



# First University Experience and Student Retention Factors

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## ABSTRACT

The global marketplace has heightened the need for highly skilled personnel worldwide, underscoring the fact that a postsecondary education has almost become a necessary link to innovation and competitiveness. Canada, along with other industrialized nations, has an ageing population and is being challenged to alleviate specialized skill imbalances and shortages. A combination of two methods is usually employed to provide a steady supply of university graduates: the first one is to increase accessibility, and the second is to reduce the attrition of first-year students. After examining the latter through a 24-variable binomial logistic regression model ( $N = 4229$ ), we found that higher retention rates are definitely achievable in particular environments.

## RÉSUMÉ

La mondialisation du marché du travail a accru les besoins de main-d'œuvre qualifiée et mis en valeur l'importance de la formation postsecondaire comme facteur d'innovation et de compétitivité. Comme plusieurs autres pays industrialisés, le Canada compte une population vieillissante et fait ainsi face aux défis causés par des déséquilibres et des pénuries de main-d'œuvre spécialisée. Deux méthodes sont généralement utilisées pour assurer un nombre suffisant de diplômés du niveau postsecondaires : l'augmentation des admissions pour favoriser l'accès et la diminution des abandons parmi la population étudiante déjà inscrite. L'examen de 24 variables via un modèle binomial de régression logistique a démontré qu'il est possible de diminuer les abandons en améliorant certains facteurs qui touchent les étudiantes et étudiants de près.

## INTRODUCTION

In the last decade, the federal government published a plethora of reports dealing with research and development (R&D) and skills as determinants of innovation. One of those studies, *Canada's Innovation Agenda* (Industry Canada, 2001a,b), has stimulated dialogue by attempting to define the role of universities with respect to education, industry, and government. This study highlighted the need for the Canadian economy to commercialize university research in order to create new processes and products that are essential to compete with emerging economies, particularly those of India and China (Industry Canada, 2006; Drummond & Alexander, 2004). Without the implementation of these policy imperatives, many Canadian businesses will have no other option but to downsize their operations and/or open foreign production facilities (Audretsch, 2003). Most innovation-focused strategies are founded on the premise that creating successful industry clusters attracts new businesses and skills into the surrounding region, resulting in employment growth. Wolfe, Davis and Lucas (2005) highlight the advantages of these clusters: "This approach views clusters as the product of traditional agglomeration economies, where firms co-located in the cluster, benefit from easier access to, and reduced costs of, certain collective resources, such as a specialized infrastructure or access to a local labor market for specialized skills" (p.5).

Successful regions such as Route 128, Silicon Valley, and other "learning regions" rely heavily on the expertise of faculty and graduates from the local universities; consequently, this type of innovation platform requires certain abilities/skills which are only available through a postsecondary education (Advisory Council on Science and Technology, 1999; Conference Board of Canada, 2003; Kitagawa, 2004; Lagendijk & Cornford, 2000). Mike Lazaridis (2006), Research in Motion co-CEO, has articulated the following regarding defining the importance of higher education to business competitiveness:

In the 20+ year history of Research in Motion, I've licensed only two technologies from universities. One was encryption technology and the other was a compression technology. In that same 20 years, I've hired over 5,000 students - co-op students, interns, undergrads, graduate students and post-docs. They have created the commercial success of our company. So, if you want to understand how commercialization happens, you need to look at the students who graduate from our universities and colleges each year. (p.1)

In support of this remark, Guthrie and Munn-Venn (2005) interviewed 47 business leaders and concluded in their report that universities should concentrate on generating research and skilled graduates. This strategic focus supports a renewed commitment to the principal function of postsecondary education which is to foster critical thinking, analysis, moral reasoning, and judgment (Duderstadt, 2005). Currently, these inherent skills are desired in order for a competitive private sector to adapt to a volatile inter-connected global economy.

## OBJECTIVES OF THE STUDY

The Introduction highlights the need to maximize the number of post-secondary graduates. This goal can be achieved by increasing accessibility or by positively affecting the factors that lead to higher retention rates, particularly those having an impact on first-year students. The purpose of this study is to identify variables that are likely to assist various stakeholders in the management of the first university experience.

This process was done through a quantitative analysis of a Statistics Canada longitudinal dataset composed of a number of variables. Our variables were chosen based on the theoretical approaches of Tinto's (1993) Theory of Student Departure and Swail, Redd, and Perna's (2003) Forces Acting on the Geometric Model of Student Persistence and Achievement models. These two models were the most applicable to our objectives stated below; the former dealing with the academic and social systems, institutional goals/commitments, and their effects on the student's departure decision and the latter providing greater details on the social, institutional, and cognitive factors of the student experience.

Our quantified model identified which of the variables significantly affected student retention. More specifically, it purported to

1. assess the significance of variables dealing with finances and persistence;
2. assess the impact of the social system and habits;
3. evaluate the effects of the academic system and cognitive habits; and,
4. determine if there is a significant retention rate difference among the institutional categories relating to size, program offerings and institutional complexity.

## LITERATURE REVIEW

### Current and Future Predicaments

In 1999, the Advisory Council on Science and Technology highlighted the population's age demographic and the brain drain as the two determinants of future skill shortages. The federal government's innovation agenda warned that the supply of these highly skilled people was not assured in the medium term (Industry Canada, 2001a). In consequence, addressing the brain drain became a policy imperative as skilled workers were leaving Canada for the United States. In 2001, the Institute for Research in Public Policy produced a publication about the various facets of the "Brain Drain." In this special issue, Finnie (2001) stated that the main outflows of skills to the United States were those in the upper echelon – namely nurses, professors, physicians, R&D and high tech workers, and other specialists. He also mentioned that 12% of the doctoral graduates from 1995 had moved to the U.S. within three years of graduation. From 1991 to 1996, he stated that 178,000 Canadians left for the United States; of these individuals, an estimated 126,000 would not return. However, a recent study

stated that changes in the post 9/11 U.S. political agenda and Canada's reinvestment in Health Care and Higher Education have made the U.S. a less desirable destination for these highly skilled individuals (Finnie, 2006). However, major changes in U.S. policies after the 2008 presidential election may affect the ability of Canada to retain these most sought-after knowledge workers?

The Canadian economy has faced a shortage of labour in certain sectors and occupations, mainly due to the high demand for those skills (Advisory Council on Science and Technology, 1999; Gingras & Roy, 1998). To illustrate the growth in knowledge industries, Lavoie & Roy (1998) conducted a study investigating annual employment growth from 1971 to 1996. The report publicized a national annual job growth of 2.1%; however, the jobs concentrating on the production of ideas, namely knowledge workers<sup>1</sup> and those managers working in science and technology, grew at rates of 4.1% and 8.4% respectively.

Current findings predict that over the next 20 years, certain industries may face severe localized shortages due to the retirement of the baby boomers from the workforce (McMullin, Cooke & Downie, 2004). Moreover, another report by the British-North American Committee (BNAC, 2001) has forecasted that the ageing population will cause acute shortages throughout the Canadian economy. In the foreseeable future, there will be an expected shortage of professors, nurses, and biotechnology workers (managers with technical experience) due to retirement as well as sector growth; subsequently, this will limit the number of professors and research specialists for Canadian universities (Industry Canada, 2001a; McMullin et al., 2004). To illustrate this point, an estimated one third of Canada's faculty is 55 years or older (Drummond & Alexander, 2004). In addition to this sea of demographic change, Industry Canada (2001b) further predicts the following:

Without a substantial increase in the proportion of young Canadians undertaking postsecondary studies and going on to obtain the graduate degrees that the labour market demands, Canada will not be able to fully seize the opportunities that the new economy offers. (p. 57)

Although, our university enrolment has increased 29.2% from 1992-1993 to 2003-2004, with additional funding recently having been provided (CAUT, 2006), there are warnings that continued safeguards are needed to maintain the quality of the final product (BNAC, 2001). However, with the requirements of the knowledge economy and the potential effects of retirement on the supply and demand for skills, there are two complementary strategies to aid in producing a greater number of graduates: one is to reduce the attrition rates while the other is to increase accessibility.

Currently, participation in the knowledge economy is more or less conditional on having an undergraduate degree, and some job vacancies require more advanced education (Duderstadt, 2005; Quirke & Davies, 2002); as such, uneducated individuals have fewer options to earn a wage to support themselves and their families.

The social rate of return for a Canadian holding an undergraduate degree was 10% in 1995. This rate of return diminishes as a person continues one's education (Gingras & Roy, 1998). Emery (2005) believes that increased tuition and student debt loads are detrimentally affecting the willingness of individuals to invest in higher education.

Some experts believe that if the high internal rates of return to education were greater comparatively to other investment options, this would reinforce the advantages of an educational investment (Heckman, Lochner & Todd, 2005). Undoubtedly, the rates of return play an important part in the decision-making process for governments, students, and parents.

### Student Retention

In many cases, different parts of Tinto's (1993) and Swail et al.'s (2003) models intersect to illustrate the causal effects instigating the student's departure from his/her institution. Both models have specific sections that deal with variables that are under the jurisdiction of the university and therefore manageable.

The literature has highlighted several determinants influencing a student's decision to dropout: economic factors, enrollment at another school, academic difficulties, family responsibilities, personal problems, dissatisfaction with residence living, academic dissatisfaction, low GPA, and poor advising or teaching (Mohr, Eiche, & Sedlacek, 1998; Aitken, 1982; Scales, 1960). Thus, these factors influence the portion of the student's satisfaction with linkages relating to a student's sense of belonging and participation in a quality education (Elliott, 2002).

The social system is influenced by some of the following social factors that are essential to increasing student persistence (Swail et al., 2003): financial issues, educational legacy, attitude toward learning, religious background, maturity, social coping skills, communication skills, attitude toward others, cultural values, expectations, goal commitment, family influence, peer influence, and social lifestyle. From the outset, helping a student choose his/her potential postsecondary institution requires universities to provide straightforward and realistic marketing materials to illustrate the true social environment (Helland, Stallings, & Braxton, 2002). Once the institution is chosen, the student enters the university and undergoes an adjustment period where physical, emotional and psychological disengagement is occurring; in the meantime, the student must establish both academic and social relationships in order to pass through Tinto's three phases of separation (Nora, 2001). Furthermore, some of the influences affecting persistence are linked to positive occurrences and experiences during the first year after enrollment for which organizational commitment can be demonstrated through an institution's policies and programs (Braxton & McClendon, 2001; Braxton & Mundy, 2001; Pascarella & Terenzini, 1979b). Other research supports that living in residence for the first and second year may further facilitate social integration (Christie & Dingman, 1991; Pascarella

& Chapman, 1983). All these institutional factors are focused on helping the student feel like he/she “matters” by fostering a network of school and family friends to create a sense of belonging (Rayle & Chung, 2007).

The academic system of a university is significant to any student’s departure decision and may be influenced by the following cognitive factors (Swail et al., 2003): academic rigor, aptitude, technological ability, critical thinking ability, content knowledge, study skills, time management, and learning skills; as a result, these inherent traits have been heavily influenced by past learning opportunities, activities, and background. There is one connective thread between the student and his/her academic system, specifically, the academic department, which is closely integrated in the daily activities of its respective students. Departments are deemed to be a critical force in reducing student attrition for commuter and non-commuter students (Grayson, 1995). The academic performance of a student is a combination of many factors: motivation, aptitudes, support systems inside and outside of the classroom, and even living conditions (Scales, 1960). However, this experience may also be affected by elevated levels of academic stress for first-year students which may be mitigated by the strength of the social network of friends and family (Rayle & Chung, 2007).

## METHODOLOGY

### *Database and Sample Size*

The data for this study were drawn from the *Youth in Transition Survey* (YITS) dataset designed and collected by Statistics Canada. Statistics Canada describes YITS as “a Canadian longitudinal survey designed to examine the patterns of, and influence on, major transitions in young people’s lives, particularly with respect to education, training, and work” (Zeman, Knighton, & Bussiere, 2004, p.24). This dataset is collected biennially; and for this paper, the authors are using the data from cycle #1. This cycle has an 80.9% response rate, targeting those between 18–20 years of age (Zeman et al., 2004).

From this dataset, we created a binomial logistic model in which 23 out of a possible 24 variables have been dummied (0, 1). Some questions were slightly transformed to meet our objectives. The sample of full-time university students born between the years 1979–1981 (18–20 years of age) engaged in their first university experience is relatively large (N= 4229).

These dichotomous (0, 1) coded variables helped to determine if some of the factors are likely to have a positive or negative impact on the dependent variable (student retention). Using the SPSS indicator function, the analysis allowed for our chosen response to be compared to all the other possibilities. With this in mind, the software automatically chose our coded value for the variable of 1 as the reference category (shown as ref. in Table #6) to be compared with our coded value of 0. The sole exception to this procedure was University categories in which Comprehensive (2) was chosen as the reference category and compared to the other three categories of institutions.

To determine whether the variable in the equation was significant, the estimated odds ratio was used (shown as Exp (B) in Table #6) for which both the upper and lower 95% confidence interval must be greater than 1 or less than 1. Using this analysis, the variables that were not statistically significant are screened and removed from Model One; subsequently, we ran a second model with the remaining significant variables.

Although the authors have attempted to choose ideal predictors, there are certain variables that could have been included to enhance the model but were not readily retrievable from the dataset.

### *Model One Variables*

#### *Dependent Variable (student retention): (0 = leaver, 1 = continuer)*

In our analysis, retention indicates the number of students who did not leave their first postsecondary experience (at a university); in other words, they continued at their respective institution as of December 1999. Since our sample students were between the ages of 18 and 20, born between the years 1979-1981, the majority of them were in their first year or second year. As of December 1999, Ontario and Quebec, representing more than 50% of Canada's population, had not made major changes to their education system. Ontario had not yet abolished Grade 13 (O.A.C.); this resulted in most students entering university the year of their 19<sup>th</sup> birthday. For about 40 years, Quebec has employed a distinct system, using CEGEPs as pre-university and college training until approximately the age of 19. Bearing in mind that the eastern and western provinces have a few students entering at 18, some 20-year-old students may be entering their third year of university because they would have commenced their studies in 1997. Unfortunately, this means that some students may be referring to a first university experience that occurred a few years beforehand. Consequently, some of the information may not be as precise as it would have been if the data was collected immediately after their first university experience.

#### *Independent variables*

##### *Indicator (gender)*

The variable of gender was included to determine whether there was a statistically significant difference between female and male students.

##### *Finances and Persistence*

Canadian students have access to different types of student aid to fund their post-secondary education. For this project, the following five sources were chosen:

##### *Social System and Habits*

There is a wide variety of variables included in this subsection with relevance to either a student's social adjustment or personal sense of belonging.



**Table 1 – Personal Financing Variables**

| Variable                   | Description  |
|----------------------------|--|
| Money from parents/partner | Did you receive money from your parents or partner that you do not have to pay back? |
| Personal savings           | Did you use money from your personal savings?  |
| Government loan            | Did you get a government sponsored student loan?                                     |
| Bank loan/line of credit   | Did you get a bank loan (other than a student loan) or line of credit?               |
| Parent/family loan         | Did you get a loan from your parents or family?                                      |

This analysis allowed the authors to identify variables that would prove beneficial in helping to improve student retention. An enumeration of these variables is included in the table below.

### *Cognitive Skills and Academic System*

The following variables deal with cognitive factors such as the amount of

**Table 2 – Social System and Habit Variables**

| Variable       | Description  |
|----------------|--|
| Skills         | I felt I had the skills and abilities needed to do well in my program.                             |
| Right decision | I felt I had found the right program for me.   |
| Friends        | I became good friends with other students at this school.  |
| Moved out      | Do you consider yourself to have moved out permanently from the home of your parents or guardians? |
| Dropping out   | During any given month, did you think about dropping out?  |
| Just a number  | I felt like I was just a number to this school most or all of the time.                            |

effort, time management skills and commitment to the academic experience, sometimes described as cognitive/behavioural habits.

**Table 3 – Cognitive Skill Variables**

| Variable         | Description  |
|------------------|--|
| Less than 15 HW  | Did you spend less than (<) 15 hours each week studying or doing assigned work outside of class? |
| Cut/skip Class   | During a month, did you cut or skip a class?   |
| Workload         | During first year, did you have trouble keeping up with the workload most or all of the time?    |
| Missed deadlines | I missed deadlines given for assigned work most or all of the time.                              |

All these factors are under the jurisdiction of the institution and are part of the academic system of the institution.

**Table 4 – Academic System Variables**

| Variable            | Description  |
|---------------------|--|
| Adjustment          | Did you take part in any workshops, programs or courses designed to help you adjust to first-year studies? |
| Residence (rez)     | During most of your first year, did you live in a student residence at your school?                        |
| Personal things     | There were people at school that I could talk to about personal things.                                    |
| Class < 35 students | Did you have classes of fewer than 35 people?  |
| Class > 75 students | Did you have classes of 75 people or more?   |
| Teaching            | Did you have any instructors with strong teaching abilities?   |
| Show interest       | Did you have any instructors show an interest in helping students succeed?                                 |

### *University Categories*

As a result of some confidentiality issues, we were obliged to use broad categories to avoid identifying any institution. In this study, the MacLean's grouping serves to categorize the institutions by size, program offerings and institutional complexity. Since this publication divides the universities into three categories based on size and types of programs, it provided an ideal aggregate of institutions with matching characteristics. In addition, we chose to place all the federated universities with their affiliated institution to make sure that all universities from the Statistics Canada index were placed in one of the four categories. The three institutional categories (MacLean's, 2006) are reported in Table 5:

**Table 5 – University Categories**

| Variable                  | Description   |
|---------------------------|---|
| Primary undergraduate (1) | Universities largely focusing on undergraduate education, with a limited range of graduate programs.  |
| Comprehensive (2)         | Universities having a significant amount of research activity and a wide range of programs at the undergraduate and graduate levels, including professional degrees.  |
| Medical/doctoral (3)      | Universities having a broad range of Ph.D. programs and research, as well as medical schools; they also happen to have law schools in which the drop-out rate between the first and second years is typically high. |
| Not in rankings (4)       | Universities that are not included in the rankings (mostly relatively small institutions).  |

Table 6 – Results of the Binomial Logistic Models

| Variables                       | Coded Values |        | Model #2              |       |      |                       |       |       |
|---------------------------------|--------------|--------|-----------------------|-------|------|-----------------------|-------|-------|
|                                 | Model #1     |        | 95.0% C.I. for EXP(B) |       |      | 95.0% C.I. for EXP(B) |       |       |
|                                 | Beta         | Wald   | Lower                 | Upper | Beta | Wald                  | Lower | Upper |
| Cons.                           | -0.27        |        |                       |       | 0.07 |                       |       |       |
| <i>Indicator Variable</i>       |              |        |                       |       |      |                       |       |       |
| Gender                          | Female (0)   | 2.5    | 0.96                  | 1.45  |      |                       |       |       |
| Ref.                            | Male (1)     |        |                       |       |      |                       |       |       |
| <i>Finances and Persistence</i> |              |        |                       |       |      |                       |       |       |
| Money from parents/ partner     | No (0)       | 0.055  | 0.23                  | 1.32  |      |                       |       |       |
| Ref.                            | Yes (1)      |        |                       |       |      |                       |       |       |
| Personal savings                | No (0)       | -0.04  | 0.15                  | 1.18  |      |                       |       |       |
| Ref.                            | Yes (1)      |        |                       |       |      |                       |       |       |
| Government loan                 | No (0)       | 0.017  | 0.02                  | 1.28  |      |                       |       |       |
| Ref.                            | Yes (1)      |        |                       |       |      |                       |       |       |
| Bank loan/line of credit**      | No (0)       | 0.457  | 8.84                  | 1.17  | 2.14 | 8.27                  | 1.15  | 2.08  |
| Ref.                            | Yes (1)      |        |                       |       |      |                       |       |       |
| Parent/family loan              | No (0)       | -0.085 | 0.08                  | 1.64  |      |                       |       |       |
| Ref.                            | Yes (1)      |        |                       |       |      |                       |       |       |
| <i>Social system and habits</i> |              |        |                       |       |      |                       |       |       |
| Skills                          | Agree (0)    | -0.065 | 0.19                  | 1.26  |      |                       |       |       |
| Ref.                            | Disagree (1) |        |                       |       |      |                       |       |       |
| Right decision**                | Agree (0)    | 1.27   | 132.91                | 2.87  | 4.42 | 140.02                | 2.88  | 4.37  |
| Ref.                            | Disagree (1) |        |                       |       |      |                       |       |       |
| Friends                         | Agree (0)    | 0.24   | 2.08                  | 0.92  | 1.76 |                       |       |       |
| Ref.                            | Disagree (1) |        |                       |       |      |                       |       |       |
| Moved out**                     | No (0)       | 0.466  | 14.89                 | 1.26  | 2.02 | 14.21                 | 1.24  | 1.96  |
| Ref.                            | Yes (1)      |        |                       |       |      |                       |       |       |
| Dropping out**                  | Yes (0)      | -0.9   | 70.06                 | 0.33  | 0.5  | 73.34                 | 0.33  | 0.50  |
| Ref.                            | No (1)       |        |                       |       |      |                       |       |       |
| Just a number**                 | No (0)       | 0.474  | 17.31                 | 1.28  | 2.01 | 19.30                 | 1.30  | 2.00  |

| Ref.  | Yes (1)     | Yes (1) | Yes (1) | Yes (1) | Yes (1) | Yes (1) | Yes (1) | Yes (1) | Yes (1) | Yes (1) |
|---|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| <b>Cognitive skills and academic system</b> |             |         |         |         |         |         |         |         |         |         |
| Less than 15 HW**                           | No (0)      | 0.273   | 5.52    | 1.05    | 1.65    | 0.32    | 7.79    | 1.10    | 1.72    |         |
| Ref.  | Yes (1)     |         |         |         |         |         |         |         |         |         |
| Cut/skip class                              | No (0)      | -0.021  | 0.02    | 0.74    | 1.3     |         |         |         |         |         |
| Ref.  | Yes (1)     |         |         |         |         |         |         |         |         |         |
| Workload **                                 | No (0)      | -0.31   | 4.77    | 0.56    | 0.97    | -0.33   | 5.93    | 0.55    | 0.94    |         |
| Ref.  | Yes (1)     |         |         |         |         |         |         |         |         |         |
| Missed deadlines**                          | No (0)      | 0.775   | 6.98    | 1.22    | 3.86    | 0.79    | 7.45    | 1.25    | 3.92    |         |
| Ref.  | Yes (1)     |         |         |         |         |         |         |         |         |         |
| Adjustment                                  | No (0)      | -0.183  | 1.73    | 0.63    | 1.09    |         |         |         |         |         |
| Ref.  | Yes (1)     |         |         |         |         |         |         |         |         |         |
| Rez   | Yes (0)     | 0.052   | 0.21    | 0.84    | 1.32    |         |         |         |         |         |
| Ref.  | No (1)      |         |         |         |         |         |         |         |         |         |
| Personal things                             | Agree (0)   | -0.05   | 0.13    | 0.73    | 1.24    |         |         |         |         |         |
| Ref.  | Disagree(1) |         |         |         |         |         |         |         |         |         |
| Class < 35                                  | Yes (0)     | -0.067  | 0.37    | 0.75    | 1.16    |         |         |         |         |         |
| Ref.  | No (1)      |         |         |         |         |         |         |         |         |         |
| Class > 75                                  | No (0)      | -0.256  | 2.6     | 0.57    | 1.06    |         |         |         |         |         |
| Ref.  | Yes (1)     |         |         |         |         |         |         |         |         |         |
| Teaching**                                  | No (0)      | -2.045  | 59.73   | 0.08    | 0.22    | -2.27   | 86.37   | 0.06    | 0.17    |         |
| Ref.  | Yes (1)     |         |         |         |         |         |         |         |         |         |
| Show interest                               | Yes (0)     | 0.395   | 1.84    | 0.84    | 2.62    |         |         |         |         |         |
| Ref.  | No (1)      |         |         |         |         |         |         |         |         |         |
| <b>University Categories</b>                |             |         |         |         |         |         |         |         |         |         |
| Undergraduate (1) **                        |             | -0.277  | 4.32    | 0.58    | 0.98    | -0.3    | 5.1     | 0.57    | 0.96    |         |
| Medical/ doctoral (3)                       |             | 0.221   | 2.82    | 0.96    | 1.62    | 0.23    | 3.17    | 0.98    | 1.63    |         |
| Not in Rankings (4)                         |             | -0.201  | 0.72    | 0.51    | 1.3     | -0.34   | 2.37    | 0.46    | 1.1     |         |
| Ref. comprehensive (2)                      |             |         |         |         |         |         |         |         |         |         |

\*\*Significant difference from reference category ( $p = 0.05$ )

### *Model One Results*

Included below are the variable name, coded value, and reference category for each of the independent variables. Model One includes all the variables while Model Two includes only those that were found to be significant.

Using the Hosmer and Lemeshow Goodness-of-Fit Test for logistic regressions, we concluded that with a p-value of 0.462 for Model One and 0.580 for Model Two, both models are a reasonably robust fit because the p-value is greater than 0.05. Additionally, we concluded that a significant amount of the variation of the dependent variable is explained by the model.

For Model One, we determined that 10 out of the 24 variables were significant. An examination of the four categories reveals *finances and persistence* has one significant variable, *social system and habits* has four significant variables, *cognitive skills and academic system* has four significant variables and *university categories* was significant with a difference in retention for primarily undergraduate universities from the reference category (comprehensive universities). Also, it should be noted that the gender indicator variable was not significant; therefore, there was no difference with regard to retention between female and male students.

### *Model Two Results*

Model Two is comprised of only the significant variables from Model One. After re-running the binomial logistic regression, we determined that all 10 variables were significant to the reference category. Therefore, the results of Model Two reported in Table 7 is the best possible model given our chosen variables.

## ANALYSIS AND IMPLICATIONS

### Finances and Persistence

In the majority of cases, *credit facility and bank loans* should only be used as a last resort by students since these financing options result in additional financial pressures due to their higher interest rates compared to those of student loans. This financial burden requires that the student compensate by allocating more hours for part-time employment to make the necessary interest payments. Thus students should be advised on the various aspects of financial management to better understand the cost implications of their decisions. This result seems to be concurrent with the finding of Hollomon (2003) who concluded that if a greater financial burden was placed on the student and his/her family, it resulted in a higher probability of attrition.

### *Social System and Habits:*

A sense of belonging and confidence is vital to retention. If students believe that the *right decision* has been made, doubts about their futures are removed from their learning environment. This seems to correspond with the aspect of having a good fit with one's department and institution (Dietsche, 1990).

**Table 7 – Explanation of Significant Variables and Effects**

| Variable  | Result   |
|---|--|
| Objective #1: Assess the significance of variables dealing with finances and persistence  |  |
| Bank loan/ line of credit   | Students who did not get a bank loan or a line of credit were “more likely” to continue at their university compared to students who did (reference category)  |
| Objective #2: Assess the impact of social systems and habits  |  |
| Right decision  | Students who found the right program for them were “more likely” to continue at their university compared to students who did not find the right program (reference category)  |
| Moved out   | Students who have not moved out permanently from their parents or family were “more likely” to continue at their university compared to the students who have moved out permanently from their parents or family (reference category)                          |
| Just a number   | Students who felt like they were NOT just a number to this school most and all of the time were “more likely” to continue at their university than students who felt like they were just a number to this school most and all of the time (reference category) |
| Dropping Out  | During any given month, students who thought about dropping out were “less likely” to continue at their university compared to those students who did not (reference category)   |
| Objective #3: Evaluate the effects of academic and cognitive habits   |  |
| Less than 15 HW   | Students who spent 15 or more hours on their homework or studying were “more likely” to continue at their university compared to students who spent less than 15 hours of doing homework or studying (reference category)                                      |
| Missed deadlines  | Students who did not miss deadlines for assigned work most or all of the time were “more likely” to continue at their university than the student who did miss deadlines (reference category).   |
| Workload  | Students who were not having trouble keeping up with the workload most or all of the time were “less likely” to continue at their university compared to student who were having trouble keeping up with their workload (reference category)                   |
| Teaching  | Students who did not have any instructors with strong teaching abilities were “less likely” to continue at their university compared to the students who did have instructors with strong teaching abilities (reference category)                              |
| Objective #4: Investigate if there is a significant retention rate difference among the institutional categories relating to size, program offerings and institutional complexity |  |
| University Categories   | Students in primarily undergraduate universities (1) were “less likely” to continue at their university compared to the students in a comprehensive university (2) (the reference category)  |

Students who have *not moved out* permanently from their home are more likely to stay in school. Therefore, those students having a home base can already count on a pre-set network of friends and family and are less affected by the social factors identified in Swail et al.’s (2003) model. This type of support provides

a social infrastructure that reduces the stress and, in some cases, responsibilities, meanwhile possibly providing aid with food, laundry and other tasks.

Overall, the administrative services at the university are the most difficult to decipher, causing many students to feel like “*Just a number.*” Many of the students may be easily frustrated by the bureaucracy and the balkanization among various departments. Students may be unprepared for the extremely large first-year classes that offer minimal interaction with the professor or teaching assistant, leaving them bewildered about the quality of their education as well as the financial return of their experience.

Students considering “*dropping out*” are usually having difficulties integrating into the academic and/or social systems. In addition, students who are unsure and do consider leaving their universities are not confident in their decisions to undertake their studies. These students may face various issues such as the following: financial issues, educational legacy, attitude towards learning, religious background, maturity, social coping skills, communication skills, attitude towards others, cultural values, expectations, goal commitment, family influence, peer influence, and social lifestyle (Swail et al., 2003).

### Cognitive Skills and Academic System

Study habits are a vital factor in increasing academic integration as well as academic performance. We identified the effects of student study habits with reference to study skills, learning skills, commitment and time management (Swail et al., 2003). These variables illustrate that if the student has a full load (five courses), he/she should spend at least one hour of homework for every hour in the classroom (Less than 15 HW). This would represent almost the base study requirements for each course. The results illustrate that studying for at least 15 hours (compared to studying less) should have a greater effect on a student’s GPA, thereby increasing his/her persistence. Upon further examination of this result, one could conclude that the lack of time spent on homework would be linked to *missed deadlines* for course assignments. Surprisingly, there is very little correlation between *less than 15 HW* and *missed deadlines*. A student who *missed deadlines* lacks maturity (social factor) and time management skills (cognitive factor) (Swail et al., 2003).

The *workload* variable result was unexpected. The authors believed it could be affected by the various factors relating to the student’s need to belong in a social network that enhances social integration. Perhaps some students do not wish to admit failings and/or are not willing to acknowledge difficulties with their subject matter for fear of losing their social standing. In the first year of university, a sense of belonging needs to be satisfied to enhance their experience (Elliott, 2002). Another possible factor related to the workload is boredom or lack of motivation or self-efficacy causing students to abandon their studies.

Teaching and the dissemination of subject matter continues to be the front line service for the university. In the United Kingdom, the government has created the Teaching Quality Assessment which is conducted by the Quality As-

insurance Agency to evaluate teaching. A Canadian example is the University of British Columbia's Centre of Excellence, Teaching and Academic Growth (TAG). The centre aims to improve teaching skills, offer resources to its faculty and a certificate of completion for its program (<http://www.tag.ubc.ca/>) is provided. This variable is part of the academic system of Tinto's (1993) model and the institutional factors (Swail et al., 2003), all affecting the integration and the achievement of the student. In summary, our results support literature emphasizing the importance of teaching and further recommend that other universities incorporate the TAG model.

### University Categories

It was generally expected that primary undergraduate institutions would have a greater success in retaining students on the basis of closer interaction between students and teachers. Surprisingly, this belief was proven false, with the mid-size university (comprehensive) performing better at retaining its students. This result is on an aggregate scale, not allowing for individual differentiation between the various institutions within each category.

### CONCLUSION

Overall, there is no question that the first year is a daunting challenge for many students. They find themselves registered in large general courses which are part of "basic" requirements for their degree programs. Oft-times students have commented that they truly became interested in their specialty only in second and third year. In recent years, many institutions have recognized first-year difficulties and have created institutionalized support services mandated to lessen the social, emotional and academic strains experienced by students. Universities have come to understand that hopes for higher retention rates are reliant on the concerted efforts between academic and administrative units, as well as on individual faculty members and institutional leaders.

We trust these findings will assist the various stakeholders, such as government, universities, high schools, parents, students and professional partners of Canada's university sector to better manage the first university experience, particularly for higher-risk students. As noted by Belanger, Mount and Wilson (2002), "happy students are propagators of good news. Unhappy students have a propensity to drop out and to affect institutional image and finances negatively" (p.228). A better managed first university experience brings dividends such as a better perception of the institution, higher student propensity to maintain his/her continuity in the academic cycle, and more alumni funding to all stakeholders. Levitz, Noel and Richter (1999) explain that student retention is the only indicator that encompasses a student's success and satisfaction. Our analysis deals with the first-year experience of 18-20-year-old students and provides some interesting results on the effects of certain variables on retention and on the first-year student's satisfaction in the academic and social



environments; however, these findings should not be generalized to include part-time and older students. If our institutional leaders and faculty members accept the challenge to further reduce attrition and truly endorse student retention as being a primary strategic issue, it would prove beneficial to Canada's future competitiveness. These new policies "must be carefully timed to meet the changing situations and needs of students as they attempt to progress along the path to college completion" (Tinto, 1988, p. 451). With economic development, innovation and ingenuity becoming the new reality of higher education, our postsecondary system must be prepared to respond to various new skill sets required by our knowledge or technological economy, for these areas are touted as being the future of our competitiveness at the global level. ♣

### NOTES

- 1 In this study, knowledge workers are categorized in the following groups: pure science, applied science, computer science, engineering and social science and humanities.

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