

# An Analysis of CAAT Transfer Students' Academic Performance at Trent University

August 2012

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## Executive Summary

- As Ontario's transfer credit agenda moves forward, more empirical evidence is required on the performance of college students transferring to university programs.
- Over the past several years, approximately 15 percent of incoming students at Trent University came from Colleges of Applied Arts and Technology (CAATs). This report provides an assessment of their performance at Trent in order to inform the larger debate about college transfers. The data refer to entrants from 2007-08 through 2011-12.
- In 2006-07, only 29 percent of Ontario CAAT graduates who went on to pursue university studies received less transfer credit than they expected. About 84 percent were either satisfied or very satisfied with the preparation for university they received in their college program.
- In 2006, Nipissing University found that CAAT entrants withdrew from studies at a higher rate (37%) than direct entry high school students (23.1%) but there was little difference between their grade point averages.
- York University also found that recent drop-out rates were higher for CAAT entrants (35.2% compared to 23.9% in 2004) but did not examine GPAs.
- At Brock University, CAAT entrants were no less likely to withdraw from 2008-09 introductory courses or to receive failing grades in the first term.
- From the academic year 2007-08 through 2011-12, Trent admitted 1,428 CAAT students, 5,499 high school entrants, 1,215 students from other universities and 1,242 others. Of the CAAT students, 103 were admitted from the Fleming College University Transfer Program designed to prepare students for university studies and a further 275 were admitted through another of the almost 50 articulation agreements Trent has with colleges.
- CAAT entrants to Trent are less likely to take Arts programs (48%) than high school entrants (58.1%) and more likely to take Science programs (28.3% compared to 23.1%).
- Almost 34 percent of CAAT students at Trent received no transfer credits, 42% received between 0.5 and 5.0 credits. Almost 15 percent received 10 credits, which represents one-half of the normal requirement for an Honours degree at Trent.
- CAAT entrants were more likely to be male than high school entrants, were appreciably older and slightly more likely to be first generation students.
- Average grades at Trent among CAAT students entering through articulation agreements were, on average, considerably higher than those of high school entrants (74.1% compared to 67.2%). CAAT transfers outside these agreements also achieved higher average grades (69.6%) but those from the Fleming University Transfer Program (UTP) were slightly lower (66.2%).
- When multivariate analysis is used to control for observable differences between groups that might be correlated with grades, CAAT articulation agreement

entrants continued to enjoy a substantial advantage over high school entrants (5.8 percentage points). Differences between high school entrants and either Fleming UTP entrants or non-articulation agreement entrants were not statistically significant.

- The drop-out rates for CAAT entrants who entered Trent outside of an articulation agreement or who have come from Fleming College's UTP were not statistically different from that of high school entrants. The drop-out rates for CAAT entrants coming to Trent through an articulation agreement were substantially lower than the overall average for high school entrants, a finding largely explained by their advanced level of study upon arrival.
- Before the results of this analysis can be used to predict the consequences of greater mobility from colleges to universities in Ontario, better data is required to determine whether the performance of CAAT students who did come to Trent can be extrapolated to those who did not.

Funding from the College-University Consortium Council is gratefully acknowledged. All opinions expressed in this report are those of the authors and are not necessarily shared by the CUCC.

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## I. Introduction

One of the challenges in moving forward Ontario's transfer credit agenda is the lack of empirical evidence to support anecdotal claims regarding community college transfer students' performance in university programs. At Trent University, a number of small, informal tracking studies in the past have focused on specific articulation agreements. These studies have demonstrated that students entering Trent through the articulation agreements are performing as well as direct entry students in the specific programs studied. This report represents a more extensive analysis of college transfer student performance at Trent University, inclusive of students entering through both articulated and non-articulated pathways. Given that students transferring from an Ontario community college make up approximately 15% of incoming students at Trent in a given year, we have a sufficiently large population of transfer students to produce a meaningful study.

The specific research questions addressed in the report are:

- Do college transfer students perform better than, worse than, or equal to direct entry students at Trent University?
- Do college transfer students entering through an articulation agreement perform better than college transfer students entering outside of an articulation agreement?
- Do graduates of the Fleming College University Transfer Program (UTP) perform as well as students entering directly from high school?
- Do community college grades predict success in university?
- Do graduation rates and degree completion timelines vary between college transfer students and direct entry students?

## II. Literature Review

Canadian evidence on student mobility between colleges and universities and the subsequent academic success of students who have moved is extremely limited.<sup>1</sup> There are, however, several research reports that may provide context and comparison for our results.

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<sup>1</sup>. There is a body of American literature on mobility within post-secondary sectors. See, for example, Nutting (2011), Long and Kurlaender (2008), and the National Student Clearinghouse Research Center (2012). In the American PSE system, however, two-year colleges have a mandated and critical transfer function purpose and lessons from the U.S. literature have limited relevance to the Ontario system.

We can develop some sense of the extent of movement from colleges to universities from the results of Decock et al. (2011). The Graduate Satisfaction Survey (GSS) is administered annually to graduates of Ontario colleges as part of the province's Key Performance Indicators process. It was augmented in 2006-07 to include questions about reasons for pursuing further education, the amount of transfer credit received, satisfaction with the credit transfer process, and so on. Since the GSS is administered only 6 months after graduation, it will not capture transitions that take longer than that. Also, it only surveys graduates and will therefore exclude those who leave college without graduating. Nevertheless, some of the results are enlightening. Among 2006-07 college graduates in Ontario, 8 percent were pursuing university studies (either full-time or part-time) 6 months later. Another 17 percent were pursuing further college studies. Those attending university were asked "Relative to what you expected, the amount of credit you received was ...". 58% said "the same" while another 14% said "more". 29% received less credit than they expected.

Decock et al. examined the data to determine the types of students (gender, age, college program, etc.) most likely to continue on to universities after college. They report (p. 34):

- *the largest percentage of students pursuing further education are under 22, began at small colleges in certificate preparatory/upgrading programs, and are enrolled full-time;*
- *graduates from metro Toronto colleges were more likely to enrol in a university degree program while graduates from the northern region were more likely to enrol in a college non-degree program;*
- *the combination of one and two year general arts and science programs constituted the highest number of college graduates attending university. The combination of business administration programs was second, and early childhood education was third;*
- *college graduates primarily attend university within the same region as the college from which they completed their studies.*

Survey respondents continuing their studies were also asked to rate their level of satisfaction with the academic preparation for their current program in order to assess whether students perceive a gap between their college academic preparation and the needs in their new program. Among college graduates continuing studies in university degree programs, 35 percent were very satisfied with their preparation and a further 49 percent were satisfied. The overall satisfaction level rises to 91 percent for graduates of preparatory programs.

The extent of mobility between colleges and universities estimated by Decock et al. is consistent with that found by Martinello (2008) who used the first 3 cycles of the Youth in Transition Survey for Cohort B to look at student transitions between programs and

PSE sectors. The YITS-B cohort is a nationally representative sample of individuals who were 18 to 20 years old at December 31, 1999 and have been re-interviewed every 2 years, with the last interview taking place at the end of 2007 (Cycle 5). The YITS tracks very detailed information on programs of study for those attending PSE and this program roster can be used to examine individuals moving between colleges and universities. Among students whose first known program was at the Bachelor's level, approximately 12% wound up in a college program by the end of Cycle 3. This includes both those who graduated from the Bachelor's program and those who proceeded to a college program without receiving the Bachelor's degree. A similar proportion of YITS-B respondents whose first program was at the college level found their way into Bachelor's programs in a university.

Information on how well college students do once they arrive at universities is more limited and available only for selected institutions. Nipissing University examined the academic success of CAAT transfers registering at Nipissing over the period 1996 to 2006 (CUCC, 2007a). Three primary measures of academic success were used: completion of a degree versus withdrawal from the university, the number of failed credits as a percentage of credits attempted, and the student's overall GPA. CAAT students were found to withdraw at a significantly higher rate (37.1 percent) compared to direct entry high school students (23.1 percent). Although CAAT students had a higher failure rate for credits attempted (5.8 percent for CAAT students, 4.0 percent for high school students), there was little difference between the overall Nipissing GPAs of these groups.

York University (CUCC, 2007b) examined CAAT transfers over the same period, 1996 to 2006, a time period that saw CAAT transfers grow from 8.7 percent to 13.8 percent of all York University annual admissions. Drop-out rates for CAAT students fell significantly over the period, perhaps reflecting the growth in university-college collaborations that better prepare CAAT students for the transition to York. For example, the drop-out rate measured three years after entry fell from 45 percent in 1996 to 35.2 percent in 2004. Although falling, these drop-out rates remain substantially higher than the rates among direct entry high school students, where the corresponding rates were 28.7 percent and 23.9 percent, respectively. Similarly, although graduation rates among CAAT students rose over the period, they remained lower when compared to direct entry high school students. The 6 year graduation rate (i.e., the percentage who had graduated 6 years after entering) was 47.9 percent for CAAT students when measured in 2001 but 65.7 percent for direct entry high school students. The York study did not examine academic achievement as measured by grade point averages.

Brock University (Stewart, 2012) analyzed course withdrawals from and grades in 2008-09 full-year introductory courses. Community college transfer students were found to achieve the same final course grades and were no more likely to withdraw from their courses or receive a failing grade in the first term when compared to students entering from high school.

### III. A Profile of New Registrants

To provide context for the analysis of academic performance to follow, we first provide an overview of the students used in that analysis.

#### III.I Admissions Rules for CAAT Transfers

Trent's general admissions standard for CAAT students requires that they have completed at least one year in a Canadian community college or Ontario CAAT with a cumulative average of at least 65 percent. However, to be eligible for transfer credit consideration, the applicant must have achieved a minimum cumulative average of 70 percent. Outside of articulation agreements that specify blocks of credit transfers, college applicants are considered for transfer credits on a course-by-course basis. Generally, graduates of a "highly academic" two-year college program can expect to receive up to 5.0 transfer credits and graduates of three-year programs can expect to receive up to 7.5 credits. Twenty credits are required for a Trent honours degree.

Trent has over 50 articulation agreements and memoranda of understanding with community colleges that specify required grades, transfer credits to be awarded, and degree completion requirements. Eligibility for transfer credit through these agreements typically requires a minimum diploma average of 75 percent. The university performance of students entering Trent through one of these agreements is of particular interest in this report. Trent and Sir Sandford Fleming College have collaborated in establishing a General Arts and Science – University Transfer program at the College. This program attracts students who have not previously considered themselves to have the potential for successful universities studies; who may have had previous unsuccessful post-secondary attempts; and those who do not meet the academic requirements for direct entry to university. Trent grants four first year credits in English, Philosophy, Psychology, and Sociology to graduates of the program who achieve an overall average of 70 percent with no individual grade of less than 65 percent in their Literature, Philosophy, Psychology and Sociology courses.

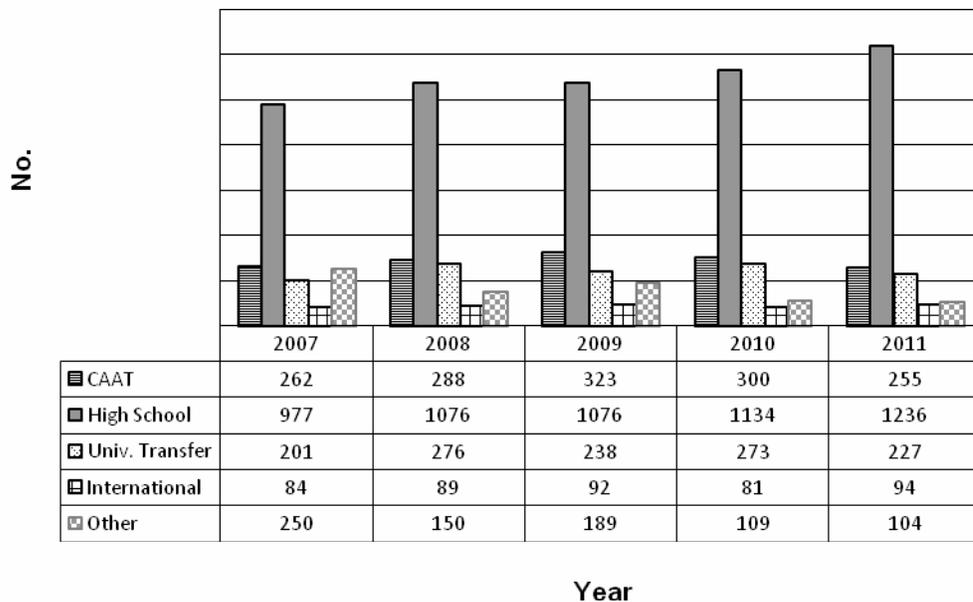
Some caution is required if the experience of college transfer students to Trent is to be used to inform the debate about increasing the number of college students transferring to universities. If the admissions rules in place at Trent have resulted in allowing only the most academically inclined college students to enter the university, the following results cannot be generalized to the rest of the college student population. Without data on both college movers and stayers, we cannot determine the extent of this possible "selectivity bias" in our results. We can say, however, that the college grades

of those students admitted to Trent are, on average, almost identical to the grades of all applicants. In other words, there appears to be no cherry-picking of the applications.

### III.2 How Many?

Figure 1 reports the sample sizes, years, and registration categories to be used in the analysis to follow. Data are available on students applying to and registering at Trent in the academic years 2007/08 to 2011/12, inclusive. The primary group of interest is, of course, students who came to Trent from CAATs as new undergraduate students and we have no fewer than 241 observations in any year, allowing for fairly reliable and detailed analysis. The two comparator groups are students who had no prior post-secondary experience (high school students) and students transferring to Trent from other universities. Note that the high school group includes direct entry and delayed entry students from Ontario high schools as well as students from other Canadian high schools. International students are included in the analysis, although comparisons between them and CAAT transfers may not be particularly informative. “Other” students are comprised of Trent students whose registration has been reactivated or who have been readmitted to Trent. We have excluded graduate and diploma students as well as those taking courses at Trent on letters of permission.

**Figure 1 - New Registrants at Trent University**



### III.3 How Many Came Through Articulation Agreements?

Trent has over 50 Articulation Agreements and Memoranda of Understanding with Ontario CAATs. The number of CAAT transfers entering Trent through these agreements is reported in Table 1, as is the number of these transfers who entered after the SSFC University Transfer program. Since these students arrived at Trent through initiatives undertaken to facilitate the transfer process, their performance will be of particular interest.

Table 1 CAAT Transfers through Articulation or University Transfer Programs

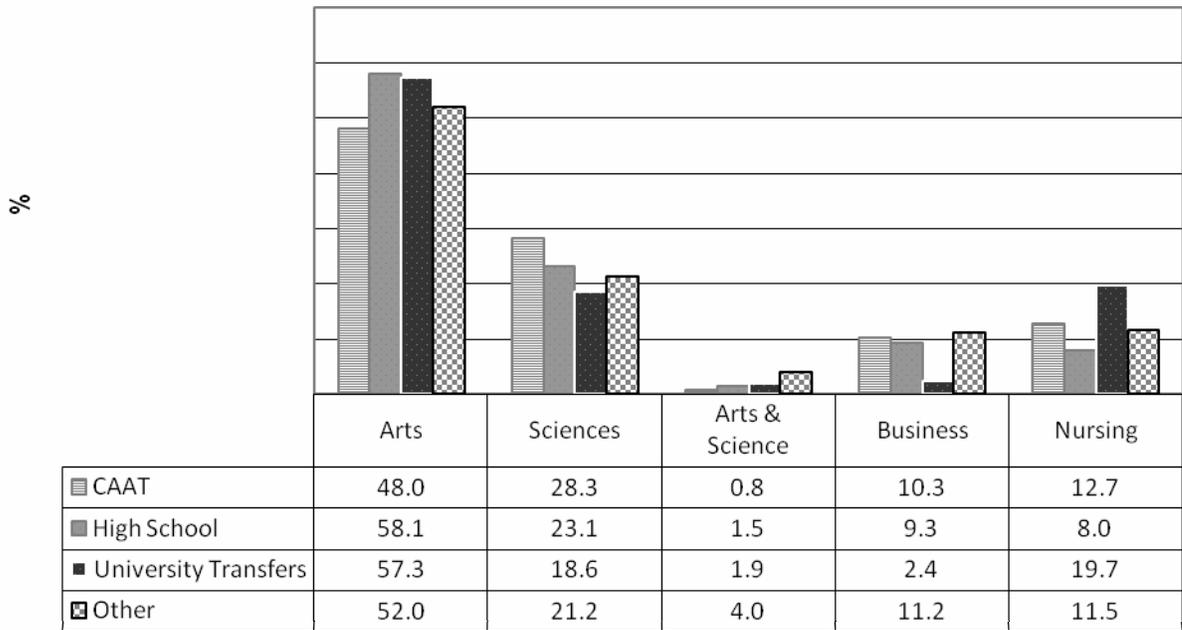
	2007	2008	2009	2010	2011
Articulation	n/a	68	62	83	62
UTProgram	12	24	19	32	16
Total CAAT	262	288	323	273	255
Total CAAT as % of All Registrants	14.8%	15.3%	16.8%	15.8%	13.3%

### III.4 What Did They Take?

There are systematic differences in grades and retention across fields of study within any university. If CAAT transfers have patterns of enrolment across fields that are different than that of comparator groups, differences in academic achievement between the groups may be a spurious composition effect rather than an indicator of true differences in academic ability. As shown in Figure 2, 48 percent of CAAT transfer students registered in Arts programs, compared to 58 percent of high school entrants and 57 percent of transfer students from other universities.<sup>2</sup> They were more likely than high school students to pursue studies in the sciences. This finding is not surprising, given that the majority of Trent University's articulation agreements provide pathways between high affinity science and business programs.

<sup>2</sup>. The program of study used in Figure 2 is the program initially taken by the individual upon entry to Trent. Definitions of programs are provided in Appendix 1. Registrants in Bachelor of Education are excluded from the analysis since the program represents a second entry program.

**Figure 2 FIELDS OF STUDY**



### III.5 How Many Transfer Credits?

An important reason for examining the performance of transfer students from CAATs to universities is addressing the question of whether their background preparation at a college is adequate for university level studies. In short, are college courses adequate substitutes for introductory university courses? This question is only interesting, however, if CAAT transfer students enter universities at an advanced stage. Tables 2 and 3 explore how far along CAAT transfers are upon entry to Trent. A full third of CAAT students transferring to Trent received no credits for courses taken at college.<sup>3</sup> A large proportion of this group includes students who have entered Trent through preparatory programs in CAATs such as the Health Prep program which is recognized as equivalent to meeting high school entrance requirements for admission to the B.Sc.N. As an upgrading program, it is not eligible for transfer credit consideration. Further, prior to January 2011, Trent’s transfer credit policy required applicants to have completed two years at a CAAT in order to be eligible for transfer credits. This policy was changed in January 2011, making students eligible for transfer credit consideration with one year of college. Of the two thirds of students who received transfer credits, a quarter of them received more than the equivalent of one year of full-time studies and almost 15 percent received 10 credits, the maximum number that Trent accepts.

<sup>3</sup>. At Trent, 10 credits represent a full-time load for two academic years.

**Table 2 Credits Transferred by CAAT Registrants  
(All registration years pooled)**

Number of Credits Transferred	Proportion of Registrants
0	33.8%
0.5 – 5.0	42.2
5.5 – 9.5	9.4
10	14.7
<b>Total Registrants</b>	<b>1,428</b>

Table 3 reports the average level of studies in the first year at Trent by registrant type. The average level is determined as follows. First level courses (i.e., 1000 level) receive a weight of 1, second level courses a weight of 2, and so on. For each student, the average level is simply the credit weight average of these values. A student taking 5 full-year equivalents of 1000 courses would have an average level of 1. A student taking 3 1000 courses and 2 2000 courses would have an average of  $(3 + 4)/5 = 1.4$ . According to Table 3, and as expected, almost all students entering from high school carry only 1000 level courses. CAAT transfer students also tend to begin their studies at Trent in what would conventionally be described as first year, although the average level has been increasing significantly over the five years of data. But even in 2011, an average level of 1.5 represents an equal weighting of 1000 and 2000 level courses in the first year of studies at Trent. It must be noted, however, that many CAAT transfer students, particularly those entering through an articulation agreement, had proceeded well into the upper year courses of their majors. The low values in Table 3 may reflect lower level courses outside the major needed to meet breadth requirements in their programs of study.

**Table 3 Level of Courses in Initial Year**

	2007	2008	2009	2010	2011
CAAT	1.27	1.37	1.46	1.43	1.49
High School	1.02	1.02	1.03	1.02	1.02
University Transfers	1.60	1.79	1.57	1.69	1.60

### III.6 What Did They Look Like?

Information on the personal characteristics of registrants is limited to age, gender, and self-reported “first generation” status (i.e., having parents without post-secondary education). Given that these characteristics are correlates of academic performance it is important to understand differences in these characteristics between CAAT

registrants and the students to which they will be compared below. Table 4 shows very pronounced differences in the age structures of the various categories of registrants. High school registrants fit the stereotype with an average age of less than 18 years with little variation within the group. A standard deviation of 1.4 implies that approximately 68% of individuals in this group will be between 16.2 and 19.0 years of age. CAAT registrants were, on average, much older and showed considerably more variability in their ages. Medians may provide a more accurate measure of central tendency given the skewedness of the age distributions but, while the differences between the registrant types are somewhat muted, they remain large. CAAT registrants were closer to students entering from other universities in terms of age than they were to direct high school entrants. They were also less likely to be female than all other groups except international students and the most likely to be first generation students.

**Table 4: Age and Gender Comparisons**

Type of Registrant	Age			Gender	First- Generation
	Mean	Std. Dev.	Median	% Female	%
CAAT	22.9	5.9	21	60.4%	4.8
High School	17.6	1.4	17	63.2	3.4
University Transfer	23.6	6.8	22	68.7	4.6
International	20.0	5.2	18	57.3	0.5
Continuing	26.0	8.3	23	68.7	1.0
Other	28.0	10.1	25	69.2	1.5

Descriptive statistics refer to pooled data from all entry cohorts.

## IV. Academic Performance

### IV.1 Grades

The most direct and obvious measure of academic performance is the grade point average achieved by a student. Our data include end of year grades for all registrants, averaged over the courses taken that year (as opposed to cumulative averages). For each individual, these term grades are averaged over the years in which the student is observed at Trent, with the results reported in Table 5.<sup>4</sup>

<sup>4</sup>. Results for international students and other entry types are not of particular interest and therefore are not reported in the table.

CAAT non-articulation transfer students outperformed those entering Trent from high school but achieved lower grade averages than students transferring from other universities. College students entering through articulation agreements achieved the highest mean term averages over their tenure at Trent, with very significant gains over direct high school entrants.<sup>5</sup> CAAT transfers from the University Transfer program achieved grade averages one percentage point below the high school mean.

**Table 5 Term Averages**

Registrant Type	Average
CAAT Transfer – Non-articulation	69.6
CAAT Transfer – Articulation	74.1
CAAT Transfer – Univ. Transfer Prog.	66.2
High School	67.2
University Transfer	72.6

The results of Table 5 provide assurances that college students admitted to Trent have largely met or exceeded the grade performance of other students. If broader lessons are to be drawn from these results, however, the analysis must be extended to try to understand the differences in Table 5. We know, for example, that CAAT transfer students tended to be older, were more likely to be male, had different enrolment patterns at Trent, and were more likely to be first generation students. In principle, it is possible that the differences reported in Table 5 result from these factors and have nothing to do with a CAAT background (except, of course, for the fact that this background creates these patterns). To disentangle the true “CAAT effect”, we use multivariate regression which essentially controls for these factors and allows the following kind of hypothetical comparison: what was the average grade difference between CAAT transfers and high school entrants who were the same age, gender, first generation status, and in the same program mix at Trent?

Unfortunately, we do not have the data required to resolve two questions of critical importance to the debate around expanding the transfer of CAAT students to universities:

- to what extent can the performance of CAAT transfers to Trent, relative to other students, be apportioned between innate academic ability and the suitability of college preparation for university studies (the nature vs. nurture issue), and
- are those CAAT students who actually transferred to Trent representative of the students who would be encouraged to transfer in that expansion (the selectivity

<sup>5</sup>. CAAT transfers through the University Transfer Program have been excluded from this group.

issue). Logic would suggest that CAAT transfers to Trent are those who stood to gain the most and their academic success would be an upward biased estimate of the success of those left behind.

Table 6 reports the results of the multivariate regression model used to control for differences between the registrant groups that are correlated with both the type of registrant and with academic success<sup>6</sup>. The first model contains no controls and the coefficient estimates are simply differences in the raw means of grades between each reported group and high school registrants.<sup>7</sup> I.e., the results of Table 5 are reproduced by the regression, although now formal significance testing is provided. With the exception of the University Transfer program students, all differences between high school entrants and others are significant.

The second model (in column 2) adds the demographic variables available in the data (age, gender and first generation status). CAAT registrants entering Trent outside articulation agreements now have only a small grade advantage over high school students. As reported above, CAAT students were considerably older, on average, than high school entrants. Age is also a positive correlate of grade performance. The observed grade difference between this group and high school entrants may thus have more to do with their age than their origin. Other outcomes remain the same in this model, including the finding that the difference between University Transfer Program students from Fleming College and high school entrants is statistically insignificant.

**Table 6 Multivariate Estimates of Mean Difference in Grade  
(compared to High School Entrants)**

	No controls	Controls for Demographics	Controls for Program and Demographics
CAAT – Non-Articulation	2.39*	1.07*	0.65
CAAT – Articulation	6.74*	6.18*	5.80*
CAAT – Univ. Transfer Prog.	-1.59	-1.81	-1.63
University Transfers	5.39*	3.74*	3.36*

\* indicates significance at the 5% level

The third model adds additional controls for program and level of study and shows no significant difference between non-agreement CAAT transfers and high school entrants. The grade advantages of CAAT students transferring into Trent through an articulation agreement or from other universities are somewhat reduced but remain statistically

<sup>6</sup>. The methodology and full regression results are reported in Appendix 2.

<sup>7</sup>. Small differences in the outcomes are the result of the regression model dropping some observations with incomplete information on the covariates.

significant. Students from the University Transfer program are now estimated to have grades 1.6 percentage points lower than those of high school entrants, although this estimate is once again insignificant.

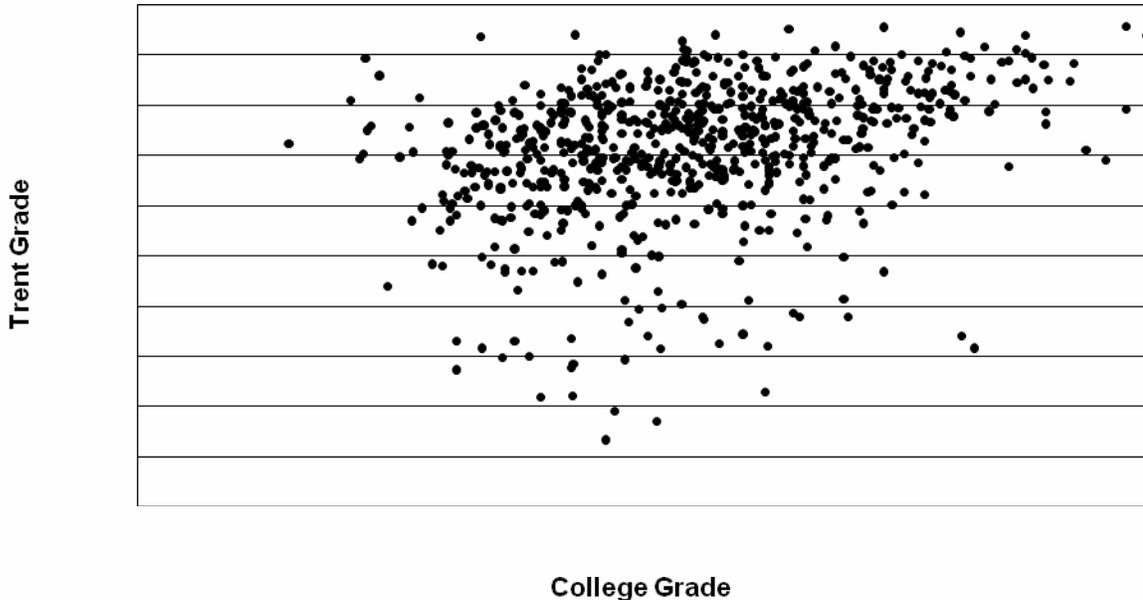
Although the regression results for other factors are not of direct interest to this report, it is interesting to note some of the outcomes. According to the third model, mean grades of female students are over three percentage points higher than males, everything else the same. This result is not surprising. The finding that mean grades for first generation students are more than three percentage points lower than non-first generation students is perhaps more interesting, given the scarcity of research on the issue in Canada. The American literature tends to find lower grade point averages among first generation students who do access postsecondary education<sup>8</sup>. Using Canadian data, Finnie et al. (2010) find that first-generation students in university have mean grades about 1.5 percentage points lower than other students.

The analysis so far (including the regression results) has only considered grade performance at the level of means. It is of interest to examine the variability of grades to determine whether the grades achieved by CAAT students in their college programs have any power to predict Trent grade performance. Our data is somewhat restricted in this analysis by allowing observation on college grades only for those students registering at Trent in 2010 and 2011. We therefore restrict the analysis to the predictive power of college grades of CAAT students first registering at Trent in 2010 or 2011 to explain the grades they achieved in those years. The scattergram of Trent grades mapped against college averages in Figure 3 provides a visual sense of the correlation between the two sets of grades. Each point represents a CAAT transfer to Trent, with the individual's final college grade measured along the horizontal axis and his or her 2010 or 2011 overall Trent average measured along the vertical axis. Whereas there does appear to be some degree of correlation between the two, the strength of the relationship is quite weak. The coefficient of determination in a regression of Trent grades against college grades is only 0.09, indicating that 9 percent of the variation in the former can be explained by variation in the latter.

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<sup>8</sup>. See, for example, Chen and Carroll (2005) for recent estimates.

Figure 3 College Grade vs Trent Grade



#### IV.2 Progress Toward Degree Completion

The second metric for assessing the academic success of CAAT transfers to Trent is their progress toward degree completion. Table 7 reports descriptive statistics on the status of CAAT transfers at the end of the 2010/11 academic year. Graduation status is coded in the student records data but the other statuses are inferred. Continuers are students who had not graduated by the end of 2010/11 and who registered again at Trent in the 2011/12 academic year. Dropping out status is assigned to students who had not graduated by the end of 2011/12 and did not register again at Trent in the following year. Note that “Dropped Out” should more rigorously be defined as dropping out of Trent, since these students may have moved to another institution and not dropped out of post-secondary education.

Table 7 Outcomes at April 2011 for CAAT Transfers

Entering Cohort	Graduated	Continuing	Dropped Out
2007 (4 years)	51.2%	13.0%	35.9%
2008 (3 years)	31.6	33.0	35.4
2009 (2 years)	16.7	54.5	28.8
2010 (1 year)	0.3	78.3	21.3

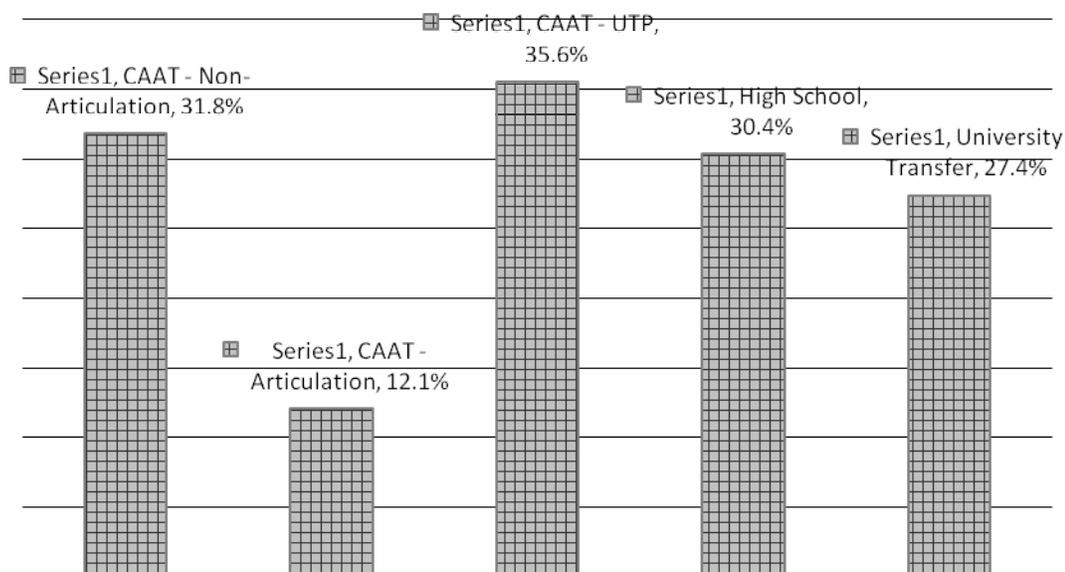
The proportion of CAAT transfers who graduated by the end of 2011/12 naturally declines with later cohorts who obviously have had less time to complete their studies. Similarly, the proportion who continued in their studies at Trent beyond 2011/12 shows a corresponding increase. Determining whether these values are “good” or “bad” is problematic. As with grades, we could compare graduation and continuation rates with those of direct high school entrants and or students transferring from other universities, but the patterns displayed by high school entrants may not be an appropriate benchmark, for two reasons. First, given the significant differences in age, high school entrants and college transfer students may well have different pathways through Trent that are both optimal. For example, it might be that CAAT transfers are more likely to pursue part-time studies due to family responsibilities. Longer times to graduation would then reflect choices rather than academic abilities. Second, the majority of CAAT transfers begin their studies at Trent with some transfer credits and are, therefore, already ahead of the game compared to high school entrants within their entering cohort.<sup>9</sup> Indeed, the graduation rate by 2011 for direct high school entrants in the 2007 cohort was 37.2 percent, considerably lower than that for CAAT transfers. Clearly, this is not evidence that high school entrants have a lower probability of eventually completing their studies successfully. They simply begin with fewer university level credits. In the literature, graduation rates are typically calculated using a six year window in order to capture the true, eventual graduation probabilities of undergraduates. Our data do not allow this calculation and we do not analyze graduation rates.

It is clear, however, that dropping out is a poor outcome for any student and a higher rate by type of applicant cannot be justified in the same way that the pace of studies might. Drop-out rates for CAAT transfers, high school entrants and university transfer students are provided in Figure 4. Note that these are calculated by pooling all entering cohorts. CAAT entrants who do not come through an articulation agreement had a marginally higher drop-out rate compared to high school entrants. The difference is more substantial for students coming through the University Transfer Program who had a drop-out rate 5 percentage points higher than high school entrants, although this difference becomes statistically insignificant when we control for program choice and demographics. Drop-out rates among CAAT articulation agreement entrants, on the other hand, are remarkably lower than those among any other group (a finding we explain below).

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<sup>9</sup>. The average number of transfer credits among all CAAT transfers is 3.5.

Figure 4: Drop-Out Status at April 2011



The unadjusted drop-out rate comparisons in Figure 4 are informative but do not provide statistical tests of differences and, importantly, fail to account for underlying differences between the types of entrants that may be correlated with drop-out decisions. CAAT transfer students tended to be older and less likely to be female compared to high school entrants and these differences may be causing some of the observed differences in drop-out rates. As before, we can control for observable differences using multivariate regression and Table 8 reports the results of a probit model of dropping out<sup>10</sup>. Cohort dummy variables used to control for the differing entrance cohorts and the estimated coefficients (as reported in Appendix 2) are interpreted as the marginal effect of the covariate on the probability of dropping out. Thus, in Table 8, the estimates for Model (1) suggest that, controlling for gender, age, first generation status, and program choice, the drop-out rate for CAAT students entering through articulation agreements was 18 percent below that of high school entrants. The rate for students coming from other universities is also lower, by 5 percent. There are no statistically significant differences between high school drop-out

<sup>10</sup>. A probit model is essentially a regression model that accounts for the fact that the dependent variable is coded as either 1 if the individual dropped out or 0 if the individual did not drop out. Full results are provided in Appendix 2.

rates and those of either CAAT students entering outside of articulation agreements or from the University Transfer Program at Fleming College.

**Table 8 Probit Estimates of Drop-out Probability  
(compared to High School Entrants)**

	Model (1) Controls for Program and Demographics	Model (2) Restricted to More Than 5 Accumulated Credits**
CAAT – Non-Articulation	-0.014	-0.007
CAAT – Articulation	-0.183*	-0.129*
CAAT – Univ. Transfer Prog.	-0.008	0.039
University Transfers	-0.051*	-0.054*

\* indicates significance at the 5% level

\*\* accumulated credits includes both transfer credits and those earned at Trent.

Full model results are reported in Appendix 2

Controlling for observable demographic differences in estimating drop-out rates is straightforward. There is, however, an additional difference between CAAT and high school entrants that is much more problematic from a statistical perspective. Because many CAAT transfers arrive with credits in hand and high school entrants do not, the former are, on average, further along in their progress toward degree completion. This means that the average CAAT transfer students have a shorter exposure to the risk of dropping out and, being closer to completion, have a different cost-benefit calculation for the decision to drop out. Thus, the drop-out probability cannot be expected to be constant as credits accumulate and some account should be taken of this in the comparison between the entrant types. The appropriate econometric methodology for handling the problem that drop-out probabilities depend on the stage of credit accumulation would be survival analysis (also known as duration analysis) but our data are not up to the task of producing robust estimates using those techniques. To provide a rough indication of what might be expected when accounting for differences in starting positions, the probit model was re-estimated using only those students who had gotten beyond the equivalent of an academic year of full-time study (i.e., dropping any observations where a drop-out occurred before the student proceeded beyond five credits). This has the effect of putting high school students on a more equal footing compared to the average CAAT entrant. The drop-out rate for CAAT articulation students is now closer to that of high school entrants, as is expected given that the latter exhibit declining drop-out rates through credit accumulation. Indeed, drop-out

rates estimated for high school students who have “survived” past 10 credits falls to 12.6 percent, close to the rate of 12.1 percent for articulation agreement entrants (who had, on average, 9.2 transfer credits accepted when they arrived at Trent). Drop-out rates among the other two CAAT categories remain statistically equivalent to that of high school entrants.

## V. Conclusion

Over the past five years, about 15 percent of all students first coming to Trent arrived from a community college. This report has not addressed the question of why these students chose to continue their studies at Trent, although for those entering through articulation agreements the motivation is fairly clear. The focus of the analysis has been on their academic performance at Trent, as captured by two primary metrics: grade averages and drop-out rates. We conclude that CAAT students who have come to Trent have performed at least as well as those entering from high schools. Their grades are as high as, and in the case of CAAT students entering through one of Trent’s articulation agreements, significantly higher than direct high school entrants. Drop-out rates among the latter group are also lower than those of high school entrants while the rates of CAAT entrants coming from outside of these agreements or from Fleming Colleges University Transfer Program are the same. The findings on grades are consistent with those at Nipissing University but our findings with respect to drop-out rates appear to conflict with those at Nipissing and York.

These results certainly provide support for Trent’s past efforts to build partnerships with and pathways from the college system. Before using them to propose a wholesale increase in the flow of students from CAATs to universities, however, additional research is required. Logic would suggest that those college students who did transfer to Trent are those who stood the most to gain from that decision. Extrapolating their academic success to those they left behind ignores the possibility of self-selection. Clearly, data on both college movers and stayers is required to resolve this question and provide a more reliable inference on the potential academic success of new college transfers.

As noted, our data did not include a sufficient number of cohorts to conduct analysis of graduation rates using the standard six year window from initial entry. A replication of this study in three or four years would permit such analysis.

Not every CAAT transfer to Trent did well and further research is also required to understand why some were successful and others not. For example, CAAT students entering Trent through articulation agreements were, on average, considerably more successful than other CAAT entrants. Is this attributable to a higher than average academic ability among these students, a better than average preparation in college

courses, better program design, or some combination of these factors? Answers to these questions are needed to fully understand what works and what does not work in the college transfer process.

## Appendix 1: Aggregated Fields of Study

### Fields of study

Aggregated Field	Specific Programs
Arts	Honours Arts, General Arts, Canadian Studies, Anthropology, Cultural Studies, Environmental and Resource Studies, Economics, English, French, Geography, History, International Development Studies, Indigenous Studies, International Political Economy, Hispanic Studies, Political Studies, Philosophy, Psychology, Sociology, Women's Studies, Native Studies
Sciences	Honours Sciences, General Sciences, Biology, Biochemistry, Chemistry, Computer Studies, Environmental and Resource Sciences, Forensics, Mathematics, Physics
Arts and Sciences	General Arts and Sciences, Honours Arts and Sciences
Business	Business Administration
Nursing	Bachelor of Science - Nursing

## Appendix 2: Multivariate Analysis of Grades

Consider a regression model in which term averages are regressed against a set of five binary indicator variables:

- CAAT = 1 if the term average is for a CAAT transfer student, = 0 otherwise;
- UT = 1 if the average is for a university transfer student, = 0 otherwise;
- INTL = 1 if the average is for an international student, = 0 otherwise;
- CONT = 1 if the average is for a continuing Trent student, = 0 otherwise; and,
- OTHER = 1 if the average is for any other student except high school, = 0 otherwise.

In the following regression equation:

$$AVG = \beta_0 + \beta_1CAAT + \beta_2UT + \beta_3INTL + \beta_4CONT + \beta_5OTHER$$

the coefficient estimates are then interpreted as follows:

- for high school entrants, all right hand side variables equal zero, leaving  $E(AVG) = \beta_0$ . Thus, the intercept (or constant) is the expected, or mean, term average for high school entrants.
- for CAAT transfers, CAAT = 1 and  $E(AVG) = \beta_0 + \beta_1$ . The coefficient on CAAT then estimates the difference between the mean term averages of high school entrants and of CAAT transfers.
- similar interpretations apply to the remaining explanatory binary variables.

The regression results for this model are reported in column (1) of Table A1.

What is gained by this methodology? First, the regression technique produces significance tests for differences between the term averages of the different categories of registrants. The values in parentheses below the estimated coefficients in Table A1 are  $t$  values. The rule of thumb is that the  $t$  statistics must be more than 2 units away from 0 before accepting the coefficient estimate as being significantly different from 0. The  $t$  statistic on the non-articulation agreement CAAT estimate is 5.86 so that we can say that term averages of these students are statistically different from those of high school entrants. Grades among students from the University Transfer program are not statistically different from those of high school entrants. The second advantage of the regression methodology is that we can simultaneously control for other factors that may be correlated with both the category of the registrant and the outcome variable (in this case, the term average).

We have already seen, for example, that CAAT transfer students are considerably older, on average, than high school entrants. If age is positively associated with academic achievement, then the term average of CAAT transfers over high school entrants may

have to do simply with their age, not their origin. The multiple regression technique can be extended to include as many control variables as are appropriate and the interpretation of the coefficients remains the same: if age is added to the regression as a control, the estimated coefficient on CAAT is interpreted as the difference between the mean term average of CAAT transfers and the mean average of high school entrants, *holding age fixed*. In other words, how do term averages compare between CAAT transfers and high school entrants of the same age? Column (2) of Table A1 extends the regression model to include a binary indicator for gender (1 if female, 0 if male), a binary indicator for first generation status, and a continuous variable for age at the time of registration.

Age, gender, and first generation status matter for grades. According to the estimates in column (2), each additional year of age is associated with an average increase of 0.26 in the term grade and females have grades 3.3 percentage points higher than males. First generation students have averages that are 3.6 percentage points lower than others. All these estimates are strongly significant. Once these factors are controlled for, the coefficient on non-articulation CAAT falls: the coefficient on CAAT in the simple model was clearly picking up the influence of age and gender.

The final column controls for the initial program of study, with Arts programs as the reference class. Note from Column (3) that there are systematic differences in grades by program of study. Since Arts is the excluded, or reference, group, the coefficient on Sciences suggests grades are 1.83 percentage points higher in the sciences than in the arts, controlling for gender, age, level of study and type of applicant. The Arts and Science, Nursing, and Business programs also have higher term averages compared to the straight Arts. The primary result from Column (3) is that, once age, gender, first generation status, and program of study are controlled for, students transferring from a CAAT to Trent outside of articulation agreements or the University Transfer program earn grades that are not statistically different from those earned by direct high school entrants. Articulation agreement transfers have grades significantly higher.

Table A1 Multivariate Analysis of Term Averages

Explanatory Variable	Model (1)	Model (2)	Model (3)
Entrant Cat. (ref. group = High School)			
CAAT – Not Articulation	2.38 (5.86)	1.07 (2.47)	0.65 (1.52)
CAAT – Articulation	6.74 (7.60)	6.18 (6.97)	5.80 (6.55)
CAAT – Univ. Transfer Program	-1.59 (1.34)	-2.12 (1.81)	-1.63 (1.40)
University Transfer	5.40 (13.54)	3.74 (6.09)	3.36 (7.81)
International	4.27 (6.90)	3.74 (6.09)	3.02 (4.84)
Continuing	4.29 (8.49)	1.90 (3.41)	1.71 (3.10)
Other Entry	3.81 (2.43)	1.02 (0.65)	1.33 (0.85)
AGE		0.26 (8.92)	0.27 (9.29)
FEMALE (1 if yes, 0 if male)		3.27 (12.22)	3.11 (11.34)
FIRST GENERATION (1 if yes, 0 if no)		-3.58 (5.13)	-3.51 (5.06)
Program of Study (ref. group = Arts)			
SCIENCES			1.83 (5.69)
ARTSCI			3.58 (3.55)
BUSINESS			2.12 (4.37)
NURSING			3.98 (9.13)
Constant	67.18 (399.78)	60.68 (107.53)	59.67 (103.06)
R <sup>2</sup>	0.03	0.06	0.07
No. of Observations	8,893	8,893	8,893

t-statistics in parentheses

Table A2 Probit Estimates of Drop-out Probability

Explanatory Variable	Model (1)	Model (2) Beyond 5 Credits
Entrant Cat. (ref. group = High School)		
CAAT – Not Articulation	-0.014 (0.177)	-0.006 (0.017)
CAAT – Articulation	-0.183 (0.027)	-0.129 (0.028)
CAAT – Univ. Transfer Program	-0.008 (0.046)	0.039 (0.047)
University Transfer	-0.051 (0.017)	-0.054 (0.016)
International	-0.020 (0.026)	-0.017 (0.025)
Continuing	-0.009 (0.022)	-0.031 (0.022)
Other Entry	0.139 (0.066)	0.117 (0.069)
AGE	0.008 (0.001)	0.005 (0.001)
FEMALE (1 if yes, 0 if male)	-0.030 (0.011)	-0.029 (0.011)
FIRST GENERATION (1 if yes, 0 if no)	0.301 (0.082)	0.373 (0.089)
Program of Study (ref. group = Arts)		
SCIENCES	-0.065 (0.013)	-0.021 (0.013)
ARTSCI	-0.065 (0.034)	-0.054 (0.032)
BUSINESS	-0.047 (0.019)	-0.034 (0.018)
NURSING	-0.220 (0.013)	-0.174 (0.012)
Cohort (ref. group= cohort 1)		
Cohort 2	-0.038 (0.014)	-0.042 (0.014)
Cohort 3	-0.083 (0.014)	-0.078 (0.013)
Cohort 4	-0.169 (0.013)	-0.154 (0.012)
Pseudo R <sup>2</sup>	0.05	0.05
No. of Observations	7,476	6,669

*t*-statistics in parentheses

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