What perceptions do instructors have about the learning environment and learner preferences of Foundation Term students enrolled in their course?*

Semi-structured interviews were conducted with instructors who taught these students in the Strategies and Skills for Academic Success course and advisors who worked with these students before, during and after the Foundation Term. After reviewing the subthemes two overarching themes emerged: *Areas for Growth in Student Learning* and *Administrative Challenges Facing the Foundation Term.*

The first overarching theme, *Areas for Growth in Student Learning*, shared many commonalities with the literature noted in Chapter 2 around retention and success in higher education, as well as, Jung's Theory of Psychological Type. For example, the subthemes: *Learning is Holistic and Individualized*, *Manage Stress and Practice Resiliency, Practice - Often!*, *Keep Trying*, and *Think about Thinking and Reflect on Experiences* as noted in the present study aligns with Kuh et. al.'s 2011 work which identified the key elements of a student's success as their satisfaction, their persistence, their purpose for learning and their personal development. Similarly, the subthemes: *Lack of Academic Skills, Lack of Life Skills, Time Management and Impulse Control, Critical Thinking and Problem Solving, Communication,* and finally, *Program and/or University 'Fit',* have similarities with Lawrence's 2009 study that identifies four factors that influence the learning process based on student's Psychological Type: 1) the approach in which an individual processes information cognitively; 2) the individual's attitude and interest in engaging with the information; 3) the individual's drive to identify learning environments which match their interests; and 4) the individual's ability to identify and successfully integrate appropriate learning tools and strategies into their learning process. Table eighteen graphically organizes the above subthemes around Areas for Growth in Student Learning in relation to findings from Kuh et. al., (2011) and Lawrence (2009).

Kuh, et. al. (2011) study on the Key Elements in a Student's Success	Present study subthemes surrounding Areas for Growth in Student Learning		Lawrence (2009) study on Factors that Influence the Learning Process based on Student's Psychological Type	Present study subthemes surrounding Areas for Growth in Student Learning
their satisfaction	Create Holistic and Individualized Learning Experiences		the approach in which an individual processes information cognitively	Time Management and Procrastination Critical Thinking and Problem Solving Communication
their persistence	Practice - Often! Keep Trying		the individual's attitude and interest in engaging with the information	Self-Awareness
their purpose for learning	Think about Thinking		the individual's drive to identify learning environments which match their interests	Program and/or University 'Fit'
their personal development	Reflect on Experiences Manage Stress and Practice Resiliency		the individual's ability to identify and successfully integrate appropriate learning tools and strategies into their learning process	A Spectrum of Academic Strategies A Spectrum of Life Skills

Table 18: An illustration of the Areas for Growth in Student Learning in relation to student success research - Kuh (2011) and Psychological Type research - Lawrence (2009)

The second overarching theme, Administrative Challenges Facing the Foundation Term shared many commonalities with the literature noted in Chapter 2 around creating effective interventions. For example, the subthemes: *Differentiating Support* and *Creating Opportunities for Application and Practice*, as noted in the present study aligns with Kuh et. al.'s 2011 work which highlights that faculty and administrators must share the responsibility in creating interactive learning environments that are conducive to engaging their students. Similarly, the subtheme: *Is the Foundation Term the right 'Fit' for Everyone,* as noted in the present study aligns with Horstmanshof and Simitat's (2007) research which identified the importance of enhancing a student's level of engagement within his/her environment, which in turn, will improve the level of academic success (Horstmanshof & Zimitat, 2007). As highlighted in Chapter Two, CAS identified eight principles for post-secondary environments that help to foster and enhance student learning, development, achievement and to promote good citizenship (Council for Advancements of Standards in Higher Education, 2015). These eight principles help to further explain the findings surrounding the Administrative Challenges Facing the Foundation Term as noted in table nineteen.

CAS Principles (2015)	supporting the 'whole' student, not just the student's academic pursuits	understanding that each student is unique and opportunities and services should be tailored appropriately	leveraging the whole post-secondary environment as a place for learning, not just the classroom	recognizing that students will access opportunities and services which they deem valuable, relevant and are made known to them in a timely manner	highlighting social and cultural resources which provide purposeful opportunities for students to learn and develop holistically	acknowledging that the student is primarily responsible for their own learning and development	celebrating the diversity of the societies and cultures within the institution	creating balanced learning environments that provide both educational choices and challenges along with support to nurture a student's development
Administrative Challenges Facing the Foundation Term	Is the Foundation Term the right 'Fit' for Everyone?	Differentiating Support	Application and Transferability of the Strategies and Skills for Academic Success course	Length and Structure of the Foundation Term	**	Gaining Student 'Buy-In'	**	Creating Opportunities for Application and Practice

** topic was not evident in the present study findings

Table 19: A tabular depiction of the Administrative Challenges Facing the Foundation Term in relation to identified Council for Advancements in Standards in Higher Education (2015) principles that help to foster and enhance student learning, development and achievement and to promote good citizenship

Phase Three of this research study further explored why students who identify with certain Psychological Types or specific Personality Preferences may be more academically successful than their peers after participating in the Foundation Term. Two binary logistic regressions were conducted to link Phase One and Phase Two of this study to a specific university classroom and highlight the potential of a predictive model. This model suggested that students who identified with any other Psychological Type besides ENFP had 2.84 times higher odds of continuing to be enrolled at the university or persisting to graduation, than students who identified with the ENFP Psychological Type. Similarly, students who identified with Judging Personality Preferences had 2.289 times higher odds of continuing to be enrolled at the university or persisting to graduation than those who identified with Perceiving Personality Preferences. Finally, higher grades in the Strategies and Skills for Academic Success course during the Foundation Term were also associated with an increased likelihood of continuing to be enrolled at the university or persisting to graduation. The predictive power of this regression model was highlighted in Chapter Four, noting that it can correctly identify students who will remain 'here' or persist to graduation upon completion of the Foundation Term successfully, 91% of the time. However, the model can only successfully identify students who are 'not here' after the completion of the Foundation Term 65% of the time. These findings are consistent with the literature noted in Chapter Two regarding conducting effective research on student success. Numerous student success models have been established; however, these models will never produce perfect results (or in turn perfect retention) because students are unique (Kuh, Kinzie, Bridges, & Hayek, 2007; Singell & Waddell, 2010; Tinto, 1999). When assessing the predictive model in this study, it is not surprising

that the linear regression model was only successful at predicting students who were 'not here' 65% of the time after completion of the Foundation Term. Students who identify with the ENFP Psychological Type are considered the most 'out of the box', 'independent' thinkers. They tend to shy away from the social norm and are fundamentally different in the way they learn. As such, they often take their own 'paths' through education ("The Myers Briggs Foundation," 2015; Sanborn, 2013). These paths may not always produce the patterns that would be necessary to accurately predict their rate of attrition with a regression model.

Implication for Practice/Recommendations

Practically, this study aimed to identify if Psychological Type could help to create richer conversations between advisors and 'at-risk' students around intervention choices as well as more effective academic interventions (Hirsch, 2013).

Creating richer conversations between advisors and students around intervention choices. As noted in Chapter One, advisors are often the first point of contact for our 'at-risk' learners. After a student fails, they are also the individuals who assist students in making decisions around whether to enter into the Foundation Term. As a key influencer of a student's decision-making processes and persistence to graduation, it is important that advisors feel appropriately prepared to engage in informed conversations about learning and personal development with students about their chosen 'path' after failure (Chickering & Gamson, 1987; Glennen, Farren, & Vowell, 1996; Guillén, 2010; Kuh et al., 2007; Seidman, 1991).

The findings from this study surrounding Psychological Type and Personality Preference helps to create more standardization in the screening process. As well, it adds

an extra analytical dimension to the conversations between advisors and their 'at-risk' students who are considering entering into certain types of interventions. Finally, it simplifies the complex topic of learning and information processing into a number of different student characteristics that advisors and students can use to help each student become more metacognitively aware of the choices they are making. As noted in figure twenty-five, a recommended approach has been created for use with advisors and students which:

1. identifies practical questions which advisors can ask to help students identify their preferences towards Extraversion or Introversion; Sensing or Intuition; Thinking or Feeling; and, Judging or Perceiving based on the MBTI self-assessment tool
2. creates a portrait of each exceptionally bright, but academically 'at-risk' student based on this Psychological Type
3. summarizes the literature around Psychological Type and Personality Preference
4. incorporates the findings of this research study to help students make informed choices

Figure twenty-six and figure twenty-seven expand on step one, step two, and step three of the recommended approach and provide advisors with potential handouts to use during their meetings with students. Figure twenty-eight expands on step four of the recommended approach and provides advisors with a process-oriented, decision-making tree.

Figure 25: A recommended approach to include Psychological Type into the Foundation Term screening process

Your Information Processing and Decision Making

For each question, circle the letter (example: 'E') that seems most natural – even if you don't agree with every point that corresponds to that letter.

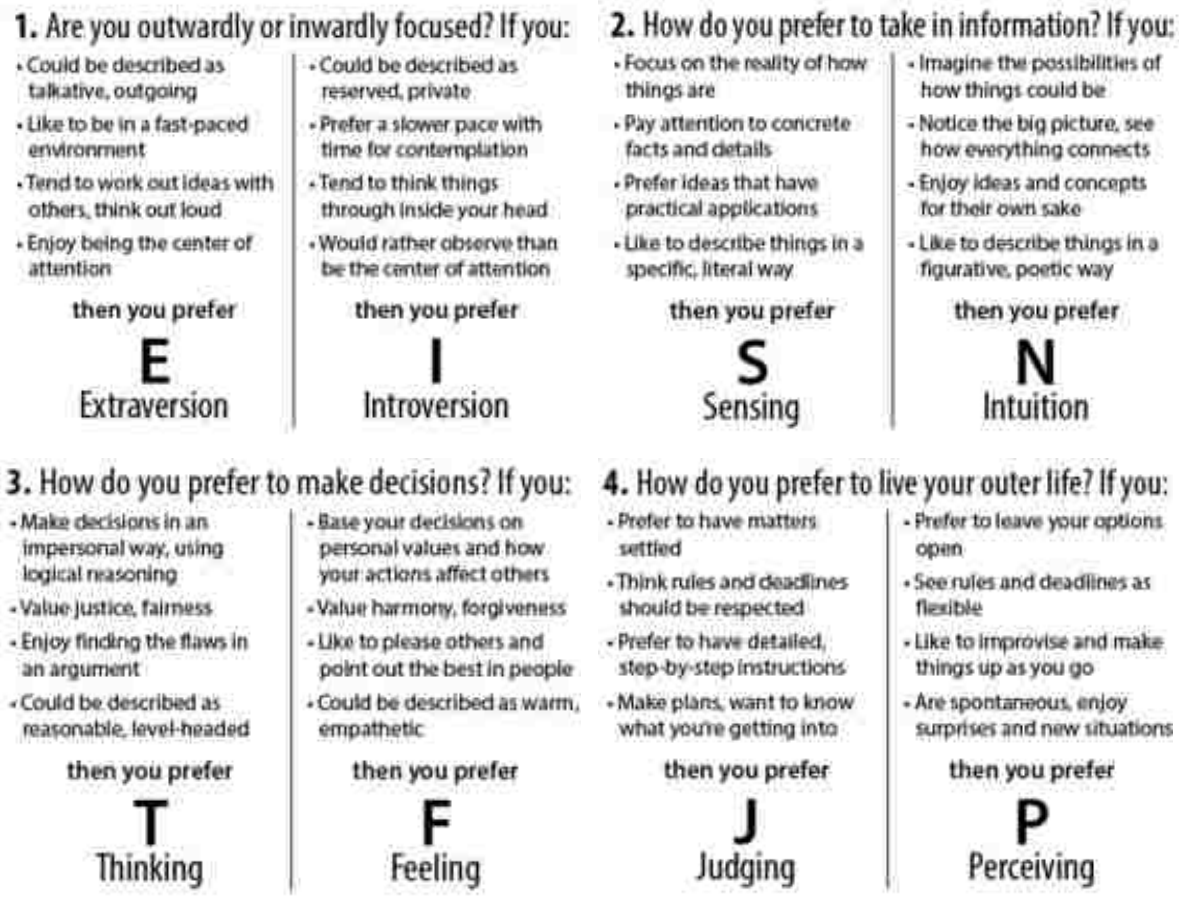

Figure 26: Sample questions / handout to implement into the advisor student conversation

ISTJ Quiet, serious, earn success by thoroughness and dependability. Practical, matter-of-fact, realistic, and responsible. Decide logically what should be done and work toward it steadily, regardless of distractions. Take pleasure in making everything orderly and organized - their work, their home, their life. Value traditions and loyalty.	ISFJ Quiet, friendly, responsible, and conscientious. Committed and steady in meeting their obligations. Thorough, painstaking, and accurate. Loyal, considerate, notice and remember specifics about people who are important to them, concerned with how others feel. Strive to create an orderly and harmonious environment at work and at home.	INFJ Seek meaning and connection in ideas, relationships, and material possessions. Want to understand what motivates people and are insightful about others. Conscientious and committed to their firm values. Develop a clear vision about how best to serve the common good. Organized and decisive in implementing their vision.	INTJ Have original minds and great drive for implementing their ideas and achieving their goals. Quickly see patterns in external events and develop long-range explanatory perspectives. When committed, organize a job and carry it through. Skeptical and independent, have high standards of competence and performance - for themselves and others.	ISTP Tolerant and flexible, quiet observers until a problem appears, then act quickly to find workable solutions. Analyze what makes things work and readily get through large amounts of data to isolate the core of practical problems. Interested in cause and effect, organize facts using logical principles, value efficiency.	ISFP Quiet, friendly, sensitive, and kind. Enjoy the present moment, what's going on around them. Like to have their own space and to work within their own time frame. Loyal and committed to their values and to people who are important to them. Dislike disagreements and conflicts, do not force their opinions or values on others.	INFP Idealistic, loyal to their values and to people who are important to them. Want an external life that is congruent with their values. Curious, quick to see possibilities, can be catalysts for implementing ideas. Seek to understand people and to help them fulfill their potential. Adaptable, flexible, and accepting unless a value is threatened.	INTP Seek to develop logical explanations for everything that interests them. Theoretical and abstract, interested more in ideas than in social interaction. Quiet, contained, flexible, and adaptable. Have unusual ability to focus in depth to solve problems in their area of interest. Skeptical, sometimes critical, always analytical.
ESTJ Practical, realistic, matter-of-fact. Decisive, quickly move to implement decisions. Organize projects and people to get things done, focus on getting results in the most efficient way possible. Take care of routine details. Have a clear set of logical standards, systematically follow them and want others to also. Forceful in implementing their plans.	ESFJ Warmhearted, conscientious, and cooperative. Want harmony in their environment, work with determination to establish it. Like to work with others to complete tasks accurately and on time. Loyal, follow through even in small matters. Notice what others need in their day-by-day lives and try to provide it. Want to be appreciated for who they are and for what they contribute.	ENFJ Warm, empathetic, responsive, and responsible. Highly attuned to the emotions, needs, and motivations of others. Find potential in everyone, want to help others fulfill their potential. May act as catalysts for individual and group growth. Loyal, responsive to praise and criticism. Sociable, facilitate others in a group, and provide inspiring leadership.	ENTJ Frank, decisive, assume leadership readily. Quickly see illogical and inefficient procedures and policies, develop and implement comprehensive systems to solve organizational problems. Enjoy long-term planning and goal setting. Usually well informed, well read, enjoy expanding their knowledge and passing it on to others. Forceful in presenting their ideas.	ESTP Flexible and tolerant, they take a pragmatic approach focused on immediate results. Theories and conceptual explanations bore them - they want to act energetically to solve the problem. Focus on the here-and-now, spontaneous, enjoy each moment that they can be active with others. Enjoy material comforts and style. Learn best through doing.	ESFP Outgoing, friendly, and accepting. Exuberant lovers of life, people, and material comforts. Enjoy working with others to make things happen. Bring common sense and a realistic approach to their work, and make work fun. Flexible and spontaneous, adapt readily to new people and environments. Learn best by trying a new skill with other people.	ENTP Quick, ingenious, stimulating, alert, and outspoken. Resourceful in solving new and challenging problems. Adept at generating conceptual possibilities and then analyzing them strategically. Good at reading other people. Bored by routine, will seldom do the same thing the same way, apt to turn to one new interest after another.	ENFP Warmly enthusiastic and imaginative. See life as full of possibilities. Make connections between events and information very quickly, and confidently proceed based on the patterns they see. Want a lot of affirmation from others, and readily give appreciation and support. Spontaneous and flexible, often rely on their ability to improvise and their verbal fluency.

Contents of figure excerpted from Introduction to Type (Briggs & Myers, 1998)

Figure 27: Sample handout to identify the student's Personality Type and provide literature for the advisor student conversation

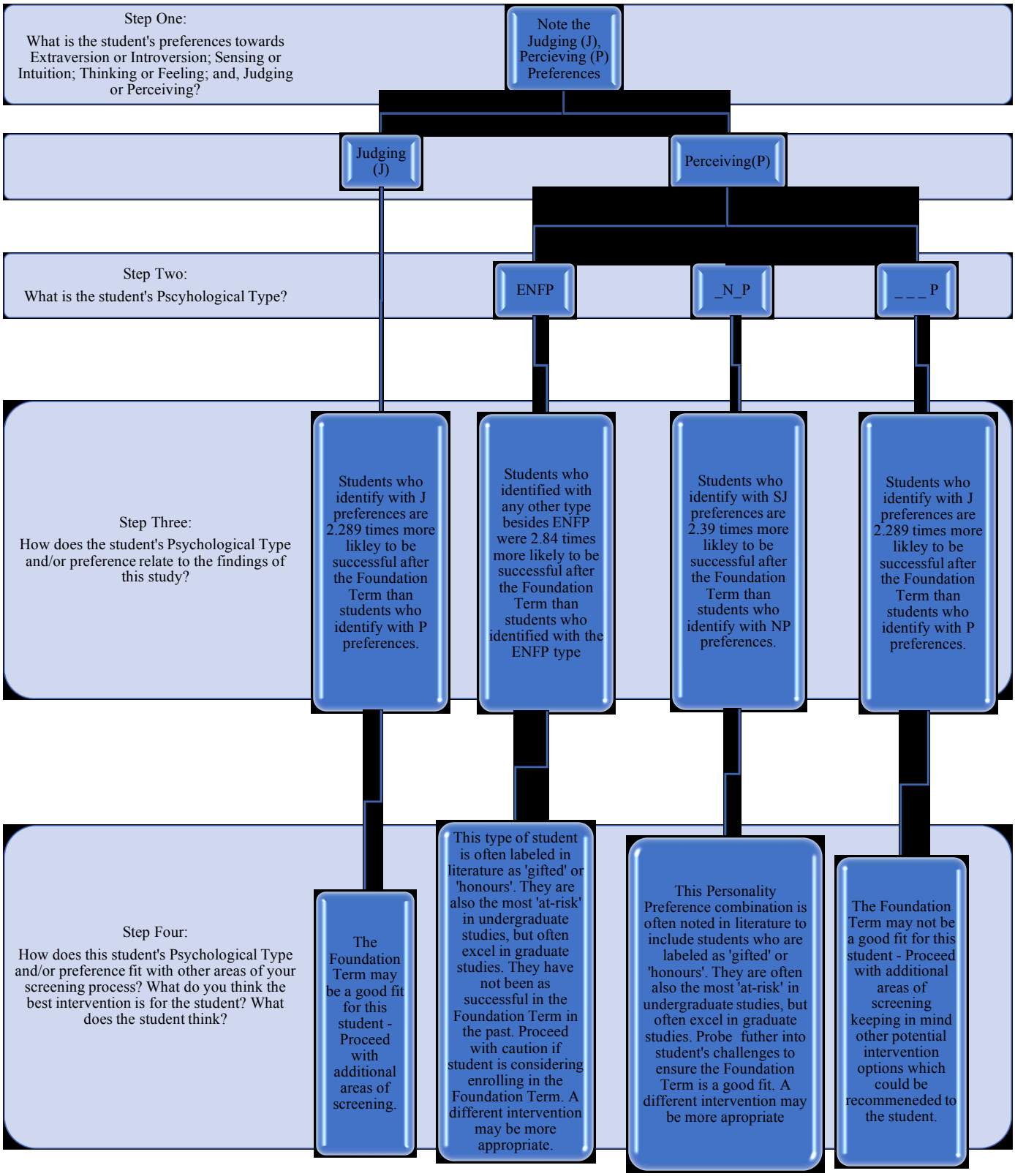

Figure 28: A process-oriented decision making tree to support advisors in step 4 of the recommended screening approach

Creating More Effective Academic Interventions

Literature by Kuh, et. al. (2011) and Lawrence (2009) were used to help simplify the Areas for Growth in Student Learning identified in this study. Curriculum developers and intervention designers could use this approach to ensure the key messages around student success are included appropriately in their intervention designs. As well, using this literature could help to simplify and categorize the portions of their programming to ensure the key messages are being disseminated in ways that are meeting the unique needs of their student population. It could also help to identify gaps in the programming that may have not been addressed.

In the current study the key messages surrounding Areas for Growth in Student Learning were identified, but the findings of this study would suggest that these key messages are not being disseminated in ways that are meeting the unique needs of students who identify with the ENFP Personality Type, or NP Personality Traits. As shown in table twenty, the integration of the Literature by Kuh, et. al. (2011) and Lawrence (2009) and literature surrounding the different Personality Types could help educators and administrators to create ENFP /NP friendly style interventions / environments at this institution. As noted throughout the literature in this study, these Personality Types / Personality Preference combinations are often noted as 'gifted' or 'honours' students who excel beyond undergraduate studies. It would be in post-secondary institutions' best interests to ensure that there are intervention approaches that have been designed specifically to support students who identify with this Personality Type and/or Personality Preference combinations. Potential ENFP /NP friendly intervention strategies could look similar in approach to currently available retention

initiatives– for example career exploration workshops, strategies and skills courses, new student transition programming etc. Or, the ENFP /NP friendly intervention strategies could be innovative in their approach – for example experiential service learning opportunities which incorporate time management, self-awareness and communication skills into the experience. Whichever approach is utilized, the development and delivery of *separate* content within these intervention strategies would need to be implemented. For example, to support this exceptionally bright but academically at risk group of learners around their time management content must assist students in 'bridging the gap' between their preferences towards processing information and making decisions in free flowing continuums and the structures and processes associated 'traditionally' with managing your time on university campuses.

Kuh, et. al. (2011) study on the Key Elements in a Student's Success	**Present study subthemes surrounding Areas for Growth in Student Learning**	**How does the curriculum / intervention support key elements in a student's success for ENFP Personality Type and / or NP Personality Preference combinations?**	**Lawrence (2009) study on Factors that Influence the Learning Process based on Student's Psychological Type**	**Present study subthemes surrounding Areas for Growth in Student Learning**	**How does the curriculum / intervention support the unique needs and approaches to learning for ENFP Personality Type and / or NP Personality Preference combinations?**
their satisfaction	Create holistic and individualized learning experiences		the approach in which an individual processes information cognitively	Time Management and Procrastination Critical Thinking and Problem Solving Communication	*Example:* *Insert practical approaches to time management for students who see time as a continuum.*
their persistence	Practice - often! Keep trying		the individual's attitude and interest in engaging with the information	Self-Awareness	
their purpose for learning	Think about thinking		the individual's drive to identify learning environments which match his/her interests	Program and/or University 'Fit'	
their personal development	Reflect on experiences Manage stress and practise resiliency		the individual's ability to identify and successfully integrate appropriate learning tools and strategies into his/her learning process	A Spectrum of Academic Skills A Spectrum of Life Skills	

Table 20: A graphic organizer to support the design of student success and retention curriculum / interventions based on Personality Type / Preference combinations

Similarly, the CAS principles were incorporated in to this study to help to simplify the Challenges of Administering the Foundation Term. Using these CAS principles standardizes the goals of effective programming. Curriculum developers and intervention designers can use this to simplify and categorize the portions of their programming, to ensure they are meeting the unique needs of their student population. As well, it can help to highlight areas that may have not been addressed by the programming. For example, table nineteen noted on page 149, identified that the present study findings did not address two of the eight CAS principles: 1. highlighting social and cultural resources, which provide purposeful opportunities for students to learn and develop holistically and 2. celebrating the diversity of the societies and cultures within the institution. Demographically, the researched university where this study took place is very culturally diverse; yet, the findings from this study do not speak to this diversity. This could either mean the instructors and advisors feel this topic has been addressed appropriately in the Foundation Term – or that these topics were missed entirely. Therefore, the above tables could be useful in the planning stages of curriculum and program development for 'at-risk' learners. These templates could help to ensure choices around the design of curriculum and programming is made intentionally. Whether the designers and administrators of the Foundation Term program intentionally omitted cultural diversity from the programming is beyond the scope of this study. However, the template that incorporated CAS principles into the planning process highlighted the omission of these two areas surrounding cultural diversity.

Practical Recommendations

It is recommended that the curriculum within the Strategies and Skills course be reviewed critically to determine if it can support the diverse range of Psychological Types within the classroom – in particular those students who identify with the ENFP Personality Type and the NP Personality Preference combination. A redesign of this course may be necessary to support the differentiated needs of these exceptionally bright but academically 'at-risk' learners. Alternatively, a supplementary intervention could be designed which works to support ENFP learners in developing strategies that work within our post-secondary environment, which is not always conducive to their flexible, creative and innovative learning approaches. Similarly, it is recommended that the curriculum of the Strategies and Skills for Academic Success course and any other intervention approaches that may stem from this course be reviewed critically to ensure that they appropriately address cultural diversity.

Broadly speaking, it is recommended that administrators, both within the post-secondary environment AND high-school environment consider ways to integrate psychological type into classroom and campus environments. This integration could provide teachers, instructors, and support staff with tangible ways to differentiate their approaches to 'preparing students' for post-secondary education.

Using psychological type would support the development of individualized programming / interventions that empower students to understand how their personal preferences towards information processing and decision making may differ from their instructors and their peers. This type of programming would also be a powerful tool in helping to 'bridge the gap' between high-school learning environments and post-

secondary learning environments. For example, integrating curriculum surrounding psychological type into grade 12 classrooms would support students in understanding their unique preferences. As well, it would allow students to compare and contrast their preferences with common post-secondary environments and instructor preferences. Grade 12 teachers could then work with students to identify practical learning strategies within a given subject (e.g. problem solving strategies for math, time management strategies for paper writing) that supports the 'bridging' of student's preferences with that of their scholastic environment. Support staff and instructors in post-secondary settings could then reinforce these same messages around psychological type. This would continue to support students as they differentiate their approaches to learning in a post-secondary environment during orientation programming / first year interventions.

Finally, to promote the consistent use of messages and learning strategies, high-school and post-secondary administrators should remain up-to-date with how material surrounding psychological type is being delivered in the different scholastic environments. In both scholastic environments the way we work with students around psychological type should remain the same. However, the programming which promotes the use of psychological type and the practical application of the individualized learning strategies surrounding this theory should be tailored to particular campus environments / cultures to ensure its effectiveness.

Implications for Theory

This study drew on the foundational learning theories of Piaget (1952), Vygotsky (1978), and Bandura (1977), as well as Jung's (1921) Theory of Psychological Type. Piaget's (1952) Theory of Cognitive Development was evident in the findings from Phase

One of this study. Piaget suggests that biological implications and environmental influences shape learners' higher order thought processes. When exploring students' Personality Types in relation to their academic success, the findings of this study highlight that there were identifiable patterns in students' Personality Types (an innate biological trait) based on their level of academic success during and after the Foundation Term. Similarly, Phase Two of this study also supported ideas from Vygotsky's (1978) Social Development Theory. This theory positions the learner in relation to their historical, cultural or institutional environment. The themes of Administrative Challenges of the Foundation Term highlighted the interactions between the individuals within the classroom environment and the interplay of their beliefs and attitudes towards how learning occurs. However, when reviewing Phase One, Phase Two and Phase Three of this study holistically, the findings of this study most closely align with Bandura's Cognitive Theory (1977) and in particular the importance of personal factors within the process of triadic reciprocal causation (1989).

Bandura suggests that learners are neither driven by biological form, as noted by Piaget, nor by social interactions, as noted by Vygotsky. Instead, learning occurs through a process of triadic reciprocal causation (1989). The findings from this study support this dynamic interplay among personal (cognition, affect and biological forms), behavioral (social and cultural beliefs), and environmental influences. For example, for some students who identified with the ENFP Personality Type, the institution and particular intervention approaches as noted by the theme *Program and/or university 'fit'* suggests that this environmental factor along with personal factors including a *spectrum of academic and life skills* and a need to *create holistic and individualized learning*

experiences led to the behavioural factor of students being disengaged in the Foundation Term. Similarly, certain Personality Types and Personality Preference combinations (personal) were over-represented or under-represented in the student population based on their discipline of study (environmental). Finally, this dynamic interplay is evident in students' Personality Types and Personality Preference combinations (personal) in relation to their time management and procrastination tendencies (behavioral) and success in the Strategies and Skills for Academic Success course (environmental). This dynamic interplay between personal (cognition, affect, and biological forms), behavioral (social and cultural beliefs), and environmental influences is outlined further in figure twenty-nine.

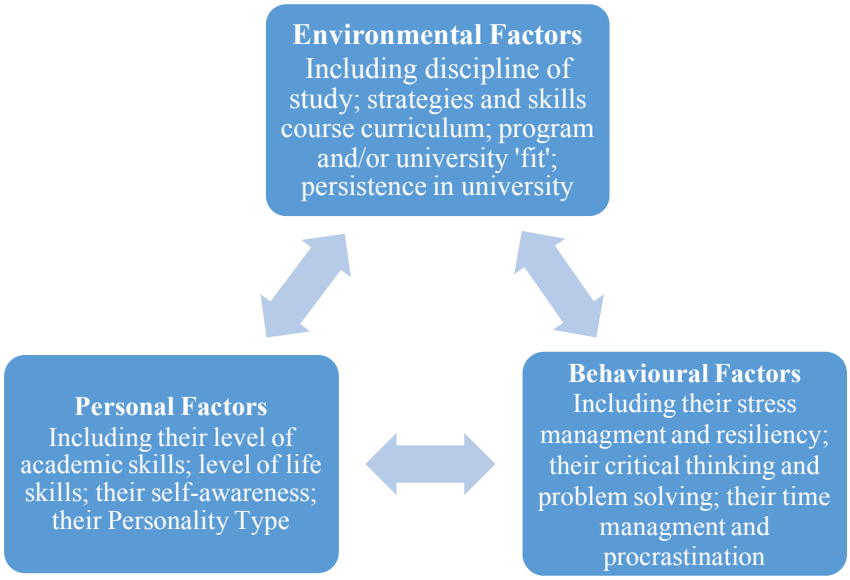

Figure 29: Interplay of Bandura's (1989) three reciprocal factors related to the findings of this three-phase study

This study extends the current literature by using Piaget (1952), Vygotsky (1978), and Bandura's (1977) theories in conjunction with Jung's (1921) Theory of Psychological Type. This unique combination gives a holistic presentation around Personality Type, student success and how students learn, process information and make decisions. While differing in their epistemological positions, the similarities in Piaget, Vygotsky and Bandura's research provides insights into the dynamic interplay between the personal, environmental, and behavioral factors with respect to exceptionally bright but academically 'at-risk' post-secondary learners based on their Personality Type. In addition, Carl Jung's Theory of Psychological Type (1921) and the practical MBTI self-assessment tool which align with this theory highlights the individual differences in student learning and how these unique characteristics may influence academic success (e.g., Felder & Brent, 2005; Fourqurean, Meisgeier, & Swank, 1990; Kim, Lee, & Ryu, 2013; Kuh, 2009; Riding & Rayner, 2013; Sadler-Smith, 2001; Xie, 2015). By situating the exceptionally bright, but academically 'at-risk', learner in relation to their internal and external information processing and decision making, we can help to simplify some of the complexity around student learning and inform retention efforts. As noted in figure thirty, Bandura's (1989) process of triadic reciprocal causation, Jung's (1921) Psychological Type and Lawrence's (2009) study which bridges Personality Type and learning have been depicted pictorially. This model highlights the dynamic interplay between how the student learns, how they process information and make decisions and the need to be cognizant of the environmental, personal and behavioural factors when designing interventions that are in-line with the student's Personality Type.

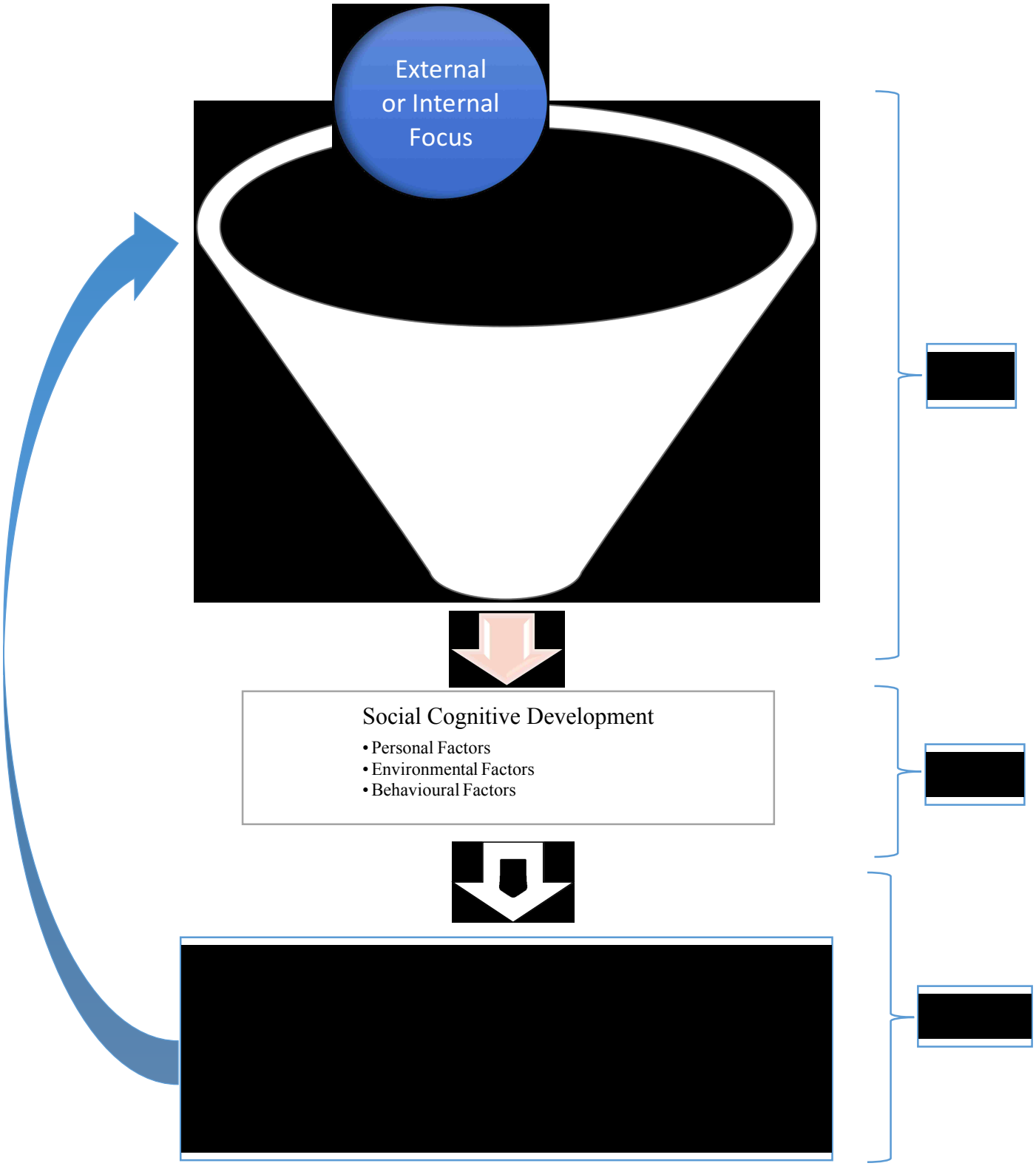

Figure 30: Psychological Type, learning and retention - The dynamic interplay between how students process information and make decisions, their social cognitive development and considerations for the development and streamlining of appropriate interventions

The above model is preliminary and denotes the processes and approaches taken in this study to simplify the findings surrounding Psychological Type, learning and retention. Social cognitive theory suggests other factors, for example; socioeconomic status, institutional structure, culture, family support etc. that influence student's goals, self-efficacy and mental states (Pajares, 2002). More research is needed into this model, including other environmental factors (for example, student's living arrangements) and behavioral factors (for example, student's self-efficacy) to see how these factors influence student success based on Personality Type.

Limitations of the Study

The study represents the Personality Types and academic success rates of one group of exceptionally bright but academically 'at-risk' students at the researched university. As well, it notes the perspectives of a group of instructors and academic advisors who worked with this particular population of students. While the sample size for the quantitative portions of this study were relatively large, caution should be taken when considering generalizing the findings beyond the particular institution studied. Similarly, the themes noted in the qualitative portions of this study represent the perspectives and experiences of instructors and advisors at the researched university that was supporting one particular type of retention program. As a result, the specific themes identified may not be reflective of other institutions' 'at-risk' students and retention efforts/programming. While the generalizability of these findings is a limitation of this study, the processes taken to study exceptionally bright but academically 'at-risk' students are transferable. Upon an institution collecting and analyzing their own data, the

practical and theoretical recommendations identified in this study could be implemented at their institution.

Another limitation of the study was the specificity of the 'predictive power' of the three logistic regression models that ranged between 35 - 38%. This means that between 45 – 48 students out of a possible 125 students were properly predicted as being 'not here' based on their preferences towards the ENFP Psychological Type, the Intuition / Perceiving Personality Preference combination, the Perceiving Personality Preference and students' grades in the Strategies and Skills for Academic Success course. However, the sensitivity of the 'predictive power' of the three logistic regression models ranged between 91– 92%. This translates to between 260 – 263 students out of a possible 287 students were properly predicted as being 'here' based on their preferences towards a different Personality Type besides ENFP, a different Personality Preference combination besides NP, or the P Personality Preference. While the models' ability to predict students who are more likely to remain at the institution after the Foundation Term / persist to graduation is strong, the addition of certain demographics (for example, what gender the student identifies with, whether they identify as a native Canadian, whether they identify as a native English speaker etc.) help to improve the predictive power of the model that identifies which students will not remain at the University.

Suggestions for Future Research

This study was conducted due to my close proximity working with exceptionally bright but academically 'at-risk' post-secondary learners and the observed limited research that addressed this specific population of students. Thus, more Canadian-based research is needed to continue to explore patterns surrounding Psychological Type and

exceptionally bright but academically ‘at-risk’ post-secondary learners. This research would not only add to the literature, but also, can practically support the diversification of retention efforts on Canadian university campuses.

The design of this research study was divided into three research phases and included both quantitative and qualitative analyses of exceptionally bright but academically at-risk university learners. This mixed methods approach, provided an overall composite assessment of the problem” and results were not compared directly, but instead, resided side by side to inform the broader perspective of characteristics of *exceptionally bright but academically ‘at-risk’ university learners* at my university. As the results were not compared directly, future research could also utilize the methods identified in the different phases of this study independently.

For example, a cross-cultural study that replicates the quantitative methodology of this study, but includes a population of exceptionally bright but academically ‘at-risk’ students from different countries and different institutions may offer additional insights into the relationship between Psychological Type, academic success and environmental, cultural and societal influences. Similarly, the predictive model noted in Chapter Four could be further enhanced by incorporating factors including gender, culture, living arrangements, financial stability etc. into the model to identify moderation effects.

Studies could also be conducted to further support the differentiation of retention efforts based on Psychological Type by replicating the qualitative methods in this study. For example, capturing the perceptions and experiences of advisors and instructors who supported students within their discipline-specific courses during the Foundation Term. Capturing the perceptions and experiences of students who have completed the

Foundation Term by conducting a discourse analysis of their assignment submissions during the Strategies and Skills for Academic Success course and/or conducing qualitative interviews to gather their feedback on the curriculum.

Finally, cross-referencing end of term course evaluations with students' grades in the Strategies and Skills for Academic Success course, persistence to graduation after the Strategies and Skills for Academic Success course could help to capture a different view of this retention effort.

Conclusion

Psychological Type can be used as an indicator for underperforming exceptionally bright learners. Understanding Psychological Type can help students to begin to understand 'how' they process information and make decisions. A metacognitively aware student recognizes their strengths and weaknesses as learners and can apply their cognitive resources in more strategic ways and find ways to extend their knowledge and capabilities (Bransford, Brown, & Cocking, 2000). Understanding Psychological Type can help advisors feel more appropriately prepared to engage students in conversations about learning, personal development and their chosen 'path' after failure. Patterns in the students' preferences towards information processing and decision-making add an extra analytical dimension to the conversation between advisors and their 'at-risk' students who are considering entering into certain types of interventions.

Highlighting relationships between Psychological Type and academic success could also help to inform pro-active identification of 'at-risk' students, more customized intervention approaches, as well as modes of classroom instruction / design both at the secondary and post-secondary level. Upon the completion of this study, I note the

importance of integrating my findings surrounding Psychological Type and academic success with other important cultural, gender and socio-economic variables. For example, combining the findings from this study with research into identified 'gifted learners' transitioning from secondary school into university. Identifying patterns in Psychological Type and academic success that incorporate this additional socio-economic variable could help to proactively predict a 'priority population' of exceptionally bright students that advisors and learning strategists could connect with at the onset of university studies.

The continued integration of each cultural, gender and socio-economic variable would provide a more robust description of this exceptionally bright student population. As well as, a richer standardized screening tool for advisors and students to use. This results in a more customized student-centered approach to supporting this population of post-secondary learners.

REFERENCES

Ackerman, B. P. (1982). Retrieval variability: The inefficient use of retrieval cues by young children. *Journal of Experimental Child Psychology*, *33*(3), 413–428. http://doi.org/10.1016/0022-0965(82)90056-X

Akbulut, Y., & Cardak, C. S. (2012). Adaptive educational hypermedia accommodating learning styles: A content analysis of publications from 2000 to 2011. *Computers & Education*, *58*(2), 835-842.

Allen, J., & Robbins, S. B. (2008). Prediction of college major persistence based on vocational interests, academic preparation, and first-year academic performance. *Research in Higher Education*, *49*(1), 62-79.

Alphonoso, C. (2014, April 14). Citing grade inflation in high schools, elite program boosts its own marks. *The Globe and Mail*. Retrieved from http://www.theglobeandmail.com/news/national/education/elite-ib-program-to-boost-marks-in-response-to-grade-inflation/article17953433/

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Retrieved from http://dsm.psychiatryonline.org/book.aspx?bookid=556

Andrade, M. S. (2008). The value of a first-year seminar: International students' insights in retrospect. *Journal of College Student Retention: Research, Theory and Practice*, *10*(4), 483–506. http://doi.org/10.2190/CS.10.4.e

Appleton, J. J., Christenson, S. L., Kim, D., & Reschly, A. L. (2006). Measuring cognitive and psychological engagement: Validation of the student engagement instrument. *Journal of School Psychology*, *44*(5), 427–445.

Arendale, D. (2002). History of supplemental instruction (SI): Mainstreaming of developmental education. *Histories of Developmental Education*, 15–27.

Arnold, K. E. (2010). Signals: Applying academic analytics. *EDUCAUSE Quarterly*, *33*(1).

Arnold, K. E., & Pistilli, M. D. (2012). Course Signals at Purdue: Using learning analytics to increase student success. In *Proceedings of the 2Nd International Conference on Learning Analytics and Knowledge* (pp. 267–270). New York, NY, USA: ACM. http://doi.org/10.1145/2330601.2330666

Astin, A. W. (1984). Student involvement: A developmental theory for higher education. *Journal of College Student Personnel*, *25*(4), 297–308.

Baeten, M., Kyndt, E., Struyven, K., & Dochy, F. (2010). Using student-centred learning environments to stimulate deep approaches to learning: Factors encouraging or discouraging their effectiveness. *Educational Research Review*, *5*(3), 243-260.

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1989). Social cognitive theory. In *Six theories of child development* (Vol. 6, pp. 1–60). Greenwich, CT: JAI Press. Retrieved from http://www.uky.edu/~eushe2/Bandura/Bandura1989ACD.pdf

Barrineau, P. (2005). Personality types among undergraduates who withdraw from liberal arts colleges. *Journal of Psychological Type, 65*(4), 27-32.

Barton, A., & Donahue, C. (2009). Multiple assessments of a first-year seminar pilot. *The Journal of General Education*, *58*(4), 259–278. http://doi.org/10.1353/jge.0.0051

Beach, C., Broadway, R., & McInnis, M. (2005). *Introduction: Background context and major issues in postsecondary education in Canada* (pp. 1–28). Kingston:

Queen's University John Deutsch Institute. Retrieved from http://jdi-legacy.econ.queensu.ca/Files/Conferences/PSEconferencepapers/Introduction.pdf

Bell, A. E., Spencer, S. J., Iserman, E., & Logel, C. E. (2003). Stereotype threat and women's performance in engineering. *Journal of Engineering Education*,*92*(4), 307-312.

Berger, J. B., Ramírez, G. B., & Lyons, S. (2005). Past to present. *College Student Retention: Formula for Student Success*, 1.

Bertram, S., Nelson, J., & Visanuvimol, L. (2011). *Early Identification and Intervention Influences the Success of First-year "At-risk" Science Students*. Carleton. Retrieved from http://server.carleton.ca/~sbertram/publications/documents/bertram_etal_2011_earlyidentification.pdf

Bettinger, E. P., Boatman, A., & Long, B. T. (2013). Student supports: Developmental education and other academic programs. *The Future of Children*, *23*(1), 93–115.

Bhattacharyya, E., & Shariff, A. B. M. S. (2014). Learning style and its impact in higher education and human capital needs. *Procedia - Social and Behavioral Sciences*, *123*, 485–494. http://doi.org/10.1016/j.sbspro.2014.01.1448

Borg, M. O., & Stranahan, H. A. (2002). Personality type and student performance in upper-level economics courses: The importance of race and gender. *The Journal of Economic Education*, *33*(1), 3-14.

Bransford, J.D., Brown A. L., & Cocking R., R. (2000). *How people learn: Brain, mind, experience, and school*. Washington, D.C.: National Academy Press.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77-101.

Briggs, K. C., & Myers, I. B. (1998). *Myers–Briggs Type Indicator*. Palo Alto, CA: Consulting Psychologists Press.

Britton, B. K., & Tesser, A. (1991). Effects of time-management practices on college grades. *Journal of Educational Psychology, 83*, 405–410.

Brown, A. (1975). The development of memory: Knowing, knowing about knowing, and knowing how to know. *Advances in Child Development and Behavior*, *10*(10), 103–152.

Bryman, A., Teevan, J. J., & Bell, E. (2009). *Social Research Methods: Second Canadian Edition*. Don Mills, Ont.: Oxford University Press.

Bryson, C., & Hand, L. (2007). The role of engagement in inspiring teaching and learning. *Innovations in Education and Teaching International*, *44*(4), 349–362.

Capraro, R. M., & Capraro, M. M. (2002). Myers-Briggs type indicator score reliability across studies: A meta-analytic reliability generalization study. *Educational and Psychological Measurement, 62*(4), 590-602.

Casas, F. R., & Meaghan, D. E. (1995). Grade inflation and university admissions in Ontario: Separating fact from perception. *Canadian Journal of Higher Education*, *25*(3), 49-70.

Chang, T., & Chang, D. (2000, June). ``Graduate engineering student performance assessment: How learning pattern affects test scores,". In *Proceeding of the American Society for Engineering Education Conference*.

Chiang, G. C. T. (1991). Student ratings of teachers, teacher psychological types, and teacher classroom behavior: An exploratory study in gifted education. (Doctoral dissertation, Northwestern University, 1991). *Dissertation Abstracts International*, *52*, 183.

Chappell, M. S., Blanding, B. Z., Silverstein, M. E., Takahashi, M., Newman, B., Gubi, A., & McCann, N. (2005). Test anxiety and academic performance in undergraduate and graduate students. Journal of Educational Psychology, 97, 268–274.

Chickering, A. W. (1994). Empowering lifelong self-development. *NACADA Journal*, *14*(2), 51–53. Retrieved from: https://dus.psu.edu/mentor/2013/08/comparing-satisfaction-faculty-professional-advisers/#sthash.aIslOsex.dpuf

Chickering, A. W., & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin*, *39*(7*),* 3-7.

Clark, L. (2000). A review of the research on personality characteristics of academically talented college students. *Teaching and learning in honors*, 7-20.

Clark, M. H., & Cundiff, N. L. (2011). Assessing the effectiveness of a college freshman seminar using propensity score adjustments. *Research in Higher Education*, *52*(6), 616–639. http://doi.org/10.1007/s11162-010-9208-x

Cobb, P., & Bauersfeld, H. (1995). *The Emergence of Mathematical Meaning: Interaction in Classroom Cultures*. Psychology Press.

Cobb, P., Zhao, Q., & Dean, C. (2009). Conducting design experiments to support teachers' learning: A reflection from the field. *Journal of the Learning Sciences*, *18*(2), 165–199. http://doi.org/10.1080/10508400902797933

Common University Data Ontario. (2012). *Retention Rates* (No. K3). Retrieved from http://cudo.cou.on.ca/

Common University Data Ontario. (2013). *Secondary School Averages of Full-Time, First Year Students* (No. B3). Retrieved from http://cudo.cou.on.ca/

Constant, K. P. (1997). Using multimedia techniques to address diverse learning styles in materials education. *Journal of Materials Education*, *19*, 1-8.

Consulting Psychological Press. (2015). Retrieved from: https://www.cpp.com/en/index.aspx.

Council for the Advancement of Standards in Higher Education. (2015). *CAS professional standards for higher education* (9th ed.). Washington, DC: Author.

Crawford, K. (1996). Vygotskian approaches in human development in the information era. *Educational Studies in Mathematics*, *31*(1-2), 43–62. http://doi.org/10.1007/BF00143926

Creswell, J. W. (2008). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches: Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE.

Creswell, J. W. (2011). Controversies in mixed methods research. *The Sage Handbook of Qualitative Research*, *4*, 269–284.

Creswell, J. W., & Plano Clark, V. (2011). Designing and Conducting Mixed Methods Research Sage. *Thousand Oaks, CA*.

Crosling, G., Heagney, M., & Thomas, L. (2009). Improving student retention in higher education: Improving teaching and learning.

Crosling, G., Thomas, L., & Heagney, M. (2008). *Improving student retention in higher education: the role of teaching and learning*. Routledge. Retrieved from

https://books.google.ca/books?hl=en&lr=&id=BiZ9AgAAQBAJ&oi=fnd&pg=PP1&dq=(Crosling,+Thomas+%26+Heagney,+2008)&ots=L4e3RoylS2&sig=cQbZLVXHtmHvQ4nBEZnQ5bRQhfs

Cuseo, J. (2003). Academic advisement and student retention: Empirical connections and systemic interventions. *National Academic Advising Association.* Retrieved from: http://www. nacada.ksu.edu/clearinghouse/advisingissues/retain.htm

Cuseo, J. (2007). The empirical case against large class size: Adverse effects on the teaching, learning, and retention of first-year students. *Journal of Faculty Development*, *21*(1), 5–21.

Daniels, M., & Pears, A. (2012, January). Models and methods for computing education research. In *Proceedings of the Fourteenth Australasian Computing Education Conference-Volume 123* (pp. 95-102). Australian Computer Society, Inc..

Davis, B., & Sumara, D. (2002). Constructivist discourses and the field of education: Problems and possibilities. *Educational Theory*, *52*(4), 409–428. http://doi.org/10.1111/j.1741-5446.2002.00409.x

Dawson, P., Meer, J. van der, Skalicky, J., & Cowley, K. (2014). On the effectiveness of Supplemental Instruction. A systematic review of Supplemental Instruction and Peer-Assisted Study Sessions literature between 2001 and 2010. *Review of Educational Research*, *84*(4), 609–639. http://doi.org/10.3102/0034654314540007

DeAngelo, L. (2014). Programs and practices that retain students from the first to second year: Results from a national study. *New Directions for Institutional Research*, *2013*(160), 53–75. http://doi.org/10.1002/ir.20061

DeFruyt, F., & Mervielde, I. (1996). Personality and interests as predictors of educational streaming and achievement. *European Journal of Personality*,*10*(5), 405-425.

Deborah, L. J., Baskaran, R., & Kannan, A. (2012). Learning styles assessment and theoretical origin in an e-learning scenario: A survey. *Artificial Intelligence Review*, *42*(4), 801–819. http://doi.org/10.1007/s10462-012-9344-0

Dewey, J. (1938). *Experience and education*. Simon and Schuster.

DiRienzo, C., Das, J., Synn, W., Kitts, J., & McGrath, K. (2010). The relationship between MBTI and academic performance: A study across academic disciplines. *Journal of Psychological Type*, *70*(5), 53-67.

Dunning, D. (2008). Introduction to type and learning. Palo Alto, CA: Consulting Psychologists Press.

Dunning, D., Johnson, K., Ehrlinger, J., and Kruger, J. (2003) Why people fail to recognize their own incompetence. *Current Directions in Psychological Science, 12*(3). 83-87.

Erdei, P., Kapitány, A., Kiss, M., & Kun, A. I. (2014). Estimating the effect of the personality vs. career match on the academic performance with comparison of admission scores and grade averages: An evidence from the Hungarian Business Higher Education. *Tudás–Tanulás–Szabadság Neveléstudományi Konferencia, Cluj-Napoca, Romania*. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2513549

Ertmer, P. A., & Newby, T. J. (1993). Behaviorism, Cognitivism, Constructivism: Comparing critical features from an Instructional Design perspective.

Performance Improvement Quarterly, *26*(2), 43–71. http://doi.org/10.1002/piq.21143

Evans, N.J. Forney, D.S., Guido, F.M., Patton, L.D., & Renn, K.A. (2010). Student Development in College. Theory, Research, and Practice (2nd ed). San Francisco: Jossey-Bass.

Eysenck, H. J. (1991). Dimensions of personality: 16, 5, or 3? Criteria for a taxonomic paradigm. *Personality and Individual Differences, 12,* 773-790.

Farnsworth, V., & Solomon, Y. (2013). *Reframing Educational Research: Resisting the 'what works' agenda*. Routledge.

Farsides, T., & Woodfield, R. (2003). Individual differences and undergraduate academic success: The roles of personality, intelligence, and application. *Personality and Individual differences*, *34*(7), 1225-1243.

Fayowski, V., & MacMillan, P. D. (2008). An evaluation of the Supplemental Instruction programme in a first year calculus course. *International Journal of Mathematical Education in Science and Technology*, *39*(7), 843–855. http://doi.org/10.1080/00207390802054433

Felder, R. M. (2010). Are learning styles invalid? (Hint:No!). *On-Course Newsletter*, 1–7.

Felder, R. M., & Brent, R. (2005). Understanding student differences. *Journal of Engineering Education*, *94*(1), 57–72. http://doi.org/10.1002/j.2168-9830.2005.tb00829.x

Felder, R. M., Felder, G. N., & Dietz, E. J. (2002). The effects of Personality Type on engineering student performance and attitudes. *Journal of Engineering Education*, *91*(1), 3–17.

Felder, R. M., & Spurlin, J. (2005). Applications, reliability and validity of the index of learning styles. *International Journal of Engineering Education*, *21*(1), 103–112.

Festinger, L. (1962). *A Theory of Cognitive Dissonance*. Stanford University Press.

Fike, D. S., & Fike, R. (2008). Predictors of first-year student retention in the community college. *Community College Review*, *36*(2), 68–88. http://doi.org/10.1177/0091552108320222

Fink, L. D. (2003). A self-directed guide to designing courses for significant learning. *University of Oklahoma*, *27*.

Finnie, R., Childs, S., & Wismer, A. (2010a). *Engagement, Attitudes and Support Networks (Version 02-24-10)* (No. 5). Toronto: Queens University. Retrieved from http://higheredstrategy.com/mesa/pub/pdf/MESA-Attitudes_02_24_10.pdf

Finnie, R., Childs, S., & Wismer, A. (2010b). *First Generation Post-Secondary Education Students (Version 02-24-10)* (Research Breif No. 4). Toronto: Queens University. Retrieved from http://higheredstrategy.com/mesa/pub/pdf/First_Generation_02_24_10-1.pdf

Finnie, R., Childs, S., & Wismer, A. (2010c). *Immigrants and Visible Minorities: Post Secondary Education Experiences (Version 11-04-10)* (8a). Toronto: Queens University. Retrieved from http://higheredstrategy.com/mesa//pub/pdf/MESA_8a_Immigrants_1_11-09-10.pdf

Finnie, R., & Martinello, F. (2010). I lost my scholarship": Changes in grades from high school to first year university. *Pursuing Higher Education in Canada: Economic, Social, and Policy Dimensions*, 15–42.

Flavell, J. H. (1976). Metacognitive aspects of problem solving. In L. B. Resnick (Ed.), *The nature of intelligence* (pp. 231–235). Hillsdale, NJ: Erlbaum.

Fourqurean, J. M., Meisgeier, C., & Swank, P. (1990). The link between learning style and Jungian Psychological Type. *The Journal of Experimental Education*, *58*(3), 225–237. http://doi.org/10.1080/00220973.1990.10806537

Fredricks, J. A., & McColskey, W. (2012). The measurement of student engagement: A comparative analysis of various methods and student self-report instruments. In *Handbook of research on student engagement* (pp. 763–782). Springer. Retrieved from http://link.springer.com/chapter/10.1007/978-1-4614-2018-7_37

Freeman, K. E., Alston, S. T., & Winborne, D. G. (2008). Do learning communities enhance the quality of students' learning and motivation in STEM? *The Journal of Negro Education*, *77*(3), 227–240.

Freeman, S. (2009, September 20). 1 in 6 first-year university students won't make the grade. *The Toronto Star*. Retrieved from http://www.thestar.com/news/canada/2009/09/20/1_in_6_firstyear_university_students_wont_make_the_grade.html

Furnham, A., Jensen, T., & Crump, J. (2008). Personality, intelligence and Assessment Centre expert ratings. *International Journal of Selection and Assessment*, *16*(4), 356–365. http://doi.org/10.1111/j.1468-2389.2008.00441.x

Gall, M. D. (1988). Making the grade. Rocklin, CA: Prima.

Gallagher, S. A. (1990). Personality patterns of the gifted. *Understanding Our Gifted*, *3*(1), 1.

Garcia, T., & Pintrich, P. R. (1996). Assessing students' motivation and learning strategies in the classroom context: The motivated strategies for learning questionnaire. In *Alternatives in assessment of achievements, learning processes and prior knowledge* (pp. 319–339). Springer. Retrieved from http://link.springer.com/chapter/10.1007/978-94-011-0657-3_12

Geiger, R. W. D. (1992). Personality characteristics of highly academically talented adolescents: Variations with verbal or mathematical ability. (Doctoral dissertation, Georgia University, 1992). *Dissertation Abstracts International,* 53, 156.

Geiser, S., & Santelices, M. V. (2007). Validity of high-school grades in predicting student success beyond the freshman year: High-school record vs. standardized tests as indicators of four-year college outcomes. Research & Occasional Paper Series: CSHE. 6.07. *Center for Studies in Higher Education*.

Gekoski, N., & Schwartz, S. (1961). Student mortality and related factors. *The Journal of Educational Research*, *54*(5), 192-194.

Gibbs, G. (1995). Assessing student centred courses. Oxford Centre for Staff and Learning Development.

Gladieux, L. E., & Swail, W. S. (2000). Beyond access: Improving the odds of college success. *Phi Delta Kappan*, 688-692.

Glennen, R. E., Farren, P. J., & Vowell, F. N. (1996). How advising and retention of students improves fiscal stability. *NACADA Journal, 16*, 38-41.

Graff, M., Davies, J., & McNorton, M. (2004). Cognitive style and cross cultural differences in internet use and computer attitudes. *European Journal of Open, Distance and E-Learning*, *2*, 1–8.

Graham, C. (2010). Hearing the voices of general staff: A Delphi study of the contributions of general staff to student outcomes. *Journal of Higher Education Policy and Management*, *32*(3), 213–223. http://doi.org/10.1080/13600801003743315

Guillén, C. (2010). Undergraduate academic advising and its relation to degree completion time (Unpublished doctoral dissertation). Humboldt State University, Arcata, CA.

Hammer, A. L. (Ed.). (1996). MBTI applications: A decade of research on the Myers-Briggs Type Indicator. Palo Alto, CA: Consulting Psychologists Press.

Hannafin, M. J., Hill, J. R., Land, S. M., & Lee, E. (2014). Student-centered, open learning environments: Research, theory, and practice. In *Handbook of research on educational communications and technology* (pp. 641-651). Springer New York.

Hattie, J. (2013). *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement*. Routledge. New York, NY.

Hawkins, J. (1997). Giftedness and psychological type. *Prufrock Journal*, *9*(2), 57-67.

Hembree, R. (1988). Correlates, causes, effects, and treatment of test anxiety. *Review of Educational Research, 58,* 7–77.

Hirsch, G. (2013). *Helping College Students Succeed: A Model for Effective Intervention*. Routledge. Philadelphia, PA.

Horstmanshof, L., & Zimitat, C. (2007). Future time orientation predicts academic engagement among first-year university students. *British Journal of Educational Psychology*, *77*(3), 703–718

Hunter, M. S. (2006). Lessons learned: Achieving institutional change in support of students in transition. *New directions for student services*,*2006*(114), 7-15.

Jackson, C. M. (1989). A comparative study of Myers-Briggs personality type, learning-style factors and locus-of-control of middle school achieving and underachieving intellectually gifted students. (Doctoral dissertation, University of Alabama, 1989). *Dissertation Abstracts International,* 50, 123.

James, W. (1907). A new name for some old ways of thinking, Cambridge, MA: Harvard University Press, 1975.

Jensen, D., Wood, J., & Wood, K. (2003). Hands-on activities, interactive multimedia and improved team dynamics for enhancing mechanical engineering curricula. *International Journal of Engineering Education*, *19*(6), 874–884.

Jimerson, S. (2001). Meta-analysis of grade retention research: Implications for practice in the 21st century. *School Psychology Review*, *30*(3), 420–437.

Jimerson, S. R., Pletcher, S. M. W., Graydon, K., Schnurr, B. L., Nickerson, A. B., & Kundert, D. K. (2006). Beyond grade retention and social promotion: Promoting the social and academic competence of students. *Psychology in the Schools*, *43*(1), 85–97. http://doi.org/10.1002/pits.20132

Johnson, B., & Christensen, L. (2008). *Educational research: Quantitative, qualitative, and mixed approaches*. Sage. Retrieved from https://books.google.ca/books?hl=en&lr=&id=8qoaXPh6E4UC&oi=fnd&pg=PA

1&dq=(Johnson++%26+Christensen,+2008)&ots=gIX3pVa6jF&sig=OdWrh7cdJLbW_wfryZKQA18LDXQ

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, *1*(2), 112–133.

Judge, T. A., & Ilies, R. (2002). Relationship of personality to performance motivation: a meta-analytic review. *Journal of applied psychology*, *87*(4), 797.

Jung, C. (2013). *Psychological Types*. Rehák David - Important Books. Princeton, NJ.

Kapitány, A., Kiss, M., & Kun, A. I. (2014). How Do Student Personality Types Contribute to the Academic Success in the Hungarian Business Higher Education?. *Tudás–Tanulás–Szabadság Neveléstudományi Konferencia, Cluj-Napoca, Romania (2014)*. http://doi.org/10.13140/2.1.4519.2321

Keirsey, D., & Bates, M. M. (1984). *Please Understand Me: Character & Temperament Types*. Prometheus Nemesis.

Keough, E., Bond, F. W., French, C. C., Richards, A. & Davis, R. E. (2004). Test anxiety: Susceptibility to distraction and examination performance. *Anxiety, Stress, & Coping: An International Journal, 17*, 241–252.

Kerr, L. A. (2011). *The educational production of students at risk* (Doctoral dissertation, University of Toronto).

Kim, J., Lee, A., & Ryu, H. (2013). Personality and its effects on learning performance: Design guidelines for an adaptive e-learning system based on a user model. *International Journal of Industrial Ergonomics*, *43*(5), 450–461. http://doi.org/10.1016/j.ergon.2013.03.001

Kim, M. R. & Han, S. J. (2014). Relationships between the Myers-Briggs Type Indicator personality profiling, academic performance and student satisfaction in nursing students. *International Journal of Bio-Science and Bio-Technology*, *6*(6), 1-12.

Kiss, M., Kotsis, Á., & Kun, A. I. (2014). The relationship between intelligence, emotional intelligence, personality styles and academic success. *Business Education & Accreditation*, *6*(2), 23–34.

Kristof-Brown, A. L., Zimmerman, R. D., & Johnson, E. C. (2005). Consequences of individuals 'fit at work: A meta-analysis of person–job, person–organization, person–group, and person–supervisor fit. *Personnel Psychology*, *58*(2), 281-342.

Kuh, G. D. (2009). What student affairs professionals need to know about student engagement. *Journal of College Student Development*, *50*(6), 683–706. http://doi.org/10.1353/csd.0.0099

Kuh, G. D., Kinzie, J., Bridges, B. K., & Hayek, J. C. (2007). *Piecing together the student success puzzle: Research, propositions, and recommendations*. Jossey-Bass.

Kuh, G. D., Kinzie, J., Schuh, J. H., & Whitt, E. J. (2011). *Student Success in College: Creating Conditions That Matter*. John Wiley & Sons.

Lawrence, G. D. (1997). *Looking at Type & Learning Styles*. Gainesville, Fla: Center for Applications of Psychological Type.

Lawrence, G. (2009). *People Types and Tiger Stripes: Using Psychological Type to Help Students Discover Their Unique Potential* (4 edition). Gainesville, FL: Center for Applications of Psychological Type.

Lea, S. J., Stephenson, D., & Troy, J. (2003). Higher education students' attitudes to student-centred learning: beyond "educational bulimia"? *Studies in Higher Education*, *28*(3), 321–334. http://doi.org/10.1080/03075070309293

Lewis, S. E., & Lewis, J. E. (2007). Predicting at-risk students in general chemistry: Comparing formal thought to a general achievement measure. *Chemistry Education Research and Practice*, *8*(1), 32–51. http://doi.org/10.1039/B6RP90018F

Li, I., Dey, A., & Forlizzi, J. (2010). A Stage-based model of personal informatics systems. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 557–566). New York, NY, USA: ACM. http://doi.org/10.1145/1753326.1753409

Li, I., Dey, A., Forlizzi, J., Höök, K., & Medynskiy, Y. (2011). Personal informatics and HCI: Design, theory, and social implications. In *CHI '11 Extended Abstracts on Human Factors in Computing Systems* (pp. 2417–2420). New York, NY, USA: ACM. http://doi.org/10.1145/1979742.1979573

Livingstone, J. A. (1997) Metacognition an overview. Available online at: http://www.gse.buffalo.edu/fas/sheell/ cep564/Metacog.htm.

Lizzio, A., & Wilson, K. (2013). Early intervention to support the academic recovery of first-year students at-risk of non-continuation. *Innovations in Education and Teaching International*, *50*(2), 109–120. http://doi.org/10.1080/14703297.2012.760867

Lufi, D., Okasha, S., & Cohen, A. (2004). Test anxiety and its effects on the personality of students with learning disabilities. Learning Disability Quarterly, June, 176–184.

Mabe, P. A., & West, S. G. (1982). Validity of self-evaluation of ability: A review and meta-analysis. *Journal of Applied Psychology*, *67*(3), 280.

Macan, T. H., Shahani, C., Dipboye, R. L., & Phillips, A. P. (1990). College students' time management: Correlations with academic performance and stress. *Journal of Educational Psychology, 82,* 760–768.

Mahon, C., & Crowley, U. (2013). One year on: Using a learning skills programme to support learners at-risk of academic underachievement (pp. 1–14). Presented at the International Conference on Engaging Pedagogy 2013 (ICEP13) Institute of Technology, IT Sligo. Retrieved from http://eprints.maynoothuniversity.ie/5005/

Malm, J., Bryngfors, L., & Mörner, L.-L. (2012). Supplemental instruction for improving first year results in engineering studies. *Studies in Higher Education*, *37*(6), 655–666. http://doi.org/10.1080/03075079.2010.535610

Mandelbaum, H., & Rosenfeld, M. (2009, April 6). Students less prepared for university education than in 2005, according to Ontario university faculty. *OCUFA Press Release*. Retrieved from http://notes.ocufa.on.ca/OCUFApress.nsf/A97A540CA9EEC6D6852573B00053F099/DA2506597AEEBA37852575900049 7B01?OpenDocument

Marr, D., Nicoll, C., von Treuer, K., Kolar, C., & Palermo, J. (2013). Improving student preparedness and retention: Perceptions of staff at two universities. *Higher Education Studies*, *3*(4), 1–14.

Martin, D. C., & Arendale, D. R. (1992). Supplemental Instruction: Improving first-year student success in high-risk courses. The freshman year experience: Monograph Series Number 7. Retrieved from http://eric.ed.gov/?id=ED354839

Mattson, C. E. (2007). Beyond admission: Understanding pre-college variables and the success of at-risk students. *Journal of College Admission*,*196*, 8-13.

McCarthy, S. V. (1975). Differential VQ ability: Twenty years later. *Review of Educational Research*, 263-282.

McCrae, R. R., & Costa, P. T. (1994). The stability of personality: Observations and evaluations. American Psychological Society, 3(6), 173–175. 123

McCrae, R. R., & Costa, P. T., Jr. (1999). A five-factor theory of personality. In L. A. Pervin & O. P. John (Eds.), Handbook of personality: Theory and research, 2nd ed., 139–153. New York: Guilford Press.

McCubbin, I. (2003). An examination of criticisms made of Tinto's 1975 student integration model of attrition. *Retrieved July*, *2*, 2008.

McKenzie, K., & Schweitzer, R. (2001). Who succeeds at university? Factors predicting academic performance in first year Australian university students. *Higher education research and development*, *20*(1), 21-33.

Mead, G. H. (1934). Mind, self and society form the standpoint of a social behaviourist. *Chicago: University of Chicago Press*.

Mertens, D. M. (2014). *Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed methods*. Sage Publications. Retrieved from https://books.google.ca/books?hl=en&lr=&id=VEkXBAAAQBAJ&oi=fnd&pg=P

R1&dq=(Mertens,+2014)&ots=4ZcCF98aun&sig=XMFD5u92DiDA7VltwuANOnDHrPk

Metcalfe, J., & Shimamura, A. (1994). Metacognition: knowing about knowing. Cambridge, MA: MIT Press.

Meyer, J. H. F., & Land, R. (2005). Threshold concepts and troublesome knowledge (2): Epistemological considerations and a conceptual framework for teaching and learning. *Higher Education*, *49*(3), 373–388. http://doi.org/10.1007/s10734-004-6779-5

Meyer, J., & Land, R. (2013). *Overcoming Barriers to Student Understanding: Threshold Concepts and Troublesome Knowledge*. Routledge.

Montequín, V. R., Fernández, J. M., Balsera, J. V., & Nieto, A. G. (2013). Using MBTI for the success assessment of engineering teams in project-based learning. *International Journal of Technology and Design Education*, *23*(4), 1127–1146.

Myers-Briggs Type Indicator. (2009). Retrieved March 7, 2014, from https://www.cpp.com/products/mbti/index.aspx

Myers-Briggs Type Indicator ® (MBTI®) Instrument in French and English Canada. (2008). Retrieved November 30, 2015, from https://www.psychometrics.com/wp-content/uploads/2015/02/mbti-in-canada.pdf

Myers, I. B. (1998). *Introduction to Type: A Guide to Understanding Your Results on the Myers-Briggs Type Indicator*. Consulting Psychologists Press.

Myers, I. B., & Myers, P. B. (1995). *Gifts Differing: Understanding Personality Type* (1st edition). Palo Alto, Calif.: Nicholas Brealey America.

Nardi, D. (2001). Multiple intelligences and personality type: Tools and strategies for developing human potential. Huntington Beac1h, CA: Telos Publications.

Nelson, C. E. (1996). Student diversity requires different approaches to college teaching, even in math and science. *American Behavioural Scientist*, *40*, 165-175.

Newcomb, T. M. (1973). *The impact of college on students*. Transaction Publishers.

O'Brien, T. P., Bernold, L. E., & Akroyd, D. (1998). Myers-Briggs type indicator and academic achievement in engineering education. *International Journal of Engineering Education*, *14*(5), 311–315.

O'Neill, G., & McMahon, T. (2005). Student-centred learning: What does it mean for students and lectures. *Emerging Issues in Practice of University Learning and Teaching*, *1*, 27–36.

Olani, A. (2009). Predicting first year university students' academic success. *Electronic Journal of Research in Educational Psychology*, *7*(3), 1053-1072.

Pajares, F. (2002). Overview of social cognitive theory and of self-efficacy. Retrieved from http://www.emory.edu/EDUCATION/mfp/eff.html

Pardo, A., & Kloos, C. D. (2011). Stepping out of the box: Towards analytics outside the learning management system. In *Proceedings of the 1st International Conference on Learning Analytics and Knowledge* (pp. 163–167). New York, NY, USA: ACM. http://doi.org/10.1145/2090116.2090142

Parkin, A., & Baldwin, N. (2009, February). Persistence in post-secondary education in Canada: The latest research. *Canada Millennium Scholarship Foundation*. Retrieved from http://contactpoint.ca/wp-content/uploads/2013/04/millennium_2009-02-12_rn-8_en.pdf

Pascarella, E. T. (2006). How college affects students: Ten directions for future research. *Journal of College Student Development*, *47*(5), 508–520. http://doi.org/10.1353/csd.2006.0060

Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2008). Learning styles concepts and evidence. *Psychological Science in the Public Interest*, *9*(3), 105–119. http://doi.org/10.1111/j.1539-6053.2009.01038.x

Piaget, J. (1952). *The origins of intelligence in children* (Vol. 8, No. 5, p. 18). New York: International Universities Press.

Piaget, J., & Inhelder, B. with Sinclair de Zwart, H.(1973). *Memory and intelligence*. (A. Pomerans, Translation). New York, NY: Basic Books.

Pin, L., Martin, C., & Andrey, S. (2011). *Rising Costs: A look at spending at Ontario Universities*. Toronto. Retrieved from http://www.ousa.ca/dev/wp-content/uploads/2011/11/Rising-Costs-FINAL.pdf

Pintrich, Paul R. (2002). The role of metacognitive knowledge in learning, teaching, and assessing. *Theory into Practice, 41*(4). 219-225.

Pittenger, D. J. (2005). Cautionary comments regarding the Myers-Briggs Type Indicator. *Consulting Psychology Journal: Practice and Research, 57*(3), 210-221.

Porter, S. R., & Swing, R. L. (2006). Understanding how first-year seminars affect persistence. *Research in Higher Education*, *47*(1), 89–109. http://doi.org/10.1007/s11162-005-8153-6

Porter, S. R., & Umbach, P. D. (2006). College major choice: An analysis of person–environment fit. *Research in Higher Education*, *47*(4), 429-449.

Prebble, T., Hargraves, H., Leach, L., Naidoo, K., Suddaby, G., & Zepke, N. (2005). *Impact of student support services and academic development programmes on student outcomes in undergraduate tertiary study: a synthesis of the research* (Report). Ministry of Education New Zealand. Retrieved from https://digital.library.adelaide.edu.au/dspace/handle/2440/48371

Price, J., Lumpkin, A. G., Seemann, E. A., & Bell, D. C. (2012). Evaluating the impact of supplemental instruction on short- and long-term retention of course content. *Journal of College Reading and Learning*, *42*(2), 8–26. http://doi.org/10.1080/10790195.2012.10850352

Pritchard, M. E., & Wilson, G. S. (2003). Using emotional and social factors to predict student success. *Journal of College Student Development*, *44*(1), 18-28.

Quaye, S. J., & Harper, S. R. (2014). *Student engagement in higher education: Theoretical perspectives and practical approaches for diverse populations*. Routledge. Retrieved from https://books.google.ca/books?hl=en&lr=&id=Y3Y9BAAAQBAJ&oi=fnd&pg=PP1&dq=Pascarella,+E.+T.+%26+Terenzini,+P.+T.+(2005)+How+college+affects+students:+Volume+2:+A+third+decade+of+research.+San+Francisco,+CA:+Jossey-Bass&ots=dH8bi_9L1i&sig=W-l76NhnJdmiryqeWwfFlryWHx8

Reynierse, J. H., & Harker, J. B. (2005). Type interactions: MBTI relationships and self report questionnaire scale scores. *Journal of Psychological Type, 64*(6a), 57-75.

Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: a systematic review and meta-analysis. *Psychological Bulletin*, *138*(2), 353.

Riding, R., & Rayner, S. (2013). *Cognitive Styles and Learning Strategies: Understanding Style Differences in Learning and Behavior*. Routledge.

Riener, C., & Willingham, D. (2010, October). The Myth of Learning Styles. *Change: The Magazine of Higher Learning*, *42*(5), 32–35.

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin*, *130*(2), 261.

Roberts, J., & Styron, R. (2010). Student satisfaction and persistence: Factors vital to student retention. *Research in Higher Education Journal*, *6*(3), 1–18.

Roberts, R. D., Schulze, R., & MacCann, C. (2007). Student 360TM: A valid medium for noncognitive assessment? Paper presented at the annual meeting of the American Educational Research Association and the National Council on Measurement in Education. Chicago, IL.

Rogowsky, B. A., Calhoun, B. M., & Tallal, P. (2015). Matching learning style to instructional method: Effects on comprehension. *Journal of Educational Psychology*, *107*(1), 64.

Rosati, P. (1997, November). Students' Psychological Type and success in different engineering programs. In *Frontiers in Education Conference, 1997. 27th Annual Conference. Teaching and Learning in an Era of Change. Proceedings.* (Vol. 2, pp. 781-784). IEEE.

Rosellini, A. J., & Brown, T. A. (2011). The NEO Five-Factor Inventory: Latent structure and relationships with dimensions of anxiety and depressive disorders in a large clinical sample. *Assessment*, *18*(1), 27–38.

Sadler-Smith, E. (2001). The relationship between learning style and cognitive style. *Personality and Individual Differences*, *30*(4), 609–616. http://doi.org/10.1016/S0191-8869(00)00059-3

Sak, U. (2004). A synthesis of research on psychological types of gifted adolescents. *Prufrock Journal*, *15*(2), 70-79.

Saklofske, D. H., Austin, E. J., Mastoras, S. M., Beaton, L., & Osborne, S. E. (2012). Relationships of personality, affect, emotional intelligence and coping with student stress and academic success: Different patterns of association for stress and success. *Learning and Individual Differences*, *22*(2), 251-257.

Salinitri, G. (2005). The effects of formal mentoring on the retention rates for first-year, low achieving students. *Canadian Journal of Education / Revue Canadienne de L'éducation*, *28*(4), 853–873. http://doi.org/10.2307/4126458

Sanborn, D. K. (2013). Myers-Briggs® preferences and academic success in the first college semester. (Unpublished Doctoral Dissertation). Iowa State University. Iowa.

Schaubhut, N. A., & Thompson, R. C. (2008). *Technical Brief for the MBTI® FORM M and FORM Q ASSESSMENTS*. Consulting Psychologists Press, Palo Alto, CA. Retrieved from https://www.cpp-qa.com/pdfs/Tech_Brief_MBTI_Afrikaans.pdf

Schaubhut, N. A., & Thompson, R. C. (2011). MBTI type tables for college majors. Mountain View, CA: Consulting Psychologists Press.

Schneider, W., & Pressley, M. (2013). *Memory Development Between Two and Twenty*. Psychology Press.

Schulze, R., & Roberts, R. D. (2006). Assessing the Big-Five: Development and validation of the Openness Conscientiousness Extraversion Agreeableness Neuroticism Index Condensed (OCEANIC). *Zeitschrift für Psychologie, 214*, 133–149.

Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational Psychologist*, *26*(3-4), 207-231.

Scott, G. (2006). *Accessing the Student Voice: Using CEQuery to Identify what Retains Students and Promotes Engagement in Productive Learning in Australian Higher Education: Final Report*. Department of Education, Science and Training.

Scrivener, S., & Coghlan, E. (2012). *Opening Doors to Student Success: A Synthesis of Findings from an Evaluation at Six Community Colleges* (SSRN Scholarly Paper No. ID 2019762). Rochester, NY: Social Science Research Network. Retrieved from http://papers.ssrn.com/abstract=2019762

Seidman, A. (1991). The evaluation of a pre/post admissions/counseling process at a suburban community college: impact on student satisfaction with the faculty and the institution, retention, and academic performance. *College and University, 66,* 223-232

Seipp, B. (1991). Anxiety and academic performance: A meta-analysis of findings. *Anxiety Research, 4*, 27–41. 131.

Shen, S.-T., Prior, S. D., White, A. S., & Karamanoglu, M. (2007). Using personality type differences to form engineering design teams. *Engineering Education*, *2*(2), 54–66.

Shitole, S. K. (2015). The study of relationship between Big-Five personality factors and use of motivated learning strategies by students aspiring for careers through civil services competitive examinations. *International Journal of Education and Management Studies*, *5*(1), 13.

Sidney, J., & Osberg, T. M. (1981). The relative accuracy of self-predictions and judgments by others in psychological assessment. *Psychological Bulletin*, *90*(2), 322–351. http://doi.org/10.1037/0033-2909.90.2.322

Singell, L. D., & Waddell, G. R. (2010). Modeling retention at a large public university: can at-risk students be identified early enough to treat? *Research in Higher Education*, *51*(6), 546–572.

Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, *75*(3), 417-453.

Slavin, Robert E. Harris, Karen R. (Ed); Graham, Steve (Ed); Urdan, Tim (Ed); Bus, Adriana G. (Ed); Major, Sonya (Ed); Swanson, H. Lee (Ed), (2012). APA educational psychology handbook, Vol 3: Application to learning and teaching. , (pp. 359-378). Washington, DC, US: American Psychological Association, viii, 668 pp.http://dx.doi.org/10.1037/13275-014

Smart, J. C., Feldman, K. A., & Ethington, C. A. (2000). *Academic disciplines: Holland's theory and the study of college students and faculty*. Vanderbilt University Press.

Students who dropout over grades. (2010, September 27). Retrieved from http://www.macleans.ca/education/uniandcollege/students-who-dropout-over-grades/

Sundström, A. (2005). *Self-assessment of knowledge and abilities: A literature study*. Institutionen för beteendevetenskapliga mätningar, Umeå universitet. Retrieved from http://www.diva-portal.org/smash/record.jsf?pid=diva2%3A154084&dswid=6899

Swail, W. S. (2004). The art of student retention: A handbook for practitioners and administrators. In *Educational Policy Institute. Texas Higher Education Coordinating Board 20th Annual Recruitment and Retention Conference Austin, TX June* (Vol. 21, p. 2004).

Tally, S. (2013, September 25). Purdue software boosts graduation rate 21 percent. *Purdue News*. Indiana. Retrieved from http://www.purdue.edu/newsroom/releases/2013/Q3/purdue-software-boosts-graduation-rate-21-percent-by-data-mining-academic-behviors.html

Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches* (Vol. 46). Sage.

Teddlie, C., & Tashakkori, A. (Eds.). (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*. Sage Publications Inc.

The Myers Briggs Foundation. (2015). Retrieved from http://www.myersbriggs.org/

Tinto, V. (1999). Taking retention seriously: Rethinking the first year of college. *NACADA Journal*, *19*(2), 5–9.

Tinto, V. (2003). Learning better together: The impact of learning communities on student success. *Higher Education Monograph Series.* Retrieved from

http://www.hear.ac.uk/assets/documents/resources/Can't%20Tag/VincentTinto_learning_better_together.pdf

Tinto, V. (2010). From Theory to Action: Exploring the Institutional Conditions for Student Retention. In J. C. Smart (Ed.), *Higher Education: Handbook of Theory and Research* (pp. 51–89). Springer Netherlands. Retrieved from http://link.springer.com/chapter/10.1007/978-90-481-8598-6_2

Tudge, J., & Winterhoff, P. (1993). Vygotsky, Piaget, and Bandura: Perspectives on the relations between the social world and cognitive development. *Human Development*, *36*, 61–81.

Urciuoli, J. A., & Bluestone, C. (2013). Study skills analysis: A pilot study linking a success and psychology course. *Community College Journal of Research and Practice*, *37*(5), 397–401. http://doi.org/10.1080/10668926.2012.716386

VanSant, S. S. (2003). Wired for conflict: The role of personality in resolving differences. Gainesville, FL: Center for Applications of Psychological Type.

Verbert, K., Duval, E., Klerkx, J., Govaerts, S., & Santos, J. L. (2013). Learning Analytics Dashboard Applications. *American Behavioral Scientist*, 0002764213479363. http://doi.org/10.1177/0002764213479363

Vygotsky, L. S. (1978). *Mind in society*. Cambridge, MA: Harvard University Press.

Walton, G. M., & Spencer, S. J. (2009). Latent ability grades and test scores systematically underestimate the intellectual ability of negatively stereotyped students. *Psychological Science*, *20*(9), 1132-1139.

Wankat, P. & Oreovicz, F. (1993) Teaching Engineering, New York, NY, McGraw-Hill, Chapter 13, 245-263.

Warburton, E. C., Bugarin, R., & Nuñez, A. M. (2001). Bridging the Gap: Academic Preparation and Postsecondary Success of First-Generation Students. Statistical Analysis Report. Postsecondary Education Descriptive Analysis Reports.

Ward, M., Gruppen, L., & Regehr, G. (2002). Measuring self-assessment: current state of the art. *Advances in Health Sciences Education*, *7*(1), 63–80.

Wilde, D. J. (2003). Creative teams, individual development and personality classification. ME310 Course Notes. *Mechanical Engineering, Stanford University*.

Willey, K., & Gardner, A. (2010). Investigating the capacity of self and peer assessment activities to engage students and promote learning. *European Journal of Engineering Education*, *35*(4), 429–443.

Williamson, J. S. (2002). *Assessing student strengths: Academic performance and persistence of first-time college students at a private church-affiliated college* (Doctoral dissertation, Olivet Nazarene University).

Williford, A. M., Chapman, L. C., & Kahrig, T. (2001). The university experience course: a longitudinal study of student performance, retention, and graduation. *Journal of College Student Retention: Research, Theory & Practice*, *2*(4), 327-340. http://doi.org/10.2190/K7K9-91EG-E6F9-EVMK

Woolfolk, A. E. (1998). *Readings in Educational Psychology*. Allyn and Bacon.

Xie, Q. (2015). Intellectual styles: Their associations and their relationships to ability and personality. *Journal of Cognitive Education and Psychology*, *14*(1), 63–76. http://doi.org/10.1891/1945-8959.14.1.63

Yeung, A., Read, J., & Schmid, S. (2012). Students' learning styles and academic performance in first year chemistry. In *Proceedings of the Australian Conference on Science and Mathematics Education (formerly UniServe Science Conference)* (Vol. 11). Retrieved from http://openjournals.library.usyd.edu.au/index.php/IISME/article/view/6468

Zeidner, M. (1998). Test anxiety: The state of the art. New York: Plenum.

Zhao, C.-M., & Kuh, G. D. (2004). Adding Value: Learning Communities and Student Engagement. *Research in Higher Education*, *45*(2), 115–138. http://doi.org/10.1023/B:RIHE.0000015692.88534.de

Zimmerman, B. J., & Schunk, D. H. (2014). *Educational Psychology: A Century of Contributions: A Project of Division 15 (educational Psychology) of the American Psychological Society*. Routledge.

Zywno, M.S. & Waalen, J.K. (2001). The effect of hypermedia instruction and achievement and attitudes of students with different learning styles. *ASEE Annual Conference and Exposition Proceedings*, Session 1330.

Appendix A: Characteristics frequently associated with each Personality Type

mbti

STEP I / REPORT FORM FORM M

CHARACTERISTICS FREQUENTLY ASSOCIATED WITH EACH TYPE

Sensing Types		Intuitive Types		
ISTJ Quiet, serious, earn success by thoroughness and dependability. Practical, matter-of-fact, realistic, and responsible. Decide logically what should be done and work toward it steadily, regardless of distractions. Take pleasure in making everything orderly and organized—their work, their home, their life. Value traditions and loyalty.	**ISFJ** Quiet, friendly, responsible, and conscientious. Committed and steady in meeting their obligations. Thorough, painstaking, and accurate. Loyal, considerate, notice and remember specifics about people who are important to them, concerned with how others feel. Strive to create an orderly and harmonious environment at work and at home.	**INFJ** Seek meaning and connection in ideas and relationships, and material possessions. Want to understand what motivates people and are insightful about others. Conscientious and committed to their firm values. Develop a clear vision about how best to serve the common good. Organized and decisive in implementing their vision.	**INTJ** Have original minds and great drive for implementing their ideas and achieving their goals. Quickly see patterns in external events and develop long-range explanatory perspectives. When committed, organize a job and carry it through. Skeptical and independent, have high standards of competence and performance for themselves and others.	Introverts
ISTP Tolerant and flexible, quiet observers until a problem appears, then act quickly to find workable solutions. Analyze what makes things work and readily get through large amounts of data to isolate the core of practical problems. Interested in cause and effect, organize facts using logical principles, value efficiency.	**ISFP** Quiet, friendly, sensitive, and kind. Enjoy the present moment, what's going on around them. Like to have their own space and to work within their own time frame. Loyal and committed to their values and to people who are important to them. Dislike disagreements and conflicts, do not force their opinions or values on others.	**INFP** Idealistic, loyal to their values and to people who are important to them. Want an external life that is congruent with their values. Curious, quick to see possibilities, can be catalysts for implementing ideas. Seek to understand people and to help them fulfill their potential. Adaptable, flexible, and accepting unless a value is threatened.	**INTP** Seek to develop logical explanations for everything that interests them. Theoretical and abstract, interested more in ideas than in social interaction. Quiet, contained, flexible, and adaptable. Have unusual ability to focus in depth to solve problems in their area of interest. Skeptical, sometimes critical, always analytical.	
ESTP Flexible and tolerant, they take a pragmatic approach focused on immediate results. Theories and conceptual explanations bore them—they want to act energetically to solve the problem. Focus on the here-and-now, spontaneous, enjoy each moment that they can be active with others. Enjoy material comforts and style. Learn best through doing.	**ESFP** Outgoing, friendly, and accepting. Exuberant lovers of life, people, and material comforts. Enjoy working with others to make things happen. Bring common sense and a realistic approach to work, and make work fun. Flexible and spontaneous, adapt readily to new people and environments. Learn best by trying a new skill with other people.	**ENFP** Warmly enthusiastic and imaginative. See life as full of possibilities. Make connections between events and information very quickly, and confidently proceed based on the patterns they see. Want a lot of affirmation from others, and readily give appreciation and support. Spontaneous and flexible, often rely on their ability to improvise and their verbal fluency.	**ENTP** Quick, ingenious, stimulating, alert, and outspoken. Resourceful in solving new and challenging problems. Adept at generating conceptual possibilities and then analyzing them strategically. Good at reading other people. Bored by routine, will seldom do the same thing the same way, apt to turn to one new interest after another.	Extraverts
ESTJ Practical, realistic, matter-of-fact. Decisive, quickly move to implement decisions. Organize projects and people to get things done, focus on getting results in the most efficient way possible. Take care of routine details. Have a clear set of logical standards, systematically follow them and want others to also. Forceful in implementing their plans.	**ESFJ** Warmhearted, conscientious, and cooperative. Want harmony in their environment, work with determination to establish it. Like to work with others to complete tasks accurately and on time. Loyal, follow through even in small matters. Notice what others need in their day-to-day lives and try to provide it. Want to be appreciated for who they are and for what they contribute.	**ENFJ** Warm, empathetic, responsive, and responsible. Highly attuned to the emotions, needs, and motivations of others. Find potential in everyone, want to help others fulfill their potential. May act as catalysts for individual and group growth. Loyal, responsive to praise and criticism. Sociable, facilitate others in a group, and provide inspiring leadership.	**ENTJ** Frank, decisive, assume leadership readily. Quickly see illogical and inefficient procedures and policies, develop and implement comprehensive systems to solve organizational problems. Enjoy long-term planning and goal setting. Usually well informed, well read, enjoy expanding their knowledge and passing it on to others. Forceful in presenting their ideas.	

cpp

07 06 05 04 03 15 14 13 12 11 10 9

Appendix B: Interview Question Guide: Specific questions to ask stakeholder

Question	Stakeholders
What are the reasons students would be in this course (why did they not meet academic program criteria in first year)?	• Advisors • Instructors
What prior knowledge and experiences do students have about this subject?	• Advisors • Instructors
What is the special pedagogical challenge of the course (what is the challenge of trying to teach this subject to these students)?	• Advisors • Instructors

After this course is over students will…[13]
• Foundational knowledge
  o What key information (facts, terms, concepts, principles) are important for students to understand and remember from this course?
  o What key ideas or perspectives are important for students to understand in this course?
• Application goals
  o What kinds of thinking are important for students to learn (critical – analyze and evaluate, creative – imagine and create, practical – solve problems and make decisions)?
  o What important skills do students need to gain?
  o Do students need to learn how to manage complex projects?
• Integration goals
  o What connections should students recognize and make
  ▪ Among ideas within the course?
  ▪ Among information/ideas in this course and other courses/areas?
  ▪ Among course material and students' own personal, social, and/or work life?
• Human dimension goals
  o What could or should students learn about themselves?
  o What could or should students learn about understanding others and/or interacting with them?
• Caring goals
  o What changes/values do you hope students will adopt?
• Learning how to learn goals
  o What would you like for students to learn about regarding how to be good students, how to learn about a particular subject, how to become a self-directed learner?
	• Advisors
	• Instructors

What else do you want us to keep in mind as we review the UNIV 101 curriculum?	• Coaches • Instructors

[13] These questions were adapted and informed by Fink's 2003 handbook *A self directed guide to designing courses for significant learning*.

VITA AUCTORIS

Education

2011 – 2016
PhD (Education – Cognition and Learning), University of Windsor
Area of research: Metacognition and 'at-risk' post-secondary learners
2009-2010
PhD Coursework (Applied Health Sciences - Recreation and Leisure Studies), University of Waterloo
Area of research: Post Secondary Learners, Mental Health and Sense of Belonging
2007 - 2008
Masters of Science in Education, Canisius College
2006
Teachers Certification – Senior Science and Senior Physical Education, OCT Registration #532487
2002 - 2006
Honours Bachelor of Physical Education and Kinesiology, Brock University

Research

Grants (Current)

- NSERC Chair in Immersive Design Engineering Activities (IDEAs) ($1,000,000 over 10 years)
- Learning Innovation and Teaching Enhancement ($30,000 over 2 years)
- Learning Innovation and Teaching Enhancement ($5,000 over 1 year)

Institution Funded Projects (Current)

- Testing potential tools that can help to inform research in large lecture classrooms: Piloting overt, covert, and bridging research methods in the MATH 135 classroom
- Exploring the longitudinal impact of the Foundation Term intervention strategy

Academic Publications, Presentations and Invited Speaker

Publications

- Supported Learning Groups (SLGs) in a First-Year Chemistry Course
- Towards a Multi-Disciplinary Teamwork Training Series for Undergraduate Engineering Students: Development and Assessment of Two First-Year Workshops
- Fearing fat: Exploring the discursive links between childhood obesity, parenting, and leisure
- Parenting in an era of risk: Responding to the obesity epidemic
- A critical constructionist and mixed methods approach to understanding parenting practices and children's leisure
- Physical leisure participation and the well-being of adults with rheumatoid arthritis: The role of sense of belonging

Presentations

- Exploring Psychological Type Theory and how it can support Administrators, Academic Advisors and their 'at-risk' students as they make important decisions around appropriate retention interventions.
- Towards a Multi-Disciplinary Teamwork Training Series for Undergraduate Engineering Students: Development and Assessment of Two First-Year Workshops
- IDEAs Clinic Series of Teamwork Workshops – Implementation and Evaluation of Two First-Year Workshops

Transforming transitional support for UWaterloo students
- Using Psychological Type Theory to transform a learning strategies classroom
- Collaborating to transform new student transition programming
- A 'portrait' of at risk university learners: Exploring belief systems, personality type and emotional intelligence in relation to two students academic progress
- D.I.Y. test questions as a tool for deeper learning
- Building a Foundation for Student Success
- Towards mental wellness and academic success: The power of peer support and family collaboration in the triangle of care
- Fearing Fat: Exploring the discursive links between childhood obesity, parenting, and leisure

Invited Speaker
- 2014 Integrative Learning Series, *Centre for Teaching Excellence, University of Waterloo*
- 2012 Innovative Practice Series, *Centre for Teaching Excellence, University of Waterloo*

Teaching / Mentoring Experience
- Course Coordinator, 2011 – Present, UNIV 101: Strategies and Skills for Academic Success
- Mentoring, 2010 – 2012**,** Masters students (Physics, Chemistry)
- Teaching Assistant, 2009, REC 100: Introduction to the Study of Recreation and Leisure Studies

Service
- Mental Health Review, Task Force. University of Waterloo (2009)
- Board Member. Learning Disabilities Association of Ontario (2009 – 2011)
- The Foundation Term, Steering Committee. University of Waterloo (2009 – 2011)
- University 101 Development, Working Group. University of Waterloo (2009 – 2011)
- New Student Transition Programming, Steering Committee, University of Waterloo (2014 – 2016)
- Communicating Academic Integrity, Steering Committee. University of Waterloo (2016 – Present)
- Measuring the Fall Reading Break, Steering Committee. University of Waterloo (2016 – Present)
- Course Evaluation Project, Project Team. University of Waterloo (2016 – Present)

Professional Experience

October 2011 – Present

Senior Academic Development Specialist, Student Success Office, University of Waterloo

Strategic Direction, Management, Project Management, Research, Curriculum Development

Seconded: June 2014 – December 2015

Senior Faculty Relations & Academic Support Specialist, Student Success Office, University of Waterloo

Strategic Direction, Relationship Building, Management, Project Management

March 2009 – October 2011

Educational Support Specialist, Health Services, University of Waterloo

Academic Support, Assessment, Accommodation, Program Development

February 2008 – February 2009

Learning Strategist, AccessAbility, University of Waterloo

Accommodation Planning, Academic Support