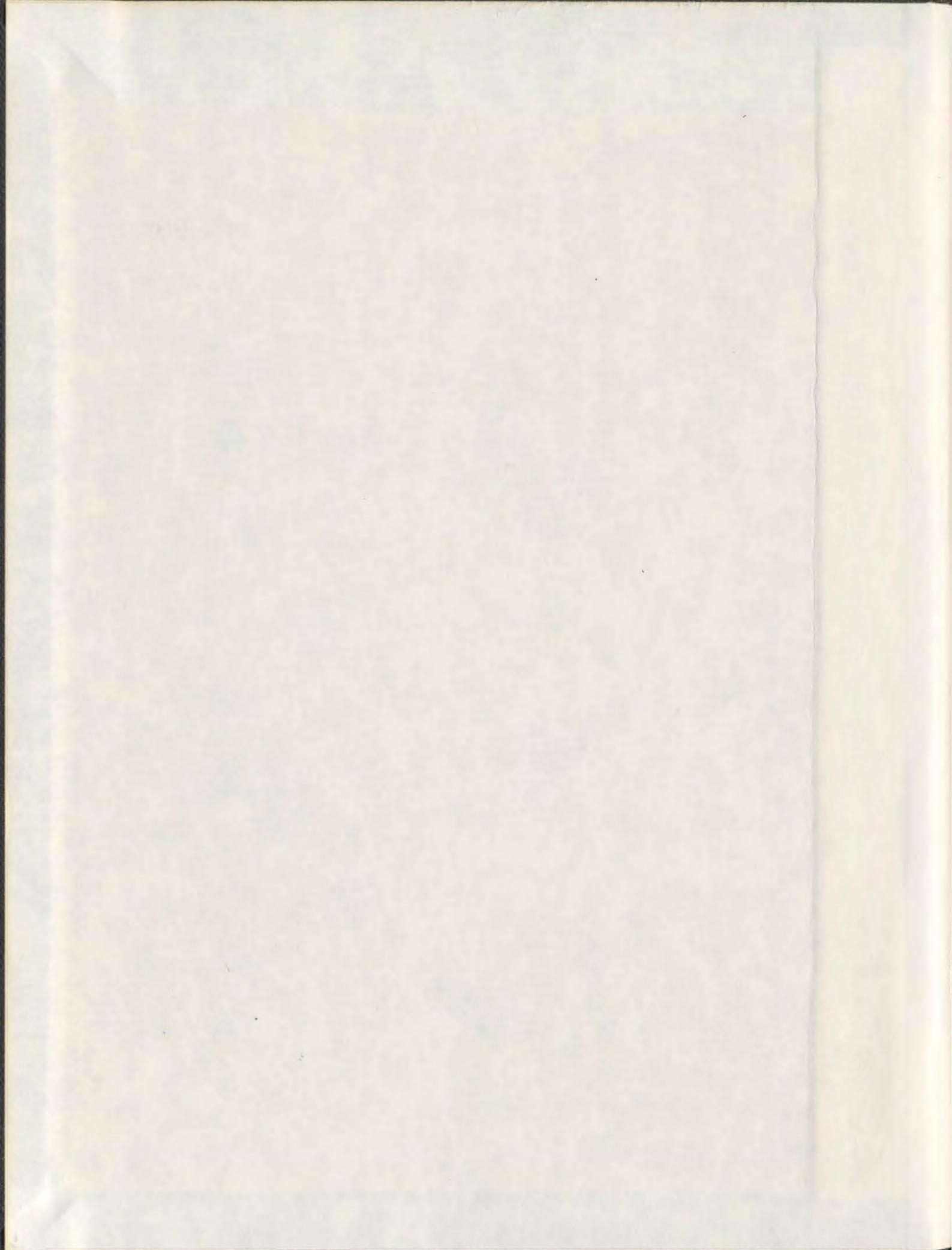


THE IMPACT OF DISTANCE EDUCATION COURSE
EXPERIENCE AND COPING STYLE ON FIRST YEAR
UNIVERSITY ACHIEVEMENT AND ATTRITION

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Running head: THE IMPACT OF DISTANCE EDUCATION EXPERIENCE

The Impact of Distance Education Course Experience and Coping Style on First Year
University Achievement and Attrition

By

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ABSTRACT

In the past, some secondary students in rural areas of Newfoundland and Labrador have experienced difficulty accessing courses necessary for graduation or entrance to post-secondary studies. This has largely been the result of inadequate resources such as the ability to recruit and retain teachers with the appropriate subject matter expertise to schools in rural areas. However, the Center for Distance Learning and Innovation (CDLI) has helped level the playing field for students from rural areas of the province by offering online, technology based distance education courses. As a result, students who graduate from high schools in rural areas of Newfoundland and Labrador comprise two groups of students: a) those who completed one or more distance education courses through the Center for Distance Learning and Innovation (CDLI) and b) those who completed their high school education entirely in the traditional, face-to-face classroom context.

Previous research has argued that distance education is equivalent or, in some circumstances, more effective than education delivered through the traditional face-to-face classroom medium (Ungerleider & Burns, 2003; Ryan, 1996; Bernard, Yiping, & Abrami, 2002; Shachar & Newman, 2003). However, little is known about how participation in online distance education courses during high school influences how students experience or cope with their transition to post-secondary studies, and how this may affect first year post-secondary achievement and subsequent attrition. Two studies were designed to explore this.

The purpose of Study 1 was to examine the effect of CDLI course experience on first year achievement and attrition in three cohorts of first year students using archival data. The purpose of Study 2 was to further explore the effect of previous distance

education experience on first year achievement and subsequent attrition in a sample of first year students, and to assess the role of coping in this process.

Data were analyzed using a combination of logistic regression and structural equation modeling techniques. Results from Study 1 revealed a significant effect of CDLI course experience on first year outcomes in a direction favoring CDLI experience. The results of Study 2 revealed no statistically significant difference between CDLI and non-CDLI students with regard to achievement, attrition or coping during the transition to post-secondary studies. No negative effect of previous distance education experience on first year post-secondary achievement or attrition was found.

Taken together, these results suggest students who have taken one or more CDLI courses are not disadvantaged during the first year transition period. These results support distance education as a viable alternative for students from rural areas of the province interested in expanding their course selection options for personal reasons, to meet high school graduation requirements or criteria necessary for acceptance to post-secondary institutes.

THE IMPACT OF PREVIOUS DISTANCE EDUCATION COURSE EXPERIENCE
AND COPING STYLE ON FIRST YEAR UNIVERSITY ACHIEVEMENT AND
ATTRITION

CHAPTER ONE: INTRODUCTION

The rapid growth of information technologies has influenced the way in which education is delivered and experienced, with substantially more courses at both the secondary and post-secondary level being offered through online mediums. In Newfoundland and Labrador, the online delivery of high school courses through the Center for Distance Learning and Innovation (CDLI) has contributed to a growing number and greater diversity of high school students completing online distance education courses. Consequently, a proportion of students from rural or remote regions of the province have entered post-secondary studies with online distance education experience. Unfortunately, little is known about the impact of distance education experience on subsequent educational pursuits. This research was designed to explore this issue by assessing the role of previous CDLI experience during high school on first year post-secondary achievement and attrition in students from rural areas of the province.

Keegan (1996) described distance education as a learning environment characterized by “a) a quasi-permanent separation of the teacher and learner; b) the influence of an organization in the planning, preparation and presentation of student support; c) the use of technical medium and d) two-way communication by student and teacher; as well as, e) the quasi-permanent absence of learning groups” (p.22-23).

Online distance education refers to distance education that uses internet-based

information and communication technology(s) (ICTs) and tools such as video, computers and other multimedia tools. Despite recent growth in technology based distance education research, most research in this area has focused on establishing the viability of distance education and parameters around the actual technology, paying little attention to the experiences of students or how such experience interacts with student level variables to influence post-secondary transition processes (Bereiter, 2003; Garrison & Anderson, 2003). The objective of the present research was to address this research gap in distance education literature by exploring differences between students from rural areas who have taken online technology-based distance education courses while in high school and students from rural areas that have not. The role of student-level variables, such as coping, that may affect the first year transition process and subsequent post-secondary achievement and attrition outcomes were also explored.

The Context

Newfoundland and Labrador, the easternmost province in Canada, is home to approximately 505,000 inhabitants. Of these, approximately one-half live in rural areas of the province. According to the Department of Education, during the 2006-2007 school year there were five school boards, 285 public schools, 5,443 teachers and 74,304 students in the K-12 system. Almost two-thirds of these schools (n=192) were located in rural areas of the province (Department of Education, 2007; 2006).

CDLI provides opportunities for students who live in rural and/or remote areas of the province to take courses that are not normally offered in their schools. According to CDLI, in 2004-2005, there were approximately 1400 student registrations in 34 high school courses taught by 25 virtual teachers. As a consequence, many Newfoundland

and Labrador students graduate from high schools in rural settings where some portion of their high school experience has involved taking courses through CDLI. Thus, a proportion of students enter Memorial University with exposure to online distance education courses.

Purpose and Rationale

The purpose of this research was to determine the impact of previous distance education experience on the first year post-secondary outcomes of a group of rural students. This research has implications for two separate lines of educational research; post-secondary attrition research and distance education research. This line of inquiry is unique in that examination of distance education as an educational background variable has not been explored in previous post-secondary attrition research nor has distance education research explored the longer term impact of distance education during high school on student outcomes at the post-secondary level. Overall, this research aims to assess how previous distance education experience affects student achievement and attrition and how student level variables such as coping affect this process.

Research on student attrition and factors that may discourage it are important from a human capital perspective. Human capital refers to the knowledge and skill that people possess as a result of natural aptitude, education, training and/or experience. As such, Human Capital Theory dictates that human capital is an essential and necessary ingredient for economic return. From this perspective, research related to post-secondary attrition is important because the cost of attrition may be great for all parties involved: students, post-secondary institutions and society in general whereas completion may result in personal and economic gains.

To illustrate, students who discontinue their education lose the money they pay for unsuccessfully completed courses. In addition, post-secondary non-completion may impede an individual's ability to garner a higher salary in careers that demand post-secondary completion. The post-secondary institution loses revenue from students who discontinue their progress and no longer pay tuition. Meanwhile, society loses highly trained and employable workers.

When considering gains, college attendance has been found to have a positive effect on socioeconomic status and intergenerational educational attainment, occupational status and the subsequent earnings of children (Pascarella & Terenzini, 1991). The potential losses resulting from post-secondary attrition or conversely, the benefits of post-secondary persistence are not only monetary. From a social psychological perspective, Pascarella and Terenzini (1991) reported college attendance to be moderately associated with subjective well-being, and overall health status as well as, marital satisfaction.

Importance of Studying the Impact of CDLI Participation on Post-secondary Outcomes in Rural Students.

Between 1992 and 2002 the overall Canadian birth rate plunged by approximately 25% (Statistics Canada, 2004). According to data available from Statistics Canada, between 2006 and 2007 New Brunswick and Newfoundland and Labrador experienced the lowest number of births among all provinces and territories in Canada (Statistics Canada, 2007). Based on this, it is foreseeable that future post-secondary enrollment of Newfoundland and Labrador students at Memorial University and other post-secondary institutions in the province will decline as birth rates continue to drop and the population of high school graduates shrinks. As such, efforts to promote

post-secondary educational opportunities and retain Newfoundland and Labrador students are warranted. Efforts in this regard should, begin with an enhanced understanding of the student population, their demographic profile and needs, personal characteristics and how these various factors relate to post-secondary achievement and attrition.

Despite research which has suggested that rural students are less likely to attend post-secondary institutions, a large percentage (42.1%) of first year students attending Memorial University are from rural areas of the province (Pippy, 2005). However, the percentage of students from rural areas obtaining a post-secondary education is generally lower (Dupuy, Mayer & Morissette, 2000).

A variety of reasons, such as limited course availability and lower educational aspirations, have been suggested for the decreased likelihood of post-secondary university attendance and completion among rural students (Looker, 1993; Andres & Looker, 2001). For rural students who do attend there is some indication that the transition to post-secondary studies may be more difficult. Institutional data provides some evidence to suggest that rural students attending Memorial University in St. John's perform more poorly than their urban counterparts (Porter, 2005; Goudie, 2004).

While research has routinely examined rural and urban differences in post-secondary attendance and attrition, very few studies have explored the impact of previous distance education experience on rural student post-secondary participation and attrition. Exploring the relationship between previous distance education experience and attrition outcomes of rural student offers a unique perspective from which to consider the first year university transition period. It also represents an essential step in understanding the effect of this unique educational experience on subsequent

educational pursuits. This analysis may also aid in the identification of educational practices that enhance university preparation and promote first year post-secondary retention among rural students.

Importance of Studying Student Characteristics such as Coping in First Year Rural Students.

It is important to investigate attrition in the first year of university as research has demonstrated that post-secondary student attrition rates tend to be highest among first year students, both internationally and nationally (Lukic, Broadbent, & Maclachlan, 2004; Grayson & Grayson, 2003). In Canada and the USA, between 20% and 25% of first year students fail to proceed to their second year and some research has suggested that that attrition rates may be higher among rural students (Hamilton & Hamilton, 2006; Aylesworth & Bloom, 1976; Porter, 2005). Closer to home, institutional data reveal that while first year attrition rates at Memorial University have declined slightly over a five year period between 1995 and 2000, from 24.9% to 20.0%, the rate of first year attrition remains high with a considerable proportion of students not proceeding to their second year of studies. It is possible the high rates of attrition found in this group may be partially associated with the potentially stressful nature of this transition period for some new students. According to Astin (1998), results from the U.S. National Freshman Survey indicated there has been a steady increase in student stress, defined as feeling overwhelmed with everything that needs to be done upon attending post-secondary studies. A review of research on student stress in higher education has also concluded the prevalence of stress is increasing among students studying in higher education (Robotham and Julian, 2006). The potentially stressful nature of this transition may be

particularly acute for rural students who are often required to move away from home to attend post-secondary institutes.

In addition to the usual achievement expectations and pressures associated with post-secondary studies, students who move to attend university or college may encounter stressors directly related to separation from family units and established social support networks. As a result, some may experience homesickness, and/or friendsickness defined as “the pressing relational challenge for new college students that is induced by moving away from an established network of friends (Paul & Brier, 2001, p. 77). The potentially stressful nature of this transition for those who have moved to attend school may also be exacerbated by novel exposure to increased financial burden (Kirby & Conlon, 2005). For instance, rural students who have moved from their communities of origin to attend school encounter added financial worries such as paying rent and living expenses that others who originate from urban areas closer to campus may not experience.

Stress has been associated with performance impairment, which may have detrimental consequences for students in post-secondary settings (Struthers, Perry and Memec, 2000; Barnes, Potter, & Feidler, 1983). However, how an individual copes with stress during the transition to post-secondary studies may play an integral role in both achievement and attrition. For instance, coping strategies have been found to mediate the effect of stress on the academic performance of post-secondary students through motivational processes (Struthers, Perry, & Menec, 2000; Sheilds, 2001; Struthers, Perry, Menec, Schonwetter, Hechter, Weinberg, & Hunter, 1995). The strength of coping as a potential mediator in this context may be relevant to educators and policy makers

interested in promoting adjustment and subsequent retention, as coping skills training may be a viable component of high school preparation efforts.

Conceptual Framework

The theoretical framework adapted in this research was largely derived from a combination of psychological theory and post-secondary ecological theories of attrition. Tinto's theory of student departure (Tinto, 1987) and model of student integration provided a theoretical backdrop for discussing the first year transition process while Bean and Metzner's (Bean & Metzner, 1985) conceptual model of nontraditional students emphasized the importance of considering nontraditional background variables such as distance education experience in the post-secondary attrition process.

Bandura's social cognitive theory (Bandura, 1977) contributed a transactional lens to view attrition. More specifically, this theory provided a theoretical foundation for considering how individuals acquire behavior and motivational patterns and how these behaviors shape subsequent behavior and decision-making processes in the first year post-secondary studies.

The work of post-secondary theorists such as Tinto (1987), and Bean and Metzner (1985) will be extended by testing a new model of first year post-secondary achievement and attrition to determine the effect of previous distance education experience and coping on first year achievement and attrition (see Figure 1). The new model may be contextualized as both a content and a process model because it identifies background variables that may influence first year transition and attrition, while acknowledging the role of psychological processes that accompany decisions to continue or discontinue studies.

It was hypothesized that there would be no significant difference between the first year post-secondary achievement of students who have taken one or more CDLI courses while in high school and those who completed their high school education completely in the traditional face-to-face context. However, it was hypothesized that relationships would exist between some of these variables and in Study 2, it was hypothesized that coping may play a role in first year post-secondary achievement and attrition for student who have taken CDLI courses and for those who have not.

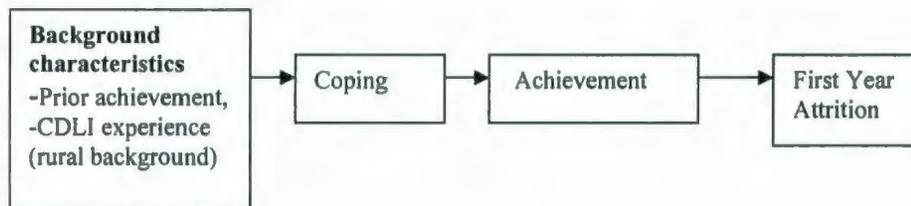


Figure 1 Model of First Year Student Transition and Outcome

Research Questions

Three main research questions guide this work:

1. Do rural students who have previous CDLI course experience differ from rural student who have not taken CDLI courses while in high school with regard to high school achievement and overall first year university achievement?
2. Is there a relationship between high school achievement and CDLI experience, and do these variables predict first year post-secondary achievement and subsequent attrition?
3. What effect does CDLI experience have on achievement and subsequent first year post-secondary attrition, as measured by voluntary and involuntary withdrawal, and what role does coping play in this process?

Organization of the Thesis

This thesis has been organized into five chapters. The introduction is provided in Chapter One. A literature review, intended to provide a theoretical overview, forms the basis of Chapter Two. Chapter Three provides an overview of the methodology and procedures implemented to investigate the above-mentioned research questions, and the results are presented in Chapter Four. Finally, a more comprehensive discussion of the findings and possible limitations of the research are presented in Chapter Five.

CHAPTER TWO: LITERATURE REVIEW

Chapter Two provides background for and context to the present research, beginning with a discussion of the rural and urban composition of Newfoundland and Labrador's population and a descriptive profile of students in the province. This section will also include a brief history of distance education in Newfoundland and Labrador, followed by a discussion of post-secondary student enrollment from a national and provincial perspective. A review of post-secondary attrition theory and research, accompanied by a short synopsis of related empirical findings in the area will follow. This section closes with a general discussion of the potentially stressful nature of the first year post-secondary transition period and the role of coping in this process.

Newfoundland and Labrador in Context

Newfoundland and Labrador, the easternmost province in Atlantic Canada, exhibits a unique settlement profile. Historically, the waters surrounding the jagged coastline of Newfoundland and Labrador were a rich fishing ground for European fishermen. The once bountiful livelihood offered by ocean resources led to the eventual settlement of numerous coastal communities around the province. Although much has changed since the closure of the cod fishery in the 1990's, many of these rural communities have remained intact. Currently, the overall distribution of the province into rural and urban communities remains relatively balanced, with a large proportion of the population residing in a couple of central urban areas and a large percentage of the population residing in rural areas widely dispersed throughout the province (Statistics Canada, 2008d).

To illustrate, the Newfoundland and Labrador Department of Education considers Census Metropolitan Areas (CMA), Census Agglomerations (CA) and communities with a population of 5,000 or more to be urban and all others to be rural areas. According to this definition, the Greater St. John's area, Bay Roberts, Corner Brook, Grand Falls-Windsor, Gander, Labrador City, Stephenville, Marystown and Clarenville are the only locations considered urban while all others are classified as rural. Although the number of people residing in these urban areas constitutes approximately 56.3% of the population, this figure also demonstrates that a substantial proportion live in rural communities (43.7%) (see Table 1). Compared to the national rate (20%), more people in Newfoundland and Labrador live in rural areas (see Figure 2).

Table 1 Percentage of Population in Urban Areas of the Province

Areas considered urban	Location type (Census Metropolitan Areas (CMA), Census Agglomerations (CA))	Frequency (Percent of Population)
Greater St. John's	CMA	181,113 (35.8%)
Corner Brook	CA	26,623(5.4%)
Grand Falls-Windsor	CA	13,558(2.7%)
Bay Roberts	CA	10,507 (5.8%)
Gander	Town	9951(1.7%)
Labrador City	CA	7240(1.4%)
Stephenville	Town	6588 (1.3%)
Marystown	Town	5436(1.1%)
Clarenville	Town	5274(1.0%)
Total	N/A	266 290(56.3%)

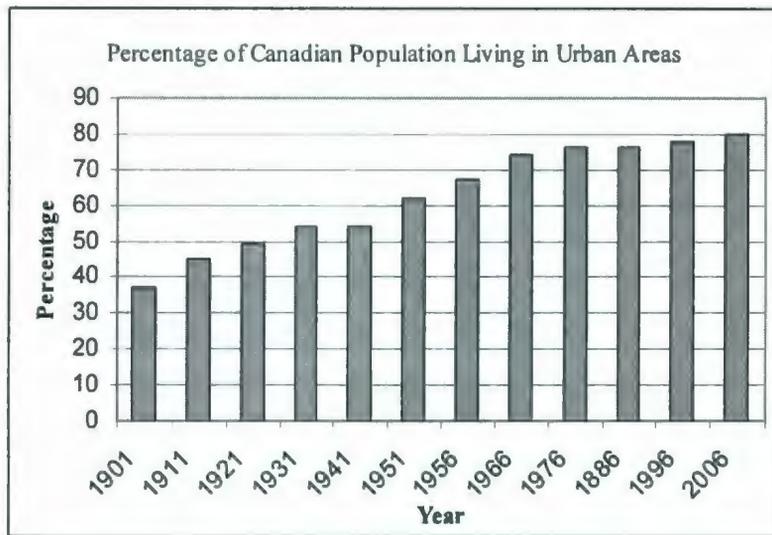


Figure 2 Percentage of the Canadian Population Living in Urban Areas (Adapted from Statistics Canada, 2008c)

According to the Department of Education, almost two thirds of schools in Newfoundland and Labrador are located in rural areas. Students attending schools in rural areas of the province comprise approximately 48.5% of the total student body, and approximately 46.8% of the current Level III (Grade 12) population in the province (see Table 2).

Table 2 School District Rural/Urban population (2006/2007)

District	Total		Level Three (Grade 12)	
	Rural	Urban	Rural	Urban
Labrador	3145	1045	176	112
Western	8604	5108	769	424
Nova Central	9793	3680	950	285
Eastern	14 422	28 284	1035	2508
Total (N=74 081)	35 964	38 117	2930	3329

Given, rural communities are widely dispersed throughout the province many rural schools in the province are considered “necessarily existent”. According to the Department of Education, a school that is necessarily existent is one that is located in a community that is too far from another school in another community to warrant transport of students to and from school. The result of this geographical isolation is that some rural schools may have a limited number of students enrolled in any one grade level, at any one time. To illustrate, according to Community Accounts (2008), in 2006-2007 one school had only two Level III students in attendance.

The lack of specialized teachers and resources often found in rural have been suggested as factors inhibiting schools in rural areas from offering a full spectrum of courses from qualified teachers with subject matter expertise (Crocker & Riggs, 1979; Canadian Council on Learning, 2006; Bussche, Temesvari, & Czamecki, 2007). In some cases, the inability to offer a full spectrum of courses may impact the ability of students to meet criteria for graduation and subsequent post-secondary attendance. Thus, it has been argued that smaller, rural schools cannot offer the educational opportunities or curriculum that larger schools located in urban regions can (Canadian Council on Learning, 2006; Bussche, Temesvari, & Czamecki, 2007). However, some contend that innovative methods, such as technology based distance education, can help level the educational playing field for rural students by providing them with quality education in their own communities (Young, 1993; Hicks, 2002).

Distance Education and CDLI

In general, distance education refers to a form of instructional delivery that involves a physical separation of teacher and student. Originally, distance education was

based on a correspondence model that depended on the postal system for exchange of materials and written correspondence between the teacher and student. Over the years, distance education has evolved to become a technology driven educational delivery model that enables a virtual connect between teacher and student.

Several formal definitions of distance education have been offered in the literature. For instance, Barker, Frisbie and Patrick (1989) defined distance education as an educational delivery method where there is a physical separation of the teacher and learner, but a link between the two through a telecommunication tool that allows interaction. Pantel (1997) described web-based distance education learning environments as those where learning takes place despite a separation between teacher and learner. As mentioned previously, Keegan (1996) offered one of the most comprehensive definitions of the distance education learning environment. He referred to it as an environment characterized by “a) a quasi-permanent separation of the teacher and learner b) the influence of an organization in the planning, preparation and presentation of student support c) the use of technical medium and d) two-way communication by student and teacher as well as e) the quasi-permanent absence of learning groups” (Keegan, 1996, p.22). Use of the prefix quasi, meaning “to have a likeness or resembling” suggests the permanent separation of teacher and student and the absence of learning groups is not a literal state of affairs and that although physical separation occurs, a connection through use of technology based mediums allows communication between teacher and student and the existence of learning groups.

The Government of Newfoundland and Labrador defines distance education as “any form of teaching and learning in which teacher and learner are separated in time or location” (Sparkes & Williams, 2000, p. 65). Currently, the Center for Distance

Learning and Innovation delivers distance education via e-learning using web-based approaches supported by telecommunications systems and computer networks around the province. In this learning environment, technology allows a connect between the teacher and student despite their geographical location.

A Brief History of Distance Education in Newfoundland and Labrador

Distance education in Newfoundland and Labrador was formally offered in a modest form at the secondary level during the late 1980's. The main objective was to offer a range of courses necessary for graduation and admittance to post-secondary institutions. This advance emerged largely as a result of a 1979 report entitled *Improving the Quality of Education: Challenge and Opportunity*, which addressed educational challenges and inequalities in the province (Crocker & Riggs, 1979). The authors suggested that disparities existed between rural and urban schools within the province with respect to resources and teacher expertise. These disparities were suggested to inhibit some rural schools from offering a full range of courses (Crocker & Riggs, 1979). Several reports that followed reported similar conclusions, suggesting that students in rural schools may be disadvantaged (see House, 1986; Riggs, 1987; Crocker, 1989).

Political change and technological advancements also spurred greater interest in the delivery of distance education and encouraged exploration of web-based delivery models designed to deliver high quality education to students in rural areas. For instance, the dissolution of the denominational school system prompted educators and politicians in Newfoundland and Labrador to address the issue of rural education as it became apparent during school consolidation process that the geographic dispersion of rural

communities would require consideration of alternate or enhanced distance education delivery models (Sparkes & Williams, 2000).

At around the same time, STEM-NET, a computer driven communications network was introduced and with the help of Human Resources Development Canada and the province, schools in the province were able to improve their computer facilities. This improvement in equipment and facilities allowed teachers from various schools across the province to communicate via computer and internet-based technology (Government of Newfoundland and Labrador, 2000). These political changes and technological advancements inspired further interest in the design of alternative education delivery models for rural students in this province.

In 1999, the Government of Newfoundland and Labrador appointed a ministerial panel to address alternative educational delivery models. The resulting discussions concluded that existing distance education could be enhanced by and should be supported by web-based technology. The introduction of web-based technology to existing distance education models allowed for a more sophisticated method of course delivery that included a synchronous component. In response to the Sparks-Williams Ministerial Panel on Educational Delivery, the Center for Distance Learning and Innovation (CDLI) was formed (Sparkes & Williams, 2000). With the formation of CDLI, the method of distance education delivery changed to rely on internet-based, computer driven technology that allowed for both synchronous and asynchronous learning.

The use of technology in this context allowed young people to overcome the educational confinements of rural living to surpass time, space and educational content boundaries to take courses delivered by highly qualified teachers with other students

from other parts of the province. As stated by Young, distance learning in this context would “enable young Newfoundlanders and Labradorians to become productive, participating, competitive, self-reliant, and enterprising individuals within their communities, province, and country as well as within a global context” (Young, 1993, p. 4).

In CDLI’s first year of operation it was estimated that approximately 703 rural students took at least one CDLI course while in high school (Brown, Sheppard & Stevens, 2000). Since then, these numbers have grown significantly. Currently, CDLI has more than 1500 student enrollments (Barbour, 2007). At the present time approximately 15% of new entrants attending Memorial University have taken one or more CDLI courses while in high school. However, empirical work examining the impact of CDLI experience during high school on the post-secondary transition experiences of students in this province has not occurred. Little, if any, research has examined how students’ previous educational experiences may affect first year post-secondary achievement and attrition.

Research in the area of distance education has concluded that distance education may be an equivalent alternative to traditional classroom based educational delivery models while other research has suggested distance education may be more superior when considering achievement (Ryan, 1996; Bernard, Yiping, & Abrami, 2002; Shachar & Newman, 2003). However, lack of matching based on equivalent achievement levels has been cited as a methodological limitation skewing findings from studies examining differences between these groups (Jahng, Krug, & Zhang, 2007). For instance, in a meta-analysis conducted by Jahng, Krug, & Zhang (2007) student achievement in distance education was better than student achievement in the

traditional context when studies imposing pre-testing were implemented. Conversely, these researchers found no significant difference between distance education and traditional educational delivery when studies using no pre-testing were implemented. Findings such as this highlight the need for more methodologically grounded empirical research before definitive conclusions may be drawn regarding the equivalency or superiority of distance education courses over the traditional face-to-face model.

However, if, as some have argued, distance education is equivalent to education received in traditional, face-to-face contexts, then one would expect little difference between the post-secondary achievement and attrition of students who have taken distance education courses versus those who have not. Conversely, any differences between these groups may suggest these students have distinct experiences or individual characteristics that may influence their first year university outcomes in different ways.

Characteristics of Students who take Distance Education Courses

While research in the field of distance education has traditionally focused on comparing distance education with traditional face-to-face classroom education and the teaching models or tools implemented, some research has investigated the reasons why students choose to take distance education courses and the characteristics of those who enroll and successfully complete such courses (Thompson, 1998).

At the post-secondary level, studies have indirectly examined why students choose distance education courses by examining their demographic characteristics. This research has suggested that distance education students are generally older and non-traditional(i.e., in that they may work either full-time or part-time and/or have home

and work responsibilities) (Thompson, 1998; Bean & Metzger, 1985). At the secondary level, it is less likely that students will be older and that work and family obligations or responsibilities will hinder school attendance at normally prescribed hours.

In Newfoundland and Labrador, it is more likely that secondary students from rural areas of the province will choose to take a distance education courses as a result of limited course availability. In some cases, taking distance education courses allows these students to complete the courses necessary for high school graduation and/or post-secondary admission. However, personal or psychological characteristics such as motivation, self-regulation, internal locus of control, preference for autonomy and self efficacy that influence academic outcomes may be relatively consistent across educational settings. These characteristics may affect student outcomes in distance education courses at both the secondary and post-secondary level.

According to Boyd (2004), the characteristics of students who enroll and successfully complete distance education courses may be categorized as environmental, technical, and personal or learning oriented. Environmental factors include timing and scheduling, as well as competing family or work responsibilities while technical characteristics include computer skill and internet savvy (Boyd, 2004). Some of the most common personal or psychological based characteristics associated with distance education enrollment and successful completion are motivation, attribution, self-regulation, internal locus of control, preference for autonomy and self-efficacy (Boyd, 2004; Wang, Peng, Huang, Hou, & Wang, 2008).

Wang and Associates (Wang, Peng, Huang, Hou & Wang, 2008) administered questionnaires to 135 adult distance learners to assess the relationship between personal characteristics including learning motivation, self-efficacy, learning strategies and

attribution style, and learning outcomes as measured by examinations scores and self-assessment. The results revealed that learning strategy and learning motivation positively predicted self-efficacy and that internal attributions had a positive, indirect effect on learning. However, this study did not include a comparison group to determine if these relationships were consistent between students who have distance education experience and those who did not.

One study conducted by Powell, Conway and Ross (1990) examined factors that affect student success in distance education courses. This study, which included a 301 first year university students who were taking a distance education course found nine characteristics to be significantly related to success. Students who persisted and passed the course(s) they were registered in were categorized as the successful group while those who dropped out or failed comprised the non-successful group. Successful learners rated themselves higher on various measures of persistence, were more likely to be married or in a common law relationship, and rated the consequences of not passing as serious. These students also demonstrated more self-efficacy for success by rating their chances of succeeding in their studies higher than others. Also, those who rated the value of formal and informal learning as high were more likely to succeed. On the other hand, students who were unsuccessful indicated that they needed support from others to complete difficult tasks and found it important to discuss course work with other students. Finally, previous educational experience did not appear to impact success. Levy (2007) also found that students who persisted in completing the distance education course in which they were enrolled reported higher satisfaction than those who dropped out.

Unfortunately, many of the samples implemented in the aforementioned studies were drawn from adult and/or university populations. Comparatively fewer studies have directly and empirically examined these characteristics in high school students.

However, Roblyer (2000) conducted research which simultaneously examined a sample of high school students and a sample of community college students taking distance education courses using survey design and interviews. The findings supported the importance of internal locus of control and preference for autonomy in both high school and distance education learners. Moreover, this research included a traditional face-to-face classroom comparison group for both the high school and community college samples. Roblyer (2000) concluded that students' control of pace and timing of learning were important considerations for distance learners while interaction with teachers and other students were important for those who chose traditional face-to-face courses.

Oxford, Young, Ito and Summral (1993) investigated the impact of motivation, learning style and strategy use on language learning in a group of high school students taking a foreign language class and found a positive association between motivation and language learning achievement. No significant relationship was found between learning style and achievement outcome; however, there was some association between preference for auditory learning and motivation as opposed to visual or tactile learning.

Overall, the findings reported in these studies suggest that, not unlike the traditional, face-to-face learning environment, the affective characteristics of the learners influence their success. Bandura's social learning theory highlights the importance of psychological concepts such locus of control, self-efficacy and motivation and the importance of interactions between the person, the environment and behavior. According to this theory, learning and motivation to learn are

influenced by perceptions of ability, and ability attributions, control or ability to exert influence over learning outcomes, as well as one's ability to cope when faced with challenge (Bandura, 1977). Hence, in the context of social learning theory, when considering the transition to post-secondary studies, it is possible that coping, or perception of coping ability may be a precursor to perceptions of self-efficacy, and motivation to perform and successfully complete tasks. Unfortunately, few, studies have examined this possibility in this context and more comparative research involving high school students is necessary before definitive conclusions may be drawn regarding the unique importance of these characteristics for students enrolled in distance education courses versus traditional face-to-face courses.

Post-secondary Enrollment and the Newfoundland Student

Philosopher and educator John Dewey stated that, "...the result of the educative process is capacity for further education..." (Dewey, 1944, p. 65). More than half a century later these words are reflected in growing post-secondary enrollment rates evidenced in Canada. According to Statistics Canada, during the 1999-2000 academic year there were approximately 847,500 students enrolled in university studies across Canada, either full time or part time. The number of student enrollments progressively increased to 1,014,486 by the 2004-2005 academic year (Statistics Canada, 2006b). The figures for post-secondary participation at the college level are less well defined. However, Statistics Canada data suggest that enrollment in community college more than doubled between 2000-2001 and 2004-2005 (Statistics Canada, 2008a). Similarly, the numbers of diplomas or certificates granted by colleges substantially increased during this time (Statistics Canada, 2008b). In Newfoundland and Labrador, the same

trend exists with figures suggesting that rates of university enrollment in the province increased by approximately 10% between 1999-2000 and 2005-2006 (Statistics Canada, 2006b).

A multitude of personal, social, and financial reasons may contribute to increased post-secondary enrollments across the country and in the province. For instance, a majority of first year students reported that their reasons for attending Memorial University were related to convenience or location (59.5%). Others reported choosing to attend Memorial to further their education (18.3%) or to pursue a specific program (9.7%), while a small percentage (3.8%) reported choosing Memorial to further their career or enhance employment opportunities (Pippy, 2005).

Perceptions that education, and post-secondary education in particular, are necessary ingredients for individual success and overall societal progress may also contribute to increasing post-secondary enrollment. To illustrate, the Council of Ministers of Education Canada contend that "...the future of our society depends on informed and educated citizens who, while fulfilling their own goals of personal and professional development, contribute to the social, economic and cultural development of their community and the country as a whole" (Council of Ministers of Education, 1993).

In 2005, approximately 1900 new students began studies at Memorial University of Newfoundland, representing a 2.5% increase from the previous year. A majority of the entering cohort attended the St. John's campus (83%) and almost half (42.1%) of the first year students attending the St. John's campus originated from rural areas of the province (Porter, 2005). Although rural students still account for a substantial proportion of the overall student enrollment, this represents an approximate 8% decrease in rural

student enrollment in the five years previous (see Table 3). Thus, despite increasing national and provincial enrollment rates, there has been a decrease in enrollment among rural students in Newfoundland and Labrador. This is consistent with research which suggested that rural students are less likely to graduate from high school and are less likely to attend and obtain a post secondary degree (Looker & Dwyer, 1998; Looker, 1993; Looker, 2001; Looker & Lowe, 2001).

Table 3 Percentage of New Matriculates Originating from Rural areas of the Province

Year	2001	2002	2003	2004	2005
%	50.0%	48.5%	46.4%	42.2%	42.1%

This decrease may be in part related to declining birth rates and out-migration of youth from the province in general, and rural areas in particular. To illustrate, in 2004, the Canadian national birth rate was at an all-time low and among the provinces, Newfoundland and Labrador experienced the greatest decline with a 3% decrease (Statistics Canada, 2006a). Such issues further accentuate the need to examine issues related to the post-secondary attrition in the rural student population because the province's ability to recruit, educate and retain young people is necessary in order to fill jobs that require knowledge, skill and training. It is estimated that by 2022 it will be 2 retirees for every 1 young person illustrating the anticipated increase in demand for labor that may be witnessed in this province (Department of Finance, 2007).

This trend has had a pronounced effect on the numbers of actual and projected kindergarten enrollments over the last decade (see figure 3). According to data from Statistics Canada, Newfoundland and Labrador has experienced the greatest provincial decline in student enrollment at all levels of the education system. Moreover, projections

suggest that this downward trend will continue (Dibbon, 2001). Simply put, there are fewer young people in this province.

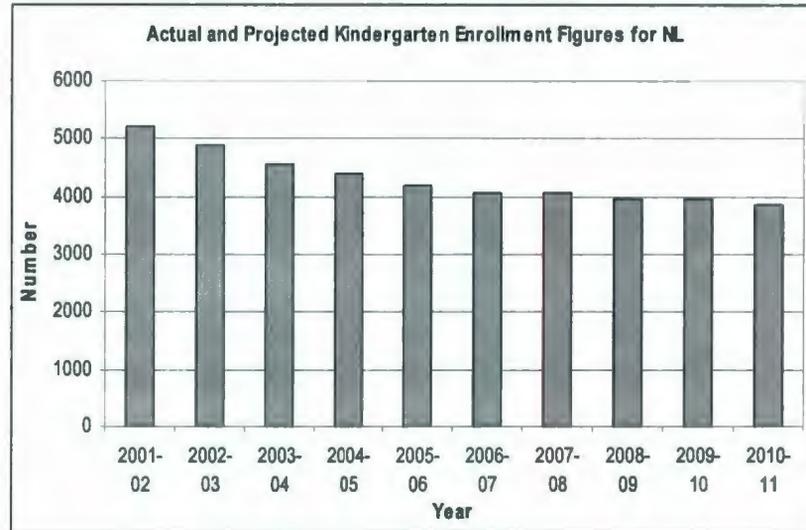


Figure 3 Actual and Projected Kindergarten Enrollment in Newfoundland and Labrador (Adapted from Dibbon, 2001)

Out-migration patterns have also contributed to population decline in Newfoundland and Labrador as many young people, especially those from rural areas, leave to find employment, starting careers and families elsewhere. According to Statistics Canada, Newfoundland and Labrador lost approximately 47,000 residents to inter-provincial out-migration between 1996 and 2001. Almost half of those who left the province were between the ages of 15 and 29 (Tremblay, 2001). Canadian out-migration patterns suggest that rural youth tend to move from rural areas to urban centers in their own provinces (Dupuy, Mayer, & Morissitte, 2000). However, in Newfoundland and Labrador this is not the case. Instead, research suggests that the destination for out-migrating rural Newfoundland and Labrador youth has been to urban areas outside the province (Dupuy, Mayer, & Morissitte, 2000).

Based on the declining birth rates and youth out-migration patterns, it is anticipated that future post-secondary enrollment of Newfoundland and Labrador residents will continue to decrease. This, in combination with insufficient immigration of post-secondary students, may result in a net decrease in post-secondary enrollment rates and consequently lost revenue for post-secondary institutions in Newfoundland and Labrador.

While efforts to increase at the recruitment of international students to supplement the projected enrolment decline is a reasonable endeavor, efforts to retain students who are Newfoundland and Labrador residents and to prevent post-secondary attrition in this group remains essential for the economic and human resource reasons. Research has suggested that post-secondary attainment is also associated with better overall health and well-being in the population (Pascarella & Terenzi, 1991, Junor & Usher, 2004).

Post-secondary Persistence or Attrition

Research on post-secondary attrition became prominent within the educational research literature during the 1970's. It appears that this research grew from student development research that aimed to ascertain factors associated with student retention. In the context of the present research, student retention refers to student persistence or continuation to degree or program completion at a post-secondary institute. Often, the terms retention and persistence are used interchangeably.

The complement of research examining retention or persistence has been research examining student attrition or post-secondary discontinuation or withdrawal. An obvious inverse relationship exists between these concepts where one (persistence)

implies continuation and the other (attrition) implies discontinuation. Generally, two types of attrition or withdrawal may occur. Involuntary withdrawal, refers to institutionally mandated withdrawal generally resulting from students' failure to meet program or course requirements. Voluntarily withdrawal refers to students' self imposed withdrawal, which may occur for a variety of reasons generally unrelated to achievement.

Theoretical Conceptualizations

Research in the area of post-secondary persistence has been approached from various perspectives; however, the most prominent theoretical contributions are ecologically based and emerge from the field of sociology. Ecologically based, person-environment fit theories of attrition have examined the congruence between individual abilities, motivations or preferences and the environmental or institutional context. Person-environment fit theories suggest that when the fit between the person and environment is poor, performance will be impaired. Conversely, when the fit is good performance will be enhanced (Strange & Banning, 2001).

Person-Environment Fit Theories of Transition and Attrition

One of the earliest accounts of person-environment fit theories common in the post-secondary attrition literature was Spady's (1970) sociological model of attrition. Spady's model of attrition was an interpretation of Durkheim's (1951) model of suicide applied to education. Durkheim's (1951) model depicted four types of suicide: *altruistic suicide* where death is perceived as morally desirable; *anomic suicide* where suicide is the result of a temporary disturbance in societal norms that weakens bonds between society and its members; *fatalistic suicide* resulting from lack of opportunity for

personal growth and expression; and finally, *egotistical suicide* resulting from individual failure to become socially and intellectually integrated into society. Durkheim's model of suicide, in particular his formulation of egotistical suicide which suggested that suicidal individuals fail to socially and intellectually integrate, was paramount in the development of Spady's theoretical formulations relating to attrition.

Spady (1970) drew a parallel between Durkheim's termination of life and the termination of a life event or situation, specifically student withdrawal from post-secondary studies. Borrowing from Durkheim, Spady's model of attrition suggested that those students who failed to fully integrate into the culture of the educational institution would be more likely to withdraw before completing their studies. Originally, in addition to family background, and student potential a Spady's model consisted of four influential factors including grades, intellectual development, social support, and norm congruence—all of which influenced or gave rise to social integration. Empirical work guided by Spady's (1970) original model suggested that these factors were all either directly or indirectly related to decisions to discontinue education through satisfaction and commitment. Many of the variables identified by Spady's model such as social integration, have remained a focus of current research, appearing in subsequent models of persistence and attrition.

In the present context, the importance of social integration or support identified by Spady (1970) may have significant implications for first year rural students who leave their families or hometowns to attend university in a new community. Several studies examining sources of stress or adjustment difficulties for first year students suggested that the actual and psychological process of leaving friends and family and homesickness are common sources of stress for students and that forms of social support

may influence coping in times of stress (Lapsley, Rice, & Shadid 1989; Paul & Brier, 2001; Van Tilburg, Vigerhoets, van Heck, & Kirschbaum, 1999; Zeleski, Levey-Thors, Schiaffino, 1998).

Another theoretical model that emphasizes the importance of integration is Tinto's (1987) theory of student departure and model of student integration. These have provided a strong theoretical framework for discussing the transition process and variables thought to influence student persistence or attrition. Tinto's (1987) work was heavily influenced by anthropologist Van Gennep's (1960) work on "Rites of Passage". Van Gennep (1960) proposed that many human activities or rituals that represent growth or movement from one stage to another can be characterized by separation, transition, and incorporation. To more fully illustrate, the first stage, referred to as the separation stage, generally involves the individual separating himself from past associations by limiting interactions. The second stage, called the transition stage reflects the point when old associations have been left in the past and the individual attempts to become acquainted with a new group or way of life. In some instances, this stage may be met with isolation and or challenge. The immersion of the individual into a new life grants the opportunity for the individual to adopt new norms and regulations of a group and to become familiar with his or her role within the new group. The final stage, described as the incorporation stage, is a phase where an individual has acquired the knowledge and skill necessary to exist and function in a new group. During this stage the person is fully integrated as a member of the new group and functions within the norms and patterns of behaviour characteristic of that group.

Tinto (1987) applied Van Gennep's Rite of Passage theory to students making the transition from secondary to post-secondary education. From Tinto's perspective,

the separation stage occurs when students are required to move away from their established social networks to attend school. In Tinto's words there is a "separation from communities of the past". This may be conceptualized from both a psychological and a physical perspective. For instance, rural students in Newfoundland and Labrador are sometimes required to physically move geographical locations to attend post-secondary institutions and in doing so no longer have the established social support that was once in close proximity to them. Put differently, these students are "strangers in a strange land" where they are among people unfamiliar to them, their social norms and expectations.

However, advances in technology now permit individuals to surpass the traditional boundaries of time and space to connect to people in a way that was unheard of 20 years ago. These advances may impact the separation and transition stages as described by Tinto (1987). For instance, students who move from rural areas of the province to attend university can today take virtual tours of campus before arriving. They can also order books online, email parents and friends from their hometowns upon arrival and chat with them via instant messaging while attending school. It is possible that students with distance education experience may be more familiar with the communication technologies that allow for a connect between the old and new life. It is also possible that this familiarity may help soothe the often difficult separation, making the transition to post-secondary studies more tolerable.

According to Tinto's (1987) interpretation, the transition stage occurs after the separation stage. However, the two may also overlap. The transition stage is characterized as a limbo-type state where an individual is concurrently absorbing and

applying the social norms and practices of the new group while still relying on or referring to old norms and perspectives. In essence, there is an overlap between the old and new life. Tinto (1987) suggested that the degree of difficulty experienced in making this transition is dependent on the degree of similarity between the old and new lives. If the old life and the new life are similar then the transition is less difficult. However, the more dissimilar the new situation or experience is from their normal reference point then the more difficult the transition. It is during this stage that the decision to withdraw from post-secondary studies is most often contemplated as a result of the pull between the old and new life. The more dissimilar the old and new life, the stronger the pull toward the old and familiar.

The final stage of incorporation occurs after the separation and transition stages have occurred. According to Tinto (1987), it is during this stage that the student must contend with the everyday events of their new life and apply the new norms and expectations to these events. Every contact the student has with society helps to make the norms and practices of the new society more salient. However, a complete understanding of how incorporation does or does not occur remains unclear.

In the context of the present research, the contrast between the urban center of St. John's, where Memorial University's main campus is located, and that of various rural communities around the province may be immense. Students from more remote locations of the province may experience more upheaval and cognitive dissonance due to the pronounced difference between their old and new lives. As a result, it may be suggested that rural students who perceive differences between their old life as a high school student in a rural community and their new life as a university student in

a larger city to be large may encounter more difficulties during the first year transition period.

When considering variables associated with student persistence and attrition, in his model of student departure Tinto (1987) recognized the roles of pre-entry characteristics, goals, intentions and commitment, as well as academic and social experience that influence integration and intentions (see Figure 4). Pre-entry characteristics such as family background, personal attributes, and pre-college educational experience are thought to work together to influence both goal and institutional commitment. Goal commitment influences grade performance and intellectual development and contribute to overall academic integration. Institutional commitment influences interaction with a peer groups and faculty contributing to overall social integration. Academic integration and social integration influence goal and institutional commitment which influence decisions to dropout.

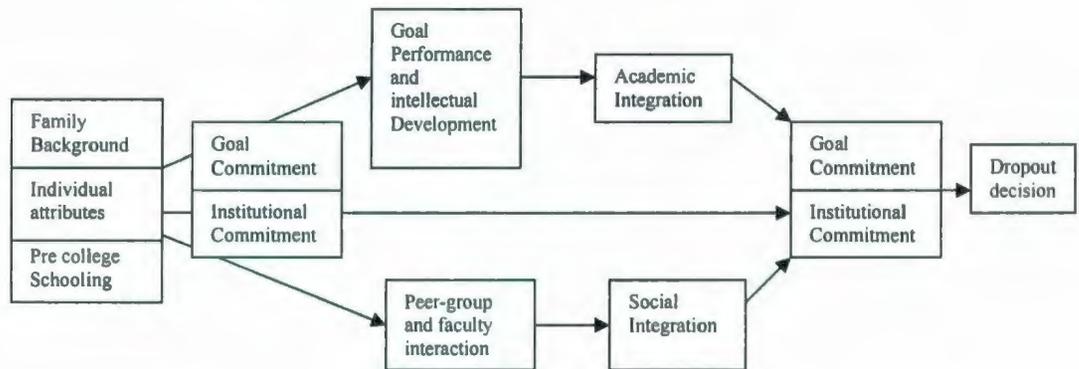


Figure 4 Conceptualization of Tinto's Model of Student Departure

Tinto's (1987) model of student departure has been criticized for two main reasons. First, some have claimed that Tinto's model concentrated primarily on traditional, university- based populations and lacked an appreciation for the experiences of students at two year colleges (McCubbin, 2003; Metz, 2002). Furthermore, others have claimed that Tinto's original formulations implied that the factors influencing dropout decisions were static when, in fact, factors influencing decisions to leave school are often dynamic, changing from year to year (McCubbin, 2003). Despite these criticisms, Tinto's work has remained influential.

Researchers such as Bean (1980; 1983) examined student attrition from a slightly different perspective. Bean's formulations were influenced by Price's work on occupational or organizational turnover (Price,1977). Bean's (1980) model acknowledged the role of background variables, an array of organizational determinants, and intervening variables such as satisfaction and institutional commitment in the decision to dropout (see Figure 5).



Figure 5 Bean's Causal Model of Student Attrition

Bean (1985) also introduced a model of dropout syndrome (see Figure 6) outlining the importance of background variables such as prior achievement, social psychological variables such as goals and social life, environmental variables such as finance and outside friendships, as well as the mediating role of institutional commitment in dropout decisions (intent to leave, discussing leaving, and actual dropout). Building on this and earlier work in the area, Bean and Metzner (1985) proceeded to formulate a conceptual model of non-traditional undergraduate student attrition. While expressing difficulty with operationally defining what constitutes a nontraditional student, Bean and Metzner (1985) described the nontraditional student as one who is older than 24 years of age, does not live on campus, and attends school part-time or any combination of these. Bean and Metzner also proposed that a nontraditional students are primarily concerned with academic matters and not social matters or the social organization of the institution. This is just one possible description of what constitutes a non-traditional student. Bean and Metzner's model of non-traditional student departure addressed deficits noted in Tinto's theory claiming empirical work concentrated primarily on traditional students in traditional context.

Empirical studies of post-secondary students often conceptualize non-traditional students as any group of students that share a common set of characteristics that contrast those shared by the majority of students in attendance. Within the Newfoundland context, the definition of the non-traditional student may include students who have completed their high school education in learning environments that differ from the traditional classroom context such as rural students who have completed high school courses via distance education. Within Newfoundland, these students represent a

minority, comprising a smaller percentage (~12-15%) of the first year student population at Memorial University's main campus.

Like other models of student attrition, Bean and Metzner's (1985) model of nontraditional student attrition suggested that student background characteristics such as prior achievement, age, educational goals, and gender influence withdrawal decisions. Bean and Metzner's also described academic variables such as study habits, academic advising, absenteeism, major certainty, and course availability as well as, environmental variables (finances, hours of employment, outside encouragement, family responsibility and opportunity to transfer) and psychological variables (utility, satisfaction, goal commitment and stress) as influential constructs, proposing these influence intentions and decisions to drop out (see figure 7). The inclusion of psychological variables such as stress is especially pertinent to the present research since a majority of rural students attending Memorial University are required to move from their normal place of residence to attend university. This relocation or a change in residence has been identified by several researchers as a significant source of stress for some individuals (Holmes & Rahe, 1967; Puskar, & Rohay, 1999; Moyle & Parkes, 1997).

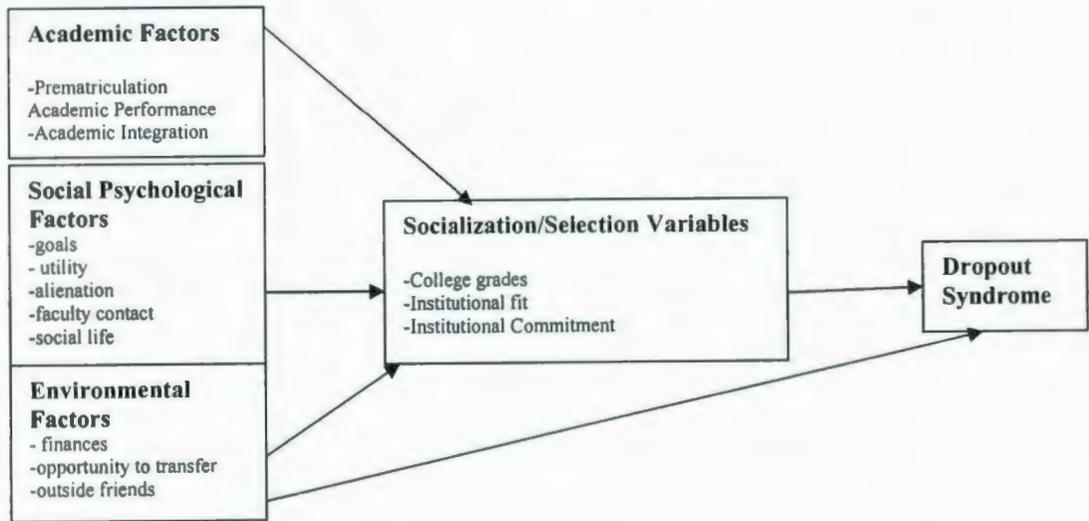


Figure 6 Bean's Conceptual Model of Dropout Syndrome (1985).

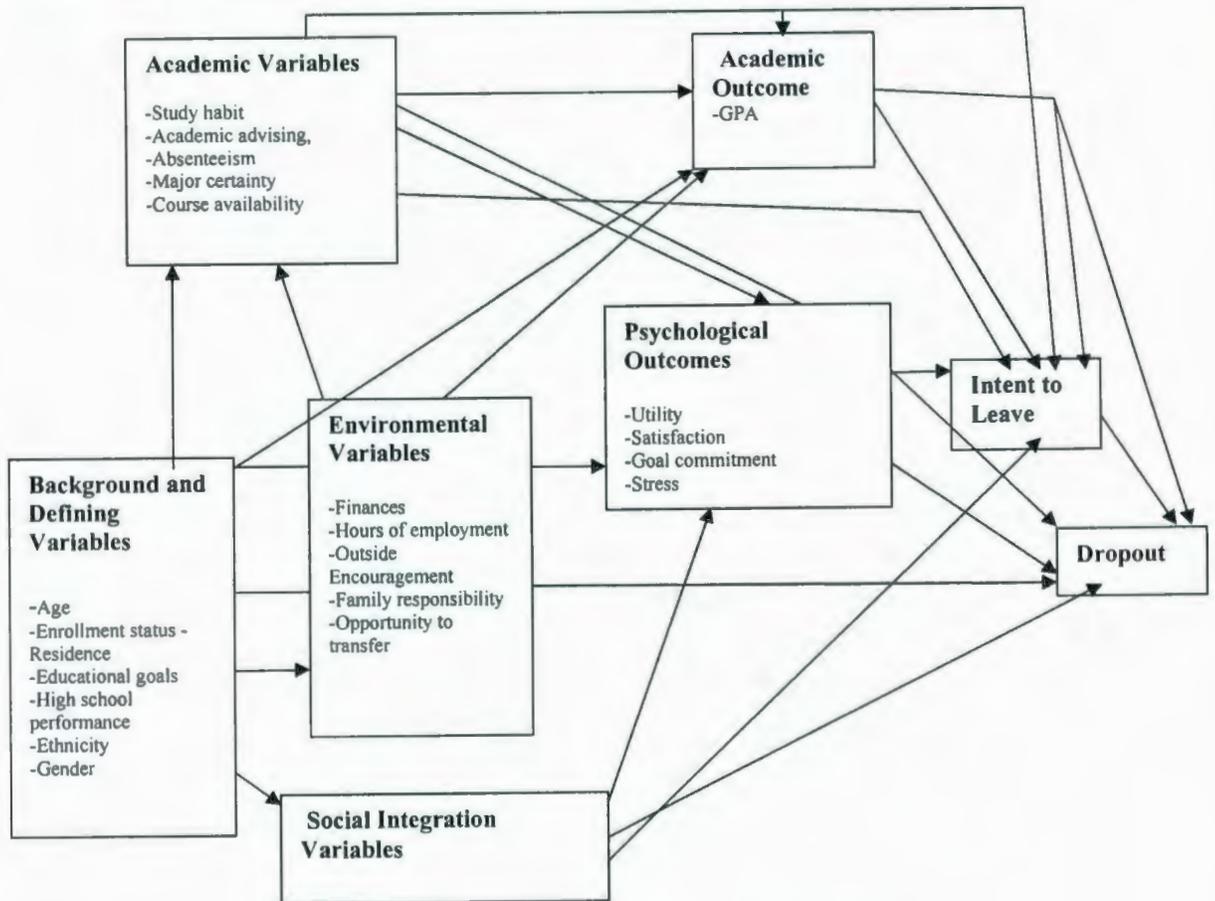


Figure 7 Bean and Metzger's Conceptual Model of Nontraditional Student Attrition (1985).

Hossler (1984, Chapter 6) was one of the first researchers to formally comment on the similarities between Tinto's (1987) model of student integration and Bean's earlier model of student attrition. Hossler (1984) pointed out that the two models converged on theoretical grounds with respect to the complex nature of persistence and the emphasis each model places on person-environment fit. During the early 1990's a group of researchers attempted an empirical analysis of the two models and proposed a marriage of theoretical thought (Cabrera, Castaneda, Nora, & Hengstler, 1992; Cabrera, Nora, & Castaneda, 1993). In a paper entitled, "The Convergence of Two Theories of College Persistence", Cabrera, Castaneda, Nora, and Hengstler, 1992 compared and tested the convergent validity of Tinto's and Bean's models using structural equation modeling procedures. The first model, which tested the orthogonal nature of the constructs, was rejected and the second model, which tested the correlation between constructs, was accepted. The results indicated a significant correlation between the constructs included in Tinto's and Bean's models. Overall, the results indicated that while both models had good predictive validity, the two models were not mutually exclusive. In other words, there was conceptual overlap between certain constructs.

Building on the work discussed above, Cabrera, Nora and Castandeda (1993) used structural equation modeling techniques to test the new integrated model of student retention that merged Tinto and Bean's models. These researchers found that through combining the theories of Tinto and Bean a more thorough and comprehensive model that accounted for more of the variance in post-secondary education persistence emerged. Put simply, the results of their study suggested that many of the environmental factors considered in Bean's model strengthened Tinto's model. This final integrated model has been reproduced in Figure 8.

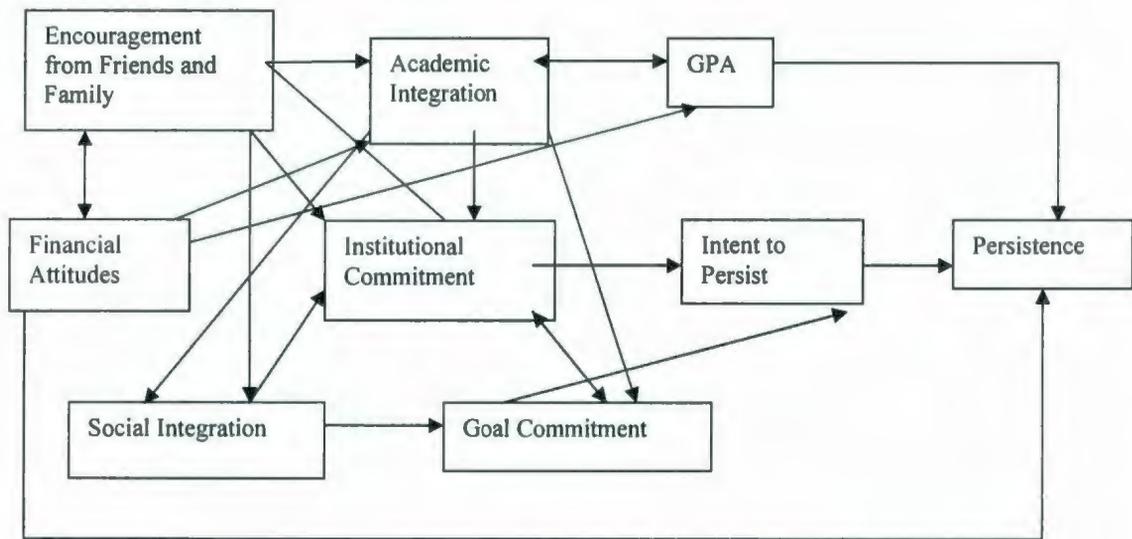


Figure 8 Cabrera, Nora and Castaneda's (1993) integrated model of student retention

Person-environment fit theories, such as those discussed here, place a common emphasis on pre-entry characteristics and the interaction between attitudes and environmental or institutional variables and the outcomes of persistence decisions. Other less prominent theories in attrition research include psychosocial theories of student development, which highlight individual and relational aspects of student development. Psychosocial theory research has generally approached student attrition research from a student service perspective. This perspective emphasizes a Gestalt view of post-secondary education, promoting both academic and social development of the student.

Psychosocial Theories of Student Development

Psychosocial theories of student development differ from ecologically based theories of attrition in that they address psychosocial growth over the life span. In their

review titled, "*How College Affects Students*", Pascarella and Terenzi (1991) identified Chickering's Vector Theory, Marcian's Model of Ego Identity, Cross's Model of Black Identity Formation and Heath's Maturity Model as psychosocial theories or models of student development. With the exception of Chickering's Vector Theory, these theories have experienced less notoriety and have limited applicability to educational research on post-secondary persistence and attrition. However, Chickering's (1969) Vector theory will be reviewed as it provides a unique developmental perspective from which to view persistence and attrition.

Chickering proposed that student psychological development occurred through a culmination of various social interactions within the post-secondary environment. More specifically, Chickering (1969) proposed that students engage in and pass through seven "vectors" or developmental directions during their academic endeavors. The authors proposed that students must master competence, manage emotions, gain a sense of autonomy, establish identity, develop freeing interpersonal relationships and finally develop a sense of purpose and integrity in order to progress and achieve optimal success in the post-secondary setting and across the life span. Chickering's work has been linked to the work of Eric Erickson who proposed eight stages of development characterized by trust versus mistrust, autonomy versus shame & doubt, initiative versus guilt, industry versus inferiority, identity versus role confusion, intimacy versus isolation, generativity versus stagnation, and integrity versus despair (Cabrera, Sharkey, 1997). Erickson proposed that individuals struggle with identity and role confusion during adolescence as they attempt to sort out who they are. In general, he suggested that one stage sets the foundation for the next and as an individual develops through each stage the solidification of their identity structure occurs. Successful progression through each

stage to achieve trust, autonomy, initiative, industry, identity, intimacy, generativity and integrity contribute to healthy psychosocial development.

Similar to Erickson's stages of development and social cognitive conceptualizations of coping, self regulation and personal agency, interpretation of Chickering's theory suggested students who feel competent in their abilities are more likely to feel they can do what is required of them in the post-secondary setting and that they are better able to handle the array of positive and negative emotions associated with the ups and downs of their academic and social life (i.e. Caver, Sheier, & Weintraub, 1989; Bandura, 1991). Once students are able to manage or self regulate their emotions in response to the demands of university life, they begin to recognize themselves as autonomous entities, being both personally and emotionally independent of others. Progressive mastery of the competence, emotional management and autonomy vectors contribute to the development of a student's sense of identity. Once students become comfortable with who they are they can then clarify their purpose, as increased self knowledge allows one to determine who, what and where they want to be in the future. Such knowledge would allow for planning, preparation and follow-through in the realization of these plans. In the context of post-secondary studies, students who feel they know where they want to be in the future will be more likely to plan, take appropriate courses and set a time-course for completion of studies. Finally, the congruence that occurs between thought and action once an educational plan is realized exemplifies the final vector of integrity development defined as the development of congruence between beliefs, values and action.

Slight revisions to the Chickering's theory/model occurred several years later and, while much of the theory/model remained unchanged, Chickering and Reisser

(1993) renamed and reordered some of the vectors and expanded on others. For instance, Chickering originally proposed that autonomy preceded the vector of interpersonal relationship formation. However, more recent research developments have suggested that this may not be necessary, particularly for women. Also, the vector entitled "freeing interpersonal relationships" was renamed as "mature interpersonal relationships" while "developing autonomy" was renamed "moving through autonomy toward interdependence". Further, in the revised version, "moving through autonomy toward interdependence" preceded "establishing identity" in recognition that interpersonal relationships may contribute to identity formation.

Chickering's theory (1969;1993) is relevant to the study of post-secondary student attrition during the first year post-secondary transition period in that it helps to highlight the importance or need for students to manage their emotions and become competent and autonomous individuals. During the potentially stressful first year transition period students encounter change and challenge. Some may be personal and some academic but all may be emotionally demanding. To effectively cope students must manage their emotions and plot a course of action to successfully meet the demands of the situation. From a social cognitive perspective, the interrelationship is clear. When a student successfully meets the demands of a situation, a sense of self efficacy and competence will no doubt emerge. This has the potential to positively influence perceptions of ability, the subsequent management of emotions and personal control over academic outcomes, further contributing to a sense of competence.

However, Pascarella and Terenzi (1991) contended that past theories of student development, while addressing growth, largely neglected the study of

individual student characteristics or attributes in favor of characteristics or processes generalized to the group level. More recently, several other models and theories have begun to address this shortcoming by placing more emphasis on individual characteristics within a psychological process context. For instance, Bean and Eaton (1995) introduced a psychological model of student retention that recognized the role of approach and avoidance coping. This model proposes that adjustment to post-secondary studies could be potentially stressful (see Figure 9). In their research, coping was defined as a defense mechanism for dealing with challenging or stressful situations. The results of this research revealed that, in addition to sociological variables such as those found in the person-environment fit theories discussed above, and group level variables such as that found in Chickering's psychosocial model, the inclusion of psychologically based variables such as stress and approach and avoidance coping are useful when examining student persistence and attrition, especially in the first year student population.

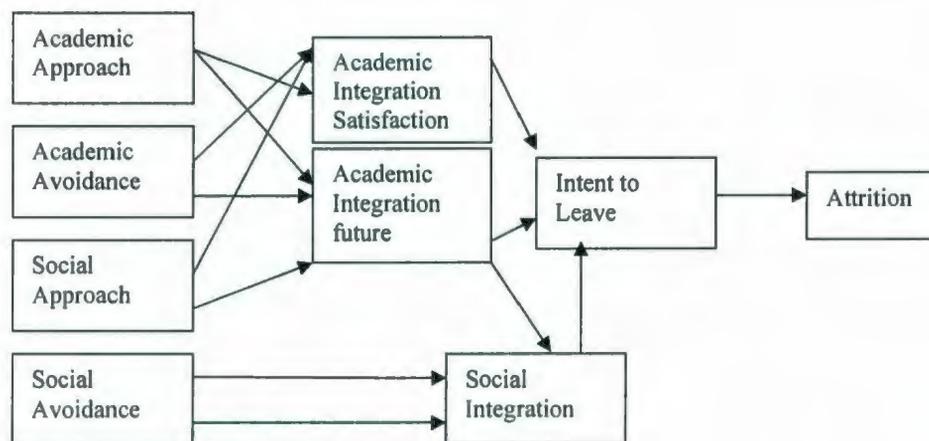


Figure 9 Bean and Eaton's 1995 Model of Approach/Avoidance Behavioural Effects on Retention

While researchers favour the continued use of Tinto's (1987) and Bean and Metzner's models (1985), Bean and Eaton's (1995) psychological model of attrition broadened past models to include an examination of approach and avoidance in the post-secondary academic setting. Chickering's Vector Model (1969;1993), introduced the element of growth and introduces the dynamic nature of student development. As John Dewey stated, "Growing is not something which is completed at odd moments: it is a continuous process leading into the future" and "If education is growth it must progressively realize present possibilities, and thus make individuals better fitted to cope with later requirements" (Dewey, 1944, p.56).

Empirical Support

Empirical consensus with regard to the impact of various theoretical constructs on outcome is less than convincing. A variety of factors may contribute to this, such as inconsistency in operational definitions and the dearth of reviews and meta-analyses in the area yielding data on magnitude of effect. Meta-analyses have the advantage of addressing the statistical effect of one variable on another with regards to effect size, thereby simplifying the interpretation process. Effect size is a correlation based statistical calculation that allows one to determine the magnitude of effect one variable has on another. Meta-analytic procedures allow researchers to summarize the results of several studies and speak to the effect of one variable on another in a statistically sound and concise manner. An exception to this was Pascarella and Terenzini's (1991) work entitled "How College Affects Students" which examined empirical findings from individual studies spanning more than two decades. This work summarized the effect of various variables on persistence and

attrition. The results revealed empirical support for the various factors presented in many of these theories or models was less than convincing, and that many accounted for very little of the variance in aspirations, attainment and persistence.

However, a meta-analysis conducted by Napoli and Wortman (2005) based on nine published articles and two paper presentations found academic integration to be significantly correlated with persistence in all studies reviewed. Calculation of effect size using Hedges' g , which adjusts for sample size, revealed a large effect of academic integration on persistence ($g = .715$, $p < .0001$). The results for social integration were less strong ($g = .189$, $p < .0001$). Only four of the studies reviewed found social integration to have significant positive correlations with persistence, resulting in a moderate effect size for social integration on persistence.

While synthesis or reviews of the literature cannot confirm magnitude of effect they are an effective means of synthesizing research findings from individual studies. Research examining reasons for attrition among students suggest a variety of individual reasons for this occurrence. For instance, Long, Carpenter and Hayden (1995) conducted a review of the literature finding numerous factors such as problems with work and courses, institutional and financial factors, as well as family, health and other unpredictable events or issues to be associated with attrition. Researchers such as Yorke and Associates (1997) found three widely cited reasons for student attrition or withdrawal; dissatisfaction with overall student experience, wrong academic choice and financial difficulties. In a book entitled "*Leaving Early: Undergraduate Non-Completion in Higher Education*", Yorke (1999) also suggested the reasons for discontinuation may be condensed into six headings; poor quality of student experience, inability to cope, unhappiness with social environment, wrong

programme choice, finance and dissatisfaction with institutional provisions.

According to Yorke, when considering quality of life and factors related to a student's ability to cope with school demands, stress, program difficulty, workload, lack of study skills, lack of support, and insufficient academic progress were also associated with withdrawal. Other research has suggested stress may account for some of the variance in non-persistence or attrition and that the effect of stress on retention may be mediated by GPA and other personality or background factors (Daugherty & Lane, 1999; Van Heynengen, 1997; Pritchard & Wilson, 2003)

To summarize, theories of attrition are predominantly grounded in ecological theory that emphasizes the interaction between the individual and the environment. However, psychosocial theories of development offer a unique developmental perspective that provide support for the dynamic role of individual change in the post-secondary attrition process. Empirical research in the area of post-secondary attrition has suggested that reasons for attrition are often highly individualized, with many of the reasons being directly or indirectly associated with the demands of the post-secondary environment and an individual's ability to cope with these demands.

Social Learning Theory Applied to Post-secondary Outcome

Despite categorization as ecological or psychosocial, many of the constructs presented in these models yield small or insignificant results when considering post-secondary outcomes of persistence and attrition. Further, many of the most prominent theories and models guiding research in this area focus on successive outcomes and fail to truly address individual characteristics and psychological processes that influence outcome.

While categorization and labeling have been useful approaches in contexts such as medicine to identify disease as a result of symptom classification, it is argued the categorization of theories and models as psychosocial or person-environment fit in the post-secondary research context may not be as advantageous. This may be partially due to the elusive nature of operational definitions and terms related to each classification or category. For instance, psychological processes exist within the person and across social contexts, thereby making the mutually exclusive nature of psychosocial and or person-environment theories nonsensical. Thus, personal, social and environmental factors are necessary but separately they are insufficient ingredients for understanding complex behavioral phenomenon such as transition and attrition. Perhaps Robbins, Lauver, Le, Langley, Carlstrom (2004) put it best when they stated "...lack of integration limits a full understanding of the relative predictive validity across academic performance, psychosocial, and study skill constructs highlighted in these emergent educational persistence and motivational models" (Robbins, Lauver, Le, Langley, Carlstrom, 2004, p. 261).

Rather than attempting to conceptualize theories or models of student attrition as person-environment or psycho-social, a more advantageous approach may be to couch theoretical conceptualizations within the underpinnings of social learning theory and Bandura's conceptualization of triadic reciprocal determinism. Bandura's conceptualization of triadic reciprocal determinism suggests that environments rich with people and social and psychologically based traditions, beliefs and norms are interdependent, interacting with each other in a bidirectional fashion to produce behavior (Bandura, 1977). See figure 10 below.

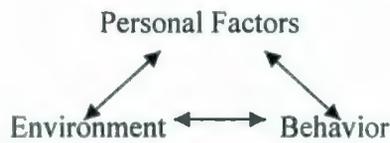


Figure 10 Triadic Reciprocal Determinism defined by Social Learning Theory

While many attrition theories directly or indirectly acknowledge the influence of the person (the student) and the environment (the post-secondary institution), the connection between the two has been poorly defined theoretically in a psychological sense. The application of triadic reciprocal determinism represents a more holistic approach and instead of the unidirectional flow of influence outlined in previous models of attrition there is acknowledgement of complex bidirectional symbiotic relationships. Reciprocal determinism acknowledges the interactive aspect of all facets of measurable influence, social, psychological (person), environmental and behavioral. Incorporation of elements of this social cognitive learning perspective surpasses the theoretical compartmentalization found in traditional theories of attrition. In this way, social learning theory provides a more sophisticated framework for approaching the study of student attrition that addresses the complex interaction between a person, their environment and their behavioral actions or outcomes.

The Transition to Post-secondary Studies, Stress and Coping

Transition

The word transition refers to the process accompanying a movement or shift and may involve an evolution from one form or state to another. The transition from high school to post-secondary studies, including university, college or technical training,

represents one of many transitions individuals experience in their lives. Tinto (1987) likened the transition from high school to post-secondary studies to a limbo-type state where an individual is in transition from one physical and psychological stage to another. According to Tinto, students making the transition from high school to post-secondary studies are concurrently attempting to absorb and apply the new social norms and practices of post-secondary studies while still relying on or referring to old norms and perspectives grounded in high school traditions. Pascarella and Terenzini (1991) have described it as a "culture shock involving significant social and psychological relearning in the face of encounters with new ideas, new teachers and friends with quite varied values and beliefs, new freedoms and opportunities, and new academic, personal and social demands" (p. 58 - 59).

Entrance to university involves change, and a variety of new social and academic challenges. Students must adjust to new people, a new environment, increased independence and different study demands. For those who perceive entrance to university as a time for increased freedom and exploration, the transition to post-secondary studies may be an exciting time. However, the transition may be more challenging for others who perceive it as a stressful or intimidating period. Perceptions of stress during the transition to post-secondary studies have been associated with academic, social and psychological maladjustment (Pritchard & Wilson, 2003; Wintre & Yaffe, 2000).

The stress or challenge encountered during the first year transition period may be more pronounced for rural students in Newfoundland and Labrador for a variety of reasons. In addition to the usual achievement expectations and pressures, rural students who attend post-secondary studies are often required to relocate while attending school.

This requires students to be away from the secure nesting of their family unit and the established social networks in their local communities. In addition to tuition payments, social isolation and homesickness, these students also experience additional financial burdens such as rent payment and household responsibilities such as cooking and cleaning. For many reasons associated with this change and upheaval, researchers have identified the first year transition period as a particularly vulnerable time in the lives of some students (Robotham and Julian, 2006; Pritchard & Wilson, 2007; Wintre & Yaffe, 2000). Some research has suggested that stress and inability to cope effectively may influence students decisions to continue or discontinue studies at the post-secondary level (Bray, Braxton & Shaw, 1999; Bean & Metzner, 1985).

Stress

Stress has become a common theme in North American culture. People use the term stress to describe a variety of events or situations that give rise to or provoke physical and or psychological strain or discomfort. Aldwin (2007) defined stress as the quality of experience produced through a person-environment interaction that through either over or under arousal results in psychological or physiological distress or strain. Research has differentiated between three predominant forms of stress: a) daily hassles, b) major life events and c) catastrophes. Daily hassles are the most common and include bothersome but generally non life-threatening events such as traffic jams. Major life events are less common and include such things as death of a loved one and divorce while catastrophes, like hurricanes or tsunamis are rare but may carry significant impact. Research has further differentiated between psychogenic processive stressors and neurogenic systemic stressors (Anisman & Mereli, 1999). Psychogenic processive

stressors are generally psychological stressors that require cognitive processing or appraisal of a stressful situation or event, whereas neurogenic systemic stressors are physical stressors resulting from a physical stimulus or assault (Anisman & Mereli, 1999). The transition to post-secondary studies may be perceived as psychogenic and processive in nature as it is psychological, requiring cognitive evaluation. Generally, the severity of stress experienced depends largely on cognitive factors such as individual perception and stressor characteristics such as chronicity, controllability and predictability.

It is well known that stress can negatively affect human immune system functioning and in some cases prolonged or chronic stress may have a more detrimental effect on health and well-being than acute or controllable stress in various populations (Lepore, Miles & Levy, 1997; Herbert & Cohen, 1993; Segerstrom & Miller, 2004). The rationale is that individuals are better able to cope with controllable or predictable stressors because they are better prepared to psychologically "brace" themselves for an expected, impending assault, change or encounter.

Research has confirmed that students studying at the post-secondary level experience varying degrees of stress (Aherne, 2001; Astin, 1998; Robotham and Julian, 2006; Sax, 1997). Fortunately, the major life events, such as relocating and changing schools that are often associated with the first year transition to post-secondary studies, are generally acute and in many cases not long lasting. For instance, research conducted by Memorial University has suggested that most students (69.3%) adjust to their new surroundings within a couple of months (Pippy, 2005). However, some stressors such as adjusting to new professors with different teaching styles or ever changing classmates may recur on a semester by semester basis.

A study based on a sample of first year college students from the U.S. National Freshman Survey reported an increase in the percentage of students reporting being frequently stressed or overwhelmed (Sax, 1997). Using the same data source, Astin (1998) acknowledged that the percentage of post-secondary students experiencing stress, almost doubled since 1987. More recently, the results of the 2004 Canadian Campus Survey indicated Canadian university students are experiencing elevated levels of psychological distress (Canadian Campus Survey, 2004). Another study examining stress in college students reported that almost 80% of the students in the sample reported being moderately stressed (Abousiere, 1994).

The Social Readjustment Rating Scale, a checklist of life events includes items common to students making the transition to post-secondary studies. These include items such as changing schools or residence or of residence or taking out a loan as stressful life experiences, (Holmes & Rahe, 1967). Measures such as the Survey of Recent Life Experiences, a 41 item scale containing items associated with daily life hassles also includes items such as “trying to secure loans”, “lower evaluation of your work...” and “social isolation” that are highly pertinent to post-secondary students in general and the first year transition period in particular (Kohn & McDonald, 1992). Studies examining stress in post-secondary students, implementing measures such as the Survey of Recent Life Experiences or the Social Readjustment Rating Scale cited above, as well as others such as the Student Stress Survey suggest that changes in sleeping habits, vacations/breaks, changes in eating habits, increased work load, and new responsibilities are sources of stress for some students (Kohn & Mc Donald, 1992; Holmes & Rahe, 1967; Ross, Niebling, & Heckert, 1999).

Other research investigating stress and associated constructs in post-secondary students have suggested that stress from various sources may account for some of the variance in attrition (Daugherty & Lane, 1999; Sandler, 2000; Bray, Braxton & Shaw, 1999; Van Heynengen, 1997). Others have suggested that the effect of stress on retention may be mediated by GPA, personality factors, and coping (Pritchard & Wilson, 2003; Sheilds, 2001; Bray, Braxton & Shaw, 1999). Unfortunately, studies on stress in the post-secondary student population have been limited by their tendency to examine students from a particular faculty or group, limiting the ability to make generalizations to the overall first year population. Nonetheless, it has become generally accepted that the transition to post-secondary studies may be a potentially stressful time for some individuals.

The Mediating Role of Coping

Coping plays an integral role in people's perception of stress and it is conceivable that coping may impact the process by which decisions to persist are made. Coping may be defined as an individual's attempt to deal with, modify or adapt to stress. Lazarus and Folkman's (1987) transactional model of stress proposed that perceptions of stress are based on primary and secondary appraisal processes. Primary appraisal includes evaluating the nature of the event or situation as positive or negative and secondary appraisal involves assessing one's ability to control and cope with the situation. When individuals perceive that they have the resources and/or ability to cope with a stressor, then the perceived threat is generally less. However, when an individual perceives that their ability to cope is insufficient, then the perceived threat is great (Pritchard & Wilson, 2003).

Related to this may be individual attribution style or how an individual explains the outcome of a situation or event in their life. In the academic context, attribution theory explains academic motivation by examining how a student rationalizes or explains success and failure as a result of internal or external causes or influence (Weiner, 1980, Chapter 7-8; Weiner, 1992, Chapter 6). Attribution theory in this context considers whether success or failure was related to internal or external causes, if the outcome was stable or unstable and if the circumstance and or outcome was controllable. Generally, students who perceive failure as internal, stable and uncontrollable will generally experience more negative self-perceptions than a student who perceived failure as external, unstable and controllable. To illustrate, a student who perceives intelligence as non-malleable and stable, and attributes their failure on an exam as the result of a lack of intelligence may perceive the reason for failure as enduring, reasoning they have little control over subsequent outcomes in this context. Ultimately, such perceptions will affect the amount of effort an individual will exert to achieve a desired outcome as effort may be judged as appropriate or futile depending on their attribution style.

In situations where events are perceived as uncontrollable and action to remedy a situation is viewed as futile a pattern of learned behavior characterized by helplessness may emerge. Seligman (1975) introduced the term helplessness to describe learned behavior that is characterized by a decrease in motivation and ability to learn that often results in feelings of depression or psychological maladjustment. When discussing depressed patients, Seligman asserted that helplessness theory explains failure as the result of an individual's "perception that he cannot control outcomes". Seligman suggested learned helplessness was a barrier to the application of effective coping where

belief that one cannot control outcome inhibits application of more effective coping strategies.

It is well established that coping effectiveness depends on the situation; the stressor and stressor controllability (Aldwin, 2007; Anisman & Mereli, 1999). Researchers interested in the area of stress and coping generally differentiate between problem-focused or active coping (e.g., problem-solving, information gathering) and emotion-focused coping approaches (e.g., crying, avoidance) (Aldwin, 2007; Carver, Scheier, & Weintraub, 1989; Lazarus & Folkman, 1987). Coping through the use of social support has been conceptualized as an emotion-focused strategy by some researchers, while others consider it a separate approach in and of itself (Anisman & Mereli, 1999).

Coping efforts have been described as adaptive and or maladaptive. This classification depends on the degree of fit between the problem or demands of the situation and use of particular strategies (Aldwin, 2007). Underlying the differentiation between adaptive and maladaptive coping is the assertion that there is no one "right" or "wrong" way to cope. For instance, coping may be considered maladaptive if emotion-focused coping strategies are applied in a controllable situation where problem-focused strategies may be more beneficial or vice-versa. The application of entirely problem-focused strategies in uncontrollable situations that may be better served by the application of emotion-focused strategies may be considered maladaptive. Adaptive coping refers to the ability to choose appropriate coping strategies based on what the situation or problem dictates or demands. Consider an event that is generally beyond one's control, such as the death of a loved one. The application of emotion-focused strategies such as crying or social support may be considered entirely appropriate as a

person mourns a death. It may even be considered adaptive. However, the use of emotion-focused strategies such as crying and rumination after one performs poorly on an exam may be cathartic but may not be adaptive in the long run, especially if better achievement outcomes are the goal. Problem-focused approaches such as planning and studying for the next exam may be more effective. Consequently, a coping strategy that is appropriate or effective in one situation may not be effective in another situation. Coping effectiveness often depends on the fit between the demands of the situations and the coping strategy employed (Aldwin, 2007). Perhaps the most important predictor of positive outcome or resilience in the face of stress exposure is the ability to adapt coping strategies given the demands of the situation.

In the academic context, coping has been examined in relation to health and well-being outcomes and in relationship to academic and achievement outcomes (Herman-Stahl, Stemmler, & Peterson, 1994; Bray, Braxton, & Shaw; 1999; Pritchard & Wilson, 2003; Pritchard, Wilson, & Yamnitz, 2007). In general, student's problem-focused coping has been associated with more positive outcomes in comparison to those which are emotion-focused (Sasaki & Yamasaki, 2007).

To illustrate, Pritchard, Wilson and Yamnitz, (2007), investigated predictors of adjustment to the first year of post-secondary studies. Among other variables, these researchers assessed student coping prior to the beginning of classes and then again at the end of first year. These researchers found that negative or emotion based coping strategies such as denial or self criticism were predictors of poorer health outcomes such as flu-like symptoms and shortness of breath, as well as alcohol usage at end of first year. Similarly, Pritchard and Wilson (2003) conducted a study to examine social and academic predictors of student success, finding students who intended to remain in

school used more adaptive or positive coping skills such as concentrating their efforts or turning to religion as opposed to giving up when dealing with stress.

De Berard, Speilmans and Julka (2004) investigated predictors of academic achievement and retention among first year students. These students completed a questionnaire that included measures of social support, coping and health during their first week of their first semester and again the following year. The results revealed that coping was a significant predictor of achievement. More specifically, once again an emotion based coping strategy such as acceptance-focused coping, described as "blaming ones self for one's problems", was related to poorer academic performance while social support was associated with more positive academic outcomes.

Finally, using data collected from a telephone survey study, Shields (2001) investigated stress, coping and performance among persisting and non-persisting college students. Persisters and non-persisters differed on a number of variables related to stress, coping, knowledge of faculty, and fall semester GPA. Interestingly, the persisters had higher levels of stress than non-persisters. It was suggested that this was a result of the persisters still being exposed to academic stressors while the non-persisters had eliminated the source of academic stress from their lives. However, among persisters, higher stress was associated with lower GPA and higher stress levels were associated with more active coping in persisters as opposed to non-persisters.

From a social cognitive perspective, coping may influence decisions to continue or discontinue educational pursuits. Stressor predictability or stability, and controllability, as well as outcome associated causal attributions, influence coping efforts and overall coping self efficacy. The ability to cope effectively with the inherent

stress and challenge encountered during the first year transition period may influence achievement outcomes and subsequent first year attrition.

Summary

Both political and technological advancements have influenced the delivery of distance education courses for students attending secondary schools in rural areas of Newfoundland and Labrador. However, little is known about how distance education experience during high school influence student's academic outcomes during the first year of the post-secondary transition period. Numerous theories and models of post-secondary attrition exist and despite classification as person-environment or psychosocial models, most acknowledge the importance of previous educational experience or achievement in future academic success and either explicitly or implicitly acknowledge the interaction between the person, the environment and resulting behavioral outcomes.

If, the overall purpose of research is to broaden our understanding of various aspects of humanity, we must be reminded that we are not simple organisms in a static system, but complex organisms influenced by various sources, living in a dynamic and ever changing world. Therefore, research on attrition should be guided by theories that embrace complex views of the world, theories and research that examine the combined effects of many influences from various disciplines and contexts; the environmental, social, personal, psychological and educational, that singularly and in combination with each other influence individual choice and potential life paths.

Viewing attrition from a social learning theory perspective that considers the transactional nature of these influences transcends the typical theoretical favoritism

present in post-secondary attrition research which has relied heavily on a number of limited contributors. The application of social learning theory to the study and theoretical explanation of attrition in this context may stimulate thought in the area and work to reduce the risk of theoretical inbreeding where creative thought based on strong empirical support rarely occurs.

The purpose of this research is to explore the first year transition process in two groups of students, one with distance education experience and one without and to determine the role of coping as a mediator during this potentially stressful time. Chapter Three will provide an overview of the methodology used to explore this issue.

CHAPTER THREE: METHODOLOGY

Chapter three is divided into four sections. The first section describes the research design, procedures, variables, and sampling implemented in Study 1. The second section will describe the research design, procedures, variables, and sampling implemented in Study 2. These sections will be followed by a brief review of ethical considerations and the chapter will conclude by revisiting the research questions and proposed analysis. This research was part of a program of research conducted under a Community University Research Alliance (CURA), Social Sciences and Humanities Research Council (SSHRC) Grant that involved many partners. More information on this CURA initiative refer to the Killick project web site, <http://www.killickcentre.ca/>.

Study 1

Study 1 was a retrospective, archival study designed to explore the impact of prior educational experience on first year rural students' post-secondary achievement and persistence. This exploratory study aimed to ascertain differences in first year post-secondary achievement and persistence between students from rural areas of the province who had taken one or more CDLI courses while in high school and those who did not. This research included first year university students commencing studies at Memorial University in 2003, 2004 and 2005 who had taken one or more CDLI courses while in high school and a group who did not.

Participants

The entire population of 2003, 2004, and 2005 new matriculates originating from rural areas of Newfoundland and Labrador were examined to assess first year

achievement and post-secondary attrition. For each cohort, the number and demographic characteristics of the populations changed. A profile of the population for each cohort is presented in Table 4.

A percentage of students were not included in analysis as they had incomplete information on key variables. More specifically, cases were deleted if Medical Care Plan (MCP) and or student numbers were missing as this prohibited the link between university and high school data files that was necessary to determine which university students had taken CDLI courses in high school. Therefore, the enrollment figures here may differ slightly from those reported by Memorial University or other entities. Those cases or records missing postal codes were also excluded as this variable was necessary to determine rural/urban community of origin.

Table 4 Number and Percentage of First Year Enrollment for Urban and Rural Students by CDLI Status

Number (%)	2003	2004	2005
Urban	1857 (67.3)	1759 (67.5)	1655 (68.3)
Rural	902 (32.7)	845 (32.5)	768 (31.7)
<i>CDLI</i>	167 (18.5)	124(14.7)	138(18.0)
<i>Non-CDLI</i>	735 (81.5)	721(85.3)	630(82.0)
Total	2759	2604	2423

Independent Variables and Dependent Variables

The independent variables examined in Study 1 were students high school average and whether or not a student had CDLI course experience. Students were considered to have CDLI experience if they had taken one or more CDLI courses while

in high school. Non-CDLI students comprised students who had not taken any CDLI courses while in high school. High school average comprised the average of all courses taken during high school.

The dependent variables included fall and winter semester achievement outcome as measured by grade point average (GPA), and voluntary and involuntary attrition. According to rules and regulations set forth by Memorial University the first semester in which a student does not meet the academic requirements of the university they are provided with an academic warning and are allowed to continue studies. However, a student is dismissed after the second consecutive semester in which they do not meet the academic requirements. In the context of the present research, this represents involuntary attrition. First year voluntary attrition was defined as failure to continue studies and re-enroll in the beginning semester of year two for reasons unrelated to academic failure.

First year persistence was calculated by subtracting the total number of students who voluntarily and involuntarily discontinued and did not re-enroll during the fall semester of the second year from the total number of original enrollments. The percentage of students attending during the summer and spring session was extremely low for each cohort; therefore, spring and summer semester enrolments were not considered in the analysis or calculation of persistence or attrition.

Procedure. Archival data implemented in Study 1 comprised select variables from two Department of Education data sources: a) annual general report data files for the 2003, 2004, and 2005 school years and b) CDLI administrative data files containing student registrations in distance education courses. The 2003, 2004, and 2005 annual general report files contained administrative data collected by schools including student demographic information and Medical Care Plan (MCP) numbers for all level III

students who graduated from high school in June of 2003, 2004 and 2005. These files also contained school demographic information such as school name and location and course level information. The CDLI administrative files contained student MCP numbers and information on student registrations in CDLI courses. Using MCP as the linking or merge variable, data from the CDLI administrative files was merged into the annual general files to identify any student who had taken one or more CDLI courses while in high school. Then, using postal code information, students were sorted according to rural /urban community of origin and only those identified as originating from rural communities, as defined in Chapter 2, were retained. This process produced three files containing pertinent high school demographic information and a CDLI indicator; one for the 2003 cohort year, the 2004 cohort year and the 2005 cohort year.

To explore the impact of previous educational experience on first year post-secondary achievement and subsequent attrition, first year post-secondary achievement and attrition data were needed. As a result, three administrative data files from Memorial University were also obtained. These files contained student numbers and MCPs, demographic information such as permanent address and postal code, entering high school average and course information for each student enrolled at Memorial during the 2003, 2004 and 2005 years.

To create a file containing only information on new matriculates, the data files were sorted based on student number, and only those student numbers belonging to new matriculates for the corresponding year of interest were selected. For instance, to retain only 2005 new matriculates, student numbers between 200500000 and 200599999 were selected and all others were deleted. This procedure was also applied to the 2003 and 2004 files.

The newly created high school files containing the CDLI indicator discussed above were then merged with the university new matriculate files. This resulted in three files containing both high school information and first year university information. These files included demographic information such as gender, postal code and rural/urban community of origin, a CDLI and non-CDLI indicator, and high school average for each new matriculate, as well as first year university achievement data as measured by fall and winter GPA.

These files were then cleaned to contain only students from rural areas of the province. Rural and urban status was determined by applying the Department of Education's classification of rural and urban. As mentioned in Chapter One, the Department of Education considers Census Metropolitan Areas (CMA), Census Agglomerations (CA) and communities with a population of 5,000 or more to be urban and all others to be rural areas. Based on this, the St. John's metropolitan area, Bay Roberts, Stephenville, Marystown, Clarendville, Corner Brook, Grand Falls-Windsor, Gander and Labrador City were considered urban while all others were considered rural.

Students' permanent postal codes were used to identify community of origin. Students reporting a permanent postal code beginning with A1A-A1H, A1N, A1S, A1W, A1X were considered to be from St. John's and surrounding areas. Those with a permanent postal code beginning with A0A were from Bay Roberts and those with a permanent postal code beginning with A2H were deemed to be from Corner Brook. Those with a postal code beginning with A2N were considered to be from Stephenville, and those with a postal code beginning with A0E were considered to be from Marystown, while those with postal codes beginning with A2A and A2B were

considered to be from Grand Falls-Windsor and those with A5A were considered to be from Clarenville. Those with permanent postal codes beginning with A1V were considered to be from Gander and those with postal codes beginning with A2V were considered to be from Labrador City. All others were considered rural. Finally, only variables pertinent to the present study were retained and all other variables deleted. This resulted in three working files, a 2003, a 2004 and a 2005 new matriculate file.

Study 2

Study 2 was a prospective study implementing a quasi-experimental, non-equivalent post-test design. It was designed to assess the impact of previous educational experience such as distance education experience and high school achievement on first year university achievement and first year attrition while exploring the possible mediating role of coping during this inherently stressful time. Study 2 was designed to explore the impact of CDLI course participation on student transition to post-secondary education. As this research was part of a larger Community University Research Alliance (CURA) initiative the measures used to assess coping were included in a larger survey package.

According to Shadish, Cook and Campbell (2002) a quasi-experimental design resembles a true experiment in that it compares two or more groups but lacks random assignment. In a non-equivalent group, post-test design, data for two or more groups are compared after the introduction of an intervention, program or treatment. In Study 2 new matriculates who took one or more CDLI courses during high school and new matriculates who did not take one or more CDLI courses were compared. However, non-random assignment of students to the CDLI and non-CDLI groups occurred in that

students self-selected themselves into one or the other group as a consequence of taking or not taking a CDLI course or courses while in high school.

Participants

Archival data served as the sampling frame for survey administration. The process undertaken was similar to procedures implemented in Study 1 where data identifying level III students who had taken one or more CDLI courses while in high school was obtained from Department of Education files and merged with data obtained from Memorial University identifying 2006 new matriculates.

The Memorial University data file identifying 2006 new matriculates contained demographic information such as date of birth, gender and community of origin. CDLI or distance education data obtained from the Department of Education was used to identify 2006 high school graduates who had taken one or more CDLI courses during high school. Once identified, the CDLI indicator was then merged into the 2006 Memorial University new matriculate file using MCP. Once merged, the MCP number was removed and any non-essential variables deleted.

As in Study 1, this file was filtered to contain only those students who originated from rural areas of the province. As mentioned previously, rural and urban status was determined by applying the Department of Education's classification of rural and urban. This classification considers the St. John's metropolitan area, Bay Roberts, Stephenville, Marystown, Clarenville, Corner Brook, Grand Falls-Windsor, Gander and Labrador City to be urban and all other communities to be rural. Similar to the methodology employed in Study 1, student's permanent address postal code was used to identify their community of origin. The resulting data file formed the sampling frame for Study 2.

Based on these records, the population of 2006 first year university students originating from rural areas who took at least one CDLI course while in high school was 162, 58 (35.8%) males and 104 (64.2%) females. The population of new matriculates from rural areas of the province who did not take any CDLI courses while in high school was 485 students, 166 (37.1%) males and 282 females (62.9%).

Due to the low number of students identified in the first year rural student population who had taken one or more CDLI courses while in high school ($n=162$), an attempt was made to contact all students in this group. One hundred and ten students completed the survey representing a 75.9% response rate. Reasons for non-participation by CDLI students included refusal or inability to make contact as a result of inaccurate contact information contained in administrative records.

The final CDLI sample was comprised of 84 females (68.3%) and 39 males (31.7%). The average entering mark for this sample was 80.0%. Males achieved at slightly higher level with an entering average of 82.7%, in comparison to 79.3% for female students. This difference was statistically significant ($t(1)= 2.67, p=.01$); however, the effect size was small ($r=.24, p=.01$). The median age of this sample was 19 years of age.

Simple random sampling without replacement was used to select a sample of students who had not taken a CDLI course while in high school. A sample size of 207 was determined necessary based on 95% confidence intervals. As part of the random sampling procedures, every student in the population was assigned a participant number between 1 and 485. No number was assigned more than once. Two hundred seven pseudo random numbers between 1 and 485 (population size) were generated using

Microsoft Excel and participants were selected based on corresponding, randomly assigned participant number.

One hundred and fifty-seven participants completed the survey. This represented a 75.8% response rate. Similar to the CDLI group, reasons for non-participation by non-CDLI students included refusal, or an inability to make contact as a result of inaccurate contact information. Surveys were deemed entirely incomplete if no contact was made despite repeated attempts (see Table 5).

The final responding sample of non-CDLI students comprised 97 females (61.8%) and 59 (37.6%) males. The average entering mark for the non-CDLI sample was 79.7%. Males had an entering high school average of 80% in comparison to the 79.5% for female students, but this difference was not statistically significant. The effect size was small ($r = -.04$, $p = .59$). The median age of this sample was 19 years of age.

Table 5 Participant Response by Reason

	CDLI sample n(%)	Non-CDLI sample n(%)	Total n(%)
Telephone interview	110(67.9)	96(46.4)	206(55.8)
Web survey	13(8.0)	61(29.5)	74(20.1)
Declined	10(6.2)	3(1.4)	13(3.5)
Trouble with number	3(1.9)	5(2.4)	8(2.1)
Other	7(4.3)	1(0.5)	8(2.1)
Incomplete	19(11.7)	41(19.8)	60(16.3)
Total	n=162	n=207	N=369

Variables and Coping Measures

In non-experimental and quasi-experimental research, the variables thought to influence the dependent or outcomes variables are considered to be the independent variables. In the present research, high school average, distance education experience (CDLI or non-CDLI), and coping were the independent variables. The Student Coping Scale (SCOPE), a 48 item academic specific coping measure derived from Carver, Scheier and Weintraub's (1989) COPE instrument was implemented to measure student coping strategies (Struthers, Perry et al, 1995). The instrument asks students to imagine themselves doing poorly on a test. The student is then asked to determine how characteristic the use of various coping strategies is for them. A variety of coping strategies are listed and students are asked to respond on a 10-point scale ranging from 1, indicating the response is extremely uncharacteristic of them, to 10, indicating extremely characteristic response.

The instrument consists of four problem-focused subscales; academic planning, general active coping, efficacy, and general academic coping, as well as four emotion-focused subscales including general emotional support, denial, emotional venting and academic behavioural disengagement. According to Struthers, Perry, Menec et al., (1995) problem-focused coping "involves thoughts, actions and strategies directed at altering the source of the stressful event" while emotion-focused coping involves "thoughts, actions, and strategies geared toward management of the emotional distress associated with the stressful event." The overall reliability of the instrument has been found to be adequate ($\alpha=.80$). Similarly, the problem-focused ($\alpha=.80$) and emotion-focused ($\alpha=.70$) scales have also been found to be adequate (Struthers, et al., 1995).

Achievement outcome, including both fall and winter semester average and voluntary and involuntary attrition were included as dependent variable in Study 2. As described in Study 1, a student was deemed to have voluntarily discontinued their program if all academic requirements were achieved but readmission did not occur. Students met involuntary discontinuation criteria if they failed to meet the academic requirements of the university for the second consecutive semester and were restricted from re-registering.

Procedure. Data was collected via telephone survey. A group of experienced interviewers were hired in February 2007 and trained to conduct telephone interviews. Telephone interviews took place between March and April of 2007. Permanent phone numbers were obtained from the Registrar's Office at Memorial University. In most instances, the permanent phone numbers were numbers provided to the university by students upon initial registration. Generally, these numbers were the phone numbers of parents. Therefore, a two-step process evolved whereby interviewers contacted parents to ask for a forwarding number for the student. In most cases, the parents were cooperative and provided the interviewer with the appropriate phone number. Once the student's phone number was obtained, interviewers called the student and proceeded to conduct the telephone survey.

Telephone interviewers were provided with a script that instructed them to introduce themselves and the research, and to explain the voluntary nature of the study. Students were explicitly asked if they would like to participate. If the students agreed, the interviewer proceeded with the telephone survey. If a student explained that he or she was not interested, the interviewer thanked them for their time and the interview ended. If students indicated they did not have time to complete the interview at that time,

the interviewer asked if they would like to be contacted at a more convenient time and arrangements were made to do so.

The growth in cell phone technology resulted in an adaptation of the original data collection procedures and methodology in order to accommodate students using cell phones as their primary mode of handheld communication. Some students indicated they could not complete the survey via telephone as they were using cell phones and would be charged for the air time minutes used to complete the survey. For some with cellular phone packages allowing free airtime after 6:00 or 8:00 pm arrangements were made to call during these times. However, for those who did not subscribe to such airtime packages and wished to participate, a web version of the telephone survey was provided. Students supplied their email addresses to the telephone interviewers and a link to the web version of the survey was provided via email. The web-based version of the survey was hosted on a Memorial University, Faculty of Education server.

At the end of data collection, the results from the web version and the paper version of the survey were merged and analysis was conducted revealing no significant differences between the two groups of respondents on key variables. Thus, data was pooled. Institutional data, including Fall and Winter final grades, as well as re-registration data were merged with the online and paper survey data.

Ethical Considerations

The ethics proposal for the present research was included in an ethics proposal for a larger Community University Research Alliance (CURA), Social Science and Humanities Research Council funded research project examining the impact of CDLI Course Participation on Student Transition into Post-secondary Education and/or the

Workforce. Ethical approval was obtained from Memorial University's Interdisciplinary Committee for Ethics in Human Research (ICEHR) (See Appendix A).

Before the telephone interviews took place, informed consent was obtained. Each participant was provided with an oral description of the research, what they would be required to do and how long the survey was expected to take (See Appendix B).

Students were assured the study was completely voluntary and they were under no obligation to participate. In addition, students were also assured their data would be kept confidential.

Once data collection concluded and survey data was merged with achievement and academic outcome data, all identifiers (student numbers, names and phone numbers) were removed and each student was provided with a unique non-identifying code to protect participant anonymity. Further, only research personnel had access to the surveys. Surveys are stored in a locked office on campus and will be destroyed after study completion. Only aggregate results were reported and no individual students were identified.

Data Analysis

Data for both Study 1 and Study 2 were compiled using the Statistical Package for the Social Sciences (SPSS) version 14. Statistical analyses were conducted using SPSS and MPLUS statistical software packages (SPSS for Windows, 2006; Muthen & Muthen, 2004). Preliminary data analysis for both studies included frequency counts and descriptive statistics. Frequency counts were conducted to summarize the data and to efficiently assess the nature and structure of the data, as well as to identify the degree of missing data and to identify coding errors.

Missing data is generally thought to be unproblematic so long as it represents less than 5% of the total data and is unrelated to research design (McKnight, McKnight, Sidani, & Figueredo, 2007; Peugh & Enders, 2004). However, missing data becomes problematic in cases where it comprises more than 5% of the data and where non-random, systematic patterns of missing data exist that may result in bias, decreased power and ultimately a misrepresentation of results (Roth, 1994). Tabachnick and Fidell (2007, p.58) argue the pattern of missing data within a data set is often more important than the actual amount of missing data.

Briefly, the first and least concerning pattern of missingness is "Missing Completely at Random" (MCAR) which implies "missingness" on one variable is unrelated to that particular variable or some other variable within the data set (McKnight, McKnight, Sidani, & Figueredo, 2007; Peugh and Enders, 2004). This pattern of missingness is considered ignorable, yielding the same results as would be expected if there were no missing data present. The second missing data pattern is "Missing at Random" (MAR). In contrast to the MCAR mechanism, missing data in this case is in some way associated with data on another variable, but not dependent on the missing values themselves. Finally, the most troublesome pattern of missing data for researchers is "Not Missing at Random" (NMAR) (Little & Rubin, 1987). This implies that missing data are the result of a non-random process, which may be associated with flaws in research design or sampling procedures. In situations where data are considered NMAR, it is generally recommended to treat the non-response group as a subgroup so that analysis may be conducted to determine differences between responders and non-responders on various outcome measures. As part of the preliminary analysis procedures

implemented in the present research, the percentage of missing data was assessed for each variable and any patterns of missingness identified.

In some instances the archival data implemented in Study 1 and Study 2 was missing information on either MCP, or student number which was necessary for merging purposes. In other instances, postal code or community or origin data was missing. In these cases data were deleted using list wise deletion practices as imputation methods were inappropriate for these variables. In Study 2, with the exception of problem-focused coping, where the amount of missingness was approximately 12%, the proportion of missing data was minimal (less than 5%) in the telephone survey data. To assess MCAR, a new variable corresponding to problem focused coping was created with a dichotomous missing data response code. Missing data was coded with a zero and non-missing data was coded with a one. Then, an independent t-test was conducted to assess if the missing data group and the non-missing data group differed with regard to achievement and attrition. The results revealed missingness on the problem-focused coping variable was found to be MCAR and was not related to fall or winter semester achievement, or attrition outcome. As a result, list wise deletion practices were also deemed appropriate.

Descriptive statistics, including measures of central tendency such as the mean, median and mode, and measures of variability such as standard deviation and variance, were compiled for Study 1 and Study 2, to help determine violations of common statistical assumptions. This in combination with the inspection of histograms with normal curve included, and scatter plots, as well as assessment of skewness and kurtosis confirmed no violations to normality, linearity or independence.

Correlation analysis was conducted for descriptive purposes to assess the strength of relationships between variables. The Pearson Correlation Coefficient was calculated to assess the relationship between coping and achievement and between CDLI experience and coping and achievement. Spearman's Rho was calculated to assess the relationship between attrition and CDLI experience.

Multiple-group structural equation modeling (SEM) was used to assess the effect of CDLI experience on achievement and attrition outcomes and the presence of statistically significant differences between CDLI and non-CDLI students when considering the effect of coping on achievement and attrition outcome. Structural Equation Modeling (SEM) is a regression based technique that combines path analysis and factor analysis (Tabachnick & Fidell, 2007). It is used to simultaneously assess interrelationships between both latent and observed variables. To illustrate, in Study 2, the factor structure of the SCOPE instrument and differences between CDLI and non-CDLI students could be tested simultaneously using SEM multiple-group analysis. SEM is advantageous in that variables may represent both predictor and predicted variables within the same solution and can be used to determine both direct and indirect relationships (Tabachnick & Fidell, 2007). Continuous or discrete, independent and dependent variables may be used SEM.

Analysis using SEM generally involves some variation of a five step process including: (1) initial model identification, (2) evaluation of model fit, (3) re-specification of the model, (4) evaluation of model fit for the revised model, and (5) model comparison (Tabachnick & Fidell, 2007; Kline, 2005). Several fit indices are generally used to determine the appropriateness of the model being tested. The most common are the chi-square statistic (χ^2), the Comparative Fit Index (CFI), Goodness of Fit Index

(GFI), Adjusted Goodness of Fit Index (AGFI) and Root Mean Square Error of Approximation (RMSEA) (Kline, 2005, p. 135-144). These indices compare the proposed model to the null model. Counterintuitively, a non-significant goodness-of-fit chi-square statistic suggests that the implied covariance matrix closely resembles the observed data (Tabachnick & Fidell, 2007; Kline, 2005) The CFI index provides information about improvement in the overall fit of the proposed model relative to the null model. For all indexes, values of .90 or above suggest an acceptable fit. It has been suggested that RMSEA, a measure of residual error or unaccounted for variance, should be less than .06 (Hu & Bentler, 1999).

Multiple-group analysis is a special case of structural equation modeling where differences between groups or samples are tested. Using multiple-group analysis one can test to determine if an overall model, means, variances or specific parameter estimates or path coefficients are consistent between different samples or groups within the same sample. In this way, multiple-group analyses were used to assess differences between CDLI and non-CDLI students.

Results of the analysis to address each research question will be presented in Chapter Four. The results from Study 1 will be reported followed by the results from Study 2. Chapter Five will provide a more thorough discussion of the findings.

CHAPTER FOUR: RESULTS

Study 1

The purpose of Study 1 was to explore the effect of high school achievement and previous distance education experience on first year university achievement and subsequent first year attrition. This included an examination of the 2003, 2004 and 2005 cohorts of new matriculates from rural areas of the province using archival data. First year university students who took one or more distance education courses through CDLI while in high school were compared to students who did not take any such distance education courses during high school. The number of males and females in each group is found in Table 6 and average high school, fall and winter semester achievement is provided in Table 7.

Table 6 The Number and Percentage of New Matriculates by Gender and CDLI Status

Cohort Year	CDLI n (%)			Non-CDLI n(%)		
	Male	Female	Total	Male	Female	Total
2003	63 (37.5)	105 (62.5)	168 (18.9)	253 (35.2)	466 (64.8)	719 (80.8)
2004	29 (23.2)	96 (76.8)	125 (14.9)	246 (34.5)	468 (65.5)	714 (85.1)
2005	47 (28.1)	120 (71.9)	167 (21.7)	205 (34.1)	396 (65.9)	601 (78.3)

Table 7 High School Average and Standard Deviation for First Semester and First Year Achievement

Cohort Year	High School		Fall GPA		Winter GPA	
	CDLI <i>M (SD)</i>	Non-CDLI <i>M (SD)</i>	CDLI <i>M (SD)</i>	Non-CDLI <i>M (SD)</i>	CDLI <i>M (SD)</i>	Non-CDLI <i>M (SD)</i>
2003	80.32 (9.25)	77.15 (13.55)	2.50 (0.89)	2.24 (0.99)	2.51 (0.89)	2.34 (0.92)
2004	78.98 (12.79)	77.71 (12.07)	2.56 (0.91)	2.30 (1.0)	2.57 (0.87)	2.31 (0.94)
2005	80.64 (6.95)	76.38 (14.35)	2.49 (1.0)	2.37 (0.95)	2.53 (0.91)	2.39 (0.87)

Research Questions

1. Do rural students who have previous CDLI experience differ from rural student who have not taken CDLI courses while in high school with regard to high school achievement and overall first year university achievement?
2. Is there a relationship between high school achievement and CDLI experience, and do these variables predict first year post-secondary achievement and subsequent attrition?

The analysis began by assessing the appropriateness of combining the three cohorts. To do this, a multiple-group analysis, using cohort year as the grouping variable, was conducted in MPLUS (Muthen and Muthen, 2004). A baseline, unconstrained model in which the means and variances were free to be estimated for each cohort year was tested and compared to a model in which means and variances were constrained to be equal across all cohort years. The dependent variable was high school achievement.

Comparison of the baseline model to the constrained model suggested no significant difference between cohort years with regard to high school average. Constraining the mean and variance to be equal across cohorts resulted in a low, non-

significant chi-square value and fit indices for the constrained model suggested the constrained model fit the data well ($\chi^2(4, N=2334) = 2.63, p=.62, (CFI)=1.00, (TLI) = 1.00$ and the $(RMESA) = .00$).

To further explore the appropriateness of combining cohorts and to determine differences between CDLI and non-CDLI students with regard to high school achievement, another model was constructed and tested using multiple-group analysis. A baseline model proposing a hypothesized relationship between CDLI experience and high school achievement was tested and compared to a model in which the path between CDLI experience and high school achievement was constrained to be zero. This model, indicating no effect of CDLI experience on high school achievement, is illustrated in Figure 11. Cohort year was the grouping variable, high school achievement was the dependent variable and CDLI experience was the independent variable:



Figure 11 Constrained Model Examining the effect of CDLI Experience and Cohort Year on High school Achievement

Results revealed no significant difference between the unconstrained model and the constrained model. A non-significant chi-square value in association with the accompanying fit indices for the constrained model suggested the model fit the data well ($\chi^2(2, N=2496) = 2.88, p=.23, CFI=.95, TLI=.93, \text{ and } RMESA = .02$). These results indicated no significant difference between cohorts with regard to the effect of CDLI experience on high school achievement. Given there were no significant differences

between groups on high school achievement, the cohorts were combined and subsequent analyses were conducted on the group as a whole.

To begin the process of assessing the effect of CDLI experience on first year achievement and attrition, correlations were produced to determine the relationship between variables. Inspection of correlations revealed a low, significant relationship between previous achievement and the dichotomous distance education variable, CDLI experience ($r = .07, p < .01$). There was a significant moderate correlation between high school average and both first semester and first year achievement outcomes respectively ($r = .46, p < .01$; $r = .48, p < .01$). There was also a significant, moderate negative correlation between winter GPA and withdrawal ($r = -.430, p < .01$). Intercorrelations between all variables are reproduced in Table 8.

Table 8 Intercorrelations Between Variables

	1	2	3	4	5	6	7
1. Gender*	—	0.02	0.03	0.09**	0.12**	-0.05	-0.05
2. HS AVG		—	0.07**	0.46**	0.48**	-0.13**	-0.22**
3. CDLI experience			—	0.10**	0.09**	-0.07*	-0.07**
4. GPA Fall				—	0.93**	-0.26**	-0.43**
5. GPA Winter					—	-0.21**	-0.43**
6. Voluntary Attrition						—	-0.11**
7. Involuntary Attrition							—

* Gender coded as and 0= male and 1= female.

** Correlation is significant at the 0.01 level (2-tailed).

Prior to addressing the main hypothesis that there would be no significant effect of CDLI course experience on first year post-secondary outcomes a model was constructed to assess the effect of CDLI experience on first semester university achievement and first semester voluntary attrition. The unconstrained model depicting both direct and indirect relationships between variables, as illustrated in Figure 12, was tested and compared to a constrained model where the paths between CDLI experience and first semester achievement and voluntary attrition were constrained to be zero or have no effect (see Figure 13). A non-significant chi-square value and associated fit indices for the baseline model, depicting a relationship between CDLI experience and first semester achievement and voluntary attrition, suggested the model fit the data well ($\chi^2(2, N=2496) = 2.63, p = 0.11, CFI = 0.99, TFI = 0.99, RMSEA = 0.03$). When compared to the baseline model, the constrained model, where the path between CDLI experience and first semester achievement and voluntary attrition was set to zero, yielded a significant chi-square value and a drop in associated fit indices ($\chi^2(2, N = 2496) = 13.18, p = .00, CFI = .99, TLI = .97, RMSEA = .05$). Removal of the path from CDLI experience and first semester achievement and the path between CDLI experience and first semester voluntary attrition resulted in poorer model fit. This suggested a significant effect of CDLI experience on both first semester achievement and attrition as depicted in the baseline model. Significant standardized path coefficients for both the baseline and constrained model are presented in Figure 12 and Figure 13.

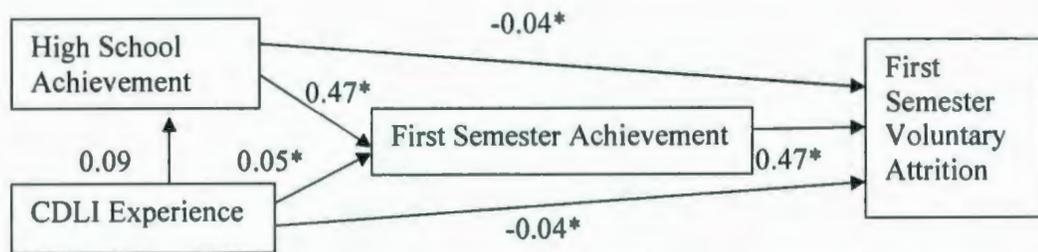


Figure 12 Baseline, Unconstrained Model Examining the effect of CDLI Experience and High school Achievement on First Semester Outcomes

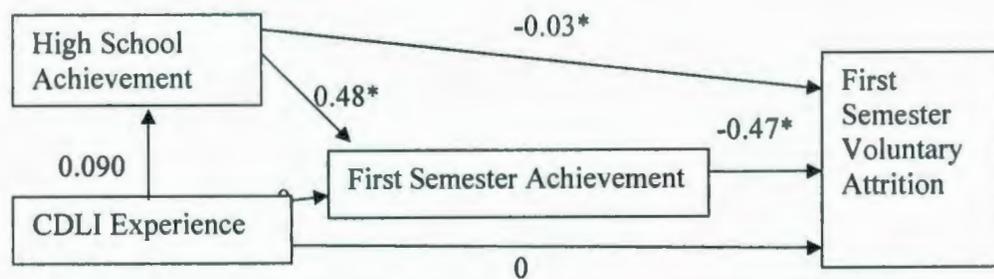


Figure 13 Constrained Model Examining the effect of CDLI Experience and High school Achievement on First Semester Outcomes

To determine if these relationships were consistent for both first semester and overall first year achievement and attrition the next analysis assessed the effect of CDLI experience on achievement and attrition at the end of the first year of university. This included an examination of data for the 2003 and 2004 cohorts only as end of year achievement data was unavailable for the 2005 cohort at time of analysis. At the time analysis for this study was conducted the 2005 cohort had not finished their first year of studies and GPA could not be calculated.

To begin this process, descriptive statistics were produced. The percentage of first year students who persisted to their second year of studies and those who withdrew before this time were calculated. This data is presented in Table 9. Two types of withdrawal or attrition were identified, voluntary and involuntary attrition.

When compared to initial enrolment figures, a larger percentage of first year rural students with CDLI experience persisted to their second year of studies in comparison to first year rural students who did not take one or more distance education courses while in high school. To determine the frequency of voluntary first year attrition the percentage of those students who achieved a passing GPA but did not re-enroll in courses the following year were calculated. The frequency of involuntary represents the number of those who did not achieve a passing GPA in both the fall and winter semesters and were subsequently unable to continue studies as a result of university regulations regarding academic performance. This data is presented in Table 10.

Table 9 The Number and Percentage of First Year Students by CDLI Experience who Persisted, and Involuntary and Voluntary Withdrew

Withdrawal Behaviour Outcome	CDLI n(%)	Non-CDLI n(%)
Persisted	214 (81.4)	833 (68.2)
Involuntarily Withdrew	26 (9.9)	214 (17.5)
Voluntarily Withdrew	23 (8.7)	175 (14.3)

Table 10 The Number and Percentage of CDLI and Non-CDLI Students by GPA Categorization

GPA Categorization	CDLI n (%)	Non-CDLI n(%)
GPA of 2.0 or greater (pass with credit)	195 (66.5)	741 (51.7)
GPA between 1.0 and 1.99 (pass/no credit)	39 (13.3)	238 (16.6)
GPA less than 1.0 (fail)	15 (5.1)	91 (6.4)

A model, illustrated in Figure 14, was constructed to assess the effect of CDLI experience on overall first year achievement and withdrawal behaviour,. The dependent

variable was first year withdrawal behaviour and the independent variables were CDLI experience, high school achievement and first year achievement. Withdrawal behaviour was categorized into three types; persistence, voluntary attrition and involuntary attrition. The reference category for the outcome of withdrawal behaviour was persistence. The baseline model, illustrated in Figure 14, was compared to a constrained model in which the paths from CDLI experience to both first year achievement and first year outcome were set to be zero (illustrated in Figure 15). The paths were constrained in order to address the main research hypothesis that there would be no significant effect of CDLI course experience on first year post-secondary outcomes.

The unstandardized path coefficients for each model have been included (Figure 14 and 15). In the model, first year outcome represented one variable where persistence was the reference category. For the baseline model there was a significant effect of CDLI experience on both first year overall achievement and on both first year voluntary and involuntary attrition.

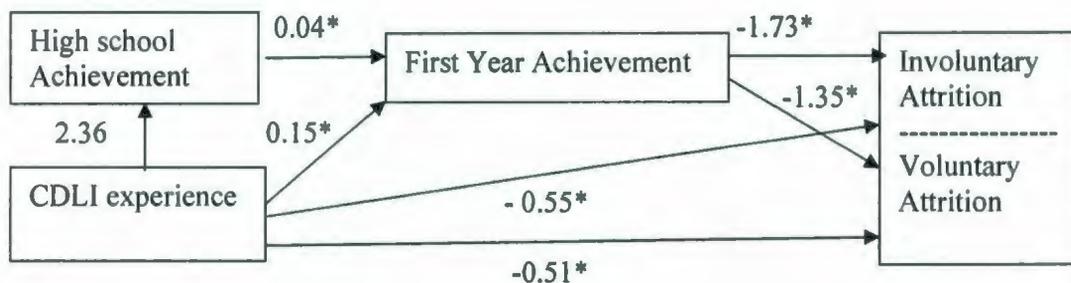


Figure 14 Baseline Model for the Effect of CDLI Experience on First Year Achievement and Attrition

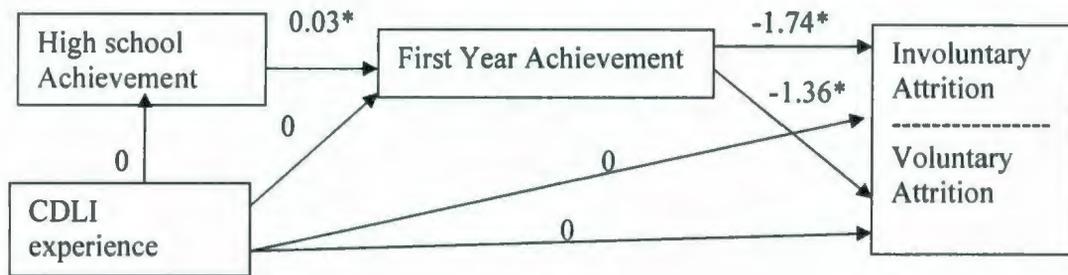


Figure 15 Constrained Model for the Effect of CDLI Experience on First Year Achievement and Attrition

The results suggested a significant effect of CDLI experience on both voluntary and involuntary attrition. Comparison of the likelihood functions and fit indices of the baseline model to the constrained model support a significant effect of CDLI experience on both first year achievement and first year withdrawal behaviour. More specifically, the log likelihood was lower for the constrained model than the baseline model respectively (-9020.91; -8892.03). Similarly, the Akaike information criteria (AIC) and Bayesian information criteria (BIC) for the baseline model was lower than that produced for the constrained model (AIC = 17810.06, BIC = 17880.82; AIC = 18059.83, BIC = 18108.81). As the outcome was multinomial, maximum likelihood estimation was used and, as a result, it was necessary to calculate the chi-square statistic. According to Muthen (2001) two times the log likelihood difference produces a chi-square value. Two times the difference in log likelihood values for the unconstrained and constrained models produced a chi-square value of 257.76, on 4 degrees of freedom. This chi-square value was significant at .05 suggesting the constrained model was not equivalent to the unconstrained model. Overall, when CDLI experience was included as a predictor, the model fit the data better. This further supported a significant effect of CDLI experience on achievement and attrition outcome.

The probability of each attrition outcome was calculated. The log odds estimate for each attrition outcome was exponentiated and divided by the sum of all exponentiated values to produce probabilities of voluntary and involuntary attrition for both CDLI and non-CDLI students (see Table 12) (Muthen & Muthen, 2007). The probability of each outcome for both CDLI and non-CDLI students were graphed as illustrated in Figure 16. The graph depicts the probability of persisting is greater for CDLI students than non-CDLI students. It also suggests the probability of both involuntary and voluntary attrition is lower for CDLI students as opposed to non-CDLI students.

Table 11 Probability of First Year Withdrawal Outcome

First Year Outcome	Non- CDLI		CDLI	
	Log Odds	Probability	Log Odds	Probability
	Estimate		Estimate	
Voluntary Attrition	-1.92	0.11	-2.83	0.05
Involuntary Attrition	-1.81	0.12	-2.61	0.07
Persistence	0	0.76	0	0.883

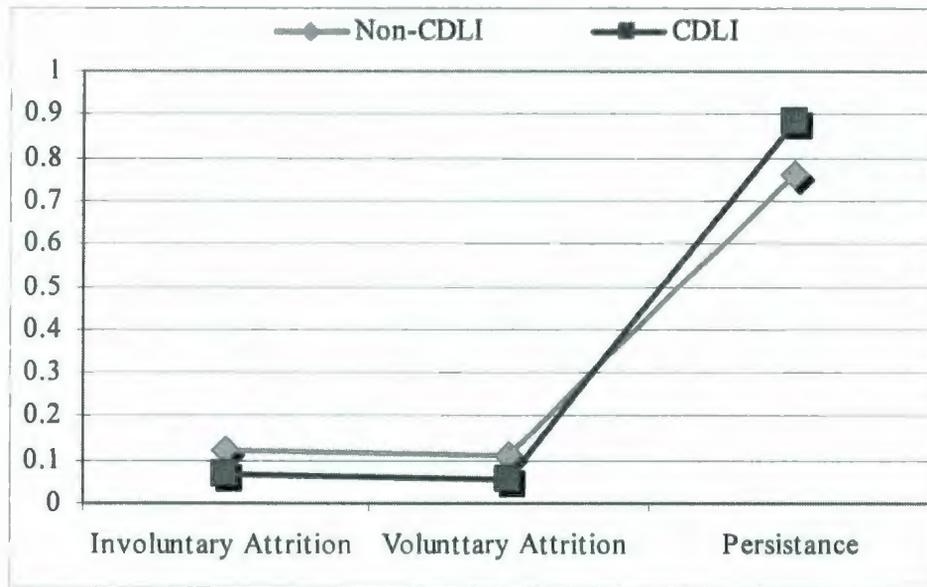


Figure 16 Probability of First Year Outcomes by CDLI Status

The probability of each attrition outcome was also assessed as a function of first year GPA. The average first year GPA for CDLI students was 2.54 and the average GPA for non-CDLI students was 2.33. The probability of first year involuntary and voluntary attrition as a function of GPA was calculated from log odds estimates. Figure 17, 18, and 19 illustrate the probability of involuntary and voluntary attrition decreased as GPA increased. There was a statistically detectable effect of CDLI experience on both involuntary and voluntary attrition respectively, as represented by the separation in lines, with CDLI students having a lower probability of both involuntary and voluntary attrition in comparison to non-CDLI students ($b = -0.513, p < .05$; $b = -0.550, p < .05$). However, as GPA increases the probability of both involuntary and voluntary attrition decreases suggesting students who achieve at higher levels are less likely to discontinue. CDLI students were more likely to persist to their second year of studies in comparison to non-CDLI students.

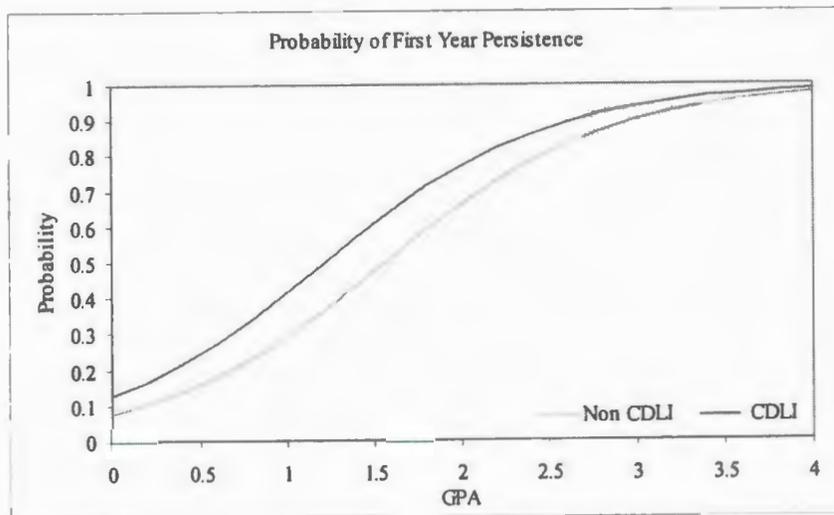


Figure 17 Probability of First Year Persistence as a Function of GPA by CDLI Status

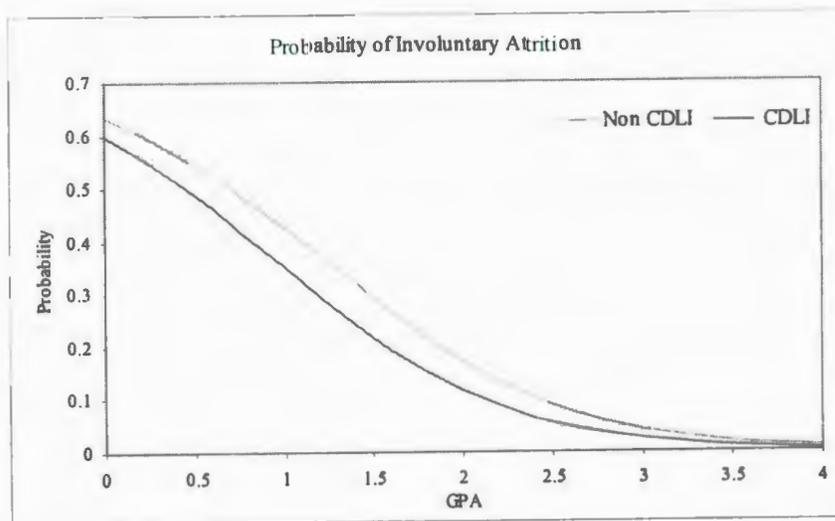


Figure 18 Probability of Involuntary Attrition as a Function of GPA by CDLI Status

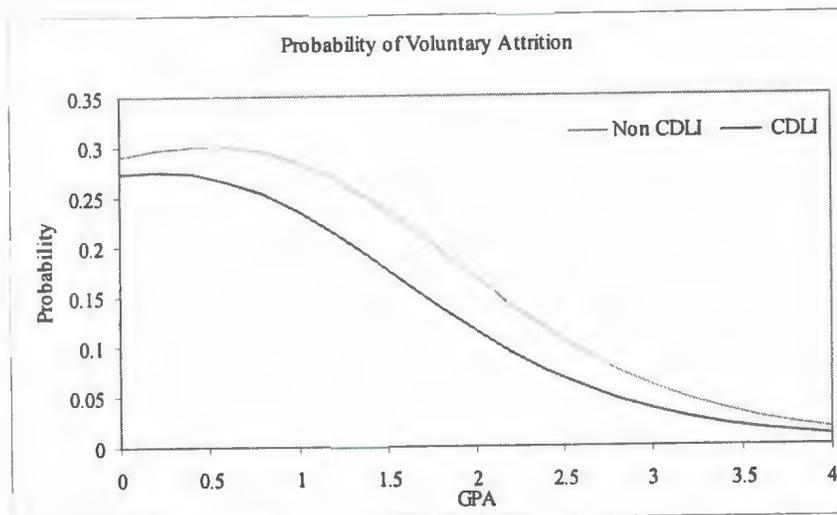


Figure 19 Probability of Voluntary Attrition as a Function of GPA by CDLI Status

Study 2

The purpose of Study 2 was to further explore the impact of CDLI experience on first year university achievement and attrition and to assess the role of coping in this process. One hundred and twenty-three students with a mean age of 19 years comprised the CDLI group and a total of 166 students with a mean age of 19 years comprised the non-CDLI group. The sample was predominantly female (65.0%), with females comprising 68.3% of the CDLI group and 61.8% of the non-CDLI group. This reflects the gender composition of Memorial University's first year student population.

Research Question

1. What effect does CDLI experience have on achievement and subsequent first year post-secondary attrition, as measured by voluntary and involuntary withdrawal, and what role does coping play in this process?

Prior to assessing the effect of CDLI experience on achievement and subsequent first year post-secondary attrition, the first step in this process was to test the factor structure of the SCOPE instrument described in Chapter Three. To do this, a confirmatory factor analysis was conducted using scale scores. The two factor structure comprising problem-focused coping and emotion-focused coping as described by Struthers, Perry and Menec (2000) was imposed on the data obtained from CDLI and non-CDLI students in this sample. The results revealed a significant chi-square value and fit indices below acceptable limits ($\chi^2(19, N=245) = 130.76, p=.000; CFI = .79; TLI = .70; RMSEA = .155$). Based on strength of factor loadings, several scales were removed and a second confirmatory factor analysis was conducted.

The results supported a modified two factor structure ($\chi^2(4, N=245) = 7.69$, $p=.104$; CFI = .99; TLI = .97; RMSEA = .06). Based on weak factor loadings, the academic coping scale comprising strategies such as buying and using a study guide, was removed from the problem-focused coping factor proposed by Struthers, Perry and Menec (2000). This resulted in a new problem-focused coping factor comprising three scales; the academic planning scale, the active coping scale, and efficacy scale. In addition, based on the strength of factor loadings, the emotion-focused coping factor described by Struthers, Perry and Menec (2000) was modified by removing the emotional venting and general emotional scales. The new emotion-focused coping factor comprising the denial and academic disengagement scales resembled an avoidance based form of coping. The factor loadings of the final scales are presented in Table 12.

Table 12 Factor Description and Factor Loadings of Final Coping Scales

Factor Description	Items	Factor Loading
Problem-focused Coping		
<i>Active Coping</i>	1. You do what has to be done, one step at a time. 2. You concentrate your efforts on doing something about it. 3. You think about reasons why the situation occurred. 4. You take additional action to try to get rid of the problem.	.901
<i>Academic Planning</i>	5. You think about how you might solve the problem. 6. You make a plan of action. 7. You try to come up with a strategy about what to do. 8. You think hard about what steps to take.	.742

	The impact of distance education experience	100
		.503
<i>Efficacy</i>	9. You feel confident. 10. You feel competent. 11. You feel hopeful. 12. You feel motivated.	
Avoidance Coping		
<i>Academic Disengagement</i>	13. You drop out of the class you are doing poorly in. 14. You skip class. 15. You reduce the amount of effort you put in to solve the problem. 16. You give up trying to reach your goal.	.855
<i>Denial</i>	17. You act as though it hasn't happened. 18. You say to yourself "this isn't real". 19. You refuse to believe that it happened. 20. You pretend that it really hasn't happened.	.509

Prior to assessing the effect of CDLI experience on first semester and first year achievement and any subsequent attrition, descriptive statistics for average achievement and coping were computed. Both CDLI and non-CDLI students had higher averages during the fall semester. Students reported being more problem-focused ($M=7.15$, $SD=1.36$) in comparison to avoidance focused ($M= 2.49$, $SD= 1.45$) when considering use of coping strategies as illustrated in Table 13.

Based on fall and winter semester achievement, as measured by academic average, the proportion of CDLI and non-CDLI students who obtained a passing average at the end of the fall and winter semesters and the proportion that did not are presented in Table 14. Students who voluntarily and involuntarily withdrew were combined to reflect a dichotomized persist or withdraw outcome due to an inadequate number of students with CDLI experience who voluntarily withdrew. The number and percentage of students who persisted to their second semester and the number and percentage of

those who withdrew or did not return are presented in Table 15. Correlations between variables may be found in Table 16.

Table 13 Average Achievement, Coping and Motivation Profile for CDLI and non-CDLI students

Variables	CDLI M(SD)	NON-CDLI M(SD)	Total M(SD)
Achievement (average)			
<i>Fall</i>	64.65 (10.67)	63.06 (11.65)	63.76(11.23)
<i>Winter</i>	62.56 (14.79)	62.32 (14.77)	62.42(14.76)
Coping			
<i>Problem-focused</i>	7.09(1.28)	7.19(1.42)	7.15(1.36)
<i>Avoidance-focused</i>	2.45(1.40)	2.53(1.48)	2.49(1.45)

Table 14 Percentage of CDLI and non-CDLI students Passing and Failing in the Fall and Winter

Academic Outcome	Fall Semester		Winter Semester	
	CDLI n (%)	Non-CDLI n (%)	CDLI n (%)	Non-CDLI n (%)
Pass	118 (95.9)	141 (89.8)	101 (82.8)	134 (86.5)
Fail	5 (4.1)	16 (10.2)	21 (17.2)	21 (13.5)

Table 15 Number and Percentage of CDLI and non-CDLI Students who Persisted to their Second Year of Studies and the Number and Percentage who Withdrew

CDLI experience	Persisted n (%)	Withdrew n (%)
CDLI	108 (87.8)	15 (12.2)
Non-CDLI	131 (83.4)	26 (16.6)

There was no significant correlation between CDLI experience and overall first year average or first year attrition outcome. There was a significant, moderate negative

correlation between overall first year average and attrition outcome ($r = -.40, p < .01$) and a significant, low positive correlation between problem-focused coping and achievement and a significant low, negative correlation between problem-focused coping and attrition ($r = .17, p < .01, r = -.17, p < .01$). There was a low negative correlation between avoidance focused coping and achievement ($r = -.25, p < .01$) and a significant low, positive correlation between avoidance-focused coping and attrition outcome ($r = .15, p < .01$).

Table 16 Correlation between CDLI Experience, Overall Average and Attrition Outcome

	1	2	3	4	5
1. CDLI experience	—	-0.04	-0.03	0.04	-0.06
2. Problem-focused Coping		—	-0.28	0.17*	-0.17*
3. Avoidance-focused Coping			—	-0.25*	0.15*
4. First Year Average				—	-0.40*
5. Attrition					—

*correlation significant at the .01 level

To assess the effect of CDLI experience on first semester achievement and subsequent attrition, multiple-group logistic regression analysis was conducted. A baseline, logistic regression model depicting a path between first semester achievement and first year attrition was tested as illustrated in Figure 20. The results of the analysis revealed a significant effect of first semester achievement on first year attrition for both CDLI and non-CDLI students respectively ($B = -0.53, p = .01; B = -0.41, p = .00$). To determine differences between CDLI and non-CDLI students when considering the effect of first semester achievement on first year attrition this model was compared to a constrained model where the path between achievement and attrition was set to be equal for both groups. The constrained model yielded a non-significant chi-square value and

fit indices suggesting good model fit. (χ^2 (2, N=280) = .28, $p=.60$, CFI =1.00, TLI = 1.00; RMSEA =.00). Difference testing was used to determine a significant difference between CDLI and non- CDLI groups. In difference testing “the chi-square value and degrees of freedom of the less restrictive model are subtracted from the chi-square value and degrees of freedom of the nested, more restrictive model” (Muthen & Muthen, 2007). According to Muthen and Muthen (2007) “...if the chi-square difference value is significant, it indicates that constraining the parameters of the nested model significantly worsens the fit of the model” (Muthen & Muthen, 2007, p. 400). Conversely, if it is not significant it suggests that constraining the parameters does not negatively affect the fit of the model, meaning the models are equivalent.

A non-significant chi-square value resulting from the difference testing procedures revealed no significant difference between CDLI and non-CDLI students with regard to the effect of first semester achievement on attrition outcome (χ^2 (2, N= 280) =.277, $p= 0.60$) (Muthen & Muthen, 2007). Constraining the effect of first semester achievement on first year attrition to be equal for both CDLI and non- CDLI students did not negatively affect the model suggesting no significant effect of CDLI experience on this relationship.

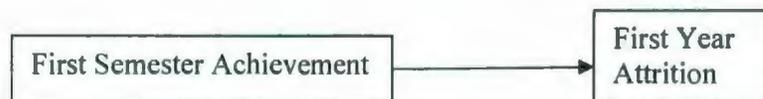


Figure 20 Unconstrained Model Examining the effect of CDLI Experience on achievement and attrition outcome

Building on this, the next step was to assess the effect of coping in this process. A model, depicting the relationship between coping, first semester achievement and attrition was constructed, as illustrated in Figure 21. Results of model testing revealed good model fit ($\chi^2(18, N=280) = 16.32, p = 0.57, CFI = 1.00, TLI = 1.00, RMSEA = .00$). Examination of standardized parameter estimates revealed a significant, negative effect of avoidance-focused coping on first semester achievement and an effect of first semester achievement on attrition for both CDLI and non-CDLI students respectively ($B = -0.32, p = .02, B = -0.42, p = .00; B = -0.43, p = .00, B = -0.32, p = .00$). No other paths were significant. There was no significant effect of problem-focused coping on first semester achievement or first year attrition (see Figure 21 and Figure 22).

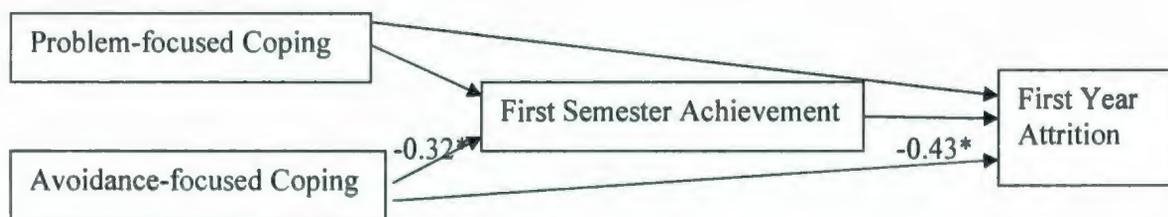


Figure 21 Baseline Model for the Effect of Coping, on First Semester Achievement and Attrition for CDLI students

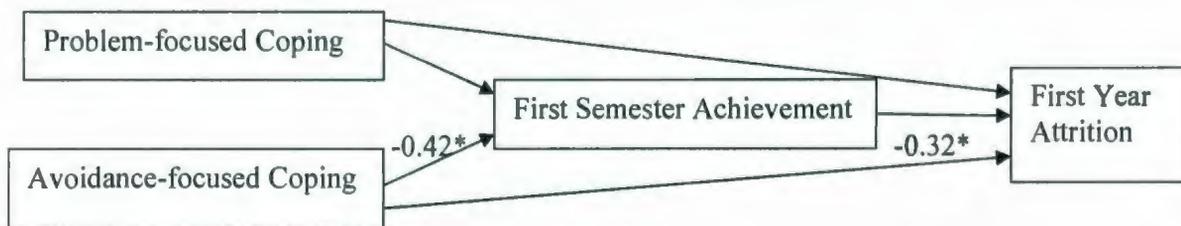


Figure 22 Baseline Model for the Effect of Coping on First Semester Achievement and Attrition for non-CDLI students

To determine statistically significant differences between CDLI and non-CDLI students all non-significant paths were constrained to have no effect and significant paths between avoidance coping and first semester achievement and between first

semester achievement and attrition outcome were set to be equal as illustrated in Figure 23. In Figure 23, paths labelled with a zero depict non-significant paths and those designated with the number one depict paths constrained to be equal. A non-significant chi-square value and accompanying fit indices suggested the constrained model fit the data well ($\chi^2(23, N=280) = 24.55, p = 0.37, CFI = .99, TLI = .99, RMSEA = .02$). A non-significant chi-square difference value suggested no significant difference between the groups with regard to these relationships ($\chi^2(7, N = 280) = 10.52, p = .16$).

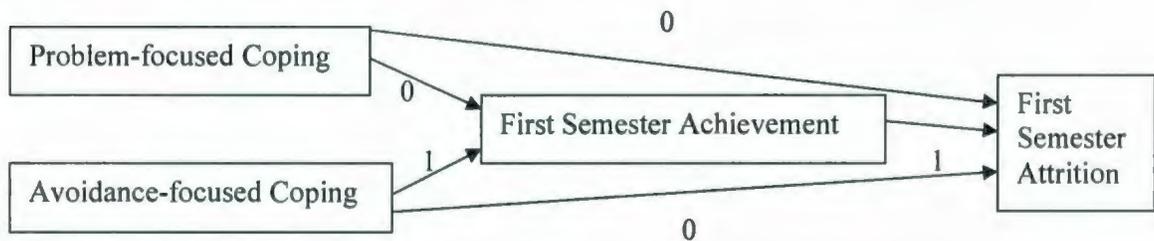


Figure 23 Constrained Model for the Effect of Coping, on First Semester Achievement and Attrition

To assess the effect of CDLI experience on first year achievement and subsequent attrition a similar baseline logistic regression model was constructed and tested using multiple-group analysis, as illustrated in Figure 24. The results revealed a significant effect of first year achievement on attrition for both the CDLI and non-CDLI groups respectively ($B = -.05, p = .00; B = -.05, p = .00$). To determine the existence of statistically significant differences between these groups a model where the path between first year achievement and attrition outcome was set to be equal for both groups was compared to a model where these paths were free to be estimated.

The results revealed a non-significant chi-square difference value suggesting no significant differences between the groups with regard to the effect of first year achievement on attrition ($\chi^2(1, N=277) = 0.01, p = .93$). The constrained model fit the

data well, as supported by a non-significant chi-square value and a CFI, and TLI of 1.00 and a RMSEA of less than .05 ($\chi^2(1, N= 277) = .01, p= .93, CFI=1.00, TLI=1.00, RMSEA=.000$).

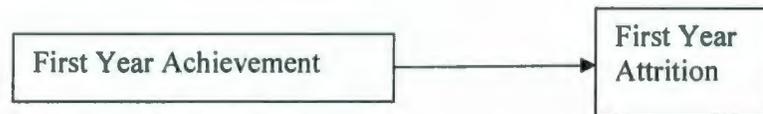


Figure 24 Baseline Unconstrained Model Examining the effect of High school Achievement on First Year Attrition for CDLI and non-CDLI students

To assess the effect of coping on first year achievement and attrition, a model was constructed depicting the proposed interrelationships between coping, first year achievement and attrition for CDLI and non-CDLI students as illustrated in Figure 25, and 26. Multiple-group analysis was used to assess the effect of coping on first year achievement and attrition in CDLI and non CDLI students. A non-significant chi-square value, a CFI and TLI of 1.0 suggested good model fit ($\chi^2(18, N= 280) = 16.68, p=.55, CFI=1.0, TFI= 1.0$). In addition, a RMSEA of less than .05 also suggested that the data fit the model well (RMSEA=.000).

Examination of the parameter estimates revealed that avoidance focused coping had a significant, negative effect on achievement ($B=-0.39, p=.02; B= 0.37, p=.00$) and that achievement had a significant effect on attrition ($B= -0.39, p=.00; B= -0.40, p=.00$) for both CDLI and non-CDLI students respectively. No other paths were significant for either group. To assess differences between CDLI and non-CDLI students the paths between avoidance coping and first year achievement and between first year achievement and attrition outcome were constrained or set to be equal, as represented by

a value of 1, for each group of students and all non-significant paths were constrained to be zero, as illustrated in Figure 27.

The constrained model was compared to the original model where the effect of avoidance coping on first year achievement and the effect of first year achievement on attrition were free to be estimated for each group. Difference testing revealed a non-significant change in the chi-square value ($\chi^2(6, N=280) = 8.13, p=.29$) suggesting no significant difference between CDLI and non-CDLI students when considering the effect of avoidance coping on achievement or achievement on attrition outcome. A non-significant chi-square value, a CFI and a TLI near 1.0 all suggested good model fit ($\chi^2(22, N=280)=22.84, p=.411, CFI=.99, TFI=.99$). In addition, RMSEA was less than .05, suggesting the data fit the model well (RMSEA=.02).

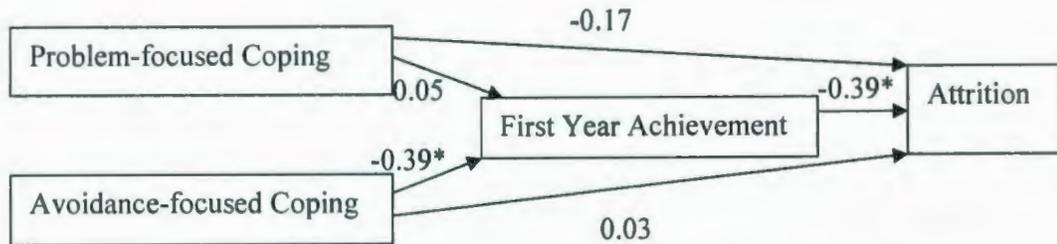


Figure 25 Baseline Model for the Effect of Coping on First Year Achievement and Attrition for CDLI students

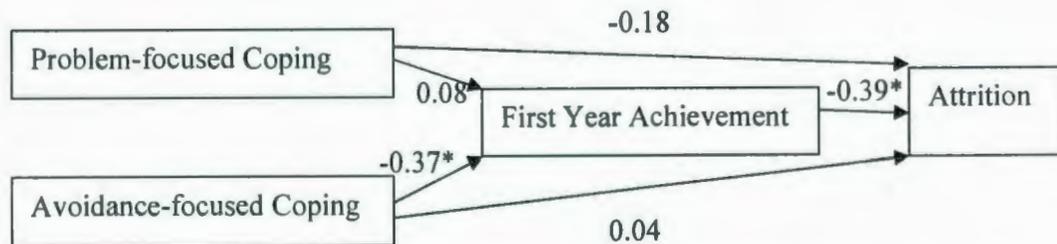


Figure 26 Baseline Model for the Effect of Coping on First Year Achievement and Attrition for non-CDLI students

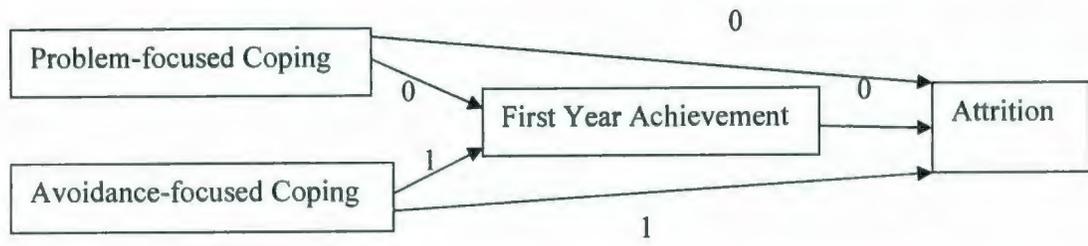


Figure 27 Baseline Model for the Effect of Coping on First Year Achievement and Attrition

CHAPTER FIVE: DISCUSSION AND LIMITATIONS

As the final entry in this dissertation, Chapter Five begins with a discussion of the findings presented in Chapter Four as they relate to theoretical constructs previously discussed in Chapter Two. This will be followed by a section devoted to the limitations of the research and a section highlighting potential areas for future research. Finally, the chapter will conclude by briefly reiterating the key findings and highlighting how this research has expanded the existing knowledge of both distance education and post-secondary student attrition processes.

Discussion

There is little doubt that technology has infiltrated almost every aspect of daily living. This is evident from the commonplace usage of laptops, cell phones, “blackberries”, and utilization of the World Wide Web for everything from email to online conferences. This growth in technology has also influenced how education is delivered and received. In Newfoundland and Labrador, the provision of online distance education courses by the Center for Distance Learning and Innovation (CDLI) has provided students in rural and remote areas of the province with a greater diversity of course options. This has helped level the playing field for rural students wishing to complete courses necessary for high school graduation and the pursuit of post-secondary studies.

This aim of this dissertation was to explore the impact of previous CDLI experience on first year post-secondary achievement and attrition in a group of rural students attending Memorial University. Two studies were designed to do this, one

using archival data and another using survey methodology. The results of both studies will be discussed in turn.

In Study 1, three cohorts of new matriculates were combined to explore the effect of CDLI experience on first year university achievement and subsequent attrition. The sample for Study I comprised approximately 2500 first year university students. The overall first year attrition rate for this sample was approximately 25%. This is in line with previous research, which has estimated that approximately 20% to 30% of students cease studies after their first year (see Grayson & Grayson, 2003 for a review).

Students with CDLI experience had a lower rate of first year attrition (18.6%) in comparison to those with no CDLI experience (31.8%). In addition, students with CDLI experience performed better than students without CDLI experience in their first year GPA. Multiple-group analysis confirmed the effect of CDLI experience on achievement and attrition was statistically significant in a direction favoring CDLI experience. Overall, students with CDLI experience had a lower probability of first year attrition.

These results suggest that students with CDLI experience may have less difficulty making the transition to post-secondary studies. Tinto (1987) suggested that the degree of congruence between the old and new life may contribute to the degree of difficulty or amount of dissonance students' experience when making the transition to post-secondary studies. As such, the more similar the old and new lives, the less difficult the transition may be. Although no significant difference was found between students with CDLI experience and those without it when considering the pre-entry background characteristics of high school average, there was a very small correlation between high school average and CDLI experience. It is plausible that in some cases students who take distance education courses are more motivated or that

their experience taking CDLI courses during high school contributed to a more independent approach to learning which transferred readily to the post-secondary environment. Students with distance education experience may be more self-regulated learners; being able to work more independently to meet the requirements of the university or to ascertain what is needed in situations where improvement is required. It is also plausible that students with CDLI experience are more familiar with communication technologies that allow them to maintain a connection between their old and new lives. This may help soothe the often difficult separation, making the transition more tolerable and continuation in post-secondary studies a more reasonable endeavor. It is possible that students with CDLI experience avail of, have access to, and are more comfortable with, email, web cameras, cellular phones or other communication tools than students without CDLI experience. As a result, it is conceivable that students with CDLI experience may more easily keep in touch with their friends and family and this connection may provide these students with enhanced social support.

While this may seem to contradict Tinto's formulation (1987) that separation from the old life is necessary in order to fully integrate into the new life, it supports stress and coping related research, which has suggested that social support in various forms has positive implications for health and academic adjustment (Uchino, Cacioppo, & Kiecolt-Glaser, 1996; Smith, Fernengel, Holcroft Gerald & Marien, 1994; Thorsteinsson & James, 1999; Aldwin, 2007; Friedlander, Reid, Shupak, & Cribbie, 2007; Cutrona, Cole, Colangelo, Assouline, & Russell, 1994; De Berard, Speilmans, & Julka, 2004). Although Tinto (1987) suggested that separation is necessary when considering the transition to post-secondary studies, it is certain he

did not intend that students need to completely separate themselves from family and friends to be successful in their post-secondary pursuits. It is more likely that a balance between the old and new life would be more adaptive, with enough separation from the old life to discourage distraction from studies but enough support or connection to it to ward against isolation.

Study 2 was designed to assess differences between CDLI and non-CDLI students and the role of coping during the potentially stressful first year transition period. The sample comprised a group of rural students who took one or more CDLI courses while in high school and another group who did not. The rate of first year attrition for students in this sample was substantially lower than that found in Study 1 with approximately 15% of students not returning in their second year, 10% less than the rate reported in Study 1. CDLI students in this study also had higher fall and winter semester averages than non-CDLI students.

When considering the effect of first semester achievement on first year attrition, no significant difference was found between students who had taken one or more CDLI courses while in high school and those who did not. When the role of coping was considered, multiple-group analysis revealed a significant negative effect of avoidance coping on first semester achievement and an effect of first semester achievement on attrition for both CDLI and non-CDLI students. However, no statistically significant difference between the two groups was noted and no effect of problem-focused coping was found.

There was also a significant effect of first year achievement on attrition but no statistically significant difference between the groups was found. When coping was included in the analysis, once again, the results revealed a negative effect of avoidance-

focused coping on achievement and attrition. This is in line with previous research conducted by Bean and Eaton (1995) who estimated a theoretical model of approach and avoidance behavior. These authors found that avoidance coping indirectly contributed to student attrition through integration. However, no significant difference in the application of avoidance based coping was found between students who had taken one or more CDLI course while in high school and those who had not. Problem-focused coping had no effect on achievement or attrition outcome for either group.

Overall, these findings suggest that students who took one or more CDLI courses during high school were as successful as students who completed high school without any distance education experience when considering first year post-secondary achievement, attrition and use of avoidance based coping. While no studies have examined the effect of distance education experience at the secondary level on student outcomes at the post-secondary level, with possibly the exception of Ryan (1996) who examined this in students taking advanced mathematics, these results do support previous distance education research which has found no significant difference between these delivery models when considering student academic outcomes (Ryan, 1996; Bernard, Yiping, & Abrami, 2002; Shachar & Newman, 2003).

The factor structure of the SCOPE instrument used to assess student coping was different for the sample examined in Study 2 than that proposed by the authors of the instrument (Struthers, Perry, & Menec, 2000). Instead of an emotion focused coping and problem focused coping scale, a problem focused and avoidance focused scales resulted. As a result, there was an inability to compare the SCOPE scores found in this sample to previous research implementing the SCOPE instrument. However, it is possible to discuss coping from a general perspective.

Avoidance-focused coping in this academic context was comprised of denial and inaction. The combined use of these two strategies would be conceptually similar to the concept of learned helplessness, described by Seligman (1975) as a pervasive pattern of behavior resulting from a pessimistic explanatory style and perceptions of uncontrollability. A person experiencing learned helplessness may attribute failure to personal characteristics not thought to be malleable or environmental factors thought to be unchanging. Such attributions contribute to perceptions that actions to change a situation or remedy a problem are futile. From a social learning perspective, knowing there is a problem is the cognitive component necessary to provoke action or elicit behavioral change. Denial, accompanied by inaction, inhibits the production of behaviors necessary to evoke change in the environment, circumstance or the person's belief system.

Given this, it is not surprising that avoidance-focused coping negatively predicted first year achievement and positively predicted attrition as university success requires hard work and active participation. Students, who engage in avoidance-focused coping strategies such as denial and inaction, are not focused on improving the situation or outcome. For instance, if a student fails a test but denies that there is a problem, they cannot or will not readily identify the actions necessary to remedy the problem such as increasing study time or improving note taking. As such, actions to improve the situation will not likely occur. As a result, it is possible that future academic endeavors would also suffer, reinforcing a continuous cycle of defeat and feelings of helplessness. Inaction would, in some cases, invite failure and eventual academic dismissal, making the ultimate avoidance-based coping strategy in the post-secondary context dropping out. This is in line with previous research on coping that found negative or emotion based

coping strategies such as denial or self criticism predicted poorer health outcomes and emotion based coping strategies such as acceptance-focused coping, described as involving "blaming one's self for one's problems," were related to poorer academic performance (Pritchard, Wilson, & Yamnitz, 2007; De Berard, Speilmans, & Julka, 2004).

Problem-focused coping has been associated with more positive personal and academic outcomes (Etzion & Pines, 1986; Greenglass, 1988; Greenglass, Burke, & Ondrack, 1990). While there was a low, positive correlation between problem-focused coping and achievement and a low negative correlation between problem-focused coping and attrition, it did not make a significant contribution to the models tested in this research for either group under examination. This may indicate problem-focused coping does not directly influence achievement and attrition as depicted in the models or that students with distance education experience and those without distance education experience apply, or do not apply, problem-focused coping strategies in a similar manner. It is possible that problem-focused coping may affect achievement and attrition in another capacity.

Within the academic research literature there has been a recent tendency to overlook non-significant findings and place a greater emphasis on those achieving statistical significance. However, the lack of a statistically detectable effect may also hold meaning, so it is important not to overlook the non-significant ones when interpreting and summarizing the findings from this research.

In Study 1 there was a statistically significant effect of CDLI experience on first year achievement and attrition outcomes in a direction favoring CDLI experience but there was no statistically significant difference between CDLI and non-CDLI students

found in Study 2. Despite significance or non-significance, the results point in the same direction, suggesting no negative effect of distance education experience on post-secondary achievement and attrition outcomes during the first year transition period. In fact, there may be reason to think that previous CDLI experience is beneficial to students making the transition to post-secondary studies. Overall, these results support distance education as a viable alternative for students interested in either expanding their course selection options for interest's sake or to meet graduation requirements or post-secondary acceptance criteria. Finally, despite having or not having distance education experience, avoidance-focused coping was associated with more difficult adjustment as measured by both first year achievement and attrition outcomes.

Limitations

It must be cautioned that outside of true experimental conditions, cause-effect relationships are impossible to ascertain and even in situations where they are implied they may not truly exist. This research, while quasi-experimental in nature, represents an exploratory effort aimed at advancing the understanding of plausible relationships between variables and to determine the impact of previous distance education experience and coping on first year university outcomes. As a result, the ability to generalize these findings to every first year rural student in every university setting is limited. Such generalizations would be unreasonable for research of this nature.

In addition, while this research hypothesized that CDLI experience impacted high school achievement, it is possible that the direction of this relationship may be the reverse with high school achievement impacting decision to take CDLI courses in high school. It is possible that higher achieving choose to take CDLI courses. More research

investigating this possibility would be needed before definitive conclusions could be drawn with regard to the direction of the relationship between these variables.

It is also possible that the inability to detect a statistically significant difference between students who took CDLI course(s) while in high school and those who did not in Study 2, after finding differences between these two groups in Study 1, may be attributable to type I error. More specifically, the act of combining cohorts in Study 1 resulted in a large sample size, increasing power and the ability to detect a statistically significant effect. Failure to detect a statistically significant effect in Study 2 may also be attributable to type II error and instability of parameter estimates. It is recommended that continued efforts occur to replicate this work to discern this as a possibility. Another possibility may be that, despite the implementation of random sampling and similar high school achievement patterns of CDLI and non-CDLI students, by chance the sample selected for Study 2 may be different from the population from which it was selected in some unexplored manner. Nonetheless, the results indicate no negative effect of CDLI experience on outcome(s).

Another limitation is related to the use of structural equation modeling and model development. Some researchers have suggested that the model development approach used in this research to test the effect of coping on achievement and attrition may be limited as that models tested this way are post-hoc (Garson, 2008). As a result there is a possibility that when tested again with other samples the model may not fit, thus indicating that the model is not stable. As a result, more research implementing various samples of first year rural students would be needed in order to cross-validate the model and the existence of the relationships proposed within the model.

One cannot conclude without first considering what happens to students who drop out and implications for future research in this context. The path from high school graduation to post-secondary studies or the initiation of a career is no longer linear. Students no longer begin university or their career immediately upon graduation from high school; the paths are many and varied. For instance, a student may graduate from high school and take a year off to save money for tuition before attending a post-secondary institution. Alternately, another may immediately begin post-secondary studies at a university and then transfer to a technical training program at another institution before the end of their first year. This same student may return at a later time to complete a degree after obtaining a diploma from a technical college. Still, another student may begin a degree and drop out for a short period as a result of a viable employment opportunity and then proceed to complete the degree on a part time basis, while others have no plans to attend post-secondary studies at all. Today, almost any combination or permutation is possible.

All of these possible pathways may influence conceptualizations of attrition, as a student who drops out and discontinues all educational pursuits is surely different from one who voluntarily drops out to pursue a program of study at another institute in which they are keenly interested. So, not only is the pathway an important consideration for future research but also the reason why the path was chosen. To more fully explore the various pathways a student may take and to more fully understand the reasons for student discontinuation, future research may need to focus on longitudinal efforts aimed at following students who discontinue. However, other than a Medical Care Plan (MCP) number or a Social Insurance Number (SIN) that may or may not be kept on file at

various post-secondary institutes, the availability of a cross-institutional or universal identifier for students is non-existent.

This became an issue during completion of Study 1 when the merging of information from the Department of Education, CDLI and Memorial University was required to match high school records and indicators of distance education experience to first year university records. Some entities used MCP, while others used another identifier, making the establishment of procedures for merging data from various sources very cumbersome. While these obstacles were overcome, issues related to data lineage may become more complex for researchers attempting to trace the educational pathways of students who drop out and do not return after their first year of studies.

Most post-secondary institutes provide new students with a code or student number. Generally, a code or student number obtained from one institution is not transferable to another institute, so, for instance, if a student from Memorial University is assigned a student number and transfers to a local college, the student number they received from Memorial would not be applicable to the college. They would receive one unique to the college. This leaves no way precise way to connect the educational record of this student from one institute to another, limiting the ability to obtain a true picture of post-secondary attrition as a function of educational pathways.

Thinking of future research in this area, it is conceivable that a benign, universal educational code assigned to all students in the provincial school system upon initial entrance to kindergarten and adapted at the postsecondary level would alleviate the difficulties in linking available data sources through various points in a student's career. These codes would be useful for both research and administrative purposes to trace educational and career paths of students from a longitudinal perspective.

Finally, this research provides evidence in favor of distance education that may be used to support policy development around distance education expansion in Newfoundland and Labrador and may also be used to inform those interested in interventions aimed at student retention such as student development specialists within the post-secondary setting. While the results do not necessarily support intervention efforts aimed at increasing student adoption of problem-focused coping strategies it, does promote interventions aimed at alleviating the use of avoidance-based coping among students. This research also supports interventions or prevention efforts focused on the first year time frame as it is during this time that the largest percentage of students are lost to attrition. However, it may be argued that prevention should be emphasized over intervention, as once a student discontinues post-secondary education; prevention is no longer a viable option.

Conclusion

In summary, the results of this research support distance education as a viable alternative for rural students wishing to enhance their course selection of high school courses for personal reasons or for the purpose of graduating and meeting the entrance requirements of post-secondary institutions. Differences between students who had previous distance education experience and those who did not were found in Study 1, in a direction favoring distance education experience, meaning those with CDLI experience had a lower probability of attrition. In Study 2, no significant differences were found between students who had taken one or more distance education course while in high school and those who did not. Taken together, the results of this research suggest that there is no negative effect of CDLI experience on

students' transition to post-secondary studies, or their first year achievement and attrition outcomes. These results contribute independently to both the distance education field and the post-secondary attrition field.

In the past, distance education research has generally focused on student outcomes in either secondary or post-secondary settings singularly, rarely bridging the gap between the two. This research has attempted to bridge this gap by examining the longer-term impact of distance education experience during high school on student success as measured by achievement and attrition at the post-secondary level.

By including distance education as a background variable this research has also contributed post-secondary attrition research, as distance education has not been previously examined as a predictor variable in this context. Examination of models such as Tinto's model of student integration (1987) and Bean's model of student attrition (1980; 1983) demonstrate that theory development and research on post-secondary attrition research has generally included prior achievement as the most prominent educational background variable. Examination of other variables that may be considered "nontraditional", such as students from rural areas with distance education experience may help to broaden our understanding of the phenomenon as it relates to the impact of background characteristics on attrition outcome.

In closing, while models may be static, people are not static, and they do not live in isolation. Preferences may change as individuals grow and interact in a dynamic and ever-changing world. As a result, factors that are influential at one stage of a student's academic career may not be at another and variables influencing successful post-secondary completion may be different than those influencing first

year attrition and may change as the student changes. Variables such as coping, thought to be relevant to the first year transition, given the potentially stressful nature of this period may not be relevant or as relevant at another period in a student's career. This is in contrast to traditional approaches that imply that factors associated with post-secondary degree completion are static, making the examination of attrition during the first year period a more reasonable endeavor.

Research advancements become stagnant when the infusion of new ideas, theory development and testing ceases. In the end, it is hoped that this research may, at the very least, spark intellectual debate to encourage further advancements in the area. After all, both significant and insignificant findings can help to enhance the understanding of a phenomenon, in this case, the impact of prior distance education experience on post-secondary attrition in first year students.

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APPENDIX A



Memorial

University of Newfoundland

Office of Research

February 16, 2007

TO: Mrs. Barbara Cox, Director, Office of Research
FROM: Chair, Interdisciplinary Committee on Ethics in Human Research
SUBJECT: Ethics Proposal

The following proposal has been submitted to the Interdisciplinary Committee on Ethics in Human Research (ICEHR).

ICEHR Reference No.	2006/07-048-ED
Principal Investigator	SHARPE, Dr. Dennis Faculty of Education
Co-Investigator(s)	KIRBY, Dr. Dale Faculty of Education
Project Title	<i>The impact of CDLI course participation on student transition into post-secondary education and/or the workforce</i>
Status	Approved
Status Date	February 16, 2007
Funding Agency	SSHRC

T. Seifert
for T. Seifert, Ph.D.
Chair, ICEHR

TS/emb

cc. Associate Dean, Graduate Programmes & Research Development, Faculty of Education

APPENDIX B

Script and Informed Consent for Telephone Interviews

Study Title: The Impact of CDLI Course Participation on Student Transition into Post-secondary Education and/or the Workforce

Introduction and Purpose: *Hi, my name is _____ and I am working with a team of researchers at Memorial who are conducting a study which explores the role of high school online distance education on post-secondary transition processes and academic outcomes. We are particularly interested in first-year student's adjustments to college or university life and how students adapt to the changes they experience during their first year of study.*

Can you help us by completing a telephone survey that will take approximately 20 minutes to complete? The questions are related to a number of transition related issues that address coping with, and adjustments to, university or college education. There are also a few questions related to your background.

Information provided will be kept strictly confidential. Only research personnel will have access to the information you provide in this survey. Any names or personal identifying information will be removed prior to analysis.

Would you be willing to help us?

Yes ___ No ___

If yes then proceed with interview. Explain to participants that they can decline to answer any particular questions or choose to withdraw from the study at any time and will not be penalized in any way.

Once survey interview is completed:

Thank the participant for their time and let them know how much their help was appreciated.

Thanks for your time. Your help is truly appreciated. The answers you have provided will help us better understand first year student transition experiences.

If they have any questions or concerns about the study they can call the numbers listed below.

Charlene Dodd (Ph.D. candidate, Faculty of Education) 737-8653
Dr. Dennis Sharpe (Professor, Faculty of Education) 737- 7549

If they have ethical concerns about the research that are not dealt with by the researcher, they may contact the Chairperson of ICEHR at icehr@mun.ca or by telephone at 737-8368.

Informed Consent for Web Version of Survey

Study Title: The Impact of CDLI Course Participation on Student Transition into Post-secondary Education and/or the Workforce

Introduction and Purpose: We are conducting a study on post-secondary transition processes and academic outcomes. We are particularly interested in first-year student's adjustments to college or university life and how students adapt to the changes they experience during their first year of studies. Part of the study compares students who have had experience with web-based courses in high school with those who have not. The following web survey will take approximately 12-15 minutes to complete. The questions are related to a number of transition related issues that address coping with and adjusting to university or college education. There are also a few questions related to your background.

Information provided will be kept strictly confidential. Only research personnel will have access to the information you provide in this survey. Any personal identifying information will be removed prior to analysis and replaced with an anonymous, unique code.

Your responses will have no impact on your academic standing or program at MUN.

Thanks in advance for your help with this survey.

If you have any questions or concerns about the study you may contact the people listed below.

Charlene Dodd (Ph.D. candidate, Faculty of Education) 737-8653

Dr. Dennis Sharpe (Professor, Faculty of Education) 737- 7549

Dr. Dale Kirby (Assistant Professor, Faculty of Education) 737-7623

The proposal for this research has been approved by the Interdisciplinary Committee on Ethics in Human Research. If you have ethical concerns about the research that are not dealt with by the researcher, you may contact the Chairperson of ICEHR at icehr@mun.ca or by telephone at 737-8368.

SCOPE Instrument

This next section looks at how you would react in a particular situation. As I read the following statements I want you to imagine you have done poorly on an important test in college or university. I want you to indicate how you would react using a 10 point scale where 1 indicates extremely uncharacteristic and 10 indicates extremely characteristic.

1	2	3	4	5	6	7	8	9	10
extremely uncharacteristic									extremely characteristic

-
- _____ You give up trying to reach your goal.
 - _____ You think about how you might solve the problem
 - _____ You do what has to be one, one step at a time.
 - _____ You feel hopeful.
 - _____ You act as though it hasn't happened.
 - _____ You concentrate your efforts on doing something about it.
 - _____ You think about reasons why the situation occurred.
 - _____ You take additional action to try to get rid of the problem.
 - _____ You feel confident.
 - _____ You get upset and let your feelings out.
 - _____ You try to come up with a strategy about what to do.
 - _____ You feel motivated.
 - _____ You try to get emotional support from your family and friends
 - _____ You use your study guide.
 - _____ You try a different study technique.
 - _____ You discuss your feelings with someone.
 - _____ You drop out of the class you are doing poorly in

- _____ You talk to someone about how you feel.
- _____ You refuse to believe that it happened.
- _____ You buy a study guide
- _____ You say to yourself "this isn't real".
- _____ You pretend that it really hasn't happened.
- _____ You let your feelings out.
- _____ You feel competent.
- _____ You get upset and are really aware of it.
- _____ You skip class.
- _____ You feel a lot of emotional distress and find yourself expressing those feelings.
- _____ You reduce the amount of effort you put in to solve the problem.



