TRANSFER STUDENT SUCCESS IN ALBERTA CASE STUDY: UNIVERSITY OF LETHBRIDGE

For the Alberta Council on Admissions and Transfer

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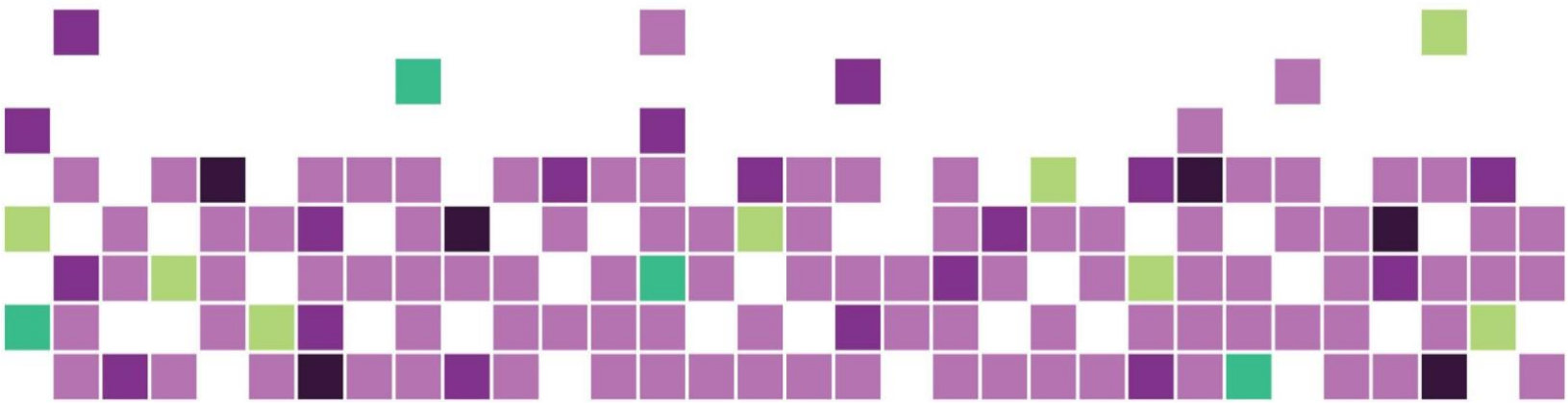

Executive Summary

The Alberta Council on Admissions and Transfer (ACAT) contracted Plaid Consulting to perform a comprehensive review of transfer student success metrics at the University of Lethbridge (ULethbridge). Plaid is a data and analytics consulting agency focused on helping post-secondary institutions, councils, and governments make data-informed decisions. This report is written from the perspective of the University of Lethbridge as a receiving institution for transfer students.

The high-level goal of the project is to begin addressing a gap in Alberta's post-secondary system learner pathway and mobility data: transfer of students between post-secondary institutions. While there is current data on the mobility of students within the system, that data is limited to tracking student enrolments at and between institutions. This project aims to improve the data available by beginning to develop and analyze measures of post-secondary transfer student success. The project is focused on measuring the success of post-secondary transfer students and how transfer students perform in comparison to direct entry students.

This project looked at ways of measuring transfer student success at ULethbridge. The proposed metrics for this report's analysis were developed using a mixed methods approach that consisted of

- applying recommendations for best practices for methodology and parameters for analysis identified in the literature review,
- contextualizing the analysis within information gained from the environmental scan about ULethbridge, which included informal qualitative data in the form of conversations with targeted representatives from ULethbridge, and
- focusing the report's core analysis and conclusions on a regression analysis of quantitative ULethbridge data that were based on targeted data metrics for analysis of transfer student success in comparison to direct entry students.

Prior research

The literature review highlighted a number of key points in regards to transfer student success. In the Canadian context, studies have looked at Statistics Canada data in the form of the now inactive Youth in Transition Survey and the ongoing Postsecondary Student Information System. These data illustrated that reporting on student success from the perspective of an individual institution underreports progress from a system perspective, because a single institution does not generally know whether a student transferred and continued their studies elsewhere, or left the system altogether. In developing success metrics that are fair to both transfer and direct entry students, it has been shown, when selecting key performance indicators, that having consistent definitions and data collection across the system, measuring results (both outcomes and outputs), measuring validity and reliability of data, and metrics, and understandable and transparent performance indicators are important. Existing metrics of student success are criticized for being overly focused on the traditional university learner: first-time, full-time, degree seeking students. In response, the Integrated Post-secondary Education Data System (IPEDS), from the US Department of Education, has recently created new definitions to better encompass both part-time and non-first-time attendees.

The case study conducted for this report includes both part- and full-time students who were admitted during the study period. Further filtering is done for particular metrics to ensure students had attended long enough to achieve those metrics. For example, graduation rate at 100% of program length considers

the proportion of students who graduate within the expected program length (4 years for baccalaureate degrees). In turn, at least that number of years had to have elapsed since the student was admitted.

This ULethbridge case study was conducted at a time that the landscape of postsecondary education in Alberta is changing quickly: institutions that formerly were large sending institutions are now completing institutions, changing the nature and dynamics of what it means to be a transfer student. Findings from this report should be considered from the perspective of a snapshot in time when changes are occurring.

For this report, we categorize institutions according to Alberta's six sector model, which includes publicly funded institutions in Alberta (Alberta Advanced Education, 2007). The University of Lethbridge is categorized in this way as a Comprehensive Academic and Research Institution. The other sectors are Baccalaureate and Applied Studies Institution, Polytechnical Institutions, Comprehensive Community Institutions, Independent Academic Institutions, and Specialized Arts and Culture Institutions. Some post-secondary institutions in Alberta are outside the six sector model, such as First Nations Colleges, but do participate in Alberta's Transfer and Pathways System and may have transfer students moving to ULethbridge. Further definitions of these sectors are available in key terms.

Environmental scan

The environmental scan revealed that the ULethbridge currently compares the success of direct entry and transfer students 3 years after the earliest possible graduation date for each program, comparing these groups based on their time of entry to the institution. Beyond current metrics, we discussed the definition of success, which participants felt was really quite individual: an example is a student who works full-time taking one course per term to complete a credential in a very part-time fashion. To this student, completion is success, just as it is to the institution.

Demographics and previous institution

Females accounted for about 58% of direct entry students included in this study compared with about 55% of transfer students.

Among transfer students, the largest group (35%) of sending institutions was Alberta's comprehensive community institutions, which includes institutions such as Lethbridge College and Medicine Hat College. Many transfer students (22%) came from outside Alberta or outside Alberta's six sector model (see key terms). Nearly 13% transferred from polytechnical institutions. 9% transferred from baccalaureate and applied studies institutions, with an additional 9% transferring from comprehensive academic and research institutions. A small number transferred from other sectors, and about 10% of students in this study did not have a transfer institution listed.

Case study

The case study performed in this report analyzed metrics both with descriptive statistics and using regression analysis. Descriptive statistics are summary level information about a particular group. The descriptive statistics included in this case study are: time to completion, graduation rate, and average credits over time. Regression analysis is used to estimate relationships among variables, with a focus on a dependent variable (for example, GPA at graduation) and multiple independent variables (for example, gender, academic program, and indigenous status). The regression analyses included in this case study are: time to completion and grade point average at graduation. For more information on the metrics used, please see key metrics.

For most metrics, we utilized three lenses: an unadjusted model, where students were compared without adjustment to the baseline; a normalized to 30 credits version, where students were compared as of the time they had completed 30 credits at the institution, or were awarded 30 transfer credits; and, a normalized to 60 credits version, where students were compared as of the time they had completed 60 credits at the institution. By normalizing the data, we allow for a comparison from a common starting point, whereas using time of admission gives transfer students an advantage because they have already completed some work towards graduation. Normalizing the data in this way illustrates an important point: the lens through which transfer student success is viewed changes the outcome metric.

Time to completion

Time to completion measures the difference, in years, between a starting point and graduation. Using the recommended approach of normalizing to 30 credits (see a more detailed overview in key metrics), this study showed transfer students finishing about 4 months faster than their direct entry counterparts, following the completion of 30 credits. For transfer students, the 30 credits were awarded via transfer credit, while for direct entry students the credits were earned at ULethbridge.

Regression analysis on time to completion confirms these assumptions, with transfer status explaining almost 22% of the variability in time to completion in the unadjusted model. Roughly, each transfer credit a student is granted at ULethbridge allows them to complete their credential 0.017 years earlier, which translates to 19 transfer credits for one term sooner, or 39 for two terms sooner. These results suggest that differences between transfer and direct entry students persist, even when other factors such as program, national status, gender, Aboriginal status, and year of admission are controlled for.

Graduation rate

Graduation rate analysis compares the proportion of students who have completed their credentials within 4 years from admission. In this model, transfer students were more likely to complete their credentials within 4 years (45-52%, but with N values less than 40 for each admission year), while direct entry students ranged from 32%-37%.

Looking further out to 6 years from admission highlights that direct entry and transfer students had similar outcomes, ranging from 62%-68% for transfer students (N ranges from 37-52), and 62%-63% for direct entry students (N ranges from 397-412).

We also looked at graduation rate for transfer students based on the Alberta post-secondary sector (see key terms) the student had transferred from. Outcomes were similar across the different sectors.

Progression

This study measured progression in two ways: from the admission term (such as 2010 Fall) to a specific term (such as 2017 Fall), and to a general term number (such as term 7). The former method grouped students into one of four categories: registered, active but not registered (and returned later), graduated, and left. Students falling into the "left" group may have returned or graduated after this study completed, which would have changed their status. For the 2010 Fall admission cohort, the earliest available in this study, 51% of direct entry students had graduated by 2017 Fall, and 43% had were classified as "left". Transfer students were more likely to graduate on this metric, at 69%, with 28% leaving the institution.

In addition, the specific number of registration terms was analyzed. Using the recommended normalized to 30 credits model, transfer students and direct entry students are similarly likely to register in terms 1 through 6 (following completion of 30 credits, with registration likelihood ranging from 95% in term 2 down to 75% by term 6). By term 7, transfer students become less likely to register, with 64% of the admit cohort still registered, as compared to 73% for direct entry students. This gap of between 7 and 10 percentage points continues until about term 11, where both groups converge and their likelihood of continuing to register is about 20% and continues to decline after that point. The difference between groups from terms 7 to 11 is reflective of transfer student's higher graduation rate over the same time period.

GPA at graduation and average credits per year

Considering a calculated cumulative GPA at graduation, transfer students tended to have GPAs very similar to those of direct entry students: the transfer flag was statistically insignificant.

The final metric studied was the average number of credits per year. In this regard, transfer students took an average of just over one credit hour per term fewer than direct entry students.

Transfer student success

The case study generally shows strong performance by both direct entry and transfer students. One of the reasons this transfer student performance is possible is because Alberta has a purpose built, transparent, transfer system that does not isolate different types of institutions from one another. This system helps ensure that transfer students are able to complete credentials quickly when changing institutions, while earning credit for their prior academic work.

Lastly, we discussed the notion of "success" with at the University of Lethbridge. As further illuminated in the literature review, institutions struggle with a single definition of success. For example, success from the perspective of one student is very different than success from the perspective of a different student. Finishing sooner may not be a good thing, from the perspective of a student.

This study aims to help further the conversation around transfer student success metrics in Alberta by beginning to define aspects of transfer student success based on available University of Lethbridge metrics. These findings may also help to inform future baseline measures for transfer student success in Alberta. The results of this study along with the academic literature, suggests the biggest challenges lie in correctly defining who is a transfer student, which cohort to include them in, and finding a dataset that goes back far enough to accurately analyze both part- and full-time student success. The study highlights that transfer students see similar outcomes to direct entry students over similar timeframes when the basis of comparison is normalized to a similar starting point.

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Introduction

The Alberta Council on Admissions and Transfer (ACAT) contracted Plaid Consulting to perform a comprehensive review of transfer student success metrics at the University of Lethbridge (ULethbridge). Plaid is a data and analytics consulting agency focused on helping post-secondary institutions, councils, and governments make data-informed decisions.

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This project consists of 3 main parts: an environmental scan reviewing existing metrics and perceptions of transfer student success, a literature review emphasizing recent Canadian research into student success, and a case study utilizing metrics proposed as part of this project. These elements are brought together to inform the conclusions and recommendations in this report.

This project looked at ways of measuring transfer student success at ULethbridge. The proposed metrics for this report's analysis were developed using a mixed methods approach that consisted of

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A number of key terms that define different types of students and institutions are used throughout this report. Please refer to key terms for further information.

Environmental scan

Plaid conducted a limited environmental scan with Susie Kennedy, Registrar, and Mandy Moser, Manager, Institutional Analysis.

An important point to consider as part of this study is that ULethbridge has a very different transfer student population than many other institutions. There are a large number of transfer students who are adult learners taking courses at ULethbridge's northern campuses in Calgary and Edmonton (the Edmonton campus is now closed). These students are typically part-time, and may skew some of the results of the case study. Part-time students, while included in the case study's metrics, tend to have longer time to completion (and corresponding graduation rate) than full-time students. As the data was aggregated to the faculty level, it was not possible to break these students out from the main analysis.

We also discussed the very notion of success with participants, who noted that the definition of success will vary depending on who you ask. For example, a student who is working full-time might well take one course per term and achieve a credential in a very part-time fashion. To this student, and the institution, that is success. The literature also mentions the idea that measuring success comes down to the ability to determine whether a student is able to complete their own goals, rather than an arbitrary definition of success created by the institution. However, most institutions currently have limited means of measuring what students individual goals are.

This study aims to help further the conversation around transfer student success metrics in Alberta by beginning to define aspects of transfer student success based on available University of Lethbridge metrics. These findings may also help to inform future baseline measures for transfer student success in Alberta.

The environmental scan also revealed that the transfer student population at ULethbridge is changing quickly, with direct entry becoming a much more common pathway into the institution. The institution estimates that even though direct entry intake will become more common, the variety of pathways available for transfer and mobility will increase in the future.

Summary of existing metrics from the environmental scan

It was confirmed that at this time, there are only a few metrics comparing transfer students with direct entry students used within ULethbridge. One method is program completion, measured three years after the earliest possible date of graduation for the program. Additionally, ULethbridge compares these groups of students upon application and at time of acceptance to the institution. In addition to metrics used within the institution, ULethbridge has participated in the Consortium for Student Retention Data Exchange (CRSDE. For further information, see the literature review) in previous years, but elected not to participate in the most recent submission year. The metrics currently used at ULethbridge are applied to students across programs, but are not directly comparable to study metrics used in the case study of this report.

Key terms

This report uses the Government of Alberta's definitions related to transfer and student mobility, where possible, as provided in the data dictionary for the Learner Pathways System (Alberta Council on Admissions and Transfer, 2017c), and the visiting student definitions as provided by the University of Lethbridge (2018b, Transfer Credit Policies). Terms that are not part of the Government's definitions are also used in this report, including the admit types of direct entry and transfer, which are used in the case study and analysis related to it. These latter terms are important because they provide a more specific mechanism for defining transfer students than the general definition currently used in Alberta in the Alberta Transfer and Pathways System, which is important in order to begin comparability between transfer and direct entry students.

The key terms employed are:

- Student Mobility (Provincial definition): Refers to a learner's ability to access different learner pathways (routes) during his/her program of study(s) in post-secondary education, including movement into, within, from, or back into post-secondary education. Mobility allows students to earn credits toward a credential at more than one institution, ladder from one credential to another credential, build on foundational learning and high school upgrading to enter post-secondary studies, and/or access to many other learner pathways (Alberta Council on Admissions and Transfer, 2017c).

- Transferability (Provincial definition): Refers to a student's ability to successfully receive transfer credit for an applicable course(s) and/or program(s) when he/she moves between post-secondary institutions and/or between program areas (Alberta Council on Admissions and Transfer, 2017c).

- Admit Types (used in the case study):
    - Transfer: a student meeting or exceeding a particular threshold of transfer credits at the time of admission. At ULethbridge, this threshold is 3 or more transferable post-secondary courses (approximately 9 transferable credits) for degree programs. Students can be evaluated for admission based solely on transfer courses provided they have completed 5 or more transferable courses (approximately 15 or more transfer credits). For those students with 3-4 courses, ULethbridge uses a weighted average of the high school and post-secondary admission averages (University of Lethbridge, 2018a). This is based on the Post-Secondary Transfer basis of admission at ULethbridge.
    - Direct entry: a student not meeting the criteria for transfer.
        - It is important to note that the direct entry will include students who have up to the threshold of credits noted in the transfer definition. For example, a degree student with 8 transfer credits would be coded as direct entry.

- Visiting Student (ULethbridge students visiting another institution): A ULethbridge student pursuing courses towards their ULethbridge credential at another recognized post-secondary institution. To obtain ULethbridge credit, students must have an application for visiting or exchange student authorization approved by their faculty prior to enrolling in the course (University of Lethbridge, 2018b).

- Note: there are also visiting students from other institutions who attend ULethbridge as visiting students and are part of Open Studies during their time at ULethbridge. These students are not included in this report.

In addition to terms related to defining students, a number of terms defining institutional categories are used. For this report, we categorize institutions according to Alberta's six sector model, which includes publicly funded institutions in Alberta (Alberta Advanced Education, 2007). The University of Lethbridge is categorized in this way as a Comprehensive Academic and Research Institution. The six types of institutions are categorized by their academic programs, research activity, and learner focus.

Institutional Sector	Institutions	Academic Programs	Research Activity	Learner Focus
Baccalaureate and Applied Studies Institutions	MacEwan University Mount Royal University	Certificate Diploma Applied Degree Bachelor's Degree (in specified areas) University Transfer Post-Diploma Certificate Graduate Certificate	Applied research and scholarly activity to enhance their instructional mandate.	Learners interested in an education oriented to employment or academic study.
Comprehensive Academic and Research Institutions	Athabasca University University of Alberta University of Calgary University of Lethbridge	Bachelor's Degree Post-Bachelor's Certificate Post-Bachelor's Diploma Master's Degree Post-Master's Certificate Post-Master's Diploma Doctoral Degree Post-Doctoral Certificate Post-Doctoral Diploma University Certificate University Diploma	The University of Alberta, University of Calgary and University of Lethbridge conduct pure and applied research in a wide range of disciplines. Athabasca University conducts research primarily in the area of distance delivery education.	The University of Alberta, University of Calgary and University of Lethbridge are campus-based institutions serving the needs of learners interested in a comprehensive, research intensive environment. Athabasca University is an open university that provides education through distance delivery. It focuses on learners interested in open, flexible learning opportunities.

Institutional Sector	Institutions	Academic Programs	Research Activity	Learner Focus
Comprehensive Community Institutions	Bow Valley College Grande Prairie Regional College Keyano College Lakeland College Lethbridge College Medicine Hat College NorQuest College Northern Lakes College Olds College Portage College Red Deer College	These institutions provide a broad range of programs that prepare learners for employment or for further study. Academic Upgrading Applied Degree Bachelor's Degree (in collaboration with a degree-granting institution) Bachelor's Degree with Applied Focus Certificate Diploma Journeyman Certificate (using Apprenticeship and Industry Training certification standards) Post-Diploma Certificate Graduate Certificate	Applied research and scholarly activity to enhance their instructional mandate.	Learners interested in preparatory, career, and academic programming.

Institutional Sector	Institutions	Academic Programs	Research Activity	Learner Focus
Independent Academic Institutions	Ambrose University Burman University Concordia University of Edmonton The King's University St. Mary's University	These institutions primarily provide liberal arts, science, and education baccalaureate degree programs. They may also offer graduate programs in niche areas. Not all programs provided by these institutions are subject to approval by the Government of Alberta. Other programs may have met the quality assurance of other regulatory bodies. Approved programs: Academic Upgrading (in specific areas) Baccalaureate Degree (in niche areas) Master's Degree (in niche areas) May also offer: Divinity Degree Post-Baccalaureate Certificate Post-Baccalaureate Diploma	Applied research and scholarly activity to enhance their instructional mandate.	Learners interested in academic programs within a faith-based educational environment.
Polytechnical Institutions	Northern Alberta Institute of Technology Southern Alberta Institute of Technology	Academic Upgrading Applied Degree Baccalaureate Degree (in specified areas) Certificate Diploma Journeyman Certificate (Training Component) Post-Diploma Certificate Graduate Certificate	Applied research and scholarly activity to enhance their instructional mandate.	Learners interested in career and technical programming.

Institutional Sector	Institutions	Academic Programs	Research Activity	Learner Focus
Specialized Arts and Culture Institutions	Alberta College of Art and Design The Banff Centre	These two unique institutions specialize in providing fine arts and cultural programming at the undergraduate, graduate or professional development level. Applied Degree Baccalaureate Degree (in niche areas) Certificate Diploma Master's Degree (in niche areas) Doctoral Degree (in niche areas) Post-Diploma Certificate	Applied research to enhance their instructional mandate. Alberta College of Art and Design also engages in scholarly activity.	Learners interested in the fine arts and creativity. In particular, Alberta College of Art and Design serves the needs of learners interested in career and academic programming. The Banff Centre serves the needs of learners with prior academic and professional experience.

Some post-secondary institutions in Alberta are outside the six sector model, such as First Nations Colleges, but do participate in Alberta's Transfer and Pathways System and may have transfer students moving to ULethbridge.

Lastly, the term "sending institution" or "transfer institution" is used to refer to the institution a transfer student attended prior to transferring to the University of Lethbridge. "Receiving institution" or "Completion institution" is used to refer to the University of Lethbridge, following a student's transfer.

Literature Review

Incoming transfer students account for a significant student population at many of Alberta's post-secondary institutions (PSIs) and are key to ACAT's role in providing oversight for "learner pathways and mobility throughout the advanced learning system" (Alberta Council on Admissions and Transfer, 2017a). While the number of students continuing in publicly funded institutions grew during the period of 2004-2013, the number of students demonstrating system mobility by continuing at a new institution declined over the same period (Alberta Council on Admissions and Transfer, 2017b). Facilitating more seamless transfer processes for Alberta students could influence these trends by ensuring students are able to obtain appropriate credit and able to move between institutions and sectors as their educational plans change. In the historical context, one of the roles of college (the sending institution) was to prepare students for university transfer, often in two year programs that laddered into four year programs at the university (the receiving institution). The landscape has changed considerably since then: there are more students, a greater variety of institutions to choose from across Alberta's Six Sector Model for Advanced Education (Alberta Advanced Education, 2007), and different societal needs for credentials. Enrolment patterns are changing as students are seeking to move fluidly from one sector to other sectors, and "a new view may prove useful, one in which students are the unit of analysis and institutions are viewed as stepping stones along a diverse set of educational paths" (Hosler et al., 2012).

For this report, we categorize institutions according to Alberta's six sector model, which includes public institutions in Alberta (Alberta Advanced Education, 2007). For further definition of these sectors, see key terms.

This literature review is further divided among two major themes: Canadian transfer student success research, and research comparing direct entry and transfer student success.

Canadian transfer student success research

Research on student persistence in the Canadian context has grown in recent years. Baseline indicators from within individual academic institutions tell one aspect of the story. More recently, researchers have begun utilizing longitudinal surveys, administrative, and earnings data from Statistics Canada: the Youth In Transition Survey (YITS), and the Postsecondary Student Information System (PSIS), and tax records.

Baseline persistence within an individual institution

Prior to work involving the YITS or the PSIS, most research has focused on persistence within a single institution (Parkin & Baldwin, 2009). This research showed that around 60% of students could be expected to complete their studies (Grayson & Grayson, 2003). Highlighting this point, Martinello (2008) found that 40% of students at the bachelor's level left or changed their first program of study, aligning with Gilbert's (1991, as cited in Martinello, 2008), finding that 42% of students enrolled full-time in the fall of 1985 in several Canadian universities dropped out after 5 years had elapsed; he further estimated that 10% of the initial cohort transferred to another institution.

Youth In Transition Survey

YITS "is designed to examine the patterns of, and influences on, major transitions in young people's lives, particularly with respect to education, training and work" (Statistics Canada, 2011). The YITS was developed by Human Resources and Skills Development Canada and Statistics Canada, in consultation with provincial and territorial ministries responsible for labour and education. The survey measures major transitions in young people's lives encompassing formal educational experiences, most labour market experiences, achievement, aspirations, expectations, and employment experiences. YITS consists of two cohorts: Cohort A (herein referred to as YITS-A) were born in 1984 and were aged 15 at the start of the survey in 1999; and Cohort B (herein referred to as YITS-B) were born between 1979 and 1981, and were aged between 18 and 20 in 1999. Follow up surveys of these cohorts were conducted every two years, in 2002, 2004, and 2006, and 2008. The initial sample size for YITS-A was 38,000 while YITS-B was 29,000.

Because the YITS (for both cohorts) is both longitudinal and focuses heavily on tracking individuals' educational experiences, academic backgrounds, aspirations and expectations, it is a very strong tool for analyzing student persistence (Finnie and Qiu, 2009).

Finnie, Childs, and Qiu (2010) calculated transition rates in Ontario focusing on four broad statuses for each student in each year: Graduate, Continuer (in the same institution), Switcher (began studying at a different institution), and Leaver (left PSE without graduating, or no longer in the data file for this regional study). Because the YITS-B dataset contains information not only on whether the student graduates from

their first program of study, but any program, they found a number of important differences between their results and research into persistence: nearly 80% of students either obtain a degree or continue to be enrolled in the post-secondary system five years following entry, with 71% graduating in 5 years and 6% who are still studying. This 71% compares to 58% if only the initial program started were being measured. Further, they note that a significant number of students follow non-traditional pathways, including switching programs, taking breaks, and moving in and out of PSE; including these students shows higher persistence rates - "while 26.9 of Ontario college students leave their first PSE program by the end of the first year, over a third of these (10.1 percent of the total) switch immediately to another PSE program" (Finnie, Childs, & Qiu, 2010 p.29-30), with 23.5% returning within a year of leaving, many at the same institution in a new program.

These results are further enforced by Lambert, Zeman, Allen and Bussiere (2004) using the YITS-B dataset for the first two cycles: 15% of those who had enrolled in PSE left without completing their program. This research was followed up by Shaienks, Eisl-Culkin, and Bussiere (2006) which showed 15.7% for the third cycle.

Finally, a study by Martinello (2008) showed that 50-60% graduated from the first program they started, with an additional 10-12% completing a credential in their second program, while 12-13% were still studying in their second program. Martinello additionally showed that only 8.7% of students left post-secondary entirely, once transfers to new programs or institutions were taken into account.

The YITS also has limitations: the sample size isn't large enough to analyze certain pathways at a more granular than national level, and it lacks specific information identifying post-secondary institutions, as well as selection and response bias (Finnie & Qiu, 2009). The YITS is also now inactive, and has not been replaced.

Statistics Canada's Postsecondary Student Information System

Statistics Canada's Postsecondary Student Information System (PSIS) "collects information pertaining to the programs and courses offered at an institution, as well as information regarding the students themselves and the program(s) and course(s) in which they were registered, or from which they have graduated" (Statistics Canada, 2017) for all public post-secondary institutions in Canada. PSIS is an annual submission. There is no sample associated with PSIS - it contains the population for the institutions that participate.

Finnie and Qiu (2009) utilized the PSIS to analyze student persistence across Atlantic Canada at all academic levels: college, bachelor's, master's, doctoral, and first professional degrees, with an emphasis on college and bachelor's students due to the sample sizes and related policy concerns. The Atlantic region was chosen in part because it had near universal participation among public institutions for the reporting period between 2001 through 2004. The researchers linked individual student records both within each reporting year (where a student enrolled in multiple programs) and over time, allowing them to uniquely identify and track students pathways in PSE. Finnie and Qiu focused on four broad statuses for each student in each year: Graduate, Continuer (in the same institution), Switcher (began studying at a different institution), and Leaver (left PSE without graduating, or no longer in the data file for this regional study).

One of the key reasons for studying persistence at a regional level, rather than from the perspective of an individual institution, is that individual institutional data doesn't provide insight into how students switch institutions, which causes an overestimation of the number of leavers.

The major findings from Finnie and Qiu (2009) on basic persistence rates were:

- The first year "dropout rate" at the university level, for 17-20 year olds beginning their first program, was 20.2%, at the individual institution level.
- Some of those noted as "leavers" are in fact "switchers" changing institutions: 5.1% in absolute terms. In effect, this leads to substantial bias in the leaving rates for PSE when a single institution is analyzed. This means that "true" leavers were only 15.1% at the university level (22.6% at the college level, where switching institutions was negligible).
- Switching and leaving rates are considerably lower in the second year as compared to the first with the leaving rates declining from 15.1 % to 11.7%, and switching rates declining from 5.1 % to 4.2%.
- Expanding the list of programs to include short courses, language training, etc. increases the number of students who would be considered switchers, resulting in a corresponding drop to the leave rate to 13.8%.

When comparing college students to bachelor's students they found that leaving rates were higher for college students at 22.6% versus 15.1% for bachelor's students in the first year. The switching rates were almost negligible for college students but were substantial for bachelor's students. The PSIS data also showed that the leaving rate increases substantially with age for bachelor's students, whereas switching rates decline with age. For college students, leaving rates are slightly lower for older students and switching rates remain negligible.

Comparing leaving rates across genders the data showed that men leave at much higher rates than women at the university level (28.4% versus 21.9% by the end of year 2). Conversely, women showed slightly higher switching rates than men. The patterns by sex at the college level are almost identical by the end of year 2 (33.1% for men and 33.6% for women). The authors underscore the important implication of these findings that since men enter university at substantially lower rates than women, and are also less likely to persist in their studies, the resulting gender differences in final graduation rate will be skewed even more than the access rates commonly looked at would indicate. When leaving and switching rates are combined (the "quit rate" from the individual institutional perspective), the gender differences in persistence in PSE are clearly understated.

Finnie and Qiu (2009) also found that 25% of bachelor's leavers return to PSE over time, with about half of these returning to the same institution, and a quarter staying at the same level but changing institutions (it should be noted that "level" is not necessarily the same as Alberta PSE sectors). 11.5% of college leavers return to their studies, with most returning to the same institution. This points to the conclusion that overall leaving rates are substantially overstated when these "leaver-returners" are not taken into account. This is referred to as the "stop-out" phenomenon.

It is possible that Finnie and Qiu (2009) study underestimates continuance rates, as it was limited geographically to just records from Atlantic Canada, meaning any student who moved to an institution in another province would be considered a leaver.

The authors concluded that the PSIS data provides a useful perspective on persistence in PSE which will be of interest to those concerned with student pathways.

Post-graduation earnings

The Educational Policy Research Initiative (EPRI), conducted research on the post-graduation outcomes of PSE graduates by "constructing and analyzing a dataset linking 14 Canadian PSE institutions' administrative data with tax data [from 2005-2013] held at Statistics Canada" (Finnie, Dubois, & Miyairi, 2017, p.4). The students were grouped by whether they were direct entry from high school or transfer students. The study grouped students on the basis of direct entry (DE), or non direct entry (non-DE, i.e., transfer). These groups were further divided according to age at graduation: younger and older, with the age-at-graduation cutoff being 23 for diploma graduates, and 24 for degree graduates.

For diploma graduates, younger and older DE groups as well as the younger non-DE group showed substantial jumps in earnings following graduation, while the older DE group showed a more modest increase.

For diploma graduates, the younger DE group saw the largest jump in salary, moving from below $10,000 prior to PSE, to just under $30,000. The older DE group earnings were mostly flat at around $20,000. Of the non-DE groups, the younger group saw a large uptick from below $10,000 to around $30,000, while the older group showed a modest increase of about $4,300 compared to their pre-PSE salary. However, the older non-DE group also exhibited an earnings decline in the two years prior to PSE, unlike the other groups - when this is accounted for, the increase is about $12,000 relative to two years prior to PSE (Finnie, Dubois, & Miyairi, 2017).

For degree graduates, younger and older DE groups as well as the younger non-DE group had pre-PSE salaries of approximately $10,000 and post-PSE salaries of approximately $30,000, while the older non-DE group had a pre-PSE salary of $30,000 and a post-PSE salary of $43,000 (Finnie, Dubois, & Miyairi, 2017).

Hango (2010) also looked at earnings following study in PSE, but focusing on the comparison between 1-2 and 5-6 years post-graduation for students who took a direct route to post-secondary or an indirect route. In this study, direct entry students showed an average lift between years 1-2 and 5-6 following graduation of 10.25% whereas those who followed an indirect route to PSE showed a lift of nearly 16%.

More recently, the Government of Alberta published the Labour Market Outcomes of Graduates of Alberta Post-Secondary Institutions in February 2018. This report did not directly compare direct entry to transfer students, but did highlight that Alberta post-secondary graduates see significant increases in income following graduation, though this varied by credential and field of study. The study also noted that students who graduate in a recession year may have lower earnings, both initially and in the long run, compared to those who graduate in non-recession years. Further, field of study is just as significant as credential type in predicting earning potential, though higher level credentials usually lead to higher income (Government of Alberta, 2018a). The Government of Alberta has also made earnings data available through the ALIS career, learning, and employment portal (Government of Alberta, 2018b).

Research comparing direct entry and transfer student success

Beyond the examples identified above, there is limited Canadian research into frameworks for effectively comparing direct entry and transfer student success on key metrics.

In the Canadian context, British Columbia has a provincial level data exchange initiative, the Student Transitions Project (STP), that brings together data from the secondary and post-secondary systems and reports on outcomes (Government of British Columbia, April 4, 2018). BC's STP provides annual high level reporting and newsletters containing highlights of transfer patterns across all types of institutions as it contains data from research-intensive universities, teaching-intensive universities, colleges and institutes. Of particular relevance to this report is the ability to see transfer patterns across different institutions. We note that the STP is distinct from BC's Central Data Warehouse (CDW) which does not include BC's research universities. The Maritime Provinces Higher Education Commission (MPHEC) reports publicly on student progress and outcomes for institutions in New Brunswick, Nova Scotia, and Prince Edward Island. As a joint commission, MPHEC can report both whether a student has persisted or completed at a particular institution and whether they have persisted or completed at an alternate maritime university (Maritime Provinces Higher Education Commission, April 4, 2018). Ontario's universities use a 7-year graduation rate for a cohort of full-time, first-time, first-year students who were attending in the Fall semester (Council of Ontario Universities, 2017). Ontario's colleges use a similar metric: certificate and diploma programs are based on the percentage of students who graduated within twice the time for standard program duration, while for degree students it is based on seven years (Higher Education Quality Council of Ontario, 2017). Previously, Ontario's colleges used a reverse cohort model, where graduation rate is based on the number of "students who complete diploma/certificate programs within a minimum time frame expressed as a percentage of entering students", which the colleges found to be highly problematic as it overinflated results for some institutions and underinflated results for others (Donner and Lazar, 2000). Newfoundland and Labrador measures its graduation rate for the college by taking the number of graduates per year as a percentage of the total entrants within expected program duration (Donner and Lazar, 2000). The Pan-Canadian Consortium on Admissions and Transfer (PCCAT) commissioned a survey and report on student mobility across Canadian jurisdictions, which touched briefly on transfer student performance by noting that many institutions do not keep a historical record of historical averages of performance measures at a point in time (such as GPA at end of first year), but tend to keep better records of completion so could more readily calculate historical graduation rate (Heath, 2012).

In the past decade, there have been significant efforts to improve the reporting of transfer student success. For example, British Columbia developed KPIs that aim to show that system goals have been achieved. These principles guided the selection of the KPIs (Donner and Lazar, 2000):

- Consistent data definitions and collection across college system;
- Emphasis on measuring results (outcomes and outputs);
- Valid measures of what they are intended to measure;
- Reliability over time; and
- Clear, understandable, and transparent.

Types of transfer students

Transfer students come from a variety of different backgrounds. The literature notes that students can transfer in several directions and that there are different subsets of transfer students.

Hossler et al. (2012) note that transfer can occur in several directions:

- Lateral transfer: a student moving from one institution to an institution in the same sector, such as from NAIT to SAIT.
- Traditional, or vertical, or upward transfer: a student moving from a two-year institution to a four-year institution, such as from moving from a regional college to a university.
- Reverse transfer: a student moving from a four-year institution to a two-year institution, such as moving from a university to a regional college.

McCormick (2003) identified several subsets of transfer students:

- Trial enrollers: students experimenting with the possibility of transferring to another institution.
- Special program enrollers: students doing most of their work at their home institution who also take advantage of unique programs offered at other institutions.
- Supplemental enrollers: students enrolling at an additional institution for a term or two to supplement or accelerate their program. This often allows students to take courses not available at the home institution, reduce expenses by enrolling where costs are lower, or make up for a shortfall in credits. Note that this can also be used strategically: a student fearing a low grade could take a course elsewhere to ensure it isn't included in the GPA of their home institution.
- Concurrent enrollers: students enrolling in courses at multiple institutions simultaneously.
- Consolidated enrollers: students who take a substantial share of their coursework at multiple institutions, but still meet their home institution's residency requirements.
- Serial transfers: Students who make one or more intermediate transfers on the way to a final transfer destination.
- Independent enrollment: students pursuing work unrelated to their degree program who transfer no credits (professional certifications and licensing are examples).

With such a wide variety of transfer students and directions they can take, it can be difficult to accurately portray success of these students. Many traditional metrics of student success focus on key completion related elements including graduation rate, time to completion, and retention rate. Typically, graduation rate is viewed in the context of some percentage of "normal" program completion - the Consortium for Student Retention Data Exchange (CSRDE) and the Integrated Post-secondary Education Data System (IPEDS) both use 150% of normal time, which most often translates into reporting on a six-year graduation rate for students in undergraduate degree programs, while Ontario's universities use a seven-year graduation rate. Time to completion is nominally the time elapsed between when a student begins study at an institution and when they complete a credential. Retention rate doesn't have a universal definition, but is often reported as the percentage of first-year students retained to second year or third year. Many institutions participate in data exchange consortia to allow comparison of these metrics to peer groups, and in some cases be able to report on outcomes for students who have left the institution but continued to study elsewhere.

The two largest exchange consortia in this realm are CSRDE and IPEDS. The CSRDE includes nearly 400 institutions, of which 36 are in Canada, including the Universities of Alberta, Calgary and Lethbridge

and Mount Royal University (Consortium for Student Retention Data Exchange, n.d.). CSRDE is based on data submitted by member institutions. IPEDS has more than 7,500 members exclusively located in the United States and its territories in the Pacific Ocean and Caribbean Sea (National Center for Education Statistics, n.d.). Both the CSRDE and IPEDS report on graduation rate, time to completion, and retention rates, and are based on submissions provided by member institutions through survey instruments. Generally, the data is comparable but not identical, with CSRDE reporting being slightly faster than the equivalent IPEDS reporting (Consortium for Student Retention Data Exchange, 2016).

Criticism of both CSRDE and IPEDS reporting on student success tends to revolve around how cohorts of students are defined. Both initiatives currently base their reporting on an incoming cohort of first-time, full-time, degree seeking students. This definition excludes significant subsets of the student population, in particular part-time students and transfer students which serves neither the sending nor receiving institutions well (Horsch, 2008; McLaughlin et al., 2016; , Cook, 2012). For example, in Massachusetts, nearly two-thirds of community college students do not meet the criteria to be included in the IPEDS graduation rate (Massachusetts Board of Higher Education, 2007); a more extreme example can be found at Marylhurst University in Oregon "a four-year institution that has been recognized for serving adult students, reportedly had a 23 percent, six-year completion rate – namely because a very small subset of its students (just one percent) fall in the first-time, full-time cohort used to calculate completion rates." (U.S. Department of Education, 2015). This exclusion of subsets of student population consequently under-reports student achievement as it does not properly account for "an increasingly mobile student population" (Student Achievement Measure, 2013a). A further criticism of IPEDS data is how it categorizes institutions: any institution offering four-year baccalaureate degrees is deemed a four-year institution, even if four-year programs are a very tiny part of their mission (Ma and Baum, 2016). Additionally, it is felt that the survey instruments used by IPEDS are not nimble enough to keep pace with the changes occurring in the higher education landscape (Engle, 2016). Further, even those students who originally met the criteria can end up outside the reporting boundaries: using the 150% of "normal" time as a graduation rate would be too short of a time window and ultimately exclude students who opted to study part-time later in their careers as a result of life changes, students who participated in additional non-credit training such as literacy or numeracy work, or those who repeated too many courses. Some studies have recommended including "full-time only", "part-time only", and "mixed" categories for reporting (Soldner et al., 2016).

The same challenges exist when discussing persistence metrics like retention rate due to the cohorts being defined in the same way. However, there "is still no universally accepted definition or measurement (operationalization) of retention. This makes comparisons very difficult" (Van Stolk, et al. 2007).

There is also criticism over using and publishing metrics: some suggest that institutions actively manage their cohorts to improve their graduation rate by deferring potentially less-qualified students to a non-Fall start term (which isn't currently counted by IPEDS) (Soldner et al., 2016) .

When defining metrics, it is important to keep in mind that many are used by outside organizations. For example, the College Scorecard is a public facing website that "provides students and families the critical information they need to make smart decisions about where to enroll for higher education" (U.S. Department of Education, 2013) and is part of the accountability initiatives of the US Department of Education. Ranking agencies such as Times Higher Education World University Rankings, QS World University Rankings, and Maclean's University Rankings Canada routinely consider student success-

related metrics as part of their publication. Prudency in determining where new metrics could be used by external agencies reduces the chance that the metrics are used incorrectly.

Notwithstanding the above criticisms, the use of the traditional first-time, full-time, degree seeking definition allows for easy comparison of results across programs both within institutions and across the post-secondary sector. Additionally, the CSRDE members began studying the inclusion of transfer students in 2005, finding that the tremendous variation in transfer student characteristics was a challenge to be overcome. Out of this process, the CSRDE did create a data sharing protocol aimed at including transfer students who had completed at least one year of community college (McLaughlin et al., 2016).

IPEDS also includes a transfer-out rate for those institutions who have a core transfer mission, which is reported separately from graduation rate (National Center for Education Statistics, 2017). Reporting this transfer-out rate is optional for non-transfer institutions, however, and some studies found it to be underreported because institutions have limited access to data at other institutions (IPEDS Technical Review Panel, n.d.).

In response to much of this criticism from institutions and in the research literature, IPEDS expanded its also expanding its data collection for the 2016 cycle to include transfer and part-time students in its completion rates (U.S. Department of Education, 2015). Consequently, the new IPEDS cohort now consists of 4 Outcome Measure Student Groups beginning with the 2015-16 and 2016-17 cohorts: First-Time Full-Time (FTFT) - similar to what has been collected since the 1990s, First-Time Part-Time (FTPT), Non-First-Time Full-Time (NFTFT), and non-First-Time Part-Time (NFTPT). For these expanded cohorts, IPEDS now reports awards conferred at 6 and 8 years following graduation. If the student did not graduate, they have to reported as still enrolled, transferred, or unknown (Jones, 2017).

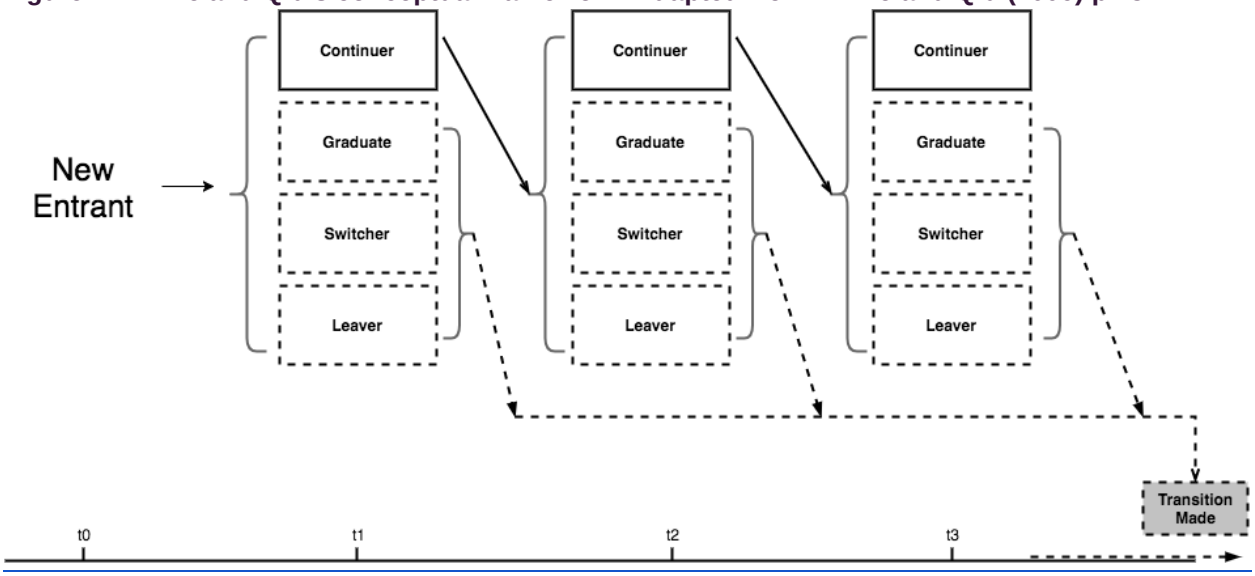
Conceptual framework: student transitions

This report will focus on transfer student populations, but some of the measures developed could also be useful to measure the success of other types of students not traditionally captured by success metrics (for example, part-time students who were not transfer students). The case study performed in this report includes all faculties at ULethbridge, generally including undergraduate degree programs, but also some undergraduate diploma programs. This program level information was aggregated to the faculty level in the data used for this study. Additionally, many of these measures will work for programs that are not four-year degree programs; however, the challenge then becomes making meaningful comparisons for benchmarking purposes - is it reasonable to compare a two-year program to a four-year program? The answer will depend on the context in which the institution operates, and the mix of programs available.

The case study utilizes the conceptual framework developed by Finnie and Qiu (2009) called a "spell time" approach, whereby time was represented in event-years defined as the number of years elapsed since the student began studying. Finnie and Qiu focused on four broad statuses for each student in each year: Graduate, Continuer (in the same institution), Switcher (began studying at a different institution), and Leaver (left PSE without graduating, or no longer in the data file for this regional study). Because the case study data is limited to a single institution, the Switcher status will be reported as Left. The case study uses a mixed methods approach based on best practices identified in the literature review, in contextual conversations with ULethbridge, and focusing the analysis and conclusions comparing direct entry with internal and external transfer students based on the key metrics used in this report.

Finnie and Qiu's original model is shown here:

Figure 1: Finnie and Qiu's conceptual framework. Adapted from Finnie and Qiu (2009) p.23.



For the purposes of this research, the term "Registered" will be used in a similar way to Finnie and Qiu's "Continuer", but note there may be continuing students not registered in courses at the university that this study will otherwise consider as a leaver. Similarly, "Graduated" is used to represent students who complete their credentials. Because this is a single institution study, "Left" will encompass both "Switcher" and "Leaver". More details on definitions can be found in key terms.

Student success metrics

In order to accurately gauge student success, particularly for non-traditional students, we utilized the following principles as identified by the American Institutes for Research principles for the inclusive measurement of student outcomes (IMSO) (Soldner et al., 2016):

1. Include all entering students, without restriction;
2. Include the outcomes those students achieve at all known institutions;
3. Collect yearly measures of student outcomes, measured from the perspective of the student, and report those outcomes yearly.

IMSO holds that it is important to include all students in measures of persistence and completion because it would provide more complete information to students, educators, and policymakers. The report also notes that the concept of measuring enrolment intensity (full-time vs. part-time) is becoming timeworn: as students enroll at an increasing number of institutions for a smaller number of credits, this measurement becomes increasingly meaningless (Cook, 2016). IMSO's yearly outcome reporting suggests presenting both completion and persistence rates for every year of a six-year period, regardless of program. Further support for the first two principles can also be found in Answering the Call: Institutions and States Lead the Way Toward Better Measures of Postsecondary Performance, a research report written for the Bill and Melinda Gates Foundation (Engle, 2016).

Research demonstrates that adding an additional cohort of transfer students who have completed 30-credit hours at a transfer institution is sufficiently reliable and valid as a predictor of student success (McLaughlin et al., 2016).

Based on both the literature review and the insight gained from the environmental scan, we propose studying the following metrics at the University of Lethbridge:

- Time to completion: number of elapsed years between when the student began studying and graduation.
- Graduation rate at the following points in time relative to expected program completion times:
    - 100%, 150%.
        - Here we note that longer than 200% would be optimal, particularly for students who are part-time, but with data starting in 2010, this is not realistic at this time.
    - Graduation rate at 100% of expected program completion time, split by post-secondary sector, for transfer students only.
    - Progression and retention (percentage of students continuing at the institution):
    - Progression over time (registered, left, or graduated).
    - Retention to student term (ie: 1st term, 2nd term, 3rd term, etc)
    - Retention to 15, 30, 45, 60 credits completed
- GPA at graduation regression analysis
- Average credits taken over time

The regression analyses makes further use of demographic and academic information provided and, where applicable, metrics will be further divided by the academic and demographic information provided for the case study: student faculty in first registration term, GPA for each registration year, full / part-time status, demographic information (national status, aboriginal status, gender) and last school attended (or sector) prior to attending ULethbridge.

Where these metrics diverge from the common metrics used by organizations like the CSRDE and IPEDS is that they will focus on all students, rather than just first-time, full-time, degree seeking students. This approach enables some opportunities but also some challenges. The opportunity is that institutions can gain a stronger understanding of populations not well served by the traditional student success metrics, better aligning with the principles of IMSO. The challenge is whether grouping these types of students together is perceived as fair or accurate. For example, because part-time students and full-time students behave so differently, it may be more prudent in the institutional context to separate part-time and full-time students in certain completion and project metrics.

The metrics used for the case study in this report are further defined in key metrics.

An additional challenge related to this study is that we are relying on institutional rather than regional or system data and therefore student success and persistence will be underrepresented due to the nature of students transferring to different institutions, or taking a longer break from their studies as noted by Finnie and Qiu (2009).

Case Study

Methodology

This project looked at ways of measuring transfer student success at ULethbridge. The proposed metrics for this report's analysis were developed using a mixed methods approach that consisted of

- applying recommendations for best practices for methodology and parameters for analysis identified in the literature review,
- contextualizing the analysis within information gained from the environmental scan about ULethbridge, which included informal qualitative data in the form of conversations with targeted representatives from ULethbridge, and
- focusing the report's core analysis and conclusions on a regression analysis of quantitative ULethbridge data that were based on targeted data metrics for analysis of transfer student success in comparison to direct entry students.

The analysis included students spanning 2010 Fall through 2017 Fall, including direct-entry and transfer students studying full-time or part-time. It excludes open studies students.

Data transformation summary

The University of Lethbridge provided Plaid with a dataset containing anonymized student enrolment records by term, representing 16,458 unique students pursuing credentials at ULethbridge. The case study period started in 2010 Fall, and ended in 2017 Fall.

For this case study, we took the base data provided by ULethbridge and transformed it into a number of database tables that could be utilized specifically for student success type analysis:

- term_tbl: a list of allterms included in this study
- student_term: this table houses enrolment records for each student in each term they were enrolled.
- student_program: this table houses records for each student at the time of admission. This table also houses bio-demographic information, where provided, including gender, indigenous status, and national status.
- student_progression_term: this table brings together information from term_table, student_term, and student_program. It ensures that reporting on student status from the time of entry until 10 years in the future is conceptually possible (though limited by length of the dataset)

Data was transformed primarily using Safe Software's FME, data analysis was primarily conducted in Tableau, and regressions were run in PyCharm CE using an Anaconda-based Python 3.6 Jupyter installation and the numpy, scipy, and scikit-learn Python modules. These tables, and the transformations required to build them, are further described in the sections that follow.

Further information on the data structure and associated transformations is provided in the appendix.

In order to enable our data analysis, we recoded the ULethbridge data so that it could be used for further analysis as consistently as possible with the case studies on three other institutions (University of Alberta, Mount Royal University and MacEwan University) that Plaid completed for ACAT. Generally, this consisted of the following processing of the data:

- Admit type: the institutional definition was used. See key terms for a complete definition.
- Demographic variables: Gender was converted to a short code using the first character of the institution provided Gender field. Visa Status (Domestic/International) was renamed to National Status and represented as D (Domestic), I (International), or U (Unknown). Academic Plan type was assumed for this study to be "Degree". This was not perfect as some faculty offer credentials other than degrees. Information was assigned to the field Program based on the field Faculty code provided by ULethbridge.
- Admit term, current term, last enrolled term and completion/graduation term were recoded to a term ID number. Terms ending in 01 represents Spring, 03 represents Summer and 04 represents Fall. Graduation terms were also recoded to be the end date of the students last enrolled term to best ensure a fair representation of time to completion regardless of convocation ceremony date. Term end dates are represented as April 30 for all terms ending in 01, August 30 for all terms ending in 03, and December 30 for all terms ending in 04. These calculated term end dates were used in calculating the number of years from the start of the admit term to graduation.
- A graduated flag (Y/N) was calculated based on the graduation date in the base data.
- Cumulative earned credits were calculated based on term credits passed.
- Term credits passed was used as the indicator of how many credits the student had completed, and forms the basis of cumulative earned credits.
- A calculated number of registered terms was created for each student for use in progression metrics.
- A status variable was created, which includes 4 possible statuses: registered, active but not registered (and returned later), graduated, and left. If the student is registered in courses, status is set to “registered”. If the student is enrolled in a subsequent term but not the current term, they will show as "active but not registered". If the student has graduated and is no longer registered, they will show as “graduated” starting from their graduation term. If the student is neither registered nor graduated then they will show as “left”.

versus first admission programs (such as XXX), or diplomas versus degrees, and so on) would assist in ensuring the metrics were applied correctly to the right programs. These limitations, in part, inform the future research recommendations in this project, which generally recommend datasets with a wider variety of variables (such as academic program, plan, additional demographic variables, or more detailed course enrolment information) and for a sufficient period of time.

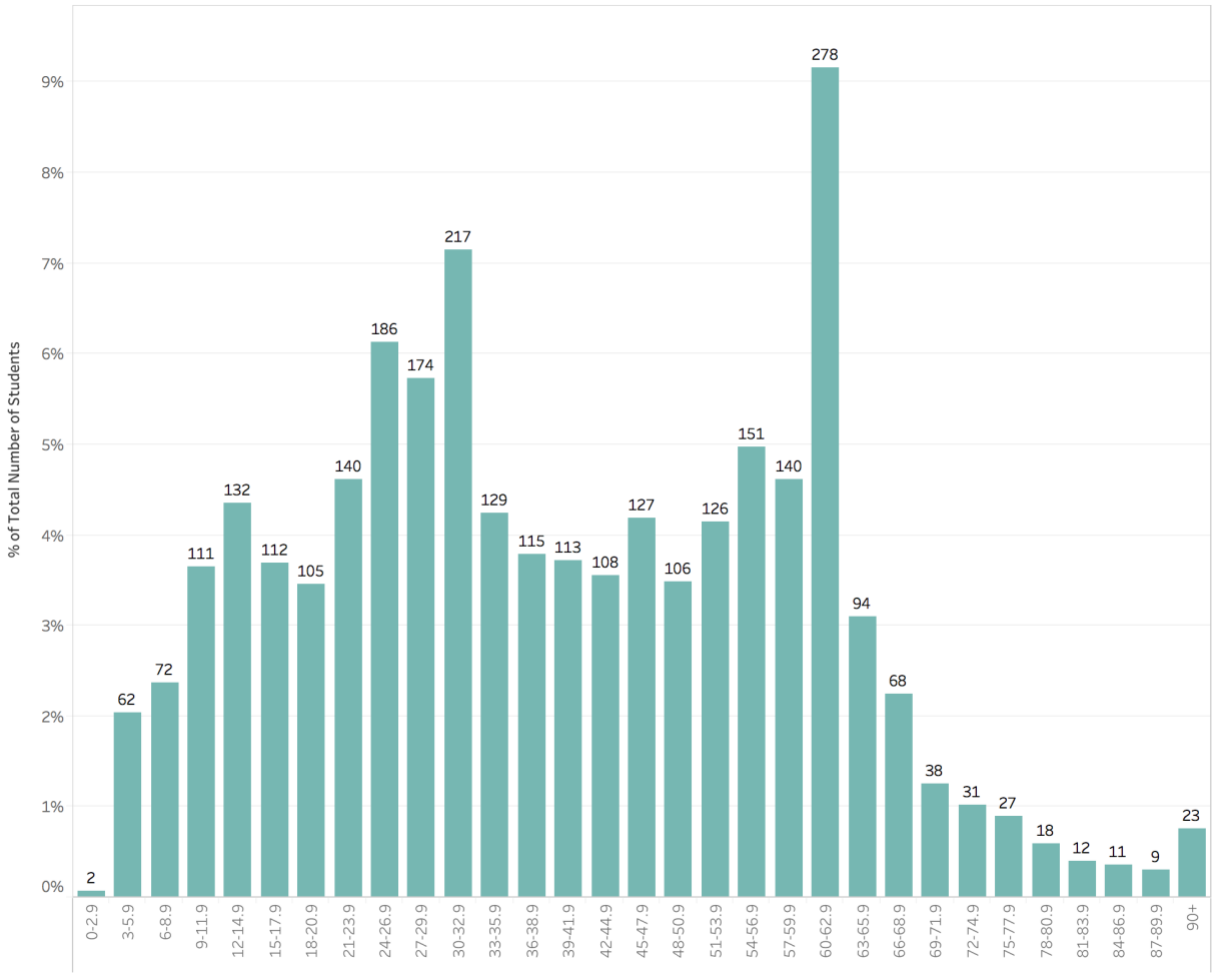
Credit normalization

In several of the key metrics for this study, we have employed normalization to provide a more fair comparison between direct entry and transfer students. Where applicable, three versions of a metric are presented: unadjusted, normalized to 30 credits, and normalized to 60 credits. In the normalized versions, direct entry students are assessed from the time that they amass the requisite number of credits within the institution and compared with transfer students with similar number of transfer credits.

To determine the appropriate number of credits to normalize with, we used a combination of analysis of the transfer credits presented in the data, and conversations with the institution to ensure that the choices made in this research aligned with their own internal methods. The spread of transfer credits presented in the data is shown in Figure 2 below. The figure shows an average number of transfer credits awarded as 38.4, and that the most common number of transfer credits (among those with transfer credit) in this dataset was 60-62.9 followed by 30-3.2.9, 24-26.9, 27-29.9, and 54-56.9. Of particular interest to this study was the large group of students with 30-32.9 and 60-62.9 transfer credits. This range of transfer credits, in conjunction with conversations with ULethbridge, helped to determine that the 30 credit and 60 credit marks were appropriate points to conduct normalization.

We chose to compare direct entry students from the time they amassed 30 credits within the institution with transfer students possessing 30-36 transfer credits. A similar analysis was conducted for direct entry students from the time they amassed 60 credits versus transfer students with 60-66 transfer credits. We chose these normalization points for two primary reasons: first, there are a large number of transfer students with 30 and 60 transfer credits, respectively (see Figure 2), and second as these are logical points in a student's academic career, from the perspective of ULethbridge (end of first year and end of second year).

Figure 2: Transfer credit distribution



Definition of transfer student

This study utilized the admit type definitions provided by ULethbridge. We recoded "Post-Secondary Transfer" as transfer, and "Direct Entry from High School" as direct entry. Other admit types were excluded from the study as they were not directly comparable to the study focus of direct entry and transfer. ULethbridge has a large proportion of transfer students, which may be attributable to several different reasons. One is the threshold used to determine admission as a transfer student (minimum 5 courses to be evaluated solely as a transfer student, or minimum 3 courses to be evaluated based on both high school and transfer courses). Additionally, ULethbridge includes students that have previously completed a bachelor's degree in the definition of "transfer" student, a category that many other institutions treat separately.

The table below shows the resulting number of students within each category.

Table 1: Total students records by admit type

	Admit type
Direct entry	9,161
Transfer	7,297
Total	**16,458**

In order to conduct an analysis that accurately compared transfer students and direct entry students, we had to exclude students who were admitted prior to the start of the study period. This amounted to 110 students. Thus, the following number of students remained for further analysis.

Table 2: Total students records analyzed by admit type

	Admit type
Direct entry	9,097
Transfer	7,251
Total	**16,348**

The data provided by ULethbridge indicated the faculty in which a student was pursuing a program, with many programs being offered by two faculties in cooperation. The percentage of students in each faculty that are transfer students varies considerably, as can be seen in Table 3.

Table 3: Total students records analyzed by faculty and admit type

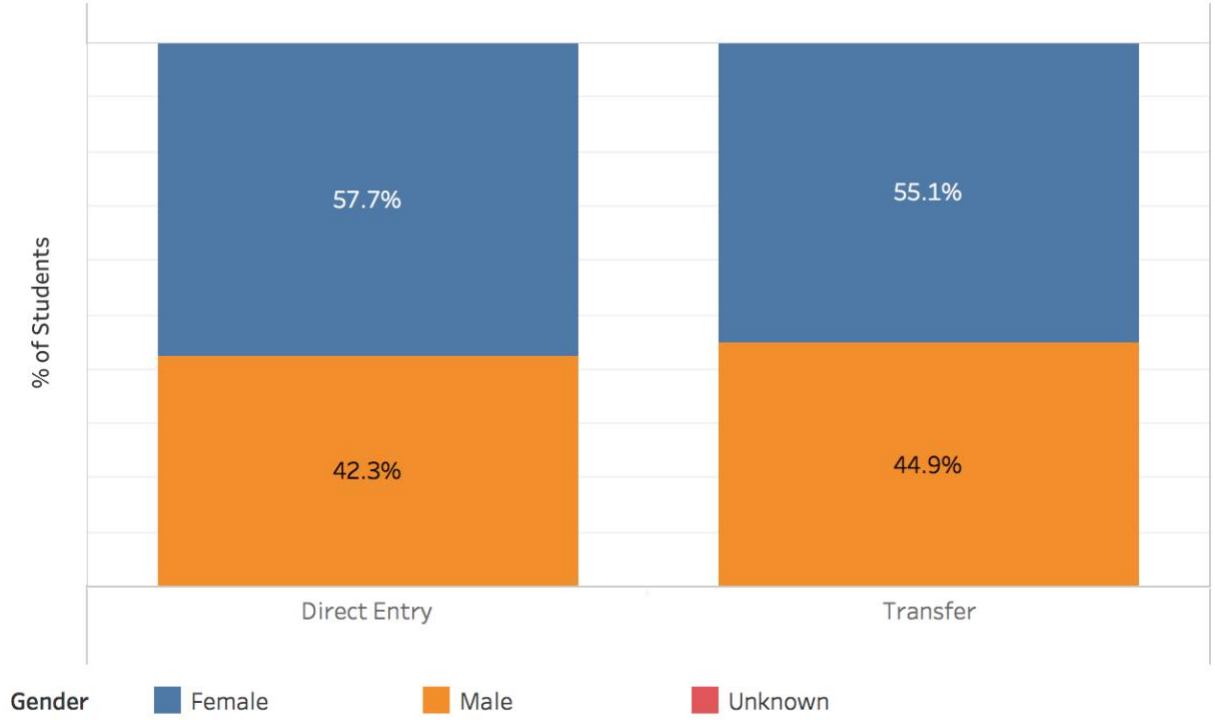
Faculty	Number of Direct Entry Students	Number of Transfer Students	Proportion of Students that are Transfers
Arts and Science	4,563	1,997	30.4%
Arts and Science/Education	1,902	864	31.2%
Arts and Science/Management	118	32	21.3%
Education		177	100.0%
Fine Arts	704	236	25.1%
Fine Arts/Education	302	88	22.6%
Fine Arts/Management	31	6	16.2%
Health Sciences	223	491	68.8%
Health Sciences/Management	20	10	33.3%
Management	1,191	3,310	73.5%
Management/Education	43	40	48.2%
Total	9,097	7,251	44.4%

Education is 100% transfer students, as students entering to complete a second-degree Bachelor of Education will be coded as transfers, while students who are direct entry complete another credential alongside the Bachelor of Education (in what ULethbridge calls a “combined degree”) and are coded in the “/Education” programs. In Management and Health Sciences, transfer students are the majority, due to program options specifically setup to be pursued after a completed degree or diploma. ULethbridge’s Calgary and now-shuttered Edmonton campuses also focused on post-degree and post-diploma options for students in Management programs, and the vast majority of students at these campuses were transfer students.

Demographics and previous institution

Figure 3 shows the breakdown of students by gender. ULethbridge records 3 separate gender identifiers (male, female, and unknown) but the number of students listed as "unknown" (N=1 across all admit types) are sufficiently small that they are not discernable in the figure. Males make up a larger proportion of transfer students (44.9%) than direct entry students (42.3%), with the difference being 2.6 percentage points (pp).

Figure 3: Gender breakdown of University of Lethbridge students studied



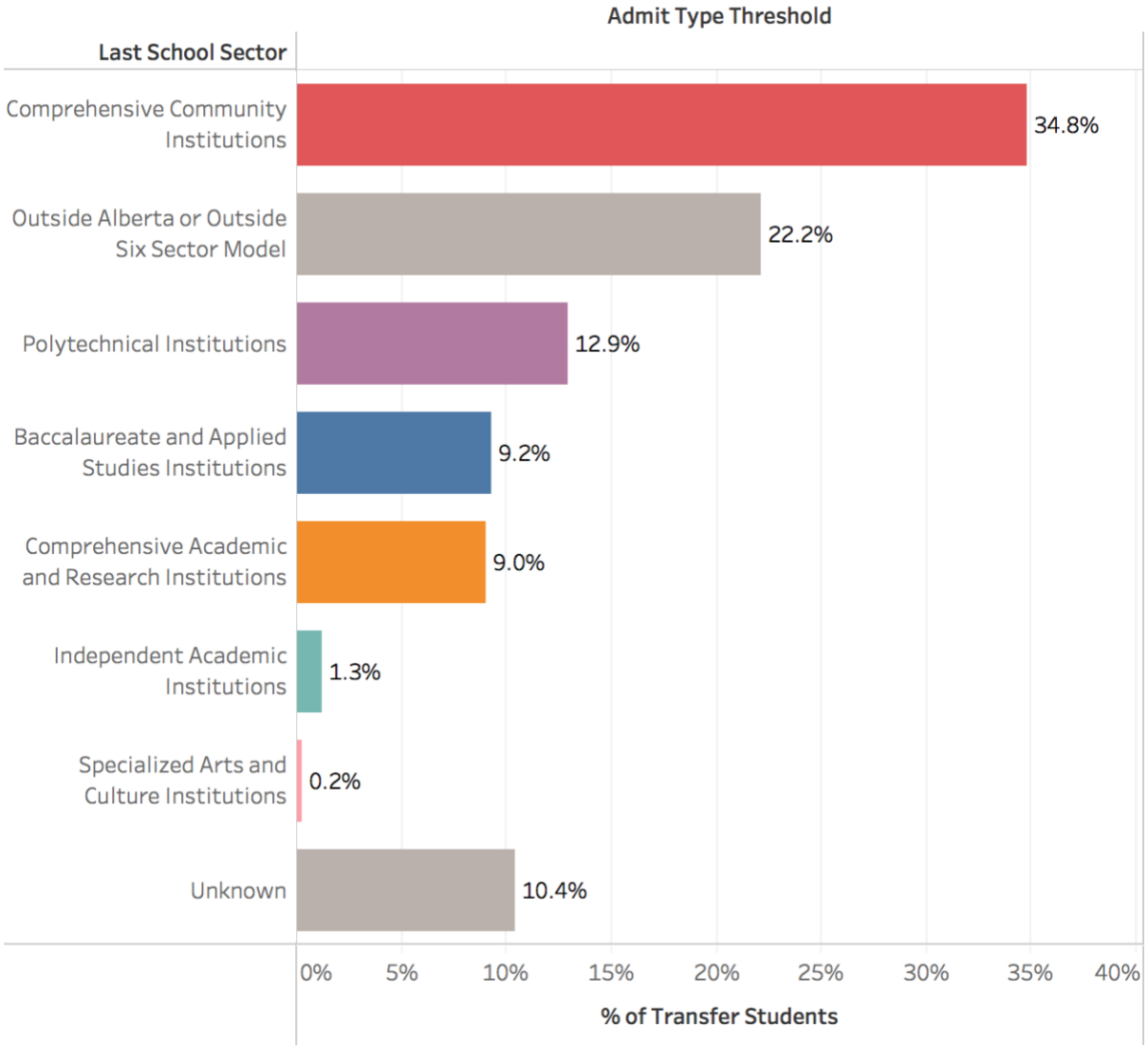
In addition to demographic information, ULethbridge provided the most recent school attended by the student before their entrance to ULethbridge; this information is shown in Figure 4 for transfer students only. Institutions were classified based on where they fit within Alberta Advanced Education's Six Sector Model of publicly-funded institutions (Alberta Advanced Education, 2007), or as outside Alberta or outside the six sector model.

The largest group of transfers to ULethbridge came from comprehensive community institutions, which includes institutions such as Lethbridge College and Medicine Hat College (34.8%), followed by institutions either outside Alberta or outside the six sector model[1] (22.2%; note: some post-secondary institutions in Alberta are outside the six sector model, such as First Nations Colleges, but do participate in Alberta's Transfer and Pathways System and may have transfer students moving to ULethbridge. This

[1] Our dataset did not include a province for the last institution, so we were unable to split the "Outside Alberta or Outside Six Sector Model" group based on province.

group also includes institutions in British Columbia geographically close to the Rocky Mountains, but outside Alberta). The third-largest group is from polytechnical institutions (12.9%), a group which includes the Northern and Southern Alberta Institutes of Technology. Baccalaureate and applied studies institutions make up 9.2% of the transfers, a group which includes Mount Royal University and MacEwan University. Comprehensive academic and research institutions make up 9.0%, a group which includes the Universities of Calgary, Alberta, and Lethbridge, as well as Athabasca University. Much smaller groups come from independent academic institutions (1.3%) and specialized arts and culture institutions (0.2%). 10.4% of students did not have a last institution listed.

Figure 4: Previous institution breakdown of students transferring in to ULethbridge



Key metrics

This section focuses on key metrics that compare the success of transfer students and direct entry students. Additionally, several metrics are framed in the context of normalizing the data. For example, on the time to completion metrics, there is an "unadjusted" version which just compares transfer and direct entry. Predictably, transfer students finish their degrees quicker (owing to their transfer credits received). There are also normalized metrics for time to completion. At ULethbridge, this includes a normalization at 30 credits and 60 credits. For the 30 credit version, direct entry students are measured from the time they hit 30 credits at ULethbridge, and are compared to transfer students with between 30 and 36 transfer credits. As a rough proxy, this means comparing a direct entry student at the start of their second year with a direct entry student who has transferred in enough credits to begin second year.

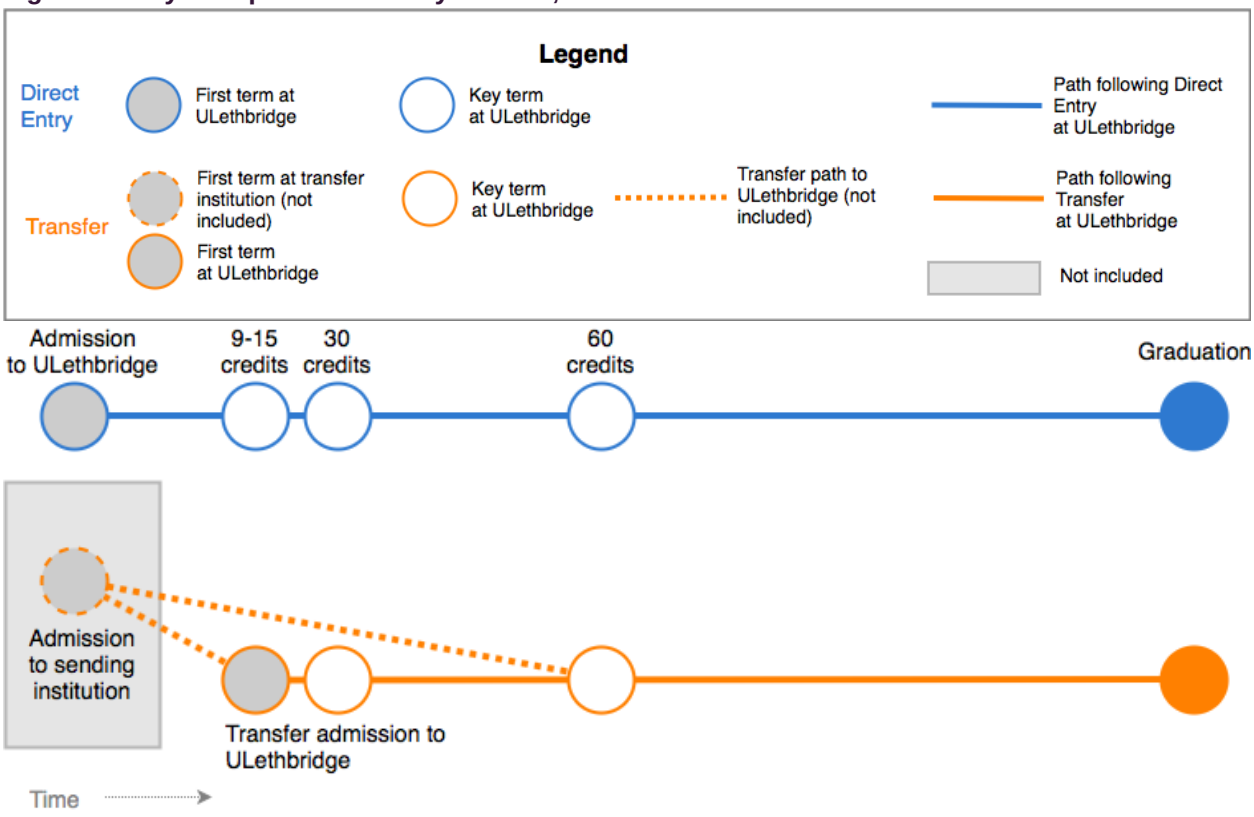
This report contains 5 major metrics:

- Study metric 1: time to completion
- Study metric 2: graduation rate
- Study metric 3: progression
- Study metric 4: grade point average at graduation
- Study metric 5: average credits over time

Within these metrics, time to completion, graduation rate, and progression (study metrics 1-3) contain unadjusted, normalized to 30 credit, and normalized to 60 credit models. Time to completion (study metric 1) has both a descriptive statistics version and a regression version, and grade point average at graduation (study metric 4) contain regression analyses, while the other metrics (study metrics 2, 3, and 5) are descriptive statistics. Regression analysis allows the study to better control for the effect of different variables such as faculty, gender, or indigenous status, while descriptive statistics show a high-level summary for the group.

Figure 5 illustrates key points in the student's academic career: the time of admission to ULethbridge , 9-15 credits (the earliest point at which transfers are coded as transfer), 30 credits (end of first year), 60 credits (end of second year), and graduation. Note that the time of admission to the sending institution for external transfer students is shown here for illustrative purposes, but is otherwise not known to this study.

Figure 5 - Key time points for study metrics, overview



Time to completion (study metric 1) calculates how long, in years, it takes students from a key start point at ULethbridge to graduation. Graduation rate (study metric 2) calculates what proportion of the admit cohort achieved graduation within 4 or 6 years.

Grade point average at graduation (study metric 4) is calculated at the time of graduation also shown in these figures. For each of these metrics, graduation is a fixed point in time.

Figure 6 augments Figure 5 by adding an overlay that shows the 3 models (unadjusted, normalized to 30 credits, and normalized to 60 credits) employed for these study metrics.

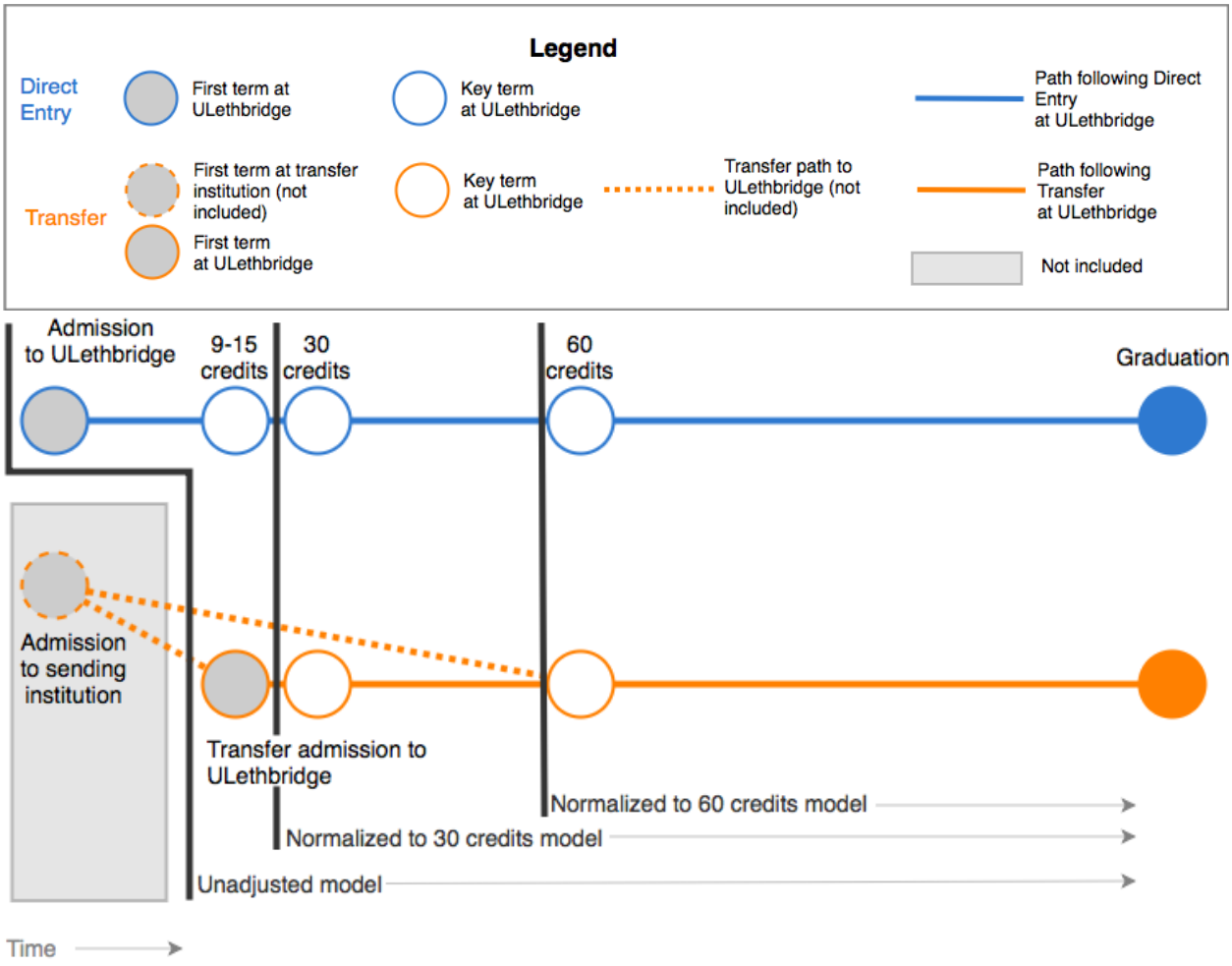
The unadjusted model compares from the start of the ULethbridge admission year to the end date of the graduation year, as shown in Figure 6, with the start point illustrated by the leftmost grey dashed line. All groups here are measured from their most recent admission year to graduation. Note, however, that transfer groups will have amassed at least 24 credit hours via transfer.

The normalized to 30 credits model is a method to compare these admit groups using a common baseline of 30-36 credits achieved, either within ULethbridge or externally. Figure 6 illustrates this concept, with the start point shown by the middle grey dashed line. In this model, students are compared from the same starting point (30-36 credits) through graduation.

Similarly, the normalized to 60 credits model is a method to compare these admit groups using a common baseline of 60-66 credits achieved, either within ULethbridge or externally. Figure 6 illustrates this concept, with the start point shown by the rightmost grey dashed line. In this model, students are compared from the same starting point (60-66 credits) through graduation.

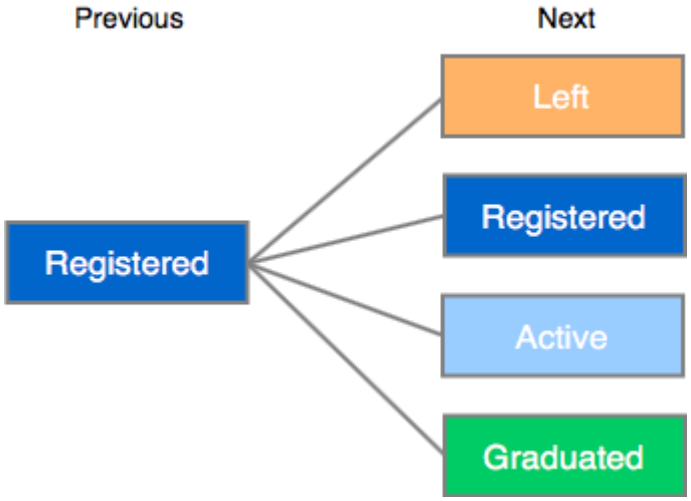
Study metric 4, average GPA at graduation is calculated at the point of graduation for each of the direct entry and transfer admit types.

Figure 6 - Key time points for study metrics, by model



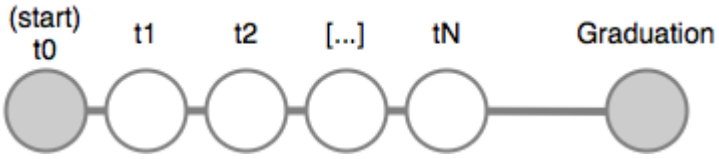
Study metric 3 (progression) has two forms. The first form is a progression status in each year, as shown in Figure 7. This metric begins with a particular admission cohort who were registered in the previous year, and shows the proportion of that cohort in one of four statuses: left, active but not registered (and returned later), registered, active but not registered (and returned later), and graduated. Further definitions on the terms used in this report can be found in key terms.

Figure 7 - Annual progression



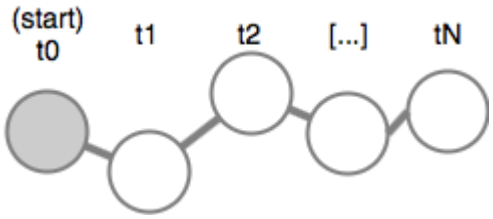
The second progression metric is progression to a particular registration year (see Figure 8). This metric considers the proportion of an admit cohort who continued to register after a specific number of years. The start point (start / y0) is dynamic in much the same way as the previous metrics: there is an unadjusted model, where the start point is the admission term; a normalized to 30 credits model, where the start point is the completion of 30-36 credits; and, a normalized to 60 credits model, where the start point is the completion of 60-66 credits. In the figure below, t0 represents the start point of the model, while t1 means the student has completed 1 term, t2 means completed 2 terms, and tN means completed N terms.

Figure 8 - Progression to registration year



Study metric 5, average number of credits over time, shows the average number of credits pursued in particular years for each admit type group (see Figure 9). In this representation of the metric, t0 represents the starting point, with t1 representing the number of credits in term 1, t2 representing the number of credits in term 2, and tN representing the number of credits in term N.

Figure 9 - Average number of credits



Each metric is now explored in more detail.

Study metric 1: Time to completion

The following section focuses on time to credential completion: defined as the number of elapsed years between when the student began studying and graduation.

Time to completion descriptive statistics

This measure of time to completion was limited to students who:

1. graduated
2. were admitted at least 5 years prior to the end of the study period
3. were admitted after the start of the study period

Figure 10 shows that transfer students, graduate more than one and a half years faster than direct entry students.

Figure 11, where direct entry students are normalized as of the point that they first complete 30 credits, shows a considerably narrower gap - transfer students finish about 4 months faster than their direct entry counterparts. Note that the transfer student group in this metric is fairly small (N<200).

Figure 12, where direct entry students are normalized as of the point that they first complete 60 credits, shows transfer and direct entry students finishing at about the same time. Note that the transfer student group in this metric is fairly small (N<200).

Table 4 summarizes the results of the 3 models.

Figure 10: Time to completion descriptive statistics (unadjusted)

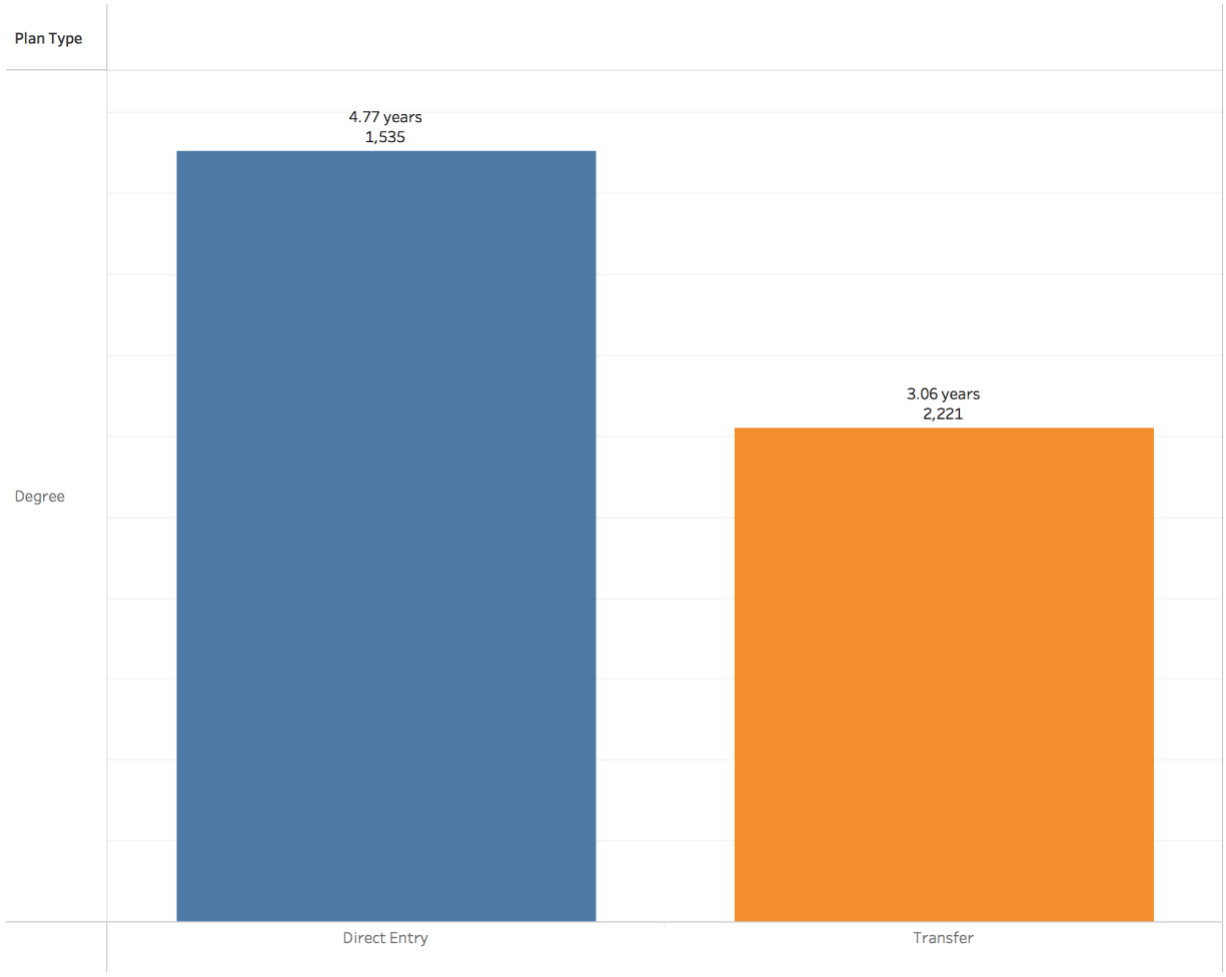


Figure 11: Time to completion descriptive statistics (normalized to 30 credits)

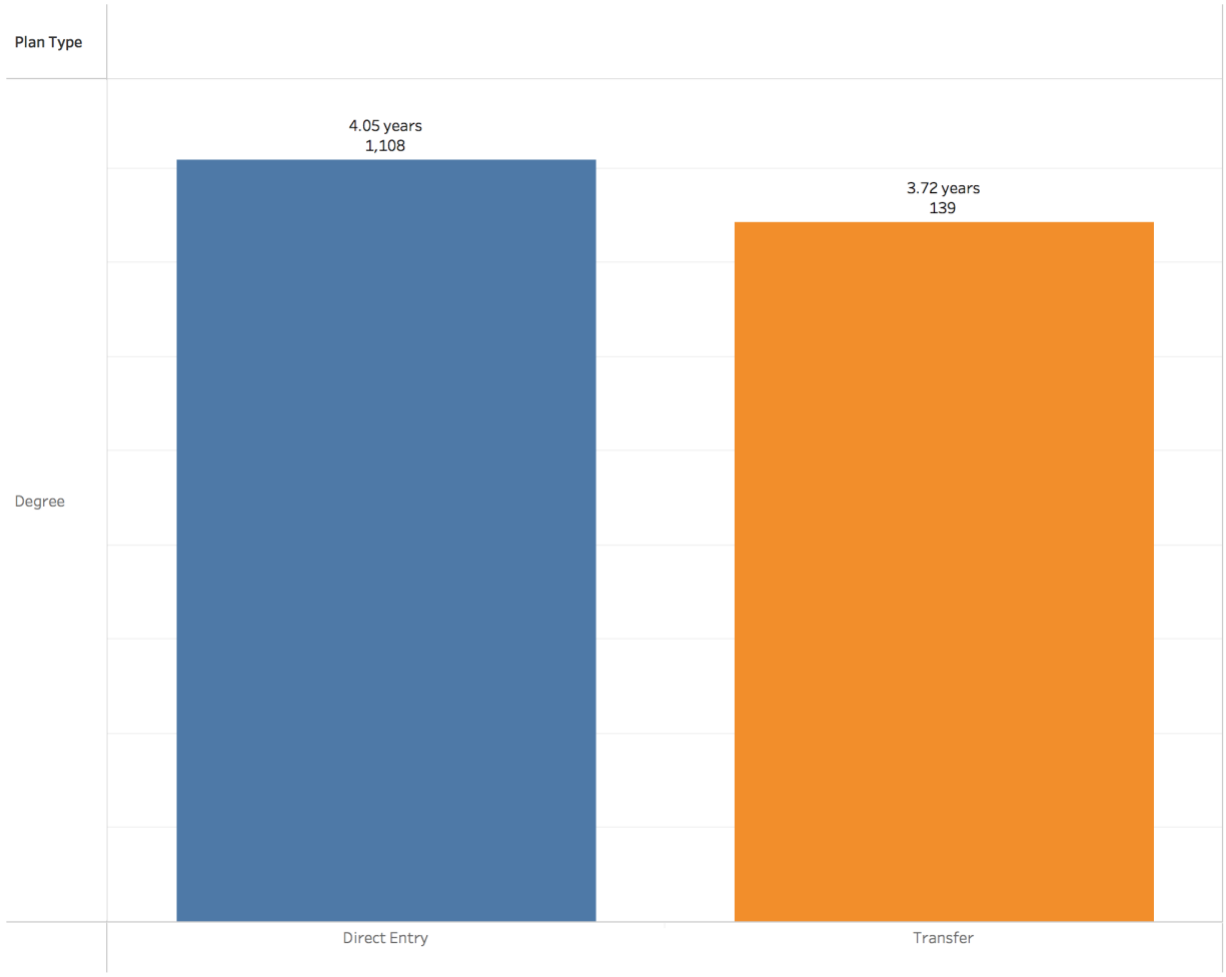


Figure 12: Time to completion descriptive statistics (normalized to 60 credits)

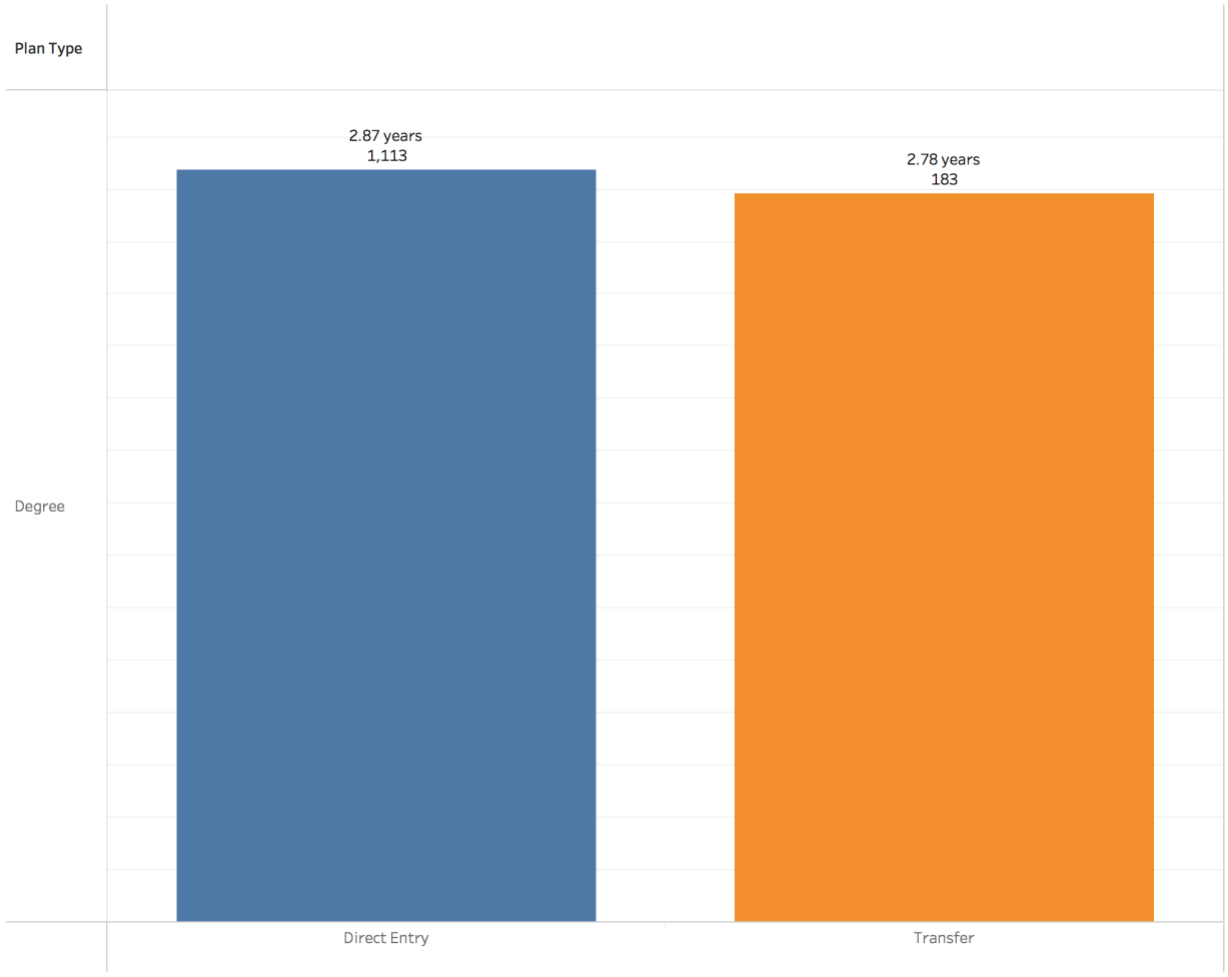


Table 4: Time to completion descriptive statistics (all models). Note: this table is replicated in the conclusion as Table 7.

		Avg. Time to Completion		Number of Students	
Model	**Plan Type**	**Direct Entry**	**Transfer**	**Direct Entry**	**Transfer**
Unadjusted	Degree	4.77	3.06	1,535	2,221
Normalized to 30 credits	Degree	4.05	3.72	1,108	139
Normalized to 60 credits	Degree	2.87	2.78	1,113	183

Time to completion regression

To see how transfer status and transfer credits would affect a student's time to completion, we performed an ordinary least squares (OLS) linear regression on the information provided by ULethbridge. The variables we included in the model were:

- International (from the national_status field, 0=D or domestic, 1=I or international)
- Female (from the gender field, 0=M or male, 1=F or female)
- Student program (from the program field, re-coded as dummy variables with 0 indicating the student was not in that particular program and 1 indicating they were in the program; this also allows us to account for combined degrees with longer expected times to graduation)
- Admit academic year (based on the student's first enrolled term at ULethbridge, re-coded as dummy variables with 0 indicating the student did not begin at ULethbridge in that year and 1 indicating that they did)

We included in the model all students who began at ULethbridge in Fall 2010 or later and who had graduated by Summer 2017, the last term finalized before the data was produced. We excluded students of unknown gender (1) or who graduated from the programs in Fine Arts/Management (1) and Health Sciences/Management (2); in all cases the numbers were sufficiently small that their inclusion in the model could have skewed results. Additionally, students in the Education program were excluded as it contains only transfer students. Only students who began their studies at ULethbridge at least 5 years prior to the end of the study period were included.

Our model dataset included 2,685 students, including 1,536 transfer students and 1,149 direct entry students. Programs varied from 1,767 graduates (Management) to 26 (Arts & Science/Management), and admission academic years were 1,386 graduates (2010/11) and 1,299 (2011/12). The average time to graduation across all 2,685 students was 3.85 years.

In order to interpret the results from the OLS model, there are several different results we need to look at. The first is the model's R^2, which provides information on how much of the variation in time to completion can be attributed to the inputs; a value of 0 means that our regression is no better than using a base case of assuming everyone will graduate at the average time to completion, while a value of 1 means that our regression perfectly predicts the time to completion. The R^2 can be read as the percentage of the differences in time to completion that is predicted by the model, such as a model with R^2 of 0.279 is said to predict 27.9% of the variation. The second element to look at is the coefficient for each input to the regression, which indicates how that input affects the result of the regression. In this case, using time to completion, if an input had a coefficient of 0.5 then the generated model suggests that for each increase of 1 in that coefficient the time to completion would be 0.5 years longer. (Some coefficients, like the transfer flag, are either 0 or 1, while others, like the number of transfer credits, could be many different values.) The final element is the input's p-value, which provides a measure of the statistical significance of the input. Similar to R^2, p is measured between 0 and 1; in p's case, however, we want lower values and below p = 0.05 an input can be called statistically significant. In our model analysis here, we will concentrate on the R^2 for the overall model as well as the coefficient and p values just for the transfer flags.

Generating the OLS model with the variables listed above (international, female, program, and admit academic year) provides an R^2 of 0.159, meaning that 15.9% of the variance in time to graduation can be explained by those factors alone. Students who were international (-0.175) or female (-0.017) tend to graduate slightly faster. Students in Health Sciences and Management programs graduate more quickly, but as these programs contain the highest concentrations of transfer students this result is not unexpected (as discussed above in Definition of transfer student.)

When we add the transfer flag to our base model our new model has an R^2 of 0.398, a significant boost of 23.9 percentage points from our base model R^2 of 0.159. The transfer flag has a coefficient of -1.544 ($p < 0.001$), indicating that transfer students will graduate over 18 months sooner than an otherwise similar non-transfer student.

Using a model that includes the base model variables along with transfer credits, the R^2 is 0.223 which is better than our base model but does not explain as much variance as the transfer flag. Each transfer credit a student brings to ULethbridge suggests they will graduate 0.017 years sooner. This translates to slightly over 19 credits of transfer credit to graduate 4 months or 1 term earlier, and 39 transfer credits to graduate 8 months or 2 terms/1 academic year earlier.

Finally, we created a model that included both the transfer flag and the number of transfer credits a student brought to ULethbridge beyond the threshold of 30. In this case, our model had a R^2 of 0.399, indicating it is similar in predictive ability to our transfer flag model; the number of transfer credits over the threshold does not show statistical significance.

In keeping with our descriptive statistics analysis above, we also looked at how long it took students to graduate from the point at which they had obtained 30 and 60 credits. We also created an additional indicator for the number of credits above the 30 or 60 credit threshold the student came into the term with, allowing us to account for the fact some students will have, for example, 33 credits and some 30 and compare appropriately.

The graduation-from-30-credits model had 836 direct entry students and 509 transfer students. Students were included if either they were a transfer student who entered ULethbridge with between 30 and 36

credits, or if they were a direct entry student who entered a term at ULethbridge with between 30 and 36 credits. The model has an R^2 of 0.136, and the transfer flag has a coefficient of -0.272***, meaning a transfer student will take approximately 3.2 fewer months to graduate after having achieved 30 credits than an otherwise similar direct entry student would.

The graduation-from-60-credits model looked at 842 direct entry students and 495 transfer students. Students were included if either they were a transfer student who entered ULethbridge with between 60 and 66 credits, or if they were a direct entry student who entered a term at ULethbridge with between 60 and 66 credits. The model has an R^2 of 0.143, and the transfer flag has a coefficient of 0.214**, meaning a transfer student will take approximately 2.6 months longer to graduate after having achieved 60 credits than an otherwise similar direct entry student would. The smaller difference in time to graduate between direct entry and transfer in the 60-credit model from the 30-credit threshold is due to students having completed a further year towards their credential and the smaller number of credits required from this point.

Study metric 2: Graduation rate

Graduation rates measure the proportion of students who have graduated within a specific time period relative to when they were admitted. For this study, we have used 4 years (100% of expected program length) and 6 years (150% of expected program length). A more detailed definition can be found in key metrics.

The following graduation rates indicate the percentage of students from an entering admit year cohort (regardless of which term within the year they were admitted) who completed their program in 100%, and 150% of expected program completion time. We note that 200% and longer would be optimal, particularly for part-time students, but the data range for this study is too short to allow for that.

For these measures, a proxy of 4 years was assumed to be the length of all degree programs, for the purposes of this study.

The analysis was further limited to only those entering cohorts who had been at the institution for at minimum the length of the program multiplied by the percentage metric. For example, for a graduation rate at 150% of expected program length, only entering cohorts who had been at the institution for 6 years (4 years x 150%) were included.

Students studying part-time were included in the analysis. The risk, however, of this inclusion is that part-time students will likely take longer than even 200% of expected program length, so the graduation rate will be underestimated until such time as a significant longitudinal dataset (10 entering cohorts or more who have had 10 years or more to complete) is available. In the context of this data, that would mean data stretching back to include the cohorts from between 1997 and 2007, allowing for 10 years to graduate by 2017. We did not request data going back this far.

Graduation rate at 100% of expected program length

Table 5 summarizes the size of the entering cohort by admit academic year, after applying filters identified previously.

Table 5: Size of entering cohorts by Admit Type for graduation at 100% of program length (4 years)

	2010-11	2010-11	2011-12	2011-12	2012-13	2012-13	2013-14	2013-14
Program length (years)	Direct entry	Transfer	Direct entry	Transfer	Direct entry	Transfer	Direct entry	Transfer
4	1,130	1,171	1,128	1,110	1,029	1,054	1,091	730

The charts below show the proportion of entering students who completed their program within the expected program length from different measurement points.

Figure 13 illustrates a large divergence, with a significantly higher percentage of transfer students finishing their degrees in the normal length of time (4 years). It should be noted with this figure that a large number of direct entry students finished between 4.00 and 4.33 years, which may be in part explained by our coding of the last day of terms rather than explicit differences in graduation rates at ULethbridge. In turn, we recommend viewing graduation rates at 150% of expected program length, which is discussed in the next section.

Figure 14, where direct entry students are normalized to a baseline of the first semester after they have completed 30 credits at ULethbridge narrows the gap between direct entry and transfer considerably: about 36% of direct entry students graduate within 4 years of achieving 30 credits versus 48% of transfer students.

Figure 15, where direct entry students are normalized to 60 credits, shows only marginal difference between the two groups, but with a very small sample size of transfer students.

Figure 13: Graduation rate at 100% of program length (unadjusted)

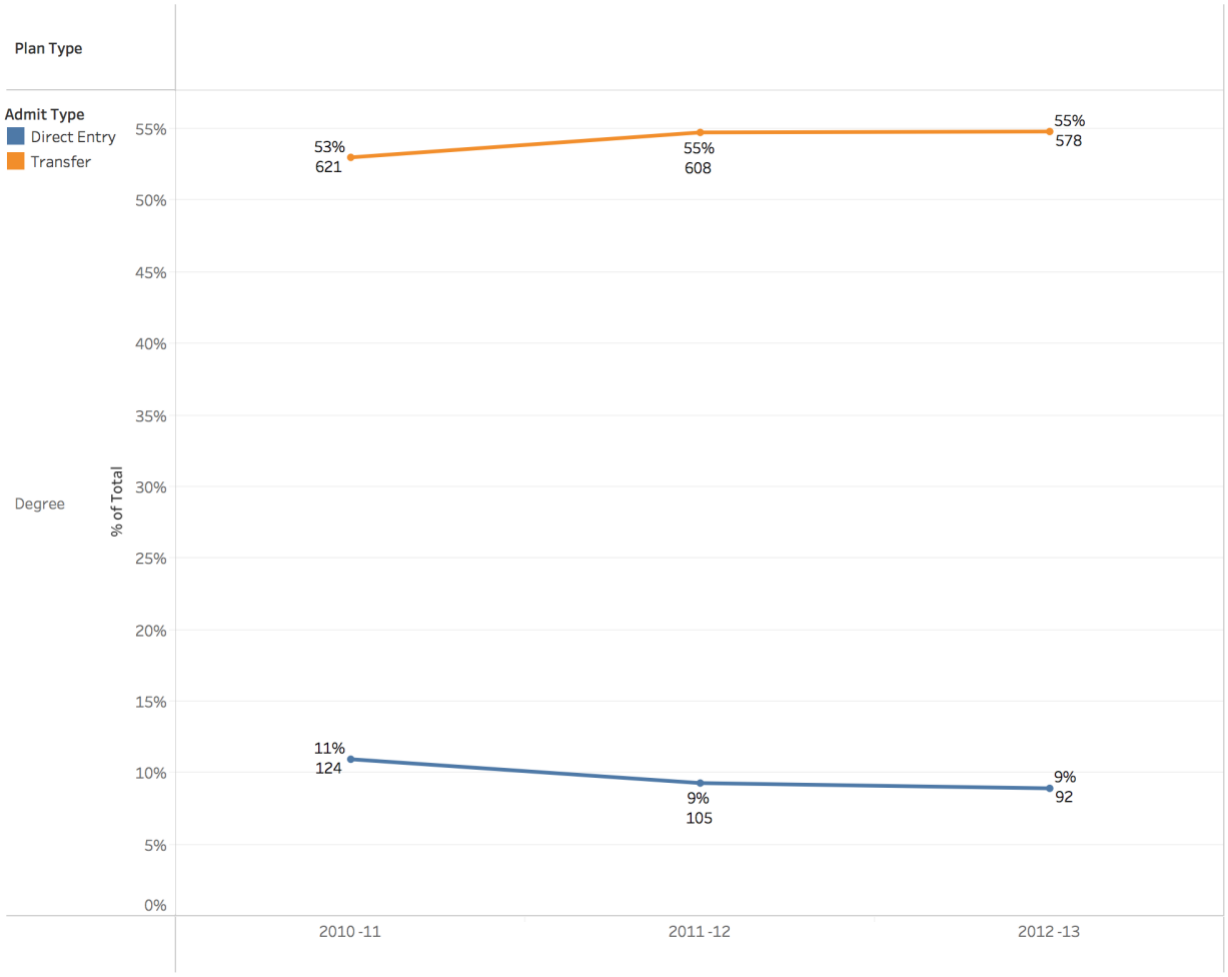


Figure 14: Graduation rate at 100% of program length (normalized to 30 credits)

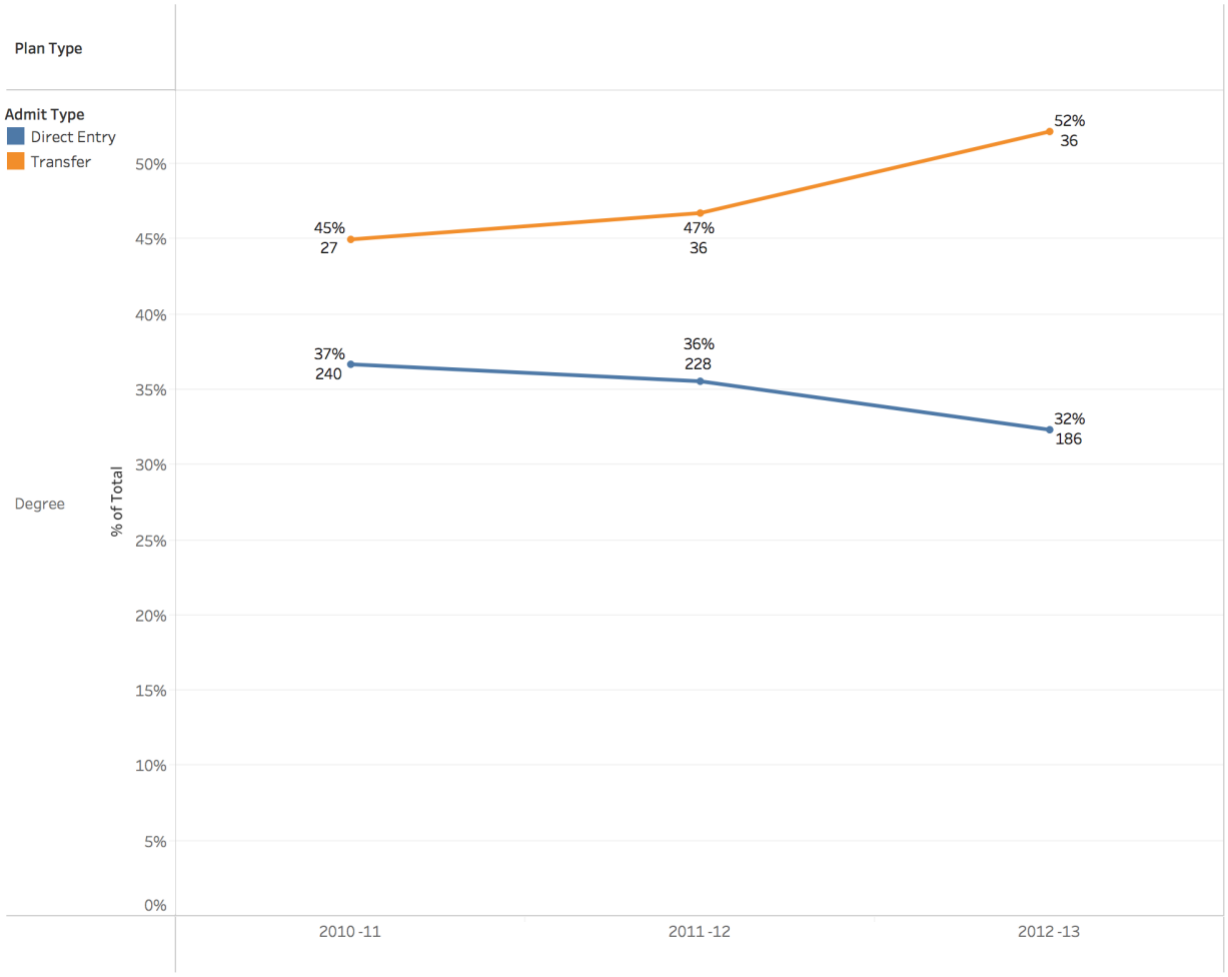
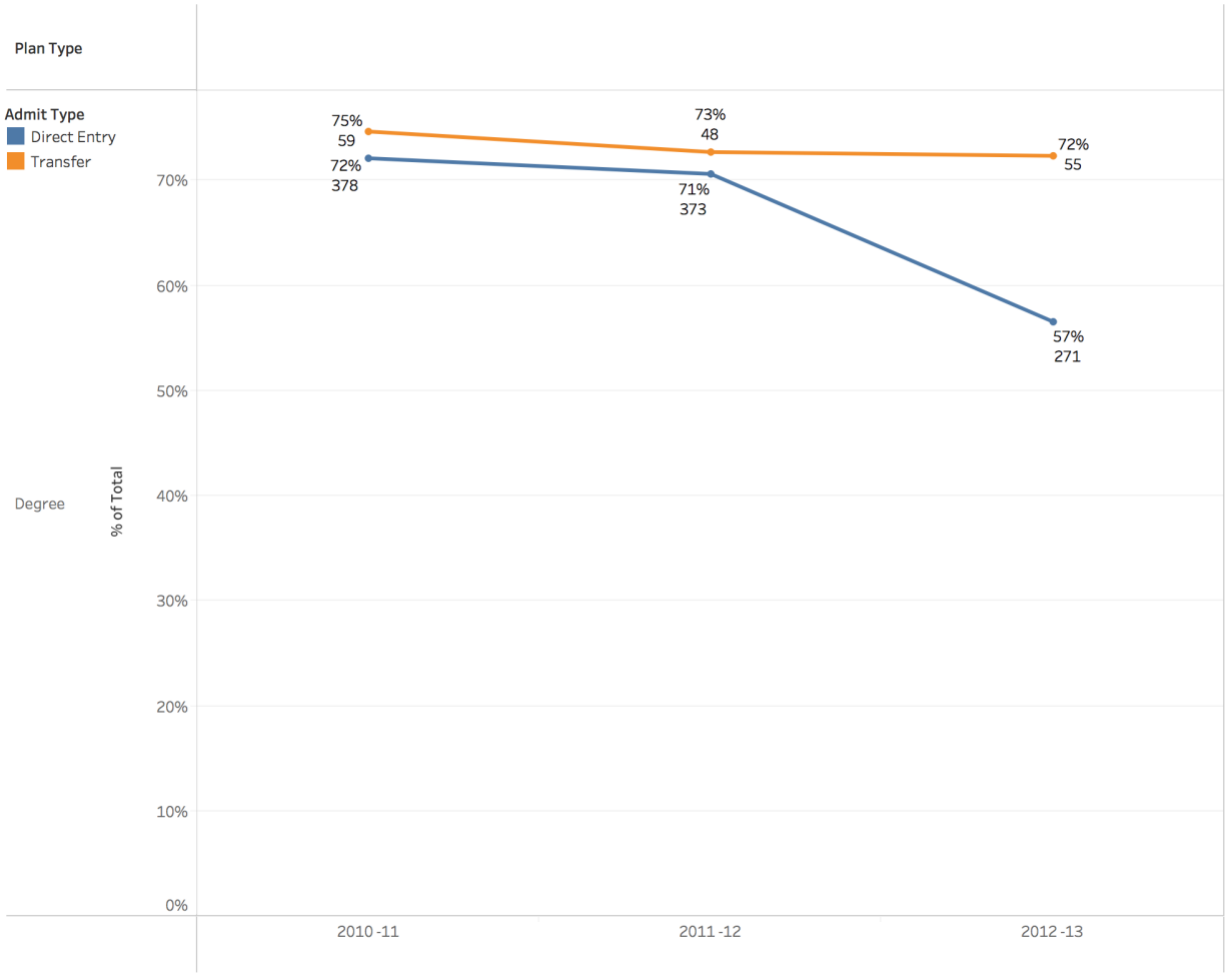


Figure 15: Graduation rate at 100% of program length (normalized to 60 credits)



Graduation rate at 150% of expected program length

This table summarizes the size of the entering cohort by admit academic year, after applying filters identified previously.

Table 6: Size of entering cohorts by admit type for graduation rates

	2010-11	2010-11	2011-12	2011-12
Program length (years)	**Direct entry**	**Transfer**	**Direct entry**	**Transfer**
4	1,130	1,171	1,048	899

The charts below show the proportion of entering students who completed their program within 150% of the expected program length.

In Figure 16, the unadjusted model shows degree-seeking transfer students are more likely than direct entry students to graduate within 6 years.

Figure 17, the normalized to 30 credit model, shows a much narrower gap in terms of graduation rate. In this case, transfer students and direct entry students are relatively equally likely to complete their credentials within 150% of normal time.

Figure 18, the normalized to 60 credit model, shows that all groups are equally likely to complete their credentials within 150% of normal time.

Figure 16: Graduation rate at 150% of program length (unadjusted)

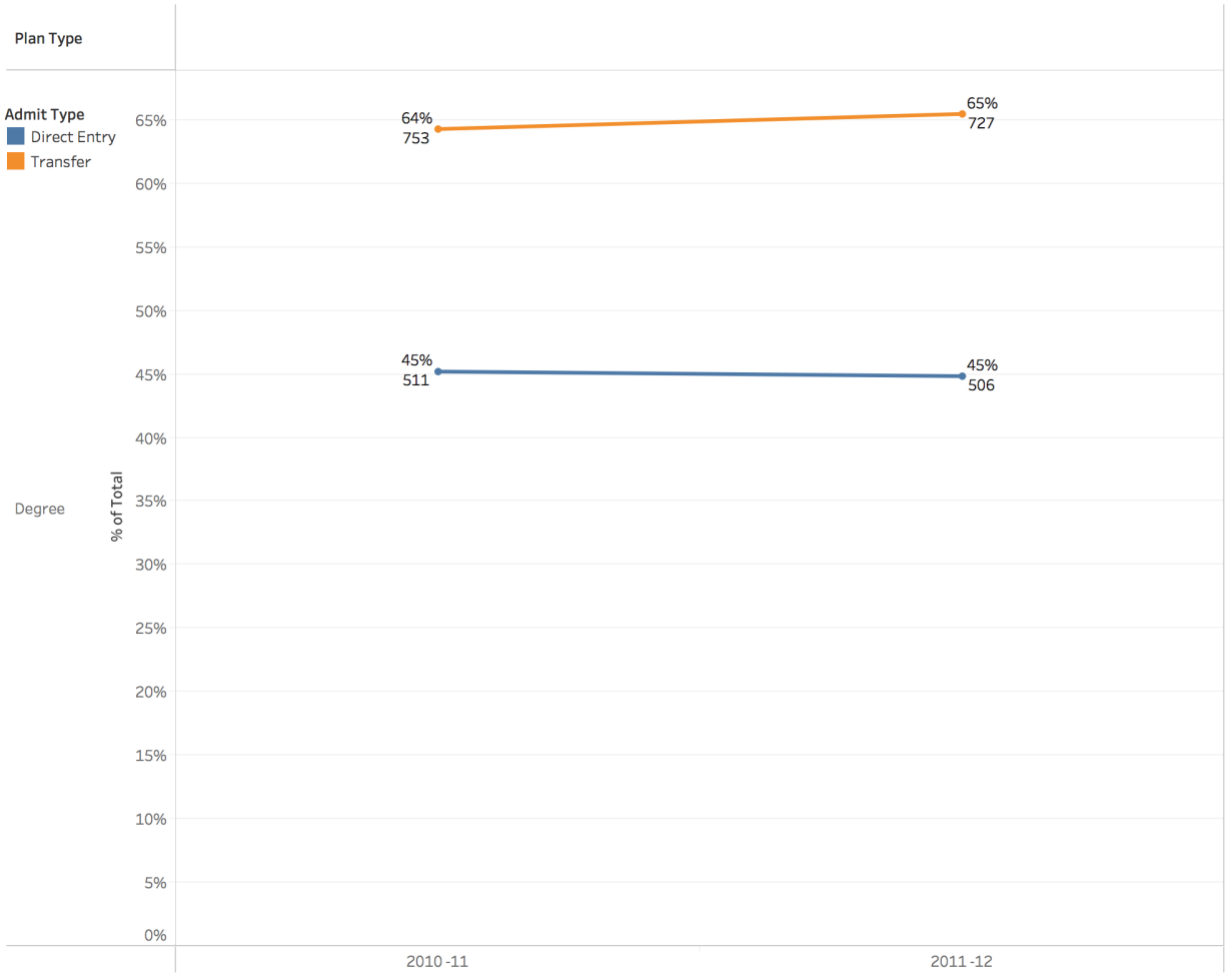


Figure 17: Graduation rates at 150% of program length (normalized to 30 credits)

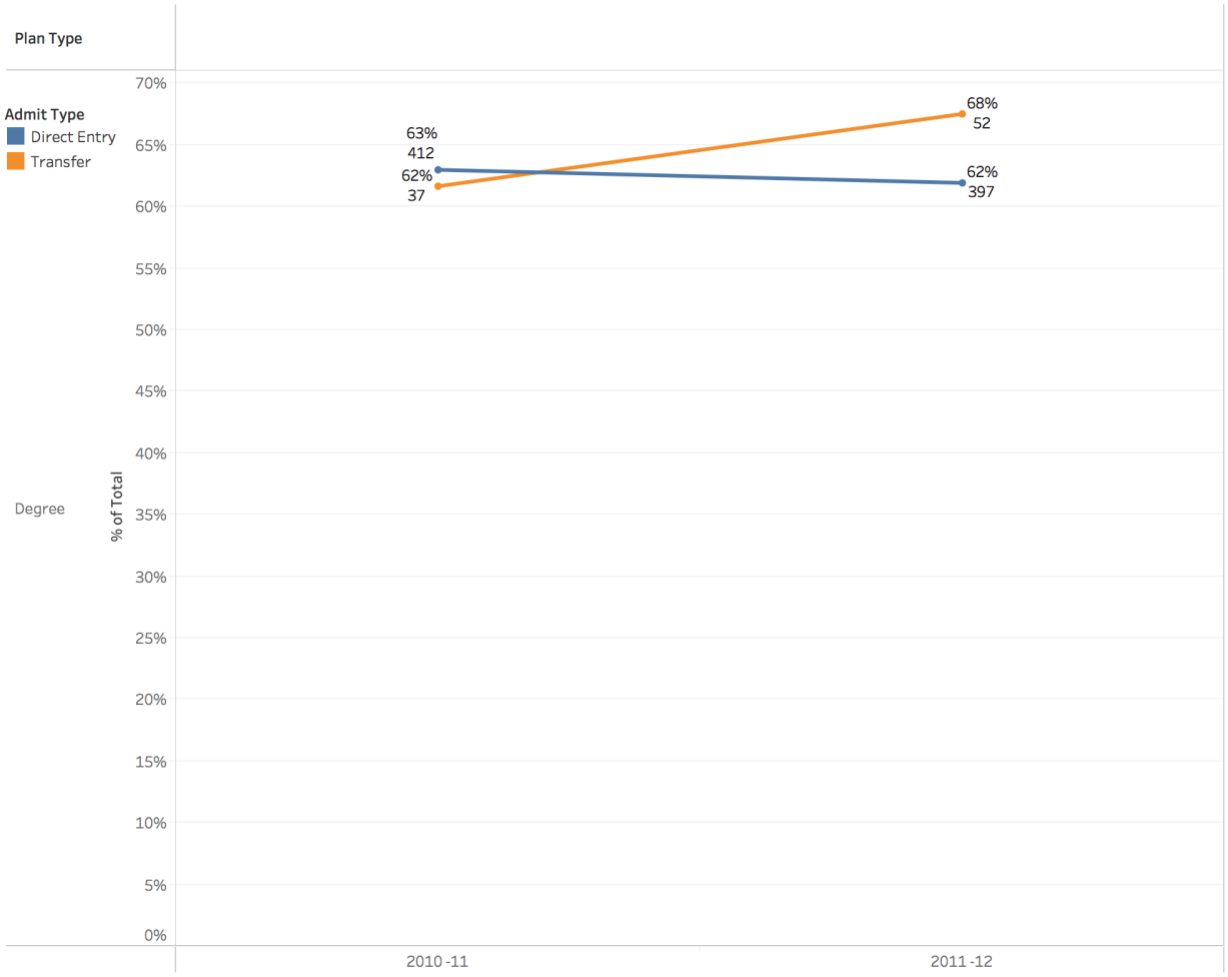
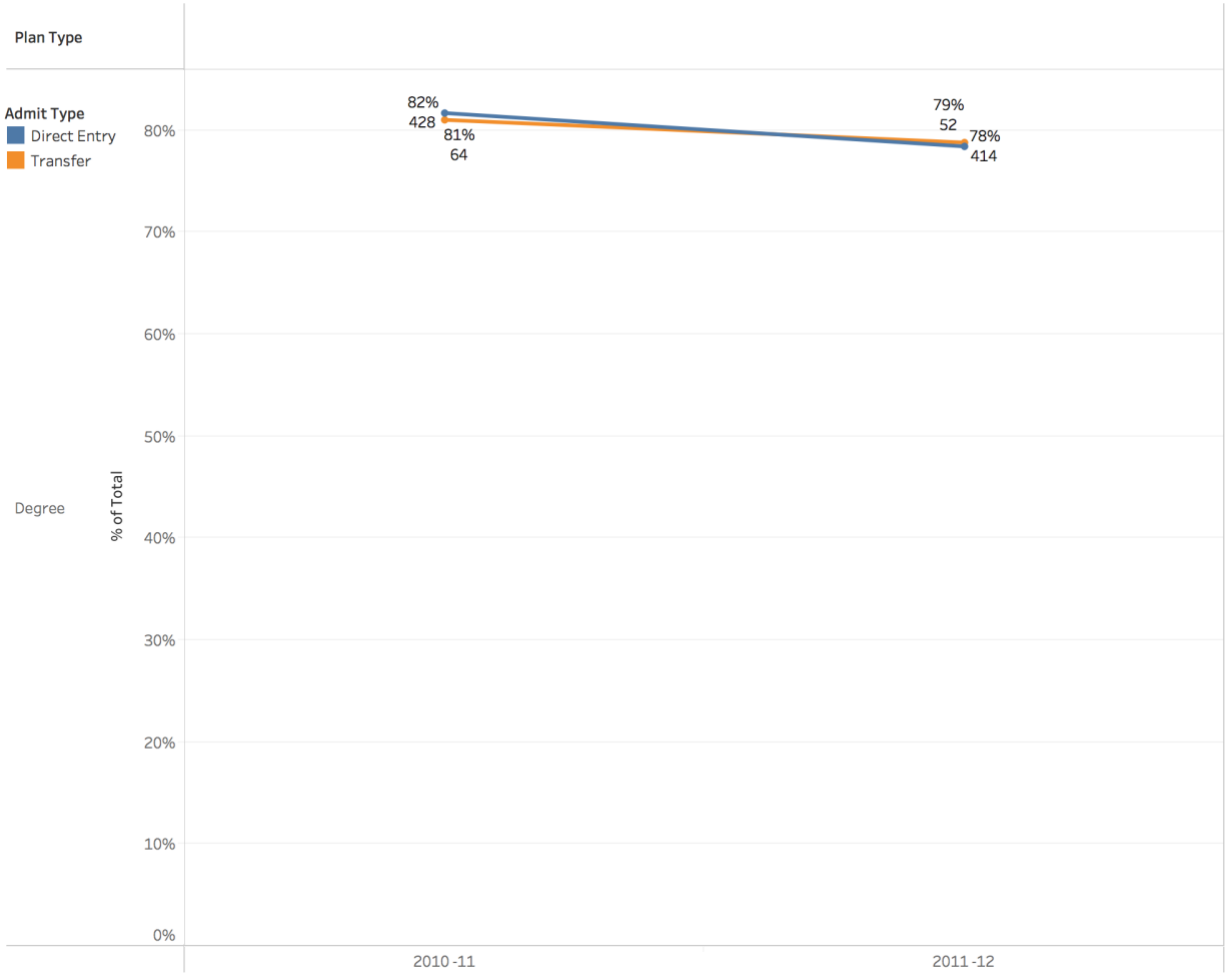


Figure 18: Graduation rate at 150% of program length (normalized to 60 credits)



Graduation rate at 100% of expected program length, by last institution sector

Figure 19 considers the Alberta PSE sector of the previous post-secondary institution for transfer students. It shows that students transferring from Baccalaureate and Applied Studies Institutions and Comprehensive Community Institutions have slightly higher graduation rates than other transfer students. Most groups in this analysis had very small N values.

Figure 20, which is normalized to 30-36 transfer credits, and Figure 21, which is normalized to 60-66 transfer credits, shows slightly higher graduation rates from all sectors, but suffer from a very small sample that may not be representative of the broader experience at ULethbridge.

Figure 19: Graduation rate at 100% of program length, by Alberta post-secondary sector (unadjusted)

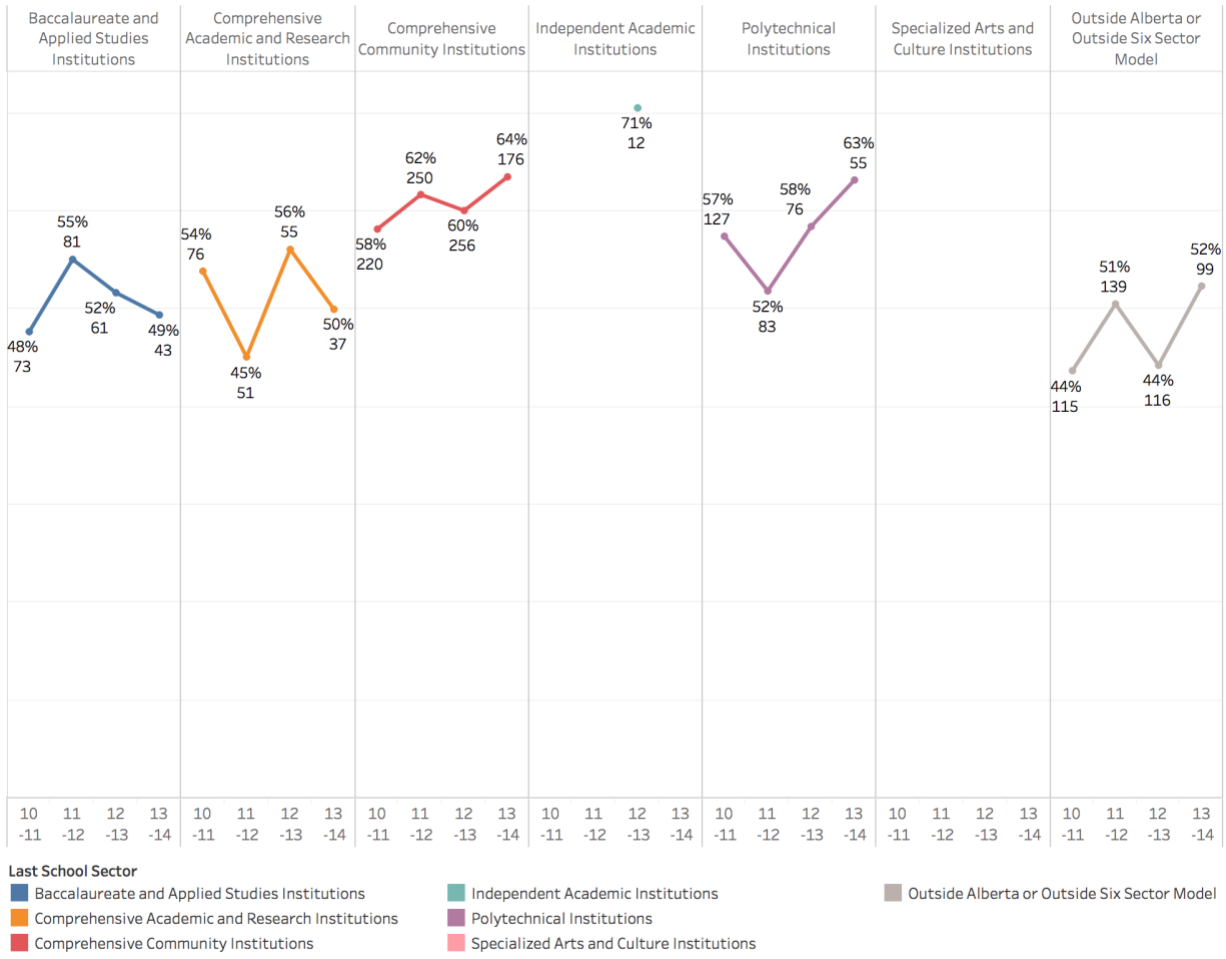


Figure 20: Graduation rate at 100% of program length, by Alberta post-secondary sector (normalized to 30 credits)

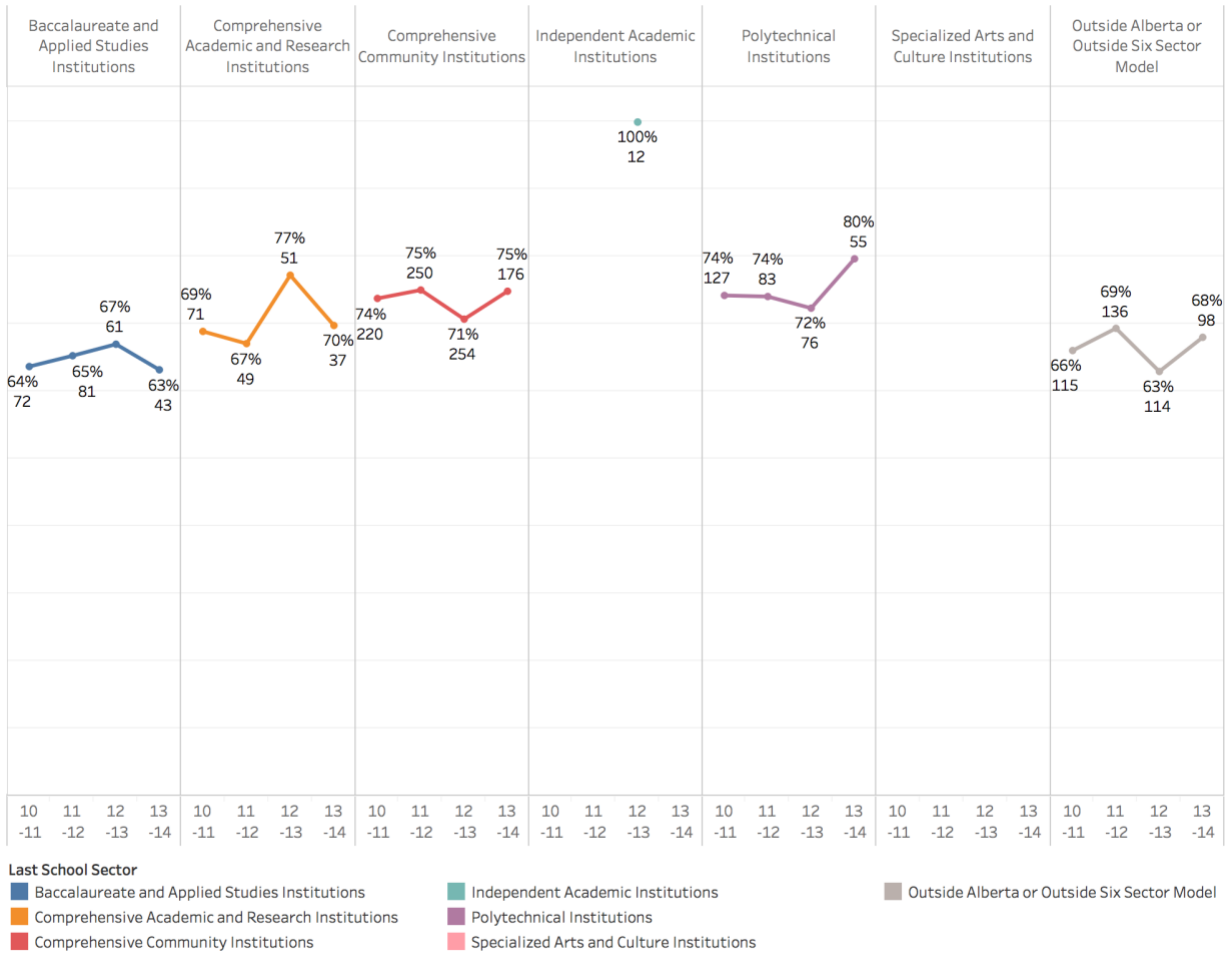
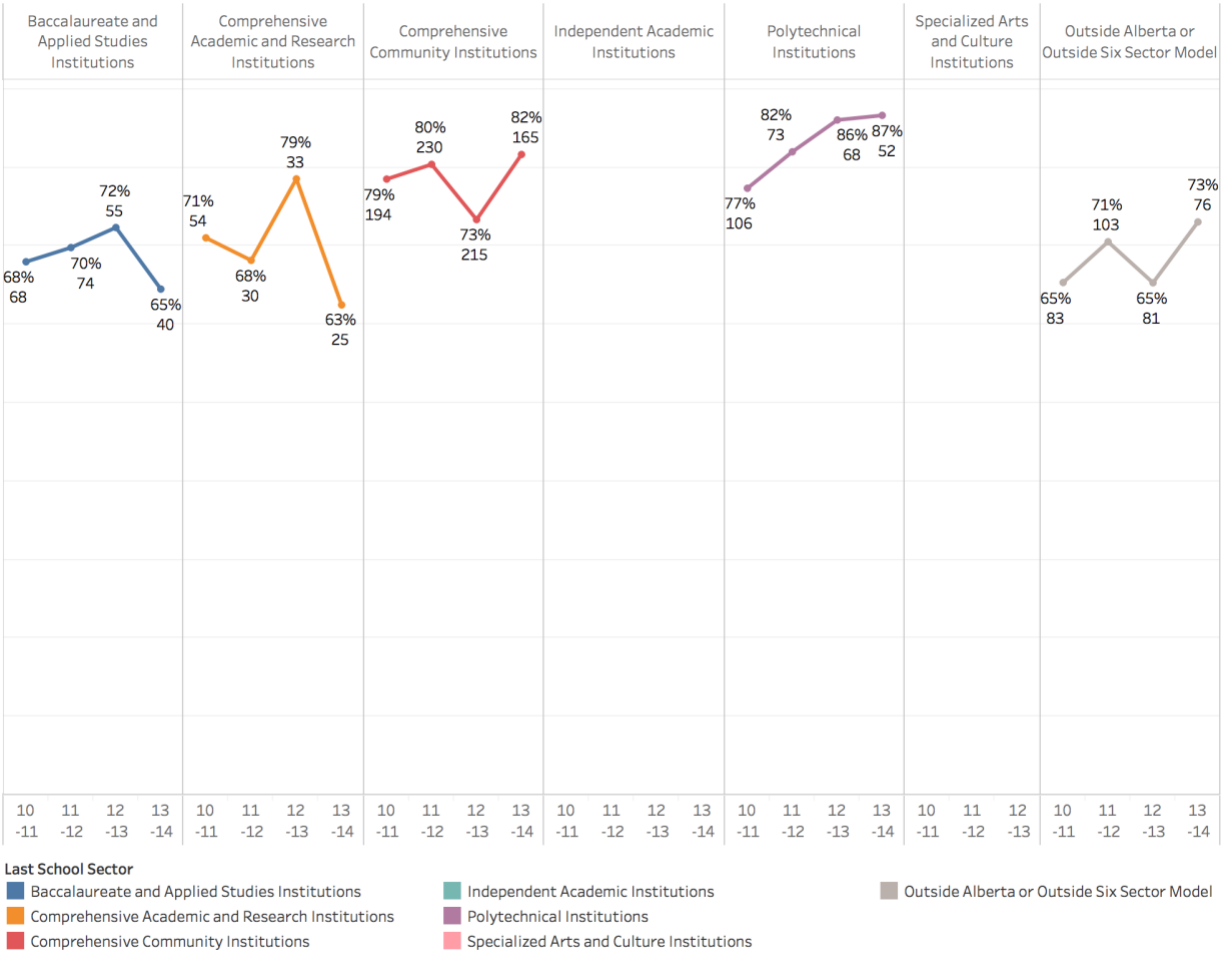


Figure 21: Graduation rate at 100% of program length, by Alberta post-secondary sector (normalized to 60 credits)



Study metric 3: Progression

This section focuses on student progression and retention, measuring whether a student returned for studies at particular points in time.

Progression - Fall to Fall, by admit term

Figure 22 shows that for students admitted in the Fall 2010 term, by the end of the report period we see about 51% of direct entry and 69% of transfer students had graduated. Transfer students have a high rate of graduation on this metric, which may be in part attributable to the large number of transfer students entering the institution with 60 transfer credits (see Figure 2). 43% of direct entry students had left the institution, compared to 28% of transfer students. This study did not investigate reasons for why students left the institution. The following Fall 2011 term shows similar trends, with slightly fewer students graduating given the shorter time frame available.

Figure 22: Progression over time: Fall 2010 admit term

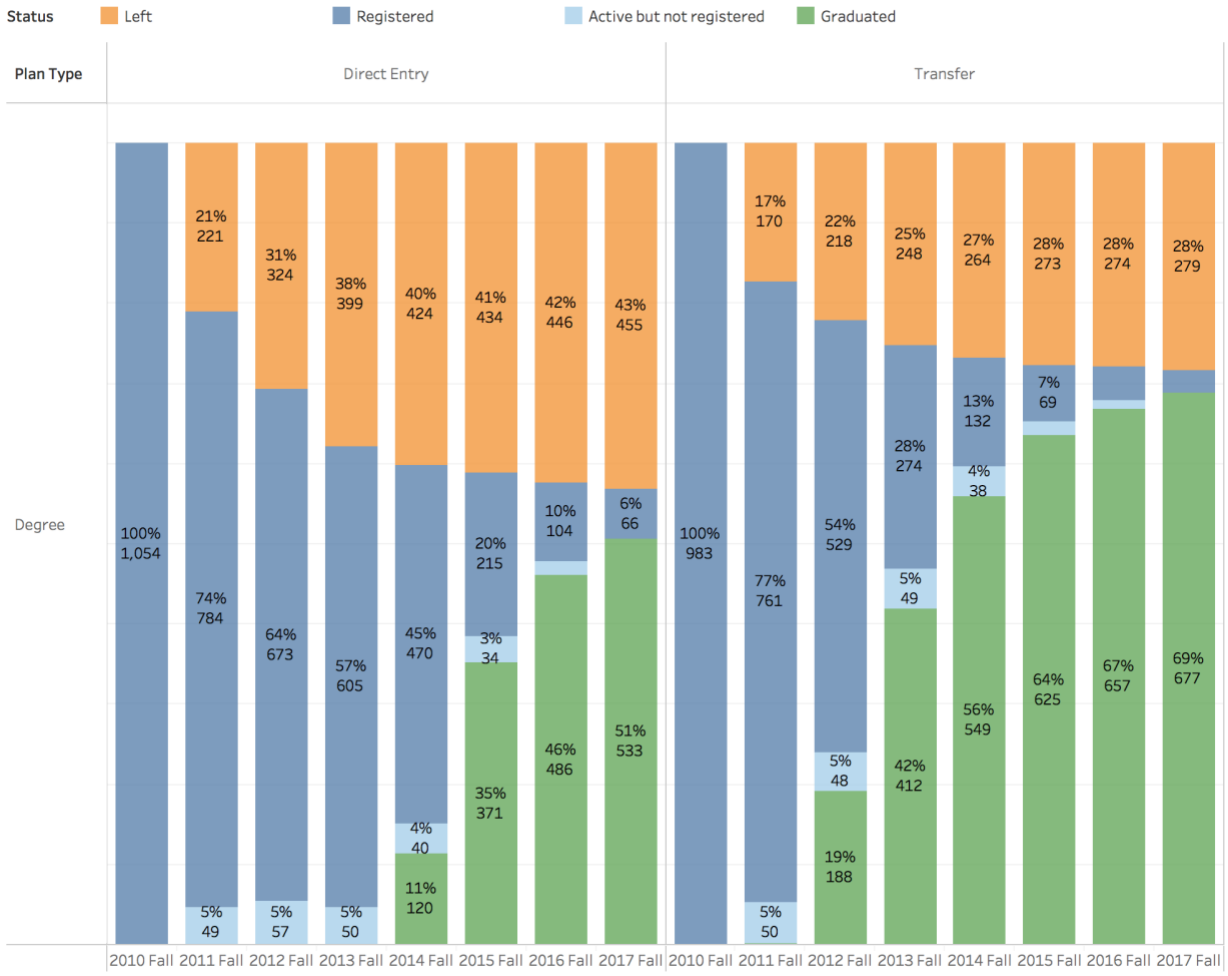
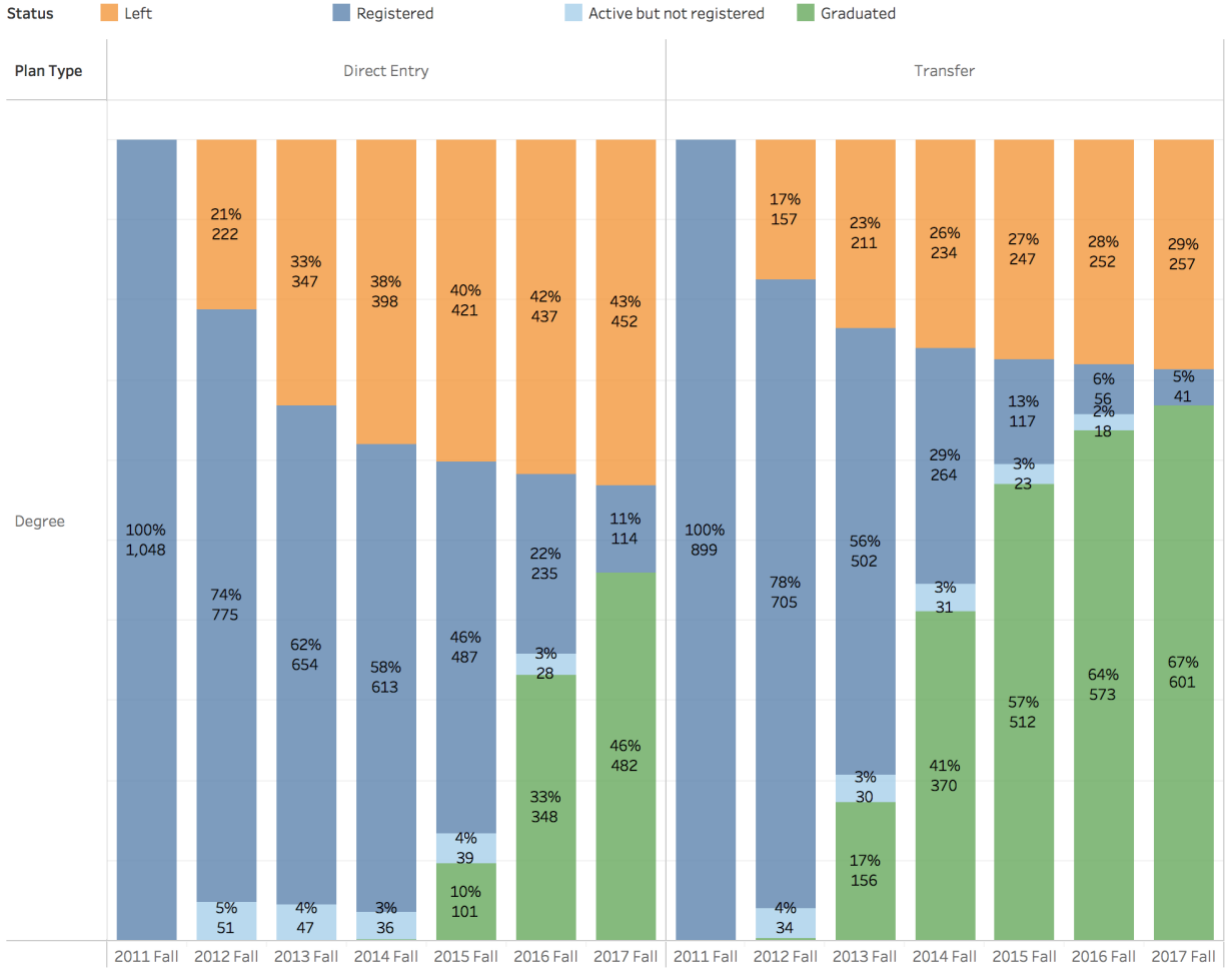


Figure 23: Progression over time: Fall 2011 admit term



Progression to registration term

This set of metrics is based on the student progressing to the number of terms within the institution. For example, a student commencing studies in Fall 2014 who stays enrolled in Spring 2015 would be retained to Term 2, regardless of the number of credits the student is enrolled in. This type of metric can be useful for term to term retention and can include part-time students.

The risk of using a metric like this, based solely on registration, is the design of it can have the unintended effect of suggesting that longer is better, which may not align with how quickly a student would like to complete their credential.

Figure 24 compares the number of terms that transfer and direct entry students enrolled at ULethbridge, based on an unadjusted model. What it shows is that the vast majority of both transfer and direct entry students enroll at ULethbridge for 6-7 terms before the trends start to diverge, and converges again by term 14. This divergence is likely caused by students with more transfer credits completing their credentials and graduating, removing the need to enroll for further terms.

Figure 25 outlines the normalized to 30 credit model, with a substantially narrower gap between the two groups. The largest gap between groups is in terms 7 and 8.

Figure 26 shows that after the 60 credit normalization there is a mix: before the inflection point at term 7, transfer students are less likely to be registered. But after term 8, they are more likely to be registered.

This analysis is limited only to students who have been studying at ULethbridge for 125% of expected program length (5 years).

Figure 24: Progression to registration term number (unadjusted)

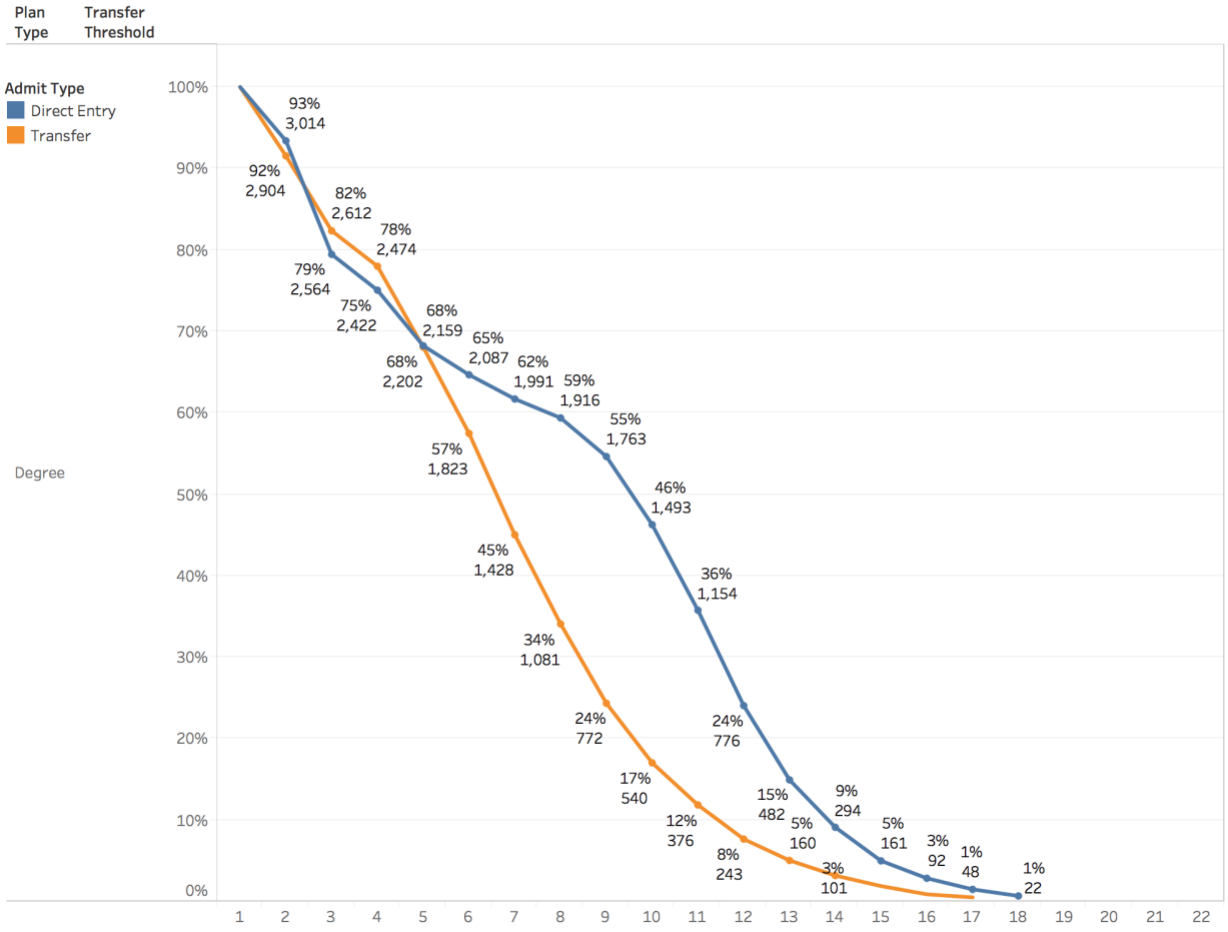


Figure 25: Progression to registration term number (normalized to 30 credits)

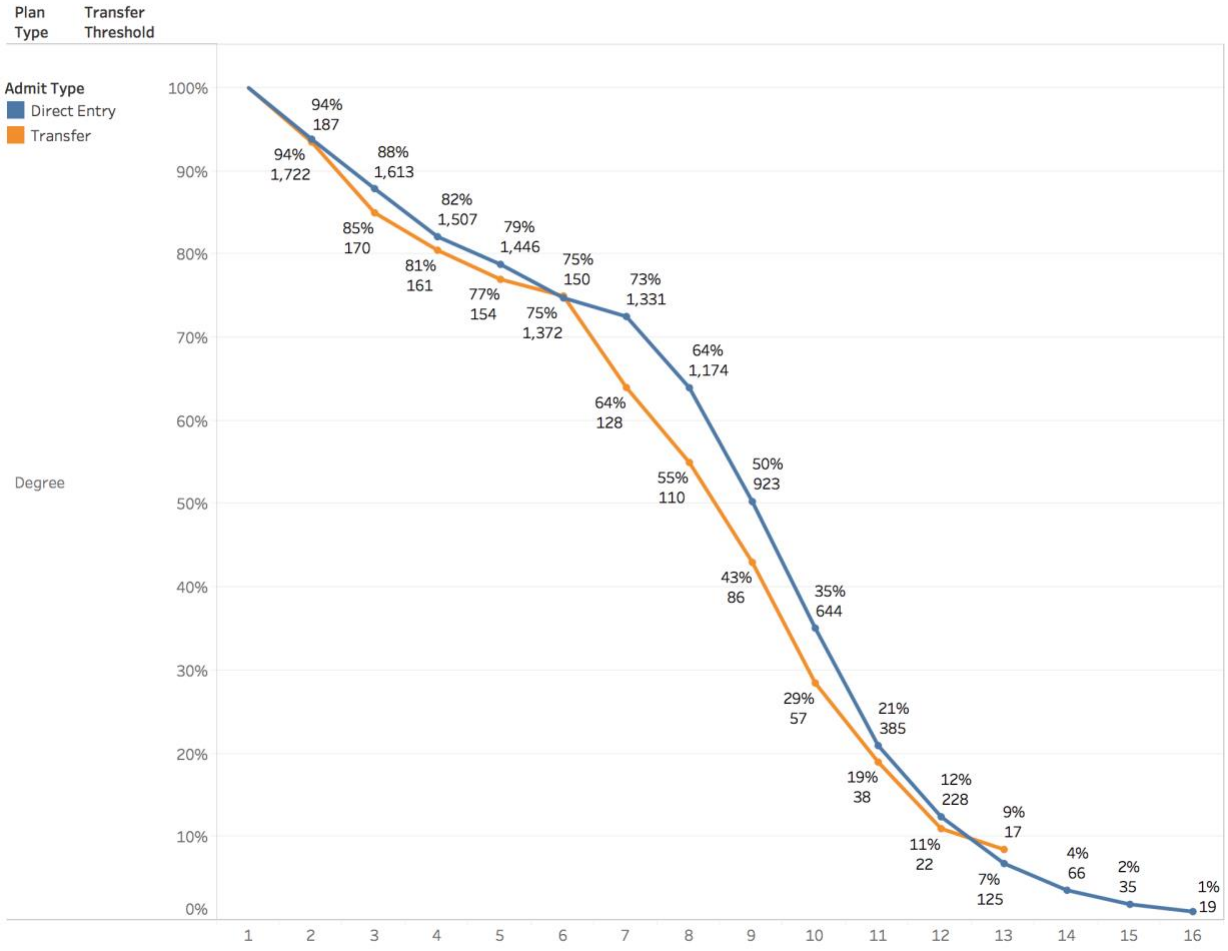
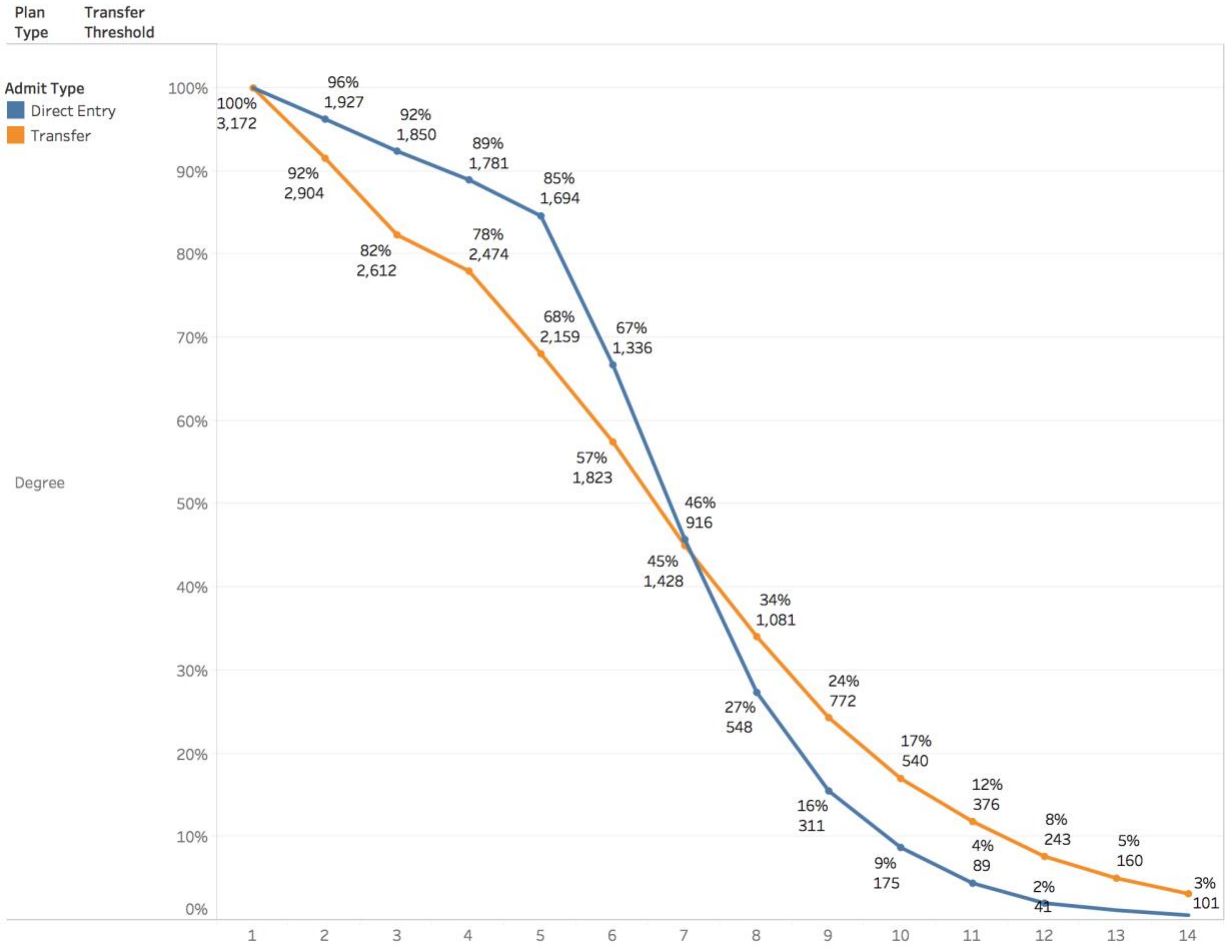


Figure 26: Progression to registration term number (normalized to 60 credits)



Study metric 4: Grade point average at graduation

Similar to the time to completion metric, we used ordinary least squares (OLS) linear regression to look at how transfer status impacts a student's grade point average at graduation. The variables we included in the model were:

- International (from the national_status field, 0=D or domestic, 1=I or international)
- Female (from the gender field, 0=M or male, 1=F or female)
- Student program (from the program field, re-coded as dummy variables with 0 indicating the student was not in that particular program and 1 indicating they were; this also allows us to account for combined degrees with longer expected times to graduation)
- Admit academic year (based on the student's first enrolled term at ULethbridge, re-coded as dummy variables with 0 indicating the student did not begin at ULethbridge in that year and 1 indicating that they did)

We included in the model all students who began at ULethbridge in Fall 2010 or later and who had graduated by Summer 2017, the last term finalized before the data was produced. We excluded students of unknown gender (N=1) or who graduated from the programs in Fine Arts/Management (N=1) and

Health Sciences/Management (N=2); in all cases the numbers were sufficiently small that their inclusion in the model could have skewed results. Additionally, students in the Education program were excluded as it contains only transfer students. Only students who began their studies at ULethbridge at least 5 years prior to the end of the study period were included.

Our model dataset included 2,685 students, of which 1,536 were transfer students and 1,149 had direct entry from high school. Programs varied from 1,767 graduates (Management) to 26 (Arts & Science/Management, a placeholder for combined programs between these two faculties), and admission academic years were 1,386 graduates (2010/11) and 1,299 (2011/12). The average GPA at graduation across all 2,685 students was 3.03.

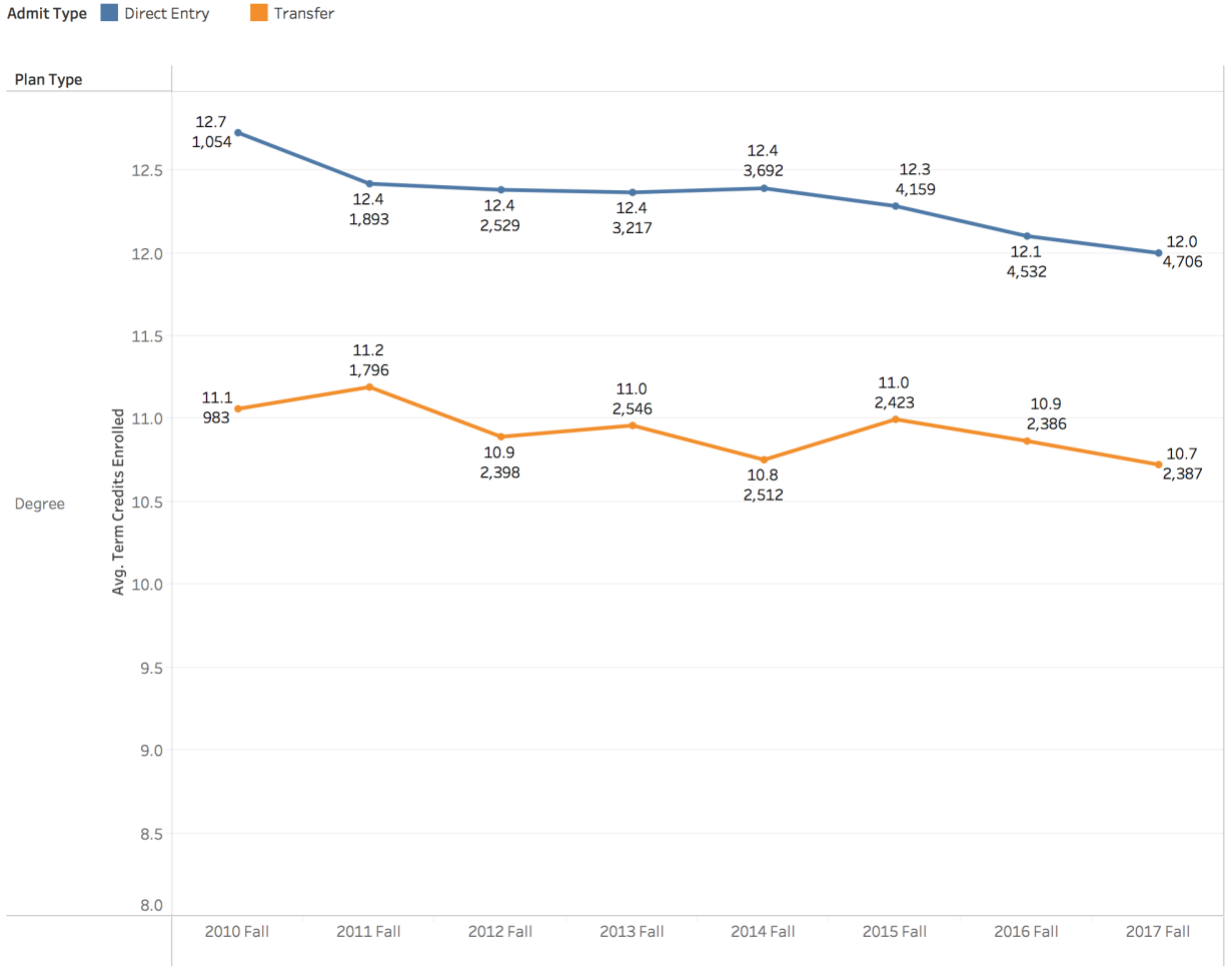
Generating the OLS model with only taking the variables listed above (international, female, program, and admit academic year) provides an R^2 of 0.050, meaning that 5.0% of the variance in graduation GPA can be explained by those factors alone. Students who were international (-0.130) tend to have slightly lower GPAs while females (+0.030) had slightly higher GPAs. Among graduates, students in Arts and Science (3.08) and Fine Arts (3.21) had the highest GPAs at graduation, while they were lowest in Management (3.00) and Health Sciences (2.70).

When we add the transfer flag to our base model our new model has an R^2 of 0.051, a very marginal boost of 0.1 percentage points from our base model; the transfer flag was statistically insignificant. Using the number of transfer credits in the model rather than the transfer flag gives similar results, with statistical insignificance for the transfer credits and an R^2 of 0.051.

Study metric 5: Average credits over time

This final metric compares direct entry and transfer students average credits enrolled at the institution over time. It highlights that credit loads are decreasing over time, part of a broader societal trend. On average, transfer students enroll in about 1 credit less per Fall term than their direct entry counterparts.

Figure 27: Average credits over time



Future research recommendations

As noted in the literature review, studies focusing on student success from the perspective of a single institution lack insight into all the educational pathways a student may pursue. While a student leaving ULethbridge could be seen as a loss for the institution, if that student found a better academic fit at another institution, this could be a win for both the student and the overall post-secondary system in Alberta.

In this context, we recommend investigating five options to expand understanding of transfer student populations and pathways at ULethbridge and in Alberta.

Recommendation #1: Student ULethbridge's transfer student population in depth.

ULethbridge has a large proportion of transfer students, representing 44% of the students included in this case study (see Table 2). The environmental scan noted that the Calgary and (now closed) Edmonton campuses had a large transfer student population who are typically part-time, adult learners. As the data for this case study was at an aggregated faculty level, it was not possible to split this group out from other students. Research seeking to better understand what makes the transfer student population unique at ULethbridge would better inform future research projects like this one, as well as the representations of data advocated in recommendations 2-5 in this report.

Recommendation #2: Normalize comparisons between transfer and direct entry.

This study highlighted the importance of normalizing the data so that reasonable comparisons between direct entry and transfer students could be made on standard metrics like time to completion, graduation rate, and progression. For the University of Lethbridge, this study used two normalization points: from the time students had achieved 30 credits or 60 credits. Alternately, ULethbridge currently compares transfer students and direct entry students 3 years after the earliest possible graduation date for the program. Both of these reporting strategies allow for a more fair comparison of the outcomes for transfer students and direct entry students than are possible using unadjusted models. In the absence of a dataset that provides additional insight into external transfer student experiences prior to (and potentially after) their studies at ULethbridge, we recommend either continuing with ULethbridge's existing technique, or normalizing the data to 30 credits as the most fair method of comparison between two unique groups of students. Recommendations 3 and 5 suggest datasets that could help close this information gap further.

Recommendation #3: Explore the feasibility of using Statistics Canada's Post-Secondary Student Information System data to measure student success.

This study considered student success metrics from the perspective of data provided by an individual institution. One of the gaps in this information is further insight into student behaviour prior to commencing studies at ULethbridge. For example, this study looked at time to completion within ULethbridge, but a more comprehensive understanding of how long it took a student to complete a credential would include the time spent at institutions prior to ULethbridge.

A study similar to Finnie and Qiu (2009) focused on the entire public post-secondary system in Alberta (or perhaps all of Western Canada) would yield further insight than what this study was able to deliver. Finnie and Qiu used Statistics Canada's PSIS data to study student transitions in Atlantic Canada and found that single institution studies typically underestimate student retention, and consequently student enrolment.

The primary advantage of using the PSIS data for this task is that it contains information about institutions and both the academic programs and individual courses in which students enroll. The PSIS data will provide insight into where a student came from prior to attending the institution and where they went after attending the institution. Data from individual institutions do not provide this broader picture of a student's learner pathway and thus the PSIS data is more effective for assessing some transfer student success metrics. Additionally, Statistics Canada is working on expanding data linkages between PSIS and other datasets, such as provincial primary- and secondary-level educational experience and postsecondary applications for admissions (Frenette, 2018). While these linkages are still in the early stages, they may ultimately allow for deeper research into student success than is currently possible.

Using this data, future research could mine considerably more deeply into the patterns of student behaviour that may influence student success. Further, the PSIS already contains data from all public post-secondary institutions in Canada, which would enhance comparability across institutions and over time providing a measure of transfer student outcomes from across Alberta rather than at a single institution.

In the context of the University of Lethbridge, PSIS data could provide insight into the student's academic experience prior to, during, and after their time studying at ULethbridge. Information of this type could improve understanding of formal and informal transfer pathways into and out of ULethbridge. As the PSIS is longitudinal in nature, commencing in the academic year 1999-2000, it would provide longer term data that is more directly comparable than what was included in this research study. Longer term data would better facilitate additional metrics, such as considering a 200% graduation rate for degrees, a measure which would better reflect the actual outcomes of part-time students.

While the Youth in Transition Survey, discussed in the literature review would form a good complement to the PSIS data, the YITS is no longer in production, reducing its utility as time passes.

Recommendation #4: Expand the labour market outcomes of graduates of Alberta post-secondary institutions analysis to compare direct entry and transfer students.

This study has highlighted that there is an interest at ULethbridge in better understanding outcomes of direct entry, internal transfer, and external transfer students. One area where the institution would benefit from additional insight and access to data is around graduate earnings. Research by Finnie, Dubois, & Miyairi (2017) looked at the earnings by discipline of direct entry and non-direct entry students at 14 Canadian institutions. As the research did not identify participating institutions, it is not known if ULethbridge was a participant.

ULethbridge appreciated the research conducted into labour market outcomes for post-secondary institutions conducted by the Alberta government and felt that being able to compare labour market outcomes of transfer students and their direct entry counterparts would be a useful complement to the existing study. ULethbridge's Office of Institutional Analysis features this report on their website as of this writing. Additional insight into labour market outcomes for different types of students can be used in a variety of ways: recruiting and advising students, curriculum design, and work integrated learning, among others. We recommend following up on that report to include the possibility of analyzing labour market outcomes for direct entry and transfer students, as well as other kinds of student mobility.

Recommendation #5: Explore the feasibility of creating a provincial dataset that measures transfer student outcomes.

In the interviews with PSIs related to this study it was noted that the existing mobility reports published by the Advanced Education Ministry could better meet their needs to separately analyze different types of mobility from one another. For example, it is not currently possible to differentiate visiting students from students switching institutions, nor is it possible to differentiate students with a small number of transfer credits versus students with a larger number of transfer credits. This points to the potential for development of a provincial dataset.

Further conversations with institutions to better understand what data is available and what kinds of questions they would like to answer on an Alberta post-secondary-wide basis would assist in the formation of a potential provincial dataset.

British Columbia's Student Transitions Project is one example of such a model. The STP "links student data from the B.C. Ministry of Education with public post-secondary student data. The data allows investigation of student transitions, mobility, and outcomes from the Kindergarten-Grade 12 (K-12) education system to the public post-secondary system, while protecting individual privacy" (Government of British Columbia, April 4, 2018). The STP also allows for a variety of post-secondary focused mobility and pathway related analyses between individual post-secondary institutions, sectors, and for participating institutions who provide this data to the Ministry. This robust dataset has allowed for annual reports including student mobility, pathways, and transitions between regions, sectors, and institutions, as well as special topic reports focused on high school graduates and non-graduates, degree completers, simultaneous enrolment at multiple institutions, and international students. This array of reporting would provide additional value beyond Alberta's current mobility reports. Note that the STP is distinct from BC's Central Data Warehouse (CDW), which BC's research institutions do not currently submit data for.

Institutions participating in this project expressed a strong desire for better access to transfer student outcome data that could be analyzed in conjunction with institutional data. Their needs would be best served by having the ability to connect directly to the transfer student outcome data, rather than working only with summary level information.

A potential provincial dataset would aid the ULethbridge in better understanding student's academic experiences both prior to and following their studies at ULethbridge. Such insight could be used towards ensuring transfer pathways are seamless and provide the appropriate transfer credits, to provide additional student supports based on previous or future institution, for partnerships between ULethbridge and other institutions, or new academic programming at ULethbridge.

A project like this one is likely a more substantial undertaking than the first recommendation, and may be a good follow up from that project.

Conclusion

This research project on transfer student success at the University of Lethbridge has brought to light a number of important issues related to measuring transfer student success in Alberta. The study was conducted at a time that the landscape of postsecondary education in Alberta is changing quickly: institutions that formerly were large sending institutions are now completing institutions, changing the nature and dynamics of what it means to be a transfer student.

This project looked at ways of measuring transfer student success at ULethbridge. The proposed metrics for this report's analysis were developed using a mixed methods approach that consisted of

- applying recommendations for best practices for methodology and parameters for analysis identified in the literature review,
- contextualizing the analysis within information gained from the environmental scan about ULethbridge, which included informal qualitative data in the form of conversations with targeted representatives from ULethbridge, and
- focusing the report's core analysis and conclusions on a regression analysis of quantitative ULethbridge data that were based on targeted data metrics for analysis of transfer student success in comparison to direct entry students.

Prior research suggests that a longer window of time, beyond 150%, for expected program completion would be most appropriate, particularly for students who do not fall into the standard first-time, full-time, four-year degree-seeking cohort often used for student outcomes analysis. As the study period used in this report was short, we were unable to produce metrics that would be optimal for a longer term longitudinal study.

Environmental scan

In addition to being able to define the appropriate starting point for the metrics, this study also highlights the importance of having an appropriate length of time available to study. This study was unable to produce intended graduation rates at 200% and 300% of program length due to the length of the study.

The environmental scan completed as part of this study illustrated that ULethbridge has current metrics that compare direct entry and transfer students in a few ways. One method is program completion, measured three years after the earliest possible date of graduation for the program. Additionally, ULethbridge compares these groups of students upon application and at time of acceptance to the institution. Finally, ULethbridge has participated in the CSRDE in the past, though not in the most recent year.

Defining transfer students

The literature review, environmental scan, and case study all highlight that one of the biggest challenges is in creating a reasonable definition of a cohort for the purposes of developing measures for transfer student success. One method of defining a transfer student is based on whether a student received transfer credit (aligning with the provincial definition of transferability). Another method is to view transfer

as a basis of admission, where transfer students are those surpassing a certain threshold of transfer credits awarded (at ULethbridge, this threshold is 5 transferable courses to be evaluated exclusively as a transfer student, or 3 to be evaluated on both transfer and high school courses). This study is based on the latter concept of basis of admission as the definition for transfer.

These differences in definition illustrate one small component of a much larger challenge. Direct entry and transfer students are very different: with different starting institutions, admission terms, and course enrolment patterns, comparing these groups in a fair way is difficult. This study attempted to level these differences by using normalization techniques, but further division of groups to ensure the most accurate comparisons would be helpful.

Demographics and previous institution

Females accounted for about 58% of direct entry students included in this study compared with about 55% of transfer students.

Among transfer students, the largest group (35%) of sending institutions was Alberta's comprehensive community institutions, which includes institutions such as Lethbridge College and Medicine Hat College. Many transfer students (22%) came from outside Alberta or outside Alberta's six sector model (see key terms). Nearly 13% transferred from polytechnical institutions. 9% transferred from baccalaureate and applied studies institutions, with an additional 9% transferring from comprehensive academic and research institutions. A small number transferred from other sectors, and about 10% of students in this study did not have a transfer institution listed.

Normalization and appropriate points in time for comparison

One of the key findings to emerge from this report is based on the point in time at which comparisons are made. As this study was based on information provided by ULethbridge as a receiving institution, it lacked full insight into the experience of students prior to their studies at ULethbridge. To account for this gap, we employed 3 variants to the key metrics of time to complete, graduation rate, and progression to registration term: an unadjusted model, which considered the admit term with no adjustment relative to either graduation or a particular term number; from the point of achieving 30 credits at ULethbridge (for direct entry students) or via transfer (for external transfer students); and from the point of achieving 60 credits.

Table 7: Time to completion descriptive statistics (all models). Note: this table is a replication of Table 4.

		Avg. Time to Completion		Number of Students	
Model	**Plan Type**	**Direct Entry**	**Transfer**	**Direct Entry**	**Transfer**
Unadjusted	Degree	4.77	3.06	1,535	2,221
Normalized to 30 credits	Degree	4.05	3.72	1,108	139
Normalized to 60 credits	Degree	2.87	2.78	1,113	183

Of these, the normalized to 30 credits model had the most robust results, as shown in Table 7, providing a meaningful comparison of direct entry and transfer. This model compares students from the time they have earned 30-36 credits (within ULethbridge or via transfer), ensuring a common starting point. Using the normalized to 30 credit model better accounts for transfer student experience prior to joining the University of Lethbridge, with the average transfer student being awarded 38 transfer credits (median 36). This model shows direct entry students taking about 4 months longer to complete their credentials than transfer students.

A close runner-up as a recommendation is the normalized to 60 credits model. Using this model, transfer students and direct entry students perform very similarly.

We ultimately recommend the normalized to 30 credits model (which takes into account years 2, 3, and 4) as this is more reflective of a wider range of experience at ULethbridge than the normalized to 60 credits model (which takes into account years 3 and 4). Additionally, while there is a large group of students receiving 60-62.9 transfer credits, the group receiving between 60 and 65.9 transfer credits is smaller than the group receiving 30-35.9 transfer credits (see Figure 2). However, if there is the ability to further split the group of transfer students according to the number of transfer credits awarded, we would recommend using the normalized to 60 credits model for anyone with 60-66 transfer credits.

This method also aligns well with prior research by McLaughlin et al. (2016), which recommends including a direct entry comparison with transfer students based on a 30-credit threshold (2016). We recommend a similar technique be used in future analyses comparing direct entry and transfer students.

The unadjusted model wasn't optimal because it inadvertently favours transfer students because it doesn't have an allowance for or insight into their experience prior to transferring programs or institutions. Table 7 highlights this pattern, with direct entry students taking 21 months longer than transfer students to complete their credentials,

Transfer student success at ULethbridge: Completion time, graduation rate, and progression

Time to completion

One of the key metrics studied in this report was time to completion: the difference, in years, between a starting point and graduation. Using the recommended normalized to 30 credits approach, transfer students finish their credentials approximately 4 months sooner than direct entry students.

Regression analysis on time to completion confirms these assumptions, with transfer status explaining almost 22% of the variability in time to completion in the unadjusted model. Roughly, each transfer credit a student is granted at ULethbridge allows them to complete their credential 0.017 years earlier, which translates to 19 transfer credits for one term sooner, or 39 for two terms sooner. These results suggest that differences between transfer and direct entry students persist, even when other factors such as program, national status, gender, Indigenous status, and year of admission are controlled for.

Graduation rate

Analysis of graduation rate was conducted at two different times: 4 years (100% of expected program length) and 6 years (150% of expected program length). In this model, transfer students were more likely to complete their credentials within 4 years (45-52%, but with N values less than 40 for each admission year), while direct entry students ranged from 32%-37%.

Graduation rate at 6 years narrowed this gap, showing direct entry and transfer students with similar outcomes. Based on this result, we recommend using a graduation rate at least 6 years from the starting point as this will be more reflective of student performance in the long run.

Progression

We also looked at progression from one fall term to the next. Classifying students into four categories: registered, active but not registered (and returned later), graduated, or left, showed the Fall 2010 admit cohort with different rates for each of direct entry and transfer. 51% of direct entry students had graduated by 2017 Fall, 43% had left, and 6% were still registered. 69% of external transfer students had graduated by 2016-17, 28% had left, and 3% were still registered.

In addition to looking at progression to specific terms, we also assessed how many registration terms students completed. Using the recommended normalized to 30 credits model, transfer students and direct entry students are similarly likely to register in terms 1 through 6 (following completion of 30 credits, with registration likelihood ranging from 95% in term 2 down to 75% by term 6). By term 7, transfer students become less likely to register, with 64% of the admit cohort still registered, as compared to 73% for direct entry students. This gap of between 7 and 10 percentage points continues until about term 11, where both groups converge and their likelihood of continuing to register is about 20% and continues to decline after that point. The difference between groups from terms 7 to 11 is reflective of transfer students higher graduation rate over the same time period.

Grade point average at graduation and average credits per year
Considering a calculated cumulative GPA at graduation, transfer students tended to have GPAs very similar to those of direct entry students: the transfer flag was statistically insignificant.

The final metric studied was the average number of credits per year. In this regard, transfer students took an average of just over one credit per term fewer than direct entry students.

Perspectives on data challenges

This study has illustrated that ULethbridge collects sufficient information to be able to build measures of transfer student success similar to those used in this report. However, the challenge associated with this is not necessarily collecting the right information, but in how it is used. As evidenced by most of the metrics in the case study, and highlighted further in the literature review, these metrics tend to be oriented towards the traditional first-year, four-year, first-time, degree-seeking student. Adjustments can be made to the metrics to better level the playing field between transfer and direct entry: Time to completion metrics can be based on a common starting point, such as from the first term in which students have amassed 30 credits via transfer, at the institution, or some combination of the two. These same adjustments could be applied to graduation rates within X years from 30 credits rather than using expected program length. These kinds of normalization techniques show that the lens through which we consider transfer student success influences how the outcomes are reported.

In addition, to be able to define the appropriate starting point for the metrics, this study also highlights that having an appropriate length of time to study available is crucial. This study was unable to produce intended graduation rate at 200% and 300% of program length due to the length of the study. These longer time frames may better illustrate outcomes for part-time students. While ULethbridge has data spanning many more years than this study focused on, this study looked only at more recent history.

The case study generally shows strong performance by both direct entry and transfer students. One of the reasons this transfer student performance is possible is because Alberta has a purpose built, transparent, transfer system that does not isolate different types of institutions from one another. This system helps ensure that transfer students are able to complete credentials quickly when changing institutions, while earning credit for their prior academic work.

As illuminated in the environmental scan, institutions generally view transfer from the vantage point of a basis of admission: a student has completed a certain threshold of transferrable courses prior to joining ULethbridge. The university's definitions for transfer are generally closer to the provincial version than other institutions. For example, ULethbridge evaluates transfer students (solely as transfer) on the basis of 5 completed transfer courses, whereas the provincial definition of transferability is based on receiving any number of transfer credits. Comparatively, many other Alberta universities use a threshold of 8 courses (24 credits) for degree programs, including both the University of Alberta and MacEwan University, institutions which participated in parallel studies with ACAT. Nevertheless, there is a small gap between the provincial definition and ULethbridge's definition, where students with 1-2 transfer courses would be seen as transfer by provincial definition, but high school by the University's definition. There may be an opportunity to further define this group in the middle to ensure that each organization's definitions can align in the future. As such, further conversation and collaboration among Advanced Education, Alberta's institutions and the Alberta Council on Admissions and Transfer could allow for a

more nuanced approach to defining transfer on a provincial basis, perhaps by credential type. Additional conversation could expand the definition to include the most appropriate ways to categorize students who have some post-secondary experience, but fewer transfer credits than the threshold used within institutions. Identifying the potential for a more refined definition and metrics for transfer and transfer credit student success was a key focus of this ACAT case study for ULethbridge.

Alberta's post-secondary institutions are interested in finding further ways to support the success of their transfer student populations. While this study had several limitations, it creates an opportunity to further conversations on campus about the success of transfer students.

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Appendix - Data Structure

The base data provided by the institution was transformed into a number of database tables that could be utilized specifically for student success type analysis:

- term_tbl: a list of all terms included in this study
- student_program: this table houses records for each student at the time of admission. This table also houses bio-demographic information, where provided, including gender, indigenous status, and national status.
- student_term: this table houses enrolment records for each student in each term they were enrolled.
- student_progression_term: this tale brings together information from term_table, student_term, and student_program. It ensures that reporting on student status from the time of entry until 10 years in the future is conceptually possible (though limited by length of the dataset)

These tables, and the transformations required to build them, are further described in the sections that follow.

Base_Data_UofL_Atomic

This table contains the base data as provided by the University of Lethbridge.

Column	Data Type	Description	Source and Notes
institution_id	integer	Institution ID	Institutions.institution_id
institution_code	text	Institution short code	Institutions.institution_code
anon_id	text	Student Anonymous ID	Originally "ID_NUMBER" in Base Data
admit_term	text	Admit term description	Base Data
faculty	text	Faculty or Program	Base Data
admit_type	text	Admit Type	Base Data
admission_average	float	Admission average	Base Data
visa_status	text	Domestic or International	Base Data
gender	text	Gender	Base Data
last_institution_attended	text	Last Institution Attended, Prior to ULethbridge	Base Data

transfer_credits	float	Transfer credits awarded at time of admission	Base Data
graduation_date	text	First Graduation Date	Base Data
grad_total_credit_hours_attempted	float	Total Credit Hours attempted at Graduation	Base Data
grad_total_credit_hours_earned	float	Total Credit Hours earned at Graduation	Base Data
registered_fall_2010	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_spring_2011	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_summer_2011	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_fall_2011	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_spring_2012	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_summer_2012	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_fall_2012	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_spring_2013	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_summer_2013	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_fall_2013	text	Registered flag (Y/N) for the term noted in field name	Base Data

registered_spring_2014	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_summer_2014	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_fall_2014	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_spring_2015	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_summer_2015	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_fall_2015	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_spring_2016	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_summer_2016	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_fall_2016	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_spring_2017	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_summer_2017	text	Registered flag (Y/N) for the term noted in field name	Base Data
registered_fall_2017	text	Registered flag (Y/N) for the term noted in field name	Base Data
full_part_time_fall_2010	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_spring_2011	text	Full or part-time status	Base Data

		for the term noted in field name	
full_part_time_summer_2011	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_fall_2011	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_spring_2012	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_summer_2012	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_fall_2012	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_spring_2013	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_summer_2013	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_fall_2013	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_spring_2014	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_summer_2014	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_fall_2014	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_spring_2015	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_summer_2015	text	Full or part-time status for the term noted in	Base Data

		field name	
full_part_time_fall_2015	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_spring_2016	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_summer_2016	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_fall_2016	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_spring_2017	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_summer_2017	text	Full or part-time status for the term noted in field name	Base Data
full_part_time_fall_2017	text	Full or part-time status for the term noted in field name	Base Data
withdrawn_hours_fall_2010	float	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_spring_2011	float	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_summer_2011	integer	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_fall_2011	float	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_spring_2012	float	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_summer_2012	integer	Credit hours withdrawn for the term noted in field name	Base Data

withdrawn_hours_fall_2012	float	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_spring_2013	float	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_summer_2013	integer	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_fall_2013	float	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_spring_2014	integer	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_summer_2014	integer	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_fall_2014	integer	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_spring_2015	integer	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_summer_2015	integer	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_fall_2015	integer	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_spring_2016	float	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_summer_2016	integer	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_fall_2016	integer	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_spring_2017	float	Credit hours withdrawn	Base Data

		for the term noted in field name	
withdrawn_hours_summer_2017	integer	Credit hours withdrawn for the term noted in field name	Base Data
withdrawn_hours_fall_2017	integer	Credit hours withdrawn for the term noted in field name	Base Data
hours_attempted_fall_2010	float	Credit hours withdrawn for the term noted in field name	Base Data
hours_attempted_spring_2011	float	Credit hours withdrawn for the term noted in field name	Base Data
hours_attempted_summer_2011	float	Credit hours withdrawn for the term noted in field name	Base Data
hours_attempted_fall_2011	float	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_spring_2012	float	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_summer_2012	float	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_fall_2012	float	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_spring_2013	float	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_summer_2013	float	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_fall_2013	float	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_spring_2014	float	Credit hours attempted for the term noted in	Base Data

		field name	
hours_attempted_summer_2014	integer	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_fall_2014	float	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_spring_2015	float	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_summer_2015	integer	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_fall_2015	float	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_spring_2016	float	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_summer_2016	integer	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_fall_2016	float	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_spring_2017	float	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_summer_2017	integer	Credit hours attempted for the term noted in field name	Base Data
hours_attempted_fall_2017	integer	Credit hours attempted for the term noted in field name	Base Data
hours_earned_fall_2010	float	Credit hours earned for the term noted in field name	Base Data
hours_earned_spring_2011	float	Credit hours earned for the term noted in field name	Base Data

hours_earned_summer_2011	float	Credit hours earned for the term noted in field name	Base Data
hours_earned_fall_2011	float	Credit hours earned for the term noted in field name	Base Data
hours_earned_spring_2012	float	Credit hours earned for the term noted in field name	Base Data
hours_earned_summer_2012	float	Credit hours earned for the term noted in field name	Base Data
hours_earned_fall_2012	float	Credit hours earned for the term noted in field name	Base Data
hours_earned_spring_2013	float	Credit hours earned for the term noted in field name	Base Data
hours_earned_summer_2013	float	Credit hours earned for the term noted in field name	Base Data
hours_earned_fall_2013	float	Credit hours earned for the term noted in field name	Base Data
hours_earned_spring_2014	float	Credit hours earned for the term noted in field name	Base Data
hours_earned_summer_2014	integer	Credit hours earned for the term noted in field name	Base Data
hours_earned_fall_2014	float	Credit hours earned for the term noted in field name	Base Data
hours_earned_spring_2015	float	Credit hours earned for the term noted in field name	Base Data
hours_earned_summer_2015	integer	Credit hours earned for the term noted in field name	Base Data
hours_earned_fall_2015	float	Credit hours earned for	Base Data

		the term noted in field name	
hours_earned_spring_2016	float	Credit hours earned for the term noted in field name	Base Data
hours_earned_summer_2016	integer	Credit hours earned for the term noted in field name	Base Data
hours_earned_fall_2016	float	Credit hours earned for the term noted in field name	Base Data
hours_earned_spring_2017	float	Credit hours earned for the term noted in field name	Base Data
hours_earned_summer_2017	integer	Credit hours earned for the term noted in field name	Base Data
hours_earned_fall_2017	integer	Credit hours earned for the term noted in field name	Base Data
gpa_fall_2010	float	Grade point average for the term noted in field name	Base Data
gpa_spring_2011	float	Grade point average for the term noted in field name	Base Data
gpa_summer_2011	float	Grade point average for the term noted in field name	Base Data
gpa_fall_2011	float	Grade point average for the term noted in field name	Base Data
gpa_spring_2012	float	Grade point average for the term noted in field name	Base Data
gpa_summer_2012	float	Grade point average for the term noted in field name	Base Data
gpa_fall_2012	float	Grade point average for the term noted in field	Base Data

		name	
gpa_spring_2013	float	Grade point average for the term noted in field name	Base Data
gpa_summer_2013	float	Grade point average for the term noted in field name	Base Data
gpa_fall_2013	float	Grade point average for the term noted in field name	Base Data
gpa_spring_2014	float	Grade point average for the term noted in field name	Base Data
gpa_summer_2014	float	Grade point average for the term noted in field name	Base Data
gpa_fall_2014	float	Grade point average for the term noted in field name	Base Data
gpa_spring_2015	float	Grade point average for the term noted in field name	Base Data
gpa_summer_2015	float	Grade point average for the term noted in field name	Base Data
gpa_fall_2015	float	Grade point average for the term noted in field name	Base Data
gpa_spring_2016	float	Grade point average for the term noted in field name	Base Data
gpa_summer_2016	float	Grade point average for the term noted in field name	Base Data
gpa_fall_2016	float	Grade point average for the term noted in field name	Base Data
gpa_spring_2017	float	Grade point average for the term noted in field name	Base Data

gpa_summer_2017	float	Grade point average for the term noted in field name	Base Data
gpa_fall_2017	float	Grade point average for the term noted in field name	Base Data

UofL_Pivoted

This dataset takes ULethbridge's base data, and pivots it from column oriented to row oriented. Some of the data has been recoded for consistency on the way to building the student_program and student_term tables, and these are noted in the Source and Notes field. Pivoting this data was done for two primary reasons:

- Additional information was embedded in the field name, such as term, which could be used for deeper analysis later (such as time to completion).
- Making the data structure more consistent between the 4 institutions that Plaid analyzed for this study. By way of example, ULethbridge provided data in the form of one row per student, but with one column per term per measure (example: gpa_summer_2017, gpa_fall_2017; hours_earned_summer_2017, hours_earned_fall_2017, etc.). For this analysis, we pivoted the data so that it was one row per student per term, with separate columns for measures (example: a row for Fall 2017 would contain columns for hours earned, hours attempted, gpa, full/part time status, and hours withdrawn, as shown in the table below). This pivot was made in part to allow analysis methods and visualizations used with 3 other institutions participating in parallel ACAT research projects (MacEwan University, Mount Royal University, and the University of Alberta) to work seamlessly and effectively with ULethbridge.

Column	Data Type	Description	Source and Notes
institution_id	integer	Institution ID	Institutions.institution_id
institution_code	text	Institution short code	Institutions.institution_code
anon_id	text	Student Anonymous ID	Originally "ID_NUMBER" in Base Data
admit_term	text	Admit term description	Base Data
faculty	text	Faculty or Program	Base Data
admit_type	text	Admit Type	Base Data
admission_average	float	Admission average	Base Data
visa_status	text	Domestic or International	Base Data

gender	text	Gender	Base Data
last_institution_attended	text	Last Institution Attended, Prior to ULethbridge	Base Data
transfer_credits	float	Transfer credits awarded at time of admission	Base Data
graduation_date	text	First Graduation Date	Base Data
grad_total_credit_hours_attempted	float	Total Credit Hours attempted at Graduation	Base Data
grad_total_credit_hours_earned	float	Total Credit Hours earned at Graduation	Base Data
year	text	Year of term	Base Data
term	text	Term Code	6 digits, including Year of Term
registered	text	Registered flag	Base Data
hoursearned	text	Credit hours earned for the Term	Base Data
hoursattempted	text	Credit hours attempted for the Term	Base Data
gpa	text	Grade point average for the Term	Base Data
fullpart	text	Full or part-time status for the Term	Base Data
hourswithdrawn	text	Hours withdrawn for the Term	Base Data
term_code	text	Term Code	Last 2 digits of Term
admit_term_code	text	Admit Term Code	Last 2 digits of Admit Term

Term_Tbl

The term table takes recoded terms from the dataset provided by the University of Lethbridge and adds start and end dates to each.

Column	Data Type	Description	Source and Notes
institution_id	integer	Institution ID	Created for the study
term	text	Term code	Recoded to year + term code (01, 02, 03, 04)
institution_code	text	Institution Code (" UofL")	Created for the study
term_start_date	text	Start date of the term	For recoded terms ending in: 01 - January 1 03 - May 1 04 -September 1
term_end_date	text	End date of the term	For recoded terms ending in: 01 - April 30 03- August 30 04 - December 30
term_name	text	Descriptive name of the term	01 - Spring 03 - Summer 04 - Fall

Student_Program

The Student_Program table is one of the main intermediate tables for the institutions. It contains all student records for every institution in the study, separated by institution_id. Many variables within this table are recoded for consistency with other institutions that Plaid completed case studies for.

Column	Data Type	Description	Source and Notes
institution_id	integer	Institution ID	Institutions.institution_id
institution_code	text	Institution short code	Institutions.institution_code
anon_id	text	Student Anonymous ID	As provided by the institution.
admit_type	text	As provided by the institution.	
admit_term	text	Admit term, recoded	Admit term, recoded to match Term_tbl.term
program	text	Faculty	Institutional
plan_type	text	Academic plan type	Created for this study as "Degree"
graduated	text	Graduation flag (Y or N)	Created, based on graduated date.
graduated_term	text	Graduated term, if available	Recoded
graduated_date	text	Graduated date	Institutional
transfer_credits	text	Transfer credits awarded at time of admission for previous post-secondary work at institutions recognized by the University of Lethbridge	Institutional
national_status	text	National Status	Recoded to D (Domestic), I (International), or U (Unknown)
indigenous	text	Indigenous status, if provided.	Recoded to Y or N, if provided.

gender	text	Gender	Recoded to F, M, O, or U.
age	text	Age at the beginning of the student's first term	Institutional
last_school	text	Last School Attended	Institutional
last_school_city	text	Last School Attended City	Institutional
last_school_state	text	Last School Attended Province or State	Institutional
last_school_type	text	Last School Attended Type, if provided	Institutional
program_length	text	Length of program	Created. For Degrees, 4 years.
last_school_country	text	Last School Attended Country	Institutional
admit_term_start_date	text	Start date of admit term	Term_tbl.term_start_date
admit_term_end_date	text	End date of admit term	Term_tbl.term_end_date
grad_term_start_date	text	Start date of grad term	Term_tbl.term_start_date
grad_term_end_date	text	End date of grad term	Term_tbl.term_end_date
admit_time_category	text	Determines whether a student is within the study period	Created. If student started on or after the first term reported by the institution, and the student's first enrollment term is within the study period, then Standard. If the student was admitted prior to the study period, identify as such. If the student student's first enrollment term is before their admission term, identify this.
inst_first_term_in_dataset	text	Determines first term	Earliest term in the

		reported by the institution.	dataset
stud_first_term_in_dataset	text	Student's first term in the dataset	Earliest term for each student in the dataset.
stud_first_term_start_date	text	Start date of the first term for the student in the dataset	Term_tbl.term_start_date
stud_first_term_end_date	text	End date of the first term for the student in the dataset	Term_tbl.term_end_date
stud_last_term_in_dataset	text	Student's last term in the dataset	Last term for each student in the dataset
stud_last_term_start_date	text	Start date of the last term for the student in the dataset	Term_tbl.term_start_date
stud_last_term_end_date	text	End date of the last term for the student in the dataset	Term_tbl.term_end_date

Student_Term

At ULethbridge the student_term table houses enrolment records for each student in each term they were enrolled, including information on term performance (GPAs), progress (credits and withdrawals) and flags related to each student (first and last term in dataset, and how many total terms they have registered for).

Column	Data Type	Description	Source and Notes
institution_id	integer	Institution ID	Institutions.institution_id
institution_code	text	Institution short code	Institutions.institution_code
anon_id	text	Student Anonymous ID	As provided by the institution.
term	text	Term code	Institutional (recoded if needed)
term_gpa	text	Grade Point Average for the Term	Base Data
cumulative_gpa	text	Cumulative GPA as of the end of that Term	Base Data

term_academic_standing_code	text	Academic Standing Code for each term	Base Data
term_academic_standing_desc	text	Academic Standing Description for each term	Base Data
term_credits_enrolled	text	Credits enrolled for the Term	Institutional
term_credits_passed	text	Credits passed for the Term	Institutional
cumulative_earned_credits	text	Cumulative earned credits (as of that Term)	Calculated based on term_credits_passed
academic_load	text	Full or part-time status that term	Institutional
term_withdrawals	text	Number or credits of withdrawals that term	Institutional
registered	text	Registered flag, for each term	Institutional
unique_key	text	Combination of institution_id and anon_id	Calculated
term_start_date	text	Start date of term	Term_tbl.term_start_date
term_end_date	text	End date of term	Term_tbl.term_end_date
Student_Registered_Term_Count	text	Number of terms the student has registered in	Calculated
inst_first_term_in_dataset	text	Determines first term reported by the institution.	Earliest term in the dataset
ua_reporting_year	text	University of Alberta reporting year	Term_tbl.ua_reporting_year
stud_first_term_in_dataset	text	Student's first term in the dataset	Earliest term for each student in the dataset.
stud_first_term_start_date	text	Start date of the first term for the student in the dataset	Term_tbl.term_start_date

stud_first_term_end_date	text	End date of the first term for the student in the dataset	Term_tbl.term_end_date
stud_last_term_in_dataset	text	Student's last term in the dataset	Last term for each student in the dataset
stud_last_term_start_date	text	Start date of the last term for the student in the dataset	Term_tbl.term_start_date
stud_last_term_end_date	text	End date of the last term for the student in the dataset	Term_tbl.term_end_date

Student_Progression_Term

At ULethbridge the student_progression_term table takes the information in student_program for each student's admit term, and builds it out over time. First, it joins to each possible term where the term is greater than or equal to the admit term, and less than or equal to the admit term + 10 years. Then, a left join is performed against the student_term table. This ensures that for each admit cohort, all future terms are visible, regardless of whether the student registered in classes or not. This, in turn, allows for the calculation of the "Status" field.

Column	Data Type	Description	Source and Notes
institution_id	integer	Institution ID	Student_Program
institution_code	text	Institution short code	Student_Program
anon_id	text	Student Anonymous ID	Student_Program
admit_type	text	As provided by the institution.	Student_Program
admit_term	text	Admit term, recoded	Student_Program
program	text	Faculty the student is registered in	Student_Program
plan_type	text	Academic plan type (degree).	Student_Program
graduated	text	Graduation flag (Y or N)	Student_Program
graduated_term	text	Graduated term, if available	Student_Program
graduated_date	text	Graduated date	Student_Program

transfer_credits	text	Transfer credits at time of admission	Student_Program
national_status	text	National Status	Student_Program
gender	text	Gender	Student_Program
age	text	Age at the beginning of the student's first term	Student_Program
last_school	text	Last School Attended	Student_Program
last_school_city	text	Last School Attended City	Student_Program
last_school_state	text	Last School Attended Province or State	Student_Program
last_school_type	text	Last School Attended Type, if provided	Student_Program
program_length	text	Length of program	Student_Program
last_school_country	text	Last School Attended Country	Student_Program
admit_term_start_date	text	Start date of admit term	Term_tbl
admit_term_end_date	text	End date of admit term	Term_tbl
grad_term_start_date	text	Start date of grad term	Term_tbl
grad_term_end_date	text	End date of grad term	Term_tbl
term	text	Term code	Student_Term
term_start_date	text	Start date of term	Student_Term
term_end_date	text	End date of term	Student_Term
term_gpa	text	Grade Point Average for the Term	Student_Term
cumulative_gpa	text	Cumulative GPA as of the end of that Term	Student_Term
term_academic_standing_code	text	Academic Standing Code for each term	Student_Term

term_academic_standing_desc	text	Academic Standing Description for each term	Student_Term
term_credits_enrolled	text	Credits enrolled for the Term	Student_Term
term_credits_passed	text	Credits passed for the Term	Student_Term
cumulative_earned_credits	text	Cumulative earned credits (as of that Term)	Student_Term
academic_load	text	Full or part-time status that term	Student_Term
term_withdrawals	text	Number or credits of withdrawals that term	Student_Term
registered	text	Registered flag, for each term	Student_Term
unique_key	text	Combination of institution_id and anon_id	Student_Term
Student_Registered_Term_Count	text	Number of terms the student has registered in	Student_Term
Status		Status, for measuring persistence. Student is either Registered, Graduated, or Left	Calculated
admit_time_category	text	Determines if the student's admit term is prior to the student's first term in the dataset	Student_Program
inst_first_term_in_dataset	text	Student's first enrolled term code in the dataset	Student_Term
term_name	text	Descriptive name of the term	Term_tbl
inst_first_term_in_dataset	text	Determines first term reported by the institution.	Earliest term in the dataset
stud_first_term_in_dataset	text	Student's first term in the dataset	Earliest term for each student in the dataset

stud_first_term_start_date	text	Start date of the first term for the student in the dataset	Term_tbl.term_start_date
stud_first_term_end_date	text	End date of the first term for the student in the dataset	Term_tbl.term_end_date
stud_last_term_in_dataset	text	Student's last term in the dataset	Last term for each student in the dataset
stud_last_term_start_date	text	Start date of the last term for the student in the dataset	Term_tbl.term_start_date
stud_last_term_end_date	text	End date of the last term for the student in the dataset	Term_tbl.term_end_date