TRANSFER STUDENT SUCCESS IN ALBERTA CASE STUDY: MACEWAN UNIVERSITY

For the Alberta Council on Admissions and Transfer

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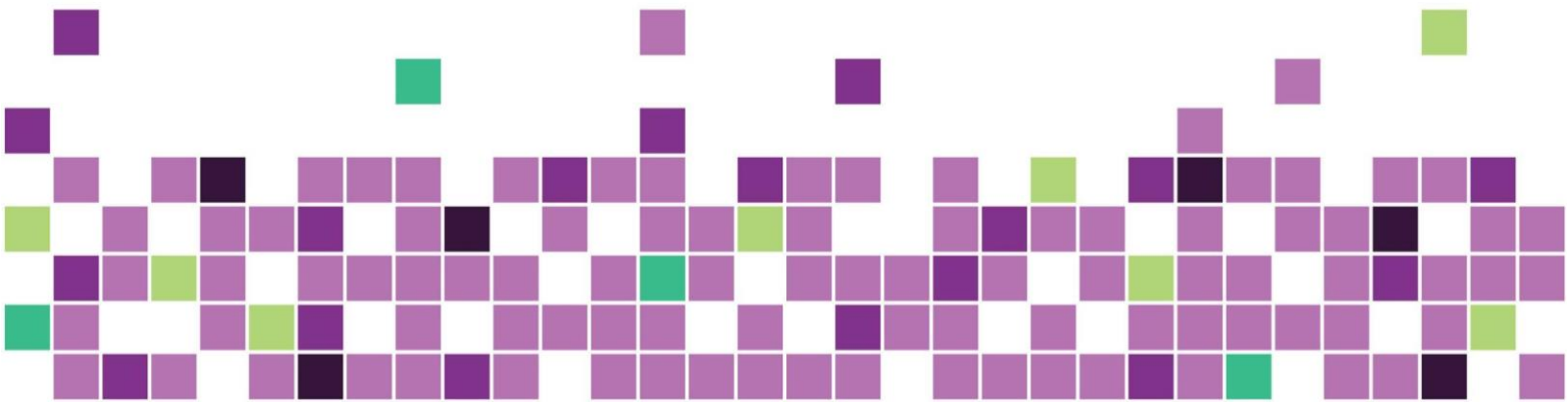

Executive summary

The Alberta Council on Admissions and Transfer (ACAT) contracted Plaid Consulting to perform a comprehensive review of transfer student success metrics at MacEwan University. 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 MacEwan as a receiving institution for transfer students. The three other reports Plaid completed will be accessible separately via ACAT.

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 MacEwan University. 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 MacEwan University, which included informal qualitative data in the form of conversations with targeted representatives from MacEwan, and
- focusing the report's core analysis and conclusions on a regression analysis of quantitative MacEwan 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 (1 year for certificates, 2 years for diplomas, and 4 years for baccalaureate degrees). In turn, at least that number of years had to have elapsed since the student was admitted.

This MacEwan University 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. The case study performed focused on baccalaureate degree, diploma, and certificate programs.

For this report, we categorize institutions according to Alberta's six sector model, which includes publicly funded institutions in Alberta (Alberta Advanced Education, 2007). MacEwan University is categorized in this way as a Baccalaureate and Applied Studies Institution. The other sectors are Comprehensive Academic and Research Institutions, 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 MacEwan University. Further definitions of these sectors are available in key terms.

Environmental scan

The environmental scan revealed that MacEwan has performed limited analysis on the success of transfer students to date. This is for a variety of reasons including a new student information system, more urgent analysis on other high priority groups of students, and the uncertainty associated with whether transfer students will receive transfer credits towards a particular credential prior to graduation.

Additionally, at MacEwan, there is debate as to what the most appropriate definition of transfer is. Some institutions have a long-defined and recorded basis of admission for post-secondary transfer, something MacEwan has only recently reliably recorded. One method of defining a transfer student is based on the 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 MacEwan, this is 18 transfer credits for diploma programs, and 24 transfer credits for degree programs). The case study in this report is based on the latter concept of basis of admission as the definition for transfer. The environmental scan at MacEwan highlighted that there is additional nuance within the notion of transfer that is not easily measured: *incidental transfer*, where a student has taken courses in post-secondary, later decides to attend MacEwan, and happens to get transfer credit for previous work; conversely, *intentional transfer* occurs when a student deliberately takes transfer courses at another institution and fully intends to transfer to MacEwan as part of their plan. The applicability of transfer credits towards a credential is another area where the definition of transfer gets harder to fully define. For example, a student moving from a fine arts diploma at one institution to an engineering degree at another institution may well get several transfer credits for fine arts, but will also likely have to take enough courses in engineering in order to graduate, invariably leading to some of the transfer courses not directly counting in the engineering degree.

Demographics and previous institution

The average age of direct entry students in this study was just under 23, while the average age of transfer students was just over 24. Females represented about 65% of direct entry students, and 62-63% of transfer students.

In terms of previous institution attended (for students with transfer credit), 34% (based on an admit type threshold of 18 credits) to 36% (based on an admit type threshold of 24 credits) were from Comprehensive Academic and Research Institutions, followed by 17% and 15% respectively from outside Alberta, and 14% from Comprehensive Community Institutions.

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**.**

As part of the case study, we created a proxy indicator to determine whether a student was a transfer student or a direct entry student. Two proxies were used: 18+, and 24+ transfer credits awarded were coded as transfer students. Those who fell below the proxy threshold (0-17 transfer credits and 0-23 transfer credits) were coded as direct entry students. The thresholds of 18 and 24 were chosen to correspond with MacEwan's use of 18 transfer credits to qualify as a transfer student to diploma programs and 24 transfer credits to qualify as a transfer student to degree programs.

Additionally, in order to provide a balanced comparison, many metrics are divided into three versions: an unadjusted model, where direct entry students and transfer students are compared directly from when they started studying at the institution; a normalized to 24 credit model, where direct entry students with between 24 and 30 credits completed at MacEwan are compared to transfer students with between 24 and 30 transfer credits - effectively from the start of second year for both; and a comparison normalized to 60 credits. 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 you view transfer student success changes the outcome metric.

Time to completion

The case study illustrated some key points: when we used unadjusted comparisons, transfer students predictably finish their credentials faster than direct entry students. However, when we normalize to our recommended common baseline of 24 credits completed at MacEwan or via transfer, the gap in time to completion narrows considerably for degree students, with diploma-seeking transfer students now taking longer than their direct entry counterparts, and degree-seeking transfer students finishing only marginally faster than direct entry students. Regression analysis on time to completion showed significance but only captured a small amount of the variance in time to completion when transfer was taken into account. For further information on these metrics, see key metrics.

Graduation rate

Graduation rate was also analyzed against expected program completion time, this being the duration nominally assigned to completion of a credential (in this study, 1 year for certificates, 2 years for diplomas, and 4 years for degrees). Using the normalized to 24 credits model, direct entry students were more likely to finish their diplomas within the expected program length, but this effect is muted by 150% of the program length. For degree students, transfer students are more likely to have completed their credential by both expected program length and 150% of that time. For further information on these metrics, see key metrics.

Progression

Transfer students were less likely to leave the institution and more likely to graduate within the study period than their direct entry counterparts. Progression to a particular registration term was comparable for transfer and direct entry students in degree programs until about 2-3 years into their studies, when more transfer students began to graduate. In diploma programs, there was minimal difference. When normalizing for completion of 24 credits, a similar pattern occurs, but earlier. Degree students start to see divergence around term 5, with transfer students being slightly more likely to continue enrolling than direct entry students until about term 10. For diploma students, this divergence occurs between terms 4 and 10. For degree students, transfer and direct entry students are similarly likely to register until term 6, after which transfer students become more likely to register up to term 10. For further information on these metrics, see key metrics.

GPA at graduation

Looking at GPA at graduation, just over 11% of the variance can be explained by the variables international, female, age, program, and admit academic year. International students tended to have slightly lower GPAs at graduation, while females and older students tended to have slightly higher GPAs at graduation. Adding a transfer indicator provides a small lift to the predictive power of these variables, between about 0.9-1.1 percentage points. While these regression results are significant, their predictive power is quite low, suggesting that the variables captured here do not account for a large amount of the variance in graduation GPA. For further information on this metric, see key metrics.

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 MacEwan University. 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 MacEwan University 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

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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 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.

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 MacEwan University, which included informal qualitative data in the form of conversations with targeted representatives from MacEwan, and
- focusing the report's core analysis and conclusions on a regression analysis of quantitative MacEwan data that were based on targeted data metrics for analysis of transfer student success in comparison to direct entry students.

The case study conducted for this report includes both part- and full-time students in baccalaureate degrees, diplomas, and certificates who were admitted during the study period. Applied degrees were excluded from the analysis as the study data included only their final two years of study. University transfer students were also excluded as we did not have information on whether the student successfully transferred to a university. 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 (1 year for certificates, 2 years for diplomas, and 4 years for baccalaureate degrees). In turn, at least that number of years had to have elapsed since the student was admitted.

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

The environmental scan consisted of in person and telephone conversations with Mike Sekulic, University Registrar, and Tony Norrad, Associate Registrar Admissions. Additional input was provided by David McLaughlin, Executive Director of Institutional Analysis and Planning. These early conversations revealed that there would be challenges stemming from adoption of the PeopleSoft Student Information System. It was also revealed that the current definition of "Previous Post-Secondary" as being 18 transfer credits for a diploma and 24 transfer credits for a degree, has only been consistently recorded in MacEwan's student information system in the last few years, necessitating the creation of an admit_type variable for this study.

At MacEwan there is some debate as to what the most appropriate definition of a transfer student is. One method of defining a transfer student is based on the whether a student received transfer credit (aligning with the provincial definition of transferability, discussed at the end of this section). Another method is to view transfer as a basis of admission, where students surpassing a certain threshold of transfer credits awarded (at MacEwan, this is 18 transfer credits for diploma programs, and 24 transfer credits for degree programs) are considered a transfer student. The case study in this report uses the latter definition, based on the number of transfer credits awarded at admission. While some institutions have a long-defined and recorded basis of admission for post-secondary transfer, MacEwan has only reliably recorded this basis of admission in their student information system in the last couple of years (though the definitions of the basis of admission have been around longer). The environmental scan at MacEwan highlighted additional nuance to the provincial definitions of both student mobility and transferability: *incidental transfer*, where a student has taken courses in post-secondary, later decides to attend MacEwan, and happens to get transfer credit for previous work; conversely, *intentional transfer* occurs when a student deliberately takes transfer courses at another institution and fully intends to transfer to MacEwan as part of their plan. There is currently no effective way to measure whether transfer is incidental or intentional. The applicability of transfer credits towards a credential is another area where the definition of transfer gets harder to fully define. For example, a student moving from a fine arts diploma at one institution to an engineering degree at another institution may well get several transfer credits for fine arts, but will also likely have to take enough courses in engineering in order to graduate, invariably leading to some of the transfer courses not directly counting in the engineering degree. A related subset of student mobility is visiting students, who, with permission of their home institution, take courses at a recognized institution, with credits counted towards their home institution credential.

The environmental scan also noted that MacEwan has a significant number of returning students: it is very common for students to complete a credential (such as a diploma) at the institution and return later to complete an additional credential (such as a degree). This distinction is allowed for in how the data was ultimately reshaped for analysis in the case study: we used the earliest graduation term for each student, and tied that to their admission program (which may not have been the same program as students can change mid-stream). As such, the analysis to follow shows graduation from the institutional perspective, rather than the individual program perspective. This case study included degree, diploma, and certificate program students.

As part of the review process, we also discussed ideas around transfer student performance. In the case study to follow, several unadjusted metrics show transfer students performing completing their credentials faster, or being more likely to graduate within a period of time, than their direct entry peers, whereas normalized metrics show a more complex story that better accounts for the fact that transfer students

begin their studies at MacEwan with a number of transfer credits already completed at their sending institution that count towards graduation at MacEwan. One of the reasons transfer students are able to complete their credentials in a timely fashion 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 the institutions. 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.

The focus of this report is to begin to define initial aspects of transfer student success based on available MacEwan metrics. These findings may help to inform future baseline measures for transfer student success in Alberta.

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 MacEwan University's website (MacEwan University, n.d.). 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 are a different method of defining transfer students, which is important for their comparability to 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 MacEwan, this threshold is 18 credits for diploma programs, and 24 credits for degree programs. Because an admit type was not available in the data provided by MacEwan, we have used the 18-credit and 24-credit thresholds for this report's case study as a proxy to determine transfer status for all programs (certificates, diplomas, and degrees).

    - 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 student with 17 transfer credits would be coded as direct entry.

- Visiting Student (MacEwan University students visiting another institution): A MacEwan University student pursuing courses towards their MacEwan credential at another recognized post-secondary institution. To obtain MacEwan credit, students must have a Letter of Permission prior to enrolling in the course (MacEwan University, April 4, 2018).
    - Note: there are also visiting students from other institutions who attend MacEwan, and are part of Open Studies during their time at MacEwan. 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). MacEwan University is categorized in this way as a Baccalaureate and Applied Studies 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.
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 MacEwan University.

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

Summary of existing metrics from the environmental scan

MacEwan currently has minimal metrics comparing the success of transfer students with direct entry students.

A detailed overview of the metrics created for this report's case study can be found in key metrics.

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 for prior learning 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).

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, n.d.). 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 are 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 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 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 are reported as still enrolled, transferred, or unknown (Jones, 2017).

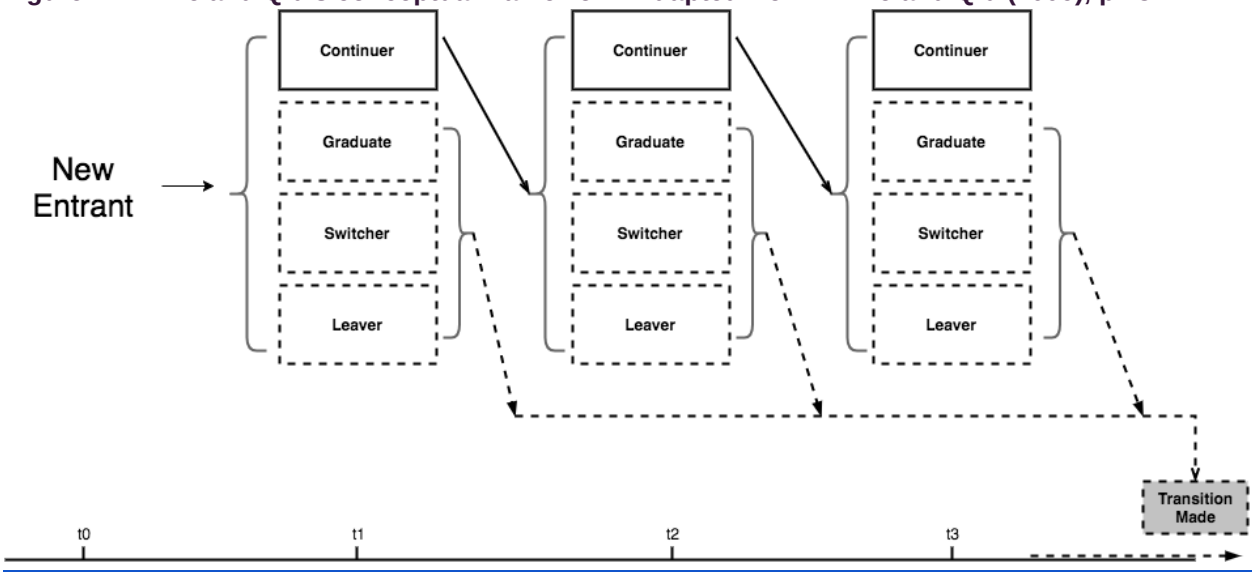
Conceptual framework: student transitions

This report focuses on comparing the success of direct entry and external transfer student populations. It includes full and part time students from all programs at MacEwan University, with the exception of university transfer and open studies. The key metrics studied can be used for students not traditionally captured by student success metrics (for example, part-time students who were not transfer students). 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 MacEwan, 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 MacEwan University:

- Time to completion: number of elapsed years between when the student began studying and graduation.
    - Descriptive statistics
    - Regression analysis

  Graduation rate at the following points in time relative to expected program completion times:
    - 100%, 150%, 200%.
        - 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)
- 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 MacEwan.

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 MacEwan University. 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 MacEwan University, which included informal qualitative data in the form of conversations with targeted representatives from MacEwan, and
- focusing the report's core analysis and conclusions on a regression analysis of quantitative MacEwan data that were based on targeted data metrics for analysis of transfer student success in comparison to direct entry students.

Students from certificate, diploma, and degree programs studying both full-time and part-time and who were enrolled at MacEwan between 2011 Fall and 2017 Spring/Summer were included in the case study.

Data transformation summary

MacEwan provided Plaid with a dataset containing 176,885 anonymized student enrolment records by term, representing 38,339 unique students pursuing certificate, diploma, applied degree, and baccalaureate degree programs at MacEwan. The case study period started in 2011 Fall and ended in 2017 Spring/Summer.

For this case study, we took the base data provided by MacEwan and transformed it 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_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 Jetbrains' 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.

The count of the number of transfer credits provided by MacEwan included transfer credits awarded to a student for prior work completed at a post-secondary institution recognized by MacEwan, calculated at the time of admission to MacEwan. It may also include transfer credit for work completed at the secondary level (such as Advanced Placement or International Baccalaureate). Dual credit completed simultaneously at the secondary level and MacEwan is included as regular work completed at MacEwan. It does not contain work completed after admission to MacEwan at another post-secondary institution such as courses taken on a Letter of Permission.

Applied degree programs require a total of 4 years of study, but at MacEwan the admission requirements for entry into an applied degree program include the completion of 60 credits of postsecondary work, generally in the form of a diploma. As 2 years of study are completed before entry into the program, the data provided by MacEwan for students in applied degree programs represents only the final 2 years of coursework and time to graduation was calculated from entry into the applied degree program at the beginning of the student's 3rd year.

In order to enable our data analysis, we recoded the MacEwan 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, University of Lethbridge and MacEwan University) that Plaid completed for ACAT. Generally, this consisted of the following processing of the data:

- Admit type was created based on transfer credit thresholds at 18 and 24 transfer credits. Note that in this study, we have analyzed both thresholds for all students as a basis of comparison, regardless of credential type. However, at MacEwan, the 18 credit threshold is used for diploma transfer students, and the 24 credit threshold is used for degree transfer students. Demographic variables: Age and Gender were used as presented if available. Domestic/International was renamed to National Status and represented as D (Domestic), I (International), or U (Unknown).
- Admit term, current term, last enrolled term, and completion/graduation term were recoded to a term ID number. This ID number began with the year followed by 2 digits identifying the term within the year. Terms ending in 01 represents Winter, 03 represents Spring/Summer) and 04 represents Fall. Graduation terms provided by MacEwan were also recoded using the same convention. 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 presence of either a completed credential, a graduation flag, or a graduation date in the base data. The earliest graduation date after the student was admitted was used, regardless of which program the student graduated from.
- Cumulative earned credits were calculated based on term credits passed.
- Plan is based on the student's academic plan.
- Plan type was provided as Certificate, Diploma, Applied Degree, or Degree by MacEwan.
- The degree code field was used to represent program.
- 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 (indicating that the student 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".

Limitations

This case study is limited in several ways, and all results should be considered in the context of these limitations. Key limitations include the length of the study period meaning that certain metrics, such as graduation rate within 200%+ of expected program completion time are not possible. Additionally, the study excludes anyone who was admitted prior to the start of the study period, as it was not possible to determine student behaviour between the admission term and the start of the study. Finally, over the course of the study period, MacEwan did not consistently label a student as either direct entry or transfer in their information systems, requiring us to determine this label based on transfer credits awarded to the student.

This study also does not have full insight into institutional rules around course repeats. It is possible that GPAs provided as part of the base data could change if a student repeats a course after the end of the study period. Further, this dataset reflects only degree, diploma, applied degree, and certificate seeking students, and excludes open studies university transfer studies. Open studies programs accounted for 1,134 - 9% of MacEwan's 12,580 enrolments in 2015-16, while other non-credential programs including university transfer accounted for a further 864 - 6% (MacEwan University, 2017). Lastly, there are rules applied to each of the metrics in the name of comparability (within the institution but not outside) and reasonability, which are further documented in each of the key metrics of the study. By way of example, graduation rate at 150% of expected program completion time require that students have attended the institution for at least 6 years for degree programs. These conditions limit the number of admission cohorts that can be assessed in the study period to only one cohort. In the case of students classified as transfer, these rules limiting which cohorts can be included in the key metrics make the sample size quite small relative to the full dataset, which may make the conclusions drawn here not representative of the fuller experience at MacEwan.

Finally, this study can only look at the time a student spent completing a credential at MacEwan, rather than looking at their entire time working towards that credential. In the case of transfer students, in particular, this study does not include the time elapsed completing the courses that are eventually awarded transfer credit at MacEwan. Within this study we use credit normalization (discussed below) to provide a fair comparison of the time at MacEwan, but other methods would be required to look at total time towards a credential.

The future research recommendations section discusses some possible solutions to these limitations.

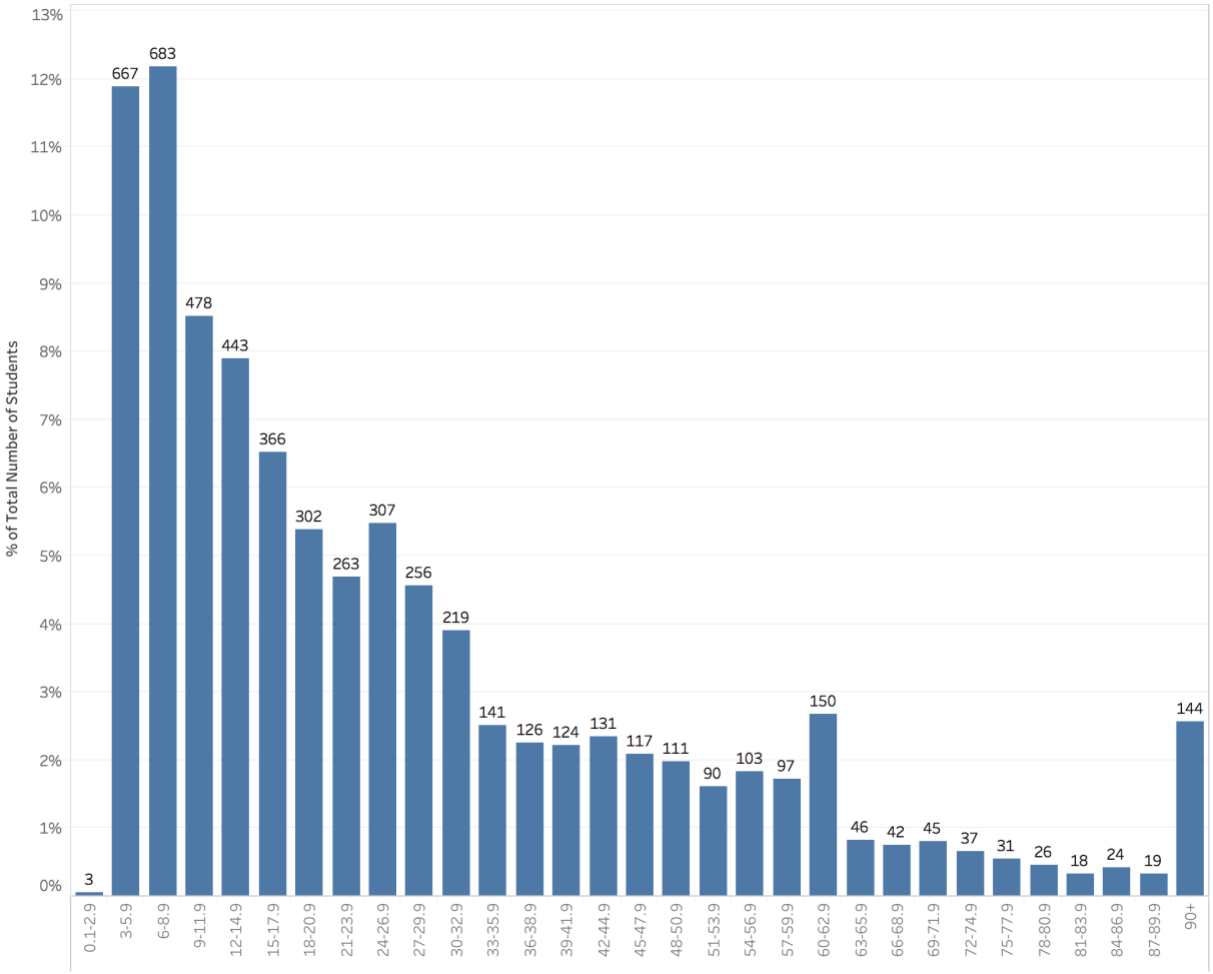
Credit normalization

In several of the key metrics for this study, we have employed normalization to provide a fairer comparison between direct entry and transfer students. Where applicable, three versions of a metric are presented: unadjusted, normalized to 24 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 our choices

aligned with their own internal methods. The spread of transfer credits presented in the data is shown in Figure 2 below. The figure shows that the most common number of transfer credits (among those with transfer credit) in this dataset were, in order, 6-8.9, 3-5.9, 9-11.9, 12-14.9, and 15-17.9. Additional peaks occurred at 24-26.9 and 60-62.9, aligning with the normalization techniques presented. We chose to compare direct entry students from the time they amassed 24-29.9 credits within the institution with transfer students possessing 24-29.9 transfer credits. A similar analysis was conducted comparing direct entry students from the time they amassed 60 credits with transfer students with 60-65.9 transfer credits.

Figure 2: Distribution of transfer credits awarded to students entering MacEwan University



Definition of transfer student

There are differing perspectives on what constitutes a transfer student - one definition would consider any student with any amount of advanced standing; while another perspective sees it as a category of evaluation for admissions purposes. Using a simple measure like whether or not a student was awarded transfer credit was insufficient for the purposes of this study, because many students elect to take a course or two at another institution and are in turn awarded transfer credit. At MacEwan University, a formal label of "transfer student" has only been consistently used within the Student Information System

(SIS) since 2016; while transfer credit was recorded for each student, the separate label for whether a student was admitted based primarily on transferred postsecondary-level work, secondary-level work, or a combination of the two, was not recorded.

Rather than use this existing MacEwan definition and attempt to retroactively classify students as direct entry or transfer, we instead created a new identifier. For the purposes of this analysis it was agreed in conversation with the Registrar's Office at MacEwan that the definition of a "transfer student" would include the following categories:

- Awarded 18 or more transfer credits
- Awarded 24 or more transfer credits

These thresholds were chosen to correspond with the definitions used by MacEwan for transfer students to diploma programs (18 credits) and degree programs (24 credits). Students who did not meet any of the above definitions were classified as "direct entry" (from high school). One of the limitations of this method is that some students who get classified as direct entry may in reality be another category. For example, students are defined as "transfer" based on the number of transfer credits they possess. However, these transfer credits may not be at all relevant to the program the student is studying and may not be applied to the student's eventual credential. These applicants would get labelled as either direct entry or transfer based on the definitions above.

The table below shows the resulting number of students within each category. The higher requirement on transfer credits means fewer students will be counted as a transfer student. Note that this table will have slightly lower totals than reported above because students were limited to their first completed credential.

Table 1: Total students records by admit type threshold during the study period
(Students at or beyond the admit type threshold are coded as transfer students. Others are coded as direct entry.)

		Admit Type Threshold	
Plan Type	**Admit Type**	**18**	**24**
Certificate	Direct Entry	1,511	1,536
	Transfer	45	20
	Total	**1,556**	**1,556**
Diploma	Direct Entry	10,482	10,713
	Transfer	784	553
	Total	**11,266**	**11,266**
Applied Degree	Direct Entry	Suppressed	Suppressed
	Transfer	N < 10	N < 10
	Total	**262**	**262**
Degree	Direct Entry	15,632	15,941
	Transfer	2,140	1,831
	Total	**17,772**	**17,772**
Excluded, admitted prior to study period		7,441	7,441
Total		**38,297**	**38,297**

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 7,441 students. Thus, the following number of students remained for further analysis.

Table 2: Students records analyzed by admit type threshold
(students at or beyond the admit type threshold are coded as transfer students. Others are coded as direct entry.)

		Admit Type Threshold	
Plan Type	**Admit Type**	**18**	**24**
Certificate	Direct Entry	1,511	1,536
	Transfer	45	20
	Total	**1,556**	**1,556**
Diploma	Direct Entry	10,482	10,713
	Transfer	784	553
	Total	**11,266**	**11,266**
Applied Degree	Direct Entry	Suppressed	Suppressed
	Transfer	N < 10	N < 10
	Total	**262**	**262**
Degree	Direct Entry	15,632	15,941
	Transfer	2,140	1,831
	Total	**17,772**	**17,772**
Total		**30,856**	**30,856**

Demographics and previous institution

MacEwan provided information on the age and gender of students. Figure 3 provides a view of the distribution of the age of students at the beginning of their first semester of studies at MacEwan, separated by transfer status as well as by the transfer threshold, either 18 or 24 credits. Transfer students tend to be slightly older at the time they begin their studies at MacEwan, though the distribution is tighter than for direct entry students - the youngest direct entry student included in our study was 15 years old at the time of admission to MacEwan, and the oldest was 74 years old, while transfer students range from 18 years old to 60 years old. Using the 18 transfer credit threshold, transfer students are approximately 1.7 years older at the time of their first semester at MacEwan - 24.3 years old compared to 22.6 for direct entry students. If the 24 transfer credit threshold is used the difference is slightly smaller at 1.6 years, 24.2 years old compared to 22.6 years old.

Figure 3: Age distribution of MacEwan University students at the beginning of their first term of studies at MacEwan

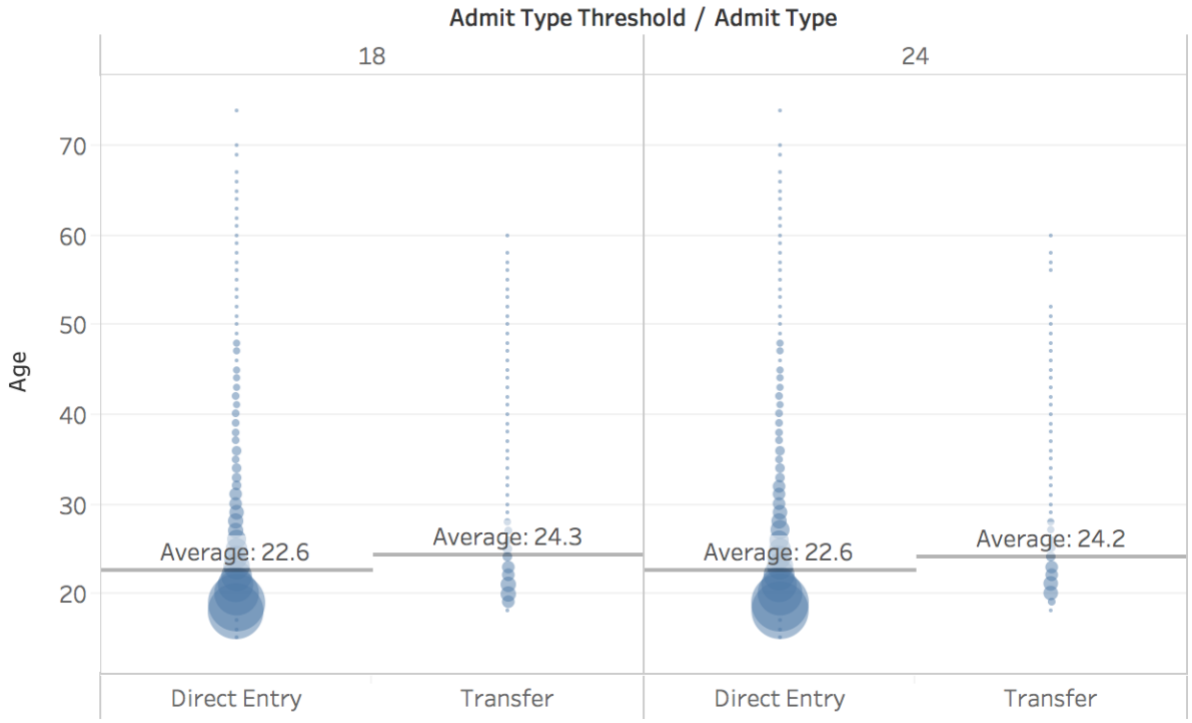
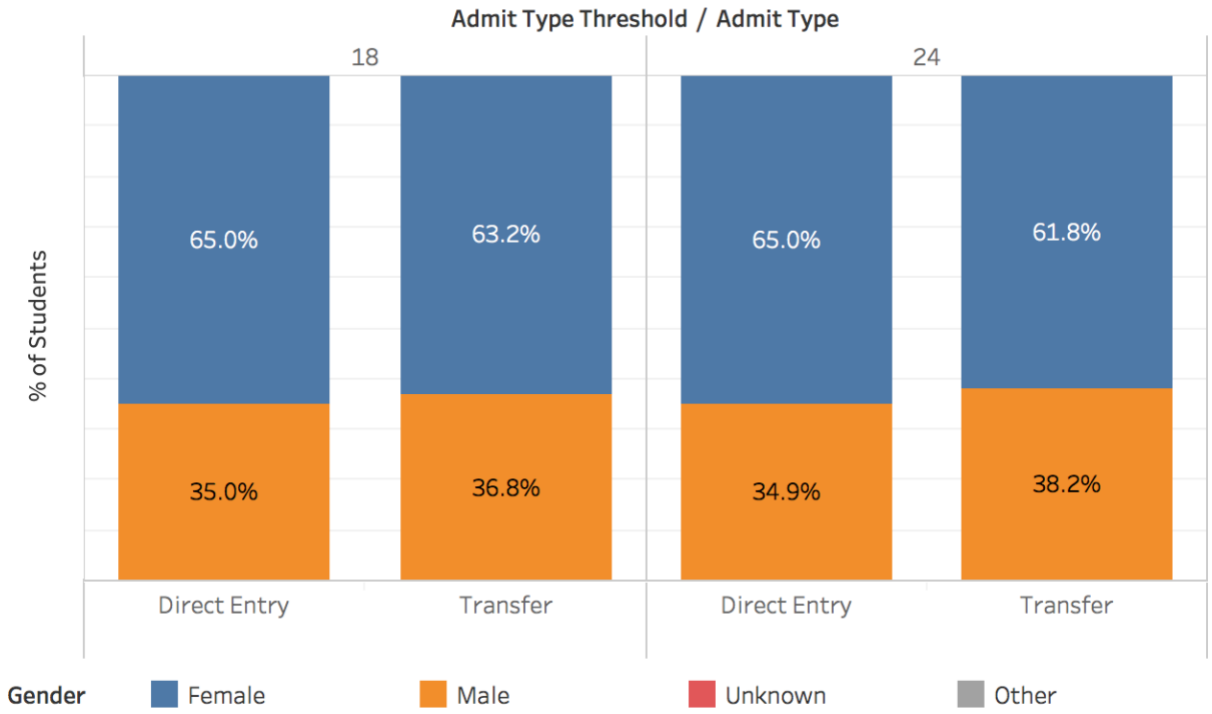


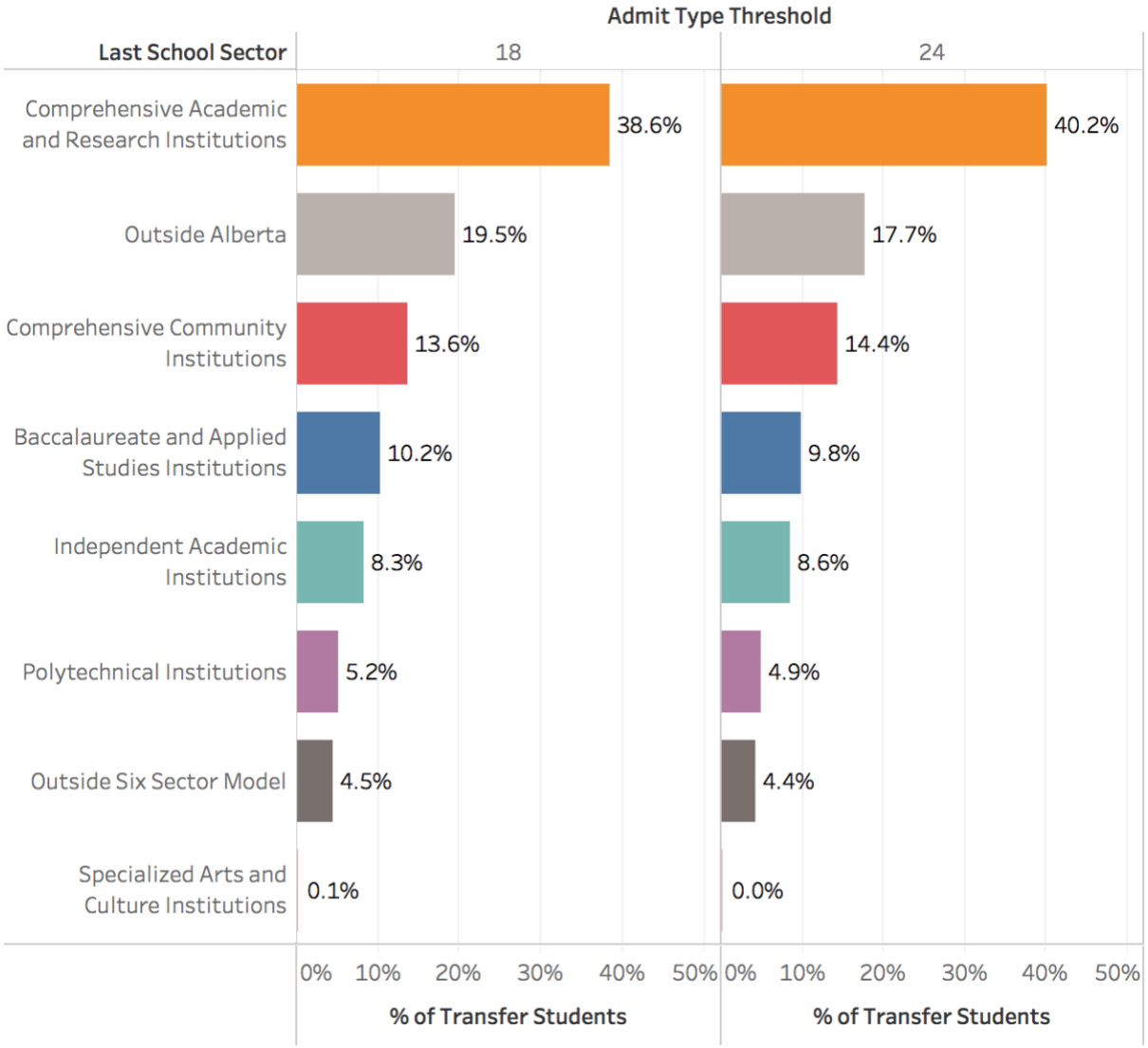
Figure 4 shows the breakdown of students by gender. MacEwan records 4 separate gender identifiers - male, female, other, and unknown - but the number of students listed as “unknown” (N=7) and “other” (N=3) are sufficiently small that they are not discernable in the figure. Males make up a larger proportion of transfer students (36.9%) than direct entry students (35.1%) at the 18-credit threshold, with the difference being 1.8 percentage points (pp); this is also the case at the 24-credit threshold but by a wider margin of 3.2pp, with 38.2% of transfers identifying as male while 35.0% of direct entry students identify as male.

Figure 4: Gender breakdown of MacEwan University students



In addition to demographic information, MacEwan provided the most recent school attended by the student before their entrance to MacEwan; this information is shown in Figure 5 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), as outside the Model but within Alberta, or as external to Alberta. The largest group of transfers to MacEwan (excluding Open Studies students) came from comprehensive academic & research institutions (40.2% of transfers at the 24-credit threshold; 38.6% at 18-credits), a group which includes Athabasca University and the Universities of Alberta, Calgary, and Lethbridge. The second-largest group (17.7% at the 24-credit threshold; 19.5% at 18-credits) comes to MacEwan from institutions outside Alberta, followed by the group that comes to MacEwan from the comprehensive community institutions made up of Alberta's publicly-funded colleges (14.4% at the 24-credit threshold; 13.6% at 18-credits). Baccalaureate and applied studies institutions make up the fourth-largest group (9.8% at the 24-credit threshold 10.2% at 18-credits. Note that within this group, MacEwan students account for 8.1% of the 9.8%, and 8.7% of the 10.2%, respectively, with the remaining 1.7% and 1.5% coming from Mount Royal University). Independent academic institutions make up the fifth-largest group (8.6% at the 24-credit threshold; 8.3% at 18-credits), followed by polytechnical institutions (4.9% at the 24-credit threshold; 5.2% at 18-credits), institutions within Alberta that are outside the Six Sector Model (4.4% at the 24-credit threshold; 4.5% at 18-credits), and finally specialized arts & culture institutions (0.0% or 1 student at the 24-credit threshold; 0.1% or 2 students at 18-credits).

Figure 5: Previous institution breakdown of students transferring in to MacEwan University



Key metrics

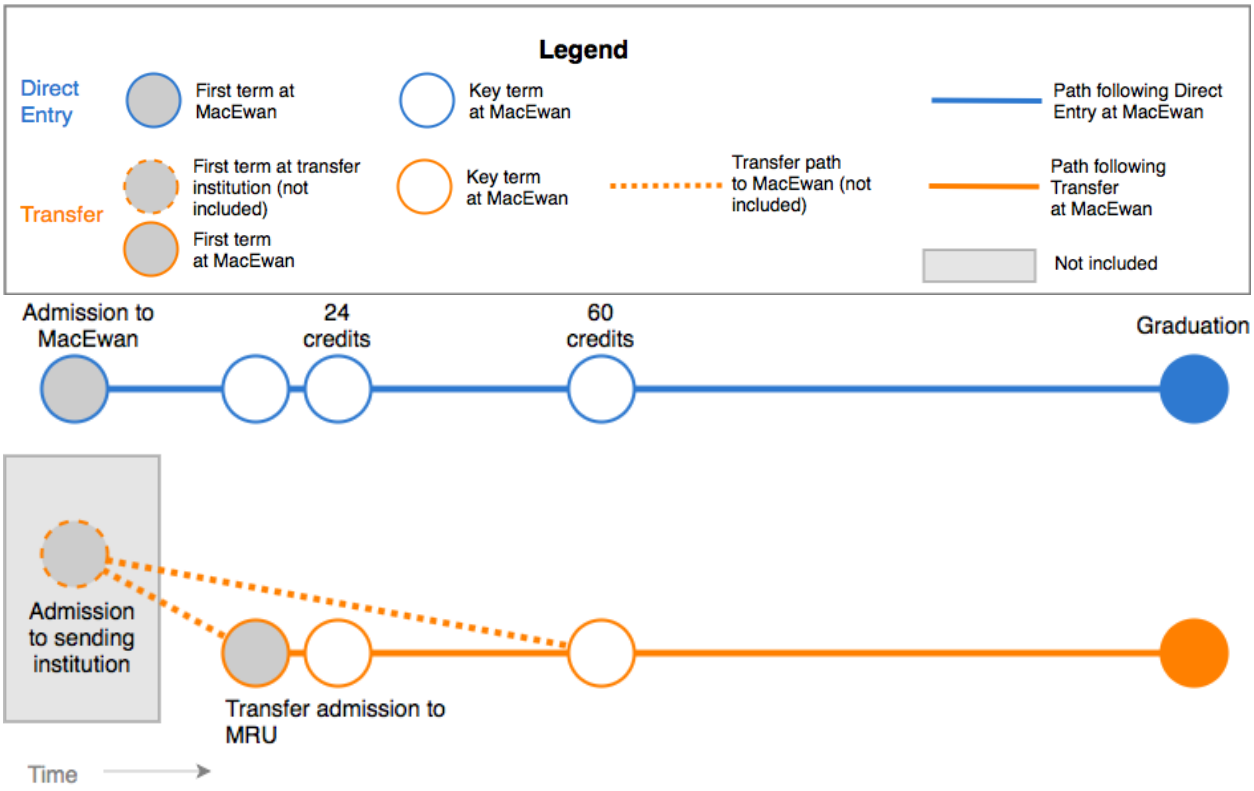
This section focuses on key metrics that compare the success of transfer students and direct entry students. Each metric is divided into the three categories of how transfer is defined for this study. Additionally, several metrics are framed in the context of normalizing the data. For example, on the 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 24 credits and 60 credits. For the 24-credit version, direct entry students are measured from the time they hit 24-30 credits at MacEwan, and are compared to transfer students with between 24 and 30 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 24 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 6 illustrates key points in the student's academic career: the time of admission to MacEwan, 24 credits (approximately the end of first year), 60 credits (end of second year), and graduation. Note that the time of admission to the sending institution for transfer students is shown here for illustrative purposes, but is otherwise not known to this study.

Figure 6 - 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 MacEwan 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 7 augments Figure 6 by adding an overlay that shows the 3 models (unadjusted, normalized to 24 credits, and normalized to 60 credits) employed for these study metrics.

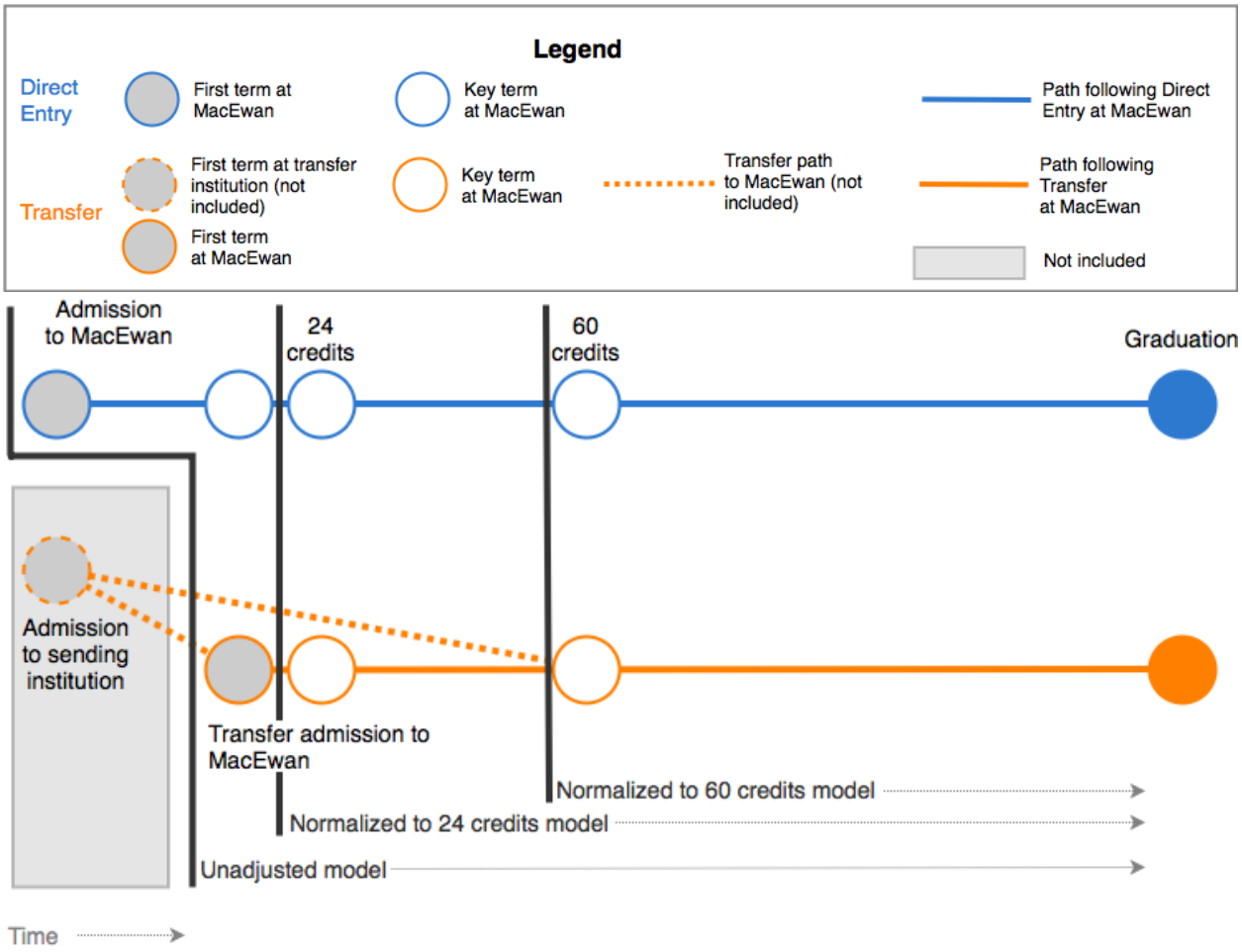
The unadjusted model compares from the start of the MacEwan admission year to the end date of the graduation year, as shown in Figure 6, with the start point illustrated by the leftmost grey dashed line. All groups here are measured from their most recent admission year to graduation. Note, however, that transfer groups will have amassed at least the number of transfer credits defined by the admit type threshold (18 or 24 credit hours).

The normalized to 24 credits model is a method to compare these admit groups using a common baseline of 24-30 credits achieved, either within MacEwan 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 (24-30 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 MacEwan 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.

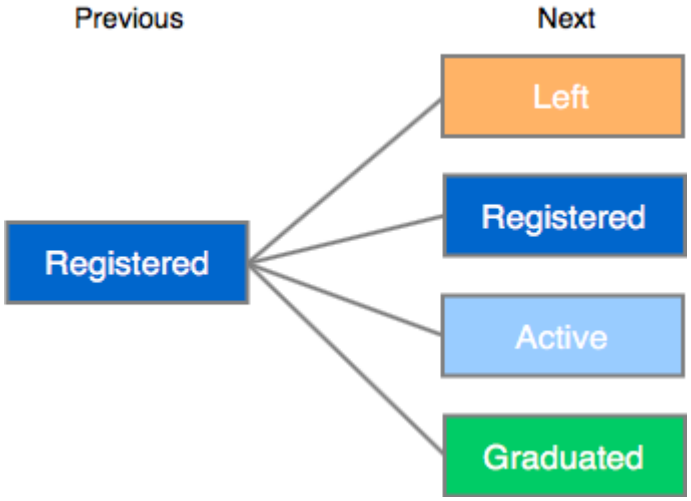
Study metric 4, average GPA at graduation is calculated at the point of graduation for each of the direct entry and transfer groups.

Figure 7 - Key time points for study metrics, by model



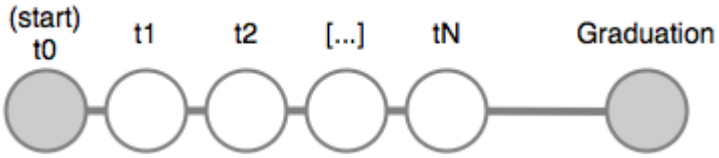
Study metric 3 (progression) has two forms. The first form is a progression status in each year, as shown in Figure 8. This metric begins with a particular admission cohort who were registered in the previous year, and shows the proportion of that cohort in one of four statuses: left, registered, active but not registered (and returned later), and graduated.

Figure 8 - Annual progression



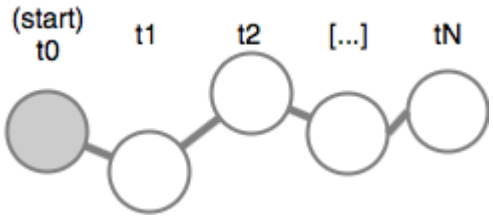
The second progression metric is progression to a particular registration year (see Figure 9). This metric considers the proportion of an admit cohort who continued to register after a specific number of terms. The start point (start / t0) is dynamic in much the same way as the previous metrics: there is an unadjusted model, where the start point is the admission term; a normalized to 24 credits model, where the start point is the completion of 24-30 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, y2 means completed 2 terms, and tN means completed N terms.

Figure 9 - 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 10). 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 10 - 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 125% of their program length prior to the end of the study period, rounded up to the next full semester: 5 years for degrees, 2.67 years (8 semesters) for diplomas and applied degrees, 1.33 years (4 semesters) for certificates
3. were admitted after the start of the study period

In the unadjusted model, as shown in Figure 11, there is little difference in the time it takes to complete a credential for certificate and diploma programs regardless of how transfer is defined. Transfer students complete baccalaureate degrees between 9 and 12 months faster than direct entry students, with the greatest difference in time to completion being if transfer is based on 24 transfer credits.

Additionally, in order to provide a balanced comparison, Figures 12 and 13 normalize the data so that time to completion is calculated from a point in the credential cycle that is common for both direct entry and transfer students. By normalizing 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. For example, by normalizing to 24 credits we compare how long direct entry students take to graduate from the semester in which they have amassed between 24 and 30 credits and compare that to the time to graduate for transfer students who enter MacEwan with 24 to 30 credits completed. The selection of normalization to 24 credits allows us to reasonably compare diploma and degree students, while normalization to 60 credits allows us to compare degree students. Due to MacEwan's residency requirement that 50% of credit applied towards a credential must be taken at MacEwan, 24 credits is substantially more than 50% of the 30 credits required for a certificate and nearly 50% of the 60 credits required for a diploma, so an attempt to compare for those credential from those normalization points will reflect additional work required of transfer students to meet the residency requirements.

In Figure 12, where direct entry students are normalized as of the point that they first complete 24 credits, there is a different effect. In diploma programs, transfer students take about 4.5 months longer to complete their credentials. In degree programs, transfer students finish only about a month faster on

average. Applied degree and certificate students are excluded from this analysis as too few students were both awarded 24 or more transfer credits and had graduated by the end of the study period.

Figure 13, where direct entry students are normalized as of the point that they first complete 60 credits, shows transfer students finishing about 5 months later than their direct entry counterparts. Applied degree, certificate, and diploma students are excluded from this analysis as too few students were awarded 60 or more transfer credits to have utility for this analysis. As MacEwan requires 50% of coursework to be completed at the institution as part of its residency requirements, only a small number of students will have 60 transfer credits, and nearly all of these will be in baccalaureate degree programs.

Table 3 summarizes the results of the 3 models. Note that this table is replicated in the Conclusion as Table 11.

Figure 11: Time to completion descriptive statistics (unadjusted)

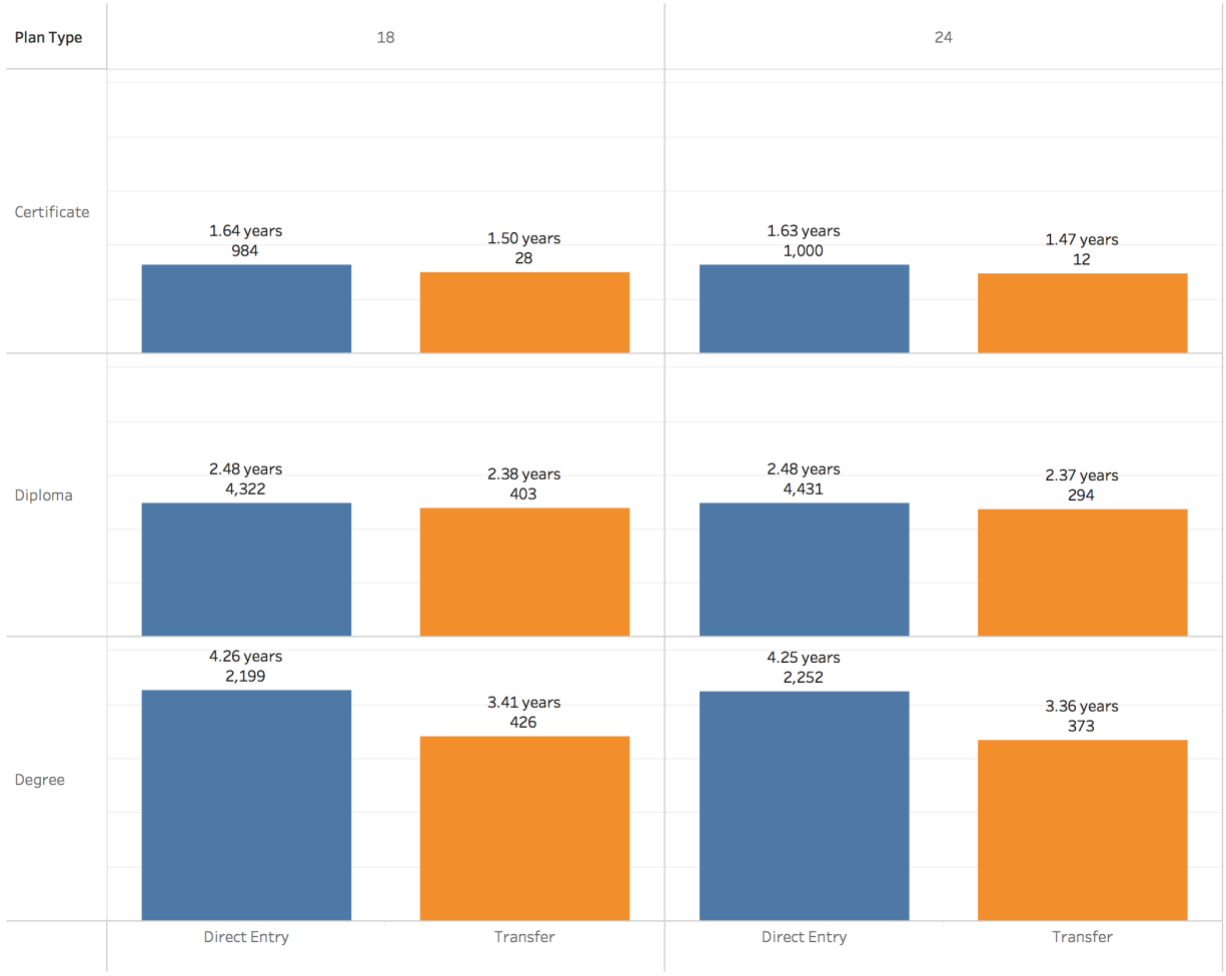


Figure 12: Time to completion descriptive statistics (normalized to 24 credits)

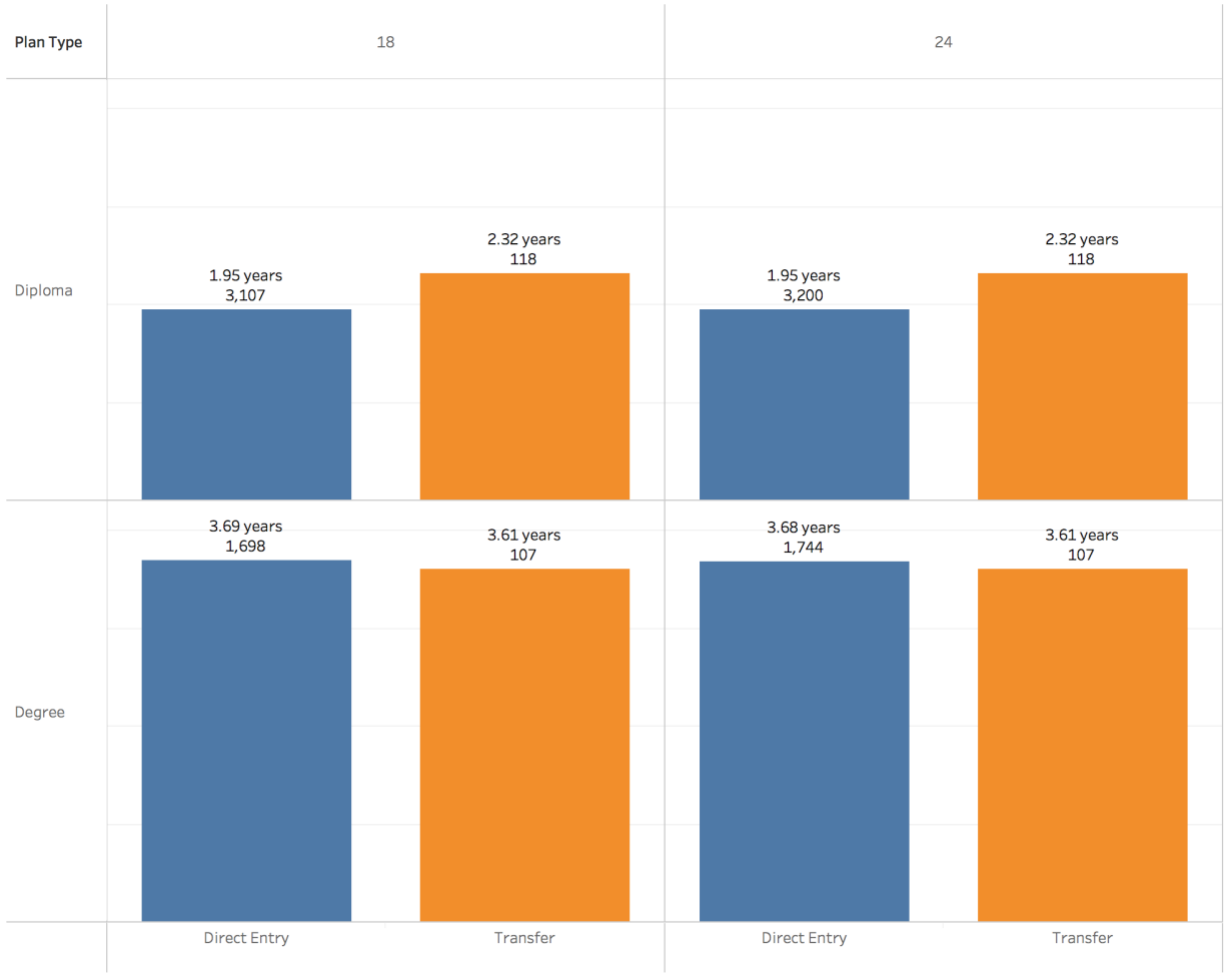


Figure 13: Time to completion descriptive statistics (normalized to 60 credits)

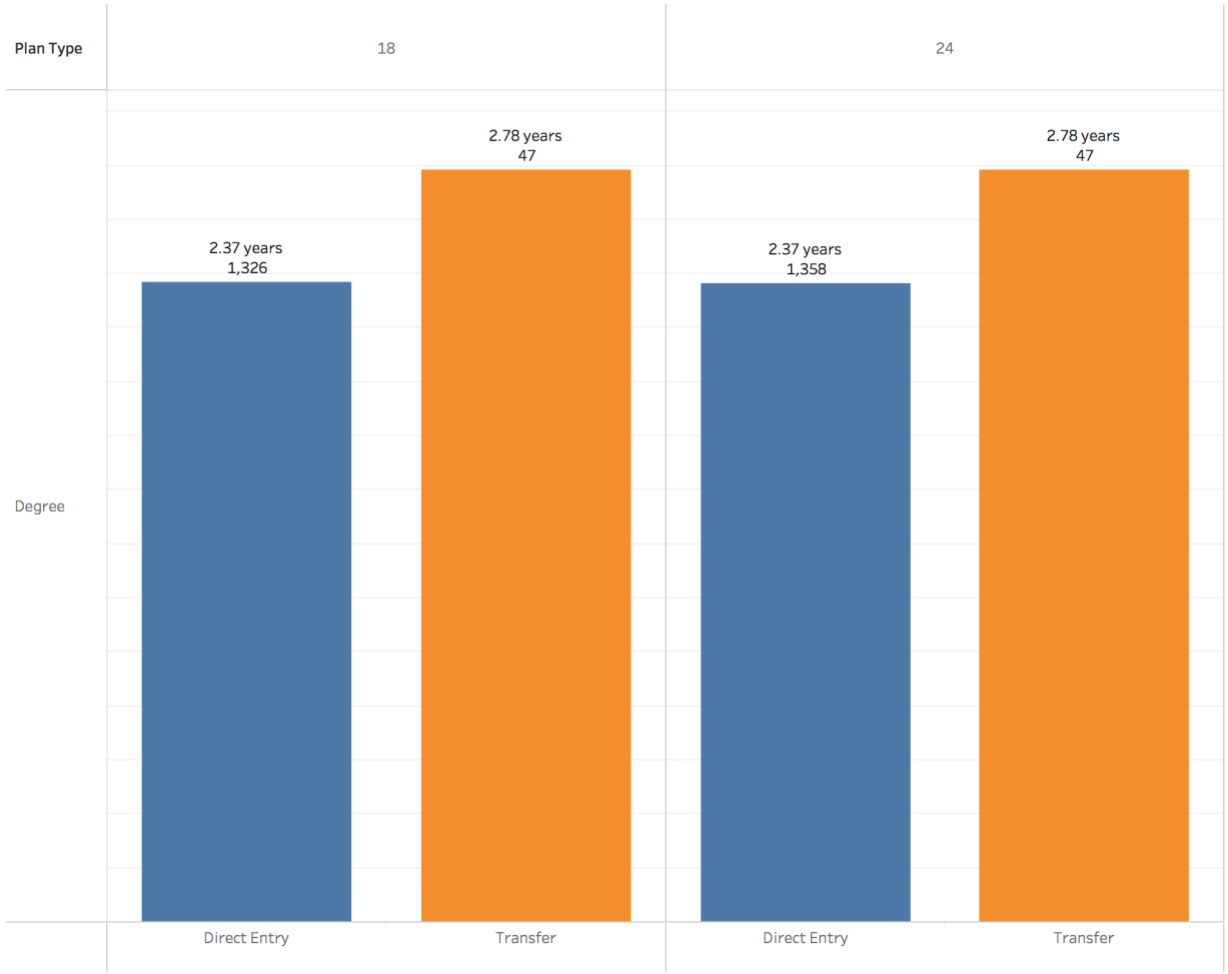


Table 3: Time to completion descriptive statistics (all models)

Model	Admit Type Threshold	Plan Type	Avg. Time to Completion		Number of Students	
			Direct Entry	Transfer	Direct Entry	Transfer
Unadjusted	18+	Certificate	1.64	1.5	984	28
	18+	Diploma	2.48	2.38	4,322	403
	18+	Degree	4.26	3.41	2,199	426
	24+	Certificate	1.63	1.47	1,000	12
	24+	Diploma	2.48	2.37	4,431	294
	24+	Degree	4.25	3.36	2,252	373
Normalized to 24 credits	18+	Certificate	1.18	1.37	520	8
	18+	Diploma	1.95	2.32	3,107	118
	18+	Degree	3.69	3.61	1,698	107
	24+	Certificate	1.18	1	531	8
	24+	Diploma	1.95	2.32	3,200	118
	24+	Degree	3.68	3.61	1,744	107
Normalized to 60 credits	18+	Degree	2.37	2.78	1,326	47
	24+	Degree	2.37	2.78	1,358	47

Time to completion regression

As another lens on the descriptive statistics above, we performed ordinary least squares (OLS) linear regressions on the information provided by MacEwan. The advantage to using a regression is the ability to control for various underlying factors that may explain portions of the differences between time to completion for direct entry students and transfer students seen above. For example, if most students in the Bachelor of Arts program graduate sooner than most students in the Bachelor of Science program, and the Bachelor of Arts program contains a much higher proportion of transfer students, then some of the differences observed above can be explained by the program rather than by transfer status.

We created models for certificate, diploma, and degree programs separately as the expected time-to-completion for these programs are sufficiently different that lumping them together may provide odd results. The variables we included in the models 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)
- Age at time of admission
- Student program and credential type (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)
    - Some programs allowed students to graduate with different types of credentials, for example a choice between a degree and a diploma or a diploma and a certificate. As the expected time to graduation would be different in these cases, we treated them as separate programs by including the credential type.
- Admit academic year (based on the student's first enrolled term at MacEwan, re-coded as dummy variables with 0 indicating the student did not begin at MacEwan in that year and 1 indicating that they did; 2011/12 was used as the reference category)

We included in the model all students who began at MacEwan in Fall 2011 or later and who had graduated by Summer 2017, the last term finalized before the data was produced. We excluded students of other gender (N=1) or who graduated from the certificate programs in Arts & Cultural Management (N=1) and General Studies (N=1), degree program in Psychiatric Nursing (N=1), or diploma program in Child & Youth Care (N=1); in all cases the numbers were sufficiently small that their inclusion in the model could have skewed results. Additionally, we included only students who were admitted at least 125% of their expected program length prior to the end of the study period, to ensure enough time for significant numbers of students to graduate.

We did not create models for applied degree programs as the number of graduates from these programs was quite small - 92 in our dataset - with a very small number of transfer students. At the 18-credit threshold for determining transfer students, only 1 student was a transfer, while there were no transfer students at the 24 credit threshold.

Our model datasets included 8,142 students, including 1,010 from certificate programs, 2,435 from degree programs and 4,724 from diploma programs. Programs varied from 796 graduates from the degree program in Commerce to 22 graduates from the Holistic Health Practitioner diploma, and admission academic years varied from 3,098 graduates (2011/12, including degree, diploma, and certificate graduates) to 250 (2016/17, including certificate students only). Due to the criteria that students only be included if they were admitted at least 125% of their expected program length prior to the end of the study period, degree students were included only if they were admitted in between Fall 2011 and Spring/Summer 2013, diploma students included only if admitted between Fall 2011 and Spring/Summer 2015, and certificate students included only if admitted between Fall 2011 and Fall 2016.

Among the 1,010 graduates of certificate programs, the average time to graduation was 1.63 years, varying from 1.95 for 2011/12 admits to 1.38 for 2015/16 admits. Certificate graduates are largely female (92.9%) with small numbers of international (2.8%) and transfer (1.2% at the 24-credit threshold, 10.7% depending on threshold) students. Of 2,435 degree graduates, average time to graduation was 4.14 years, varying from 4.25 for 2011/12 admits to 3.98 for 2012/13 admits. Degree graduates were 61.9% female and 2.6% international, and were 16.2% transfer at the 24-credit threshold and 29.4% transfer at the 18-credit threshold. Of 4,724 diploma graduates, average time to graduation was 2.47 years, varying from 2.85 for 2011/12 admits to 2.28 years for 2014/15 admits. Diploma graduates were 70.4% female and 8.3% international, and were 6.2% transfer at the 24-credit threshold and 20.2% transfer at the 18-credit threshold.

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 .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.

We first generated an OLS model for each program type that used just the base variables, and then generated 3 additional OLS models utilizing the original variables plus a single transfer indicator each. One indicator was the number of transfer credits the student had at time of admission to MacEwan, with the remaining 2 being a transfer flag (0=not a transfer student, 1=transfer student) at the 18-credit and 24-credit thresholds. Note that while the number of transfer credits for a student and the transfer flag will be correlated, as they are not included in the same model this correlation has no effect. The following table shows the results for certificate programs:

Table 4: Time to completion regression: certificate programs

Indicator	Number of transfer students	Model R^2	Indicator coefficient	Indicator *p*-value
None	-	.279	-	-
Number of transfer credits	165	.247	-0.008	
Transfer flag, threshold 18	28	.280	-0.187	
Transfer flag, threshold 24	12	.281	-0.321	
Indicator *p*-value: blank means p > 0.05, * means p <= 0.05, ** means p <= 0.01, and *** means p <= 0.001.				

For diploma programs:

Table 5: Time to completion regression: diploma programs

Indicator	Number of transfer students	Model R^2	Indicator coefficient	Indicator *p*-value
None	-	.251	-	-
Number of transfer credits	1,052	.252	-0.003	*
Transfer flag, Threshold 18	403	.252	-0.103	*
Transfer flag, Threshold 24	294	.252	-0.136	*
Indicator *p*-value: blank means p > 0.05, * means p <= 0.05, ** means p <= 0.01, and *** means p <= 0.001.				

For degree programs:

Table 6: Time to completion regression: degree programs

Indicator	Number of transfer students	Model R^2	Indicator coefficient	Indicator *p*-value
None	-	.186	-	-
Number of transfer credits	510	.231	-0.013	***
Transfer flag, threshold 18	384	.234	-0.675	***
Transfer flag, threshold 24	335	.234	-0.716	***
Indicator *p*-value: blank means p > 0.05, * means p <= 0.05, ** means p <= 0.01, and *** means p <= 0.001.				

The results suggest that transfer indicators provide little predictive value for time to graduation for certificate and diploma programs. For certificates, while there is some improvement in the R^2 by adding in transfer information, the actual transfer indicators are not statistically significant in the model. Diploma programs show slightly more promising results, but we still see only small R^2 improvements. At the 24-credit threshold the transfer flag is statistically significant and shows students coming in with 24 or more transfer credits graduate roughly 0.136 years or a little over 7 weeks sooner.

For graduates of degree programs, we see more substantial predictive value in transfer status, with improvements of as much as 4.8 percentage points (R^2 improvements from .186 or 18.6% to highs of .234 or 23.4%). Students that are considered transfers at the various thresholds graduate from 0.675 to 0.716 years earlier - as much as 8.6 months less of studying required - with all flags showing statistical significance. Looking at transfer credits, each transfer credit a student brings to MacEwan suggests they will graduate 0.013 years sooner. This translates to approximately 26 transfer credits to graduate 4 months or 1 term earlier. Residency requirements could play a role in these results.

Finally, we added into the "transfer flag, threshold 24" OLS model for degree students a variable for the number of transfer credits a student brought to MacEwan beyond the threshold of 24. In this case, our model had a R^2 of 0.235, indicating it explains 4.9 percentage points more variance than does our original base model, and 0.1 percentage points more than the "transfer flag, threshold 24" model. In this model, the transfer flag had a coefficient of -0.621*** and the transfer credits variable had a coefficient of -0.004, indicating that a student with 24 transfer credits would graduate nearly 7.5 months sooner than a non-transfer student, but that the number of transfer credits beyond 24 was statistically insignificant.

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 24 and 60 credits. For these models we used the 24-credit threshold group; this only affects the number of students who are classified as direct entry, as we used a 24 or 60 credit cutoff for inclusion in the dataset. We also created an additional indicator for the number of credits above the 24 or 60 credit threshold the student came into the term with, allowing us to account for the fact some students will have, for example, 27 credits and some 24 and compare appropriately.

The graduation-from-24-credits model for degree programs had 1,655 direct entry students and 100 transfer students. Students were included if either they were a transfer student who entered MacEwan with between 24 and 30 credits, or if they were a direct entry student who entered a term at MacEwan with between 24 and 30 credits. The model has an R^2 of 0.195, and the transfer flag has a coefficient of 0.015, however the *p*-value of 0.884 puts the transfer flag well into statistical insignificance.

The graduation-from-60-credits for degree programs model looked at 1,280 direct entry students and 40 transfer students. Students were included if either they were a transfer student who entered MacEwan with between 60 and 66 credits, or if they were a direct entry student who entered a term at MacEwan with between 60 and 66 credits. The model has an R^2 of 0.074, and the transfer flag has a coefficient of 0.446***, meaning a transfer student will take approximately 5.4 months longer to graduate after having achieved 60 credits than an otherwise similar direct entry student would.

These adjusted graduation time models suffer from a small number of transfer students being included; additionally, there's significant variation in times to graduation that is not captured by the factors this research was able to access. Adjusted time-to-graduation models for certificates or diplomas were not constructed. For certificates at a nominal program length of 1 year, adjusting to start the clock at what is

nearly a year in does not make logical sense, and we also run into the issue of residency requirements that require students to complete 50% of their work towards the certificate at MacEwan, leaving many of 24 transfer credits unusable. For diplomas, there were only 9 transfer students that fell within the 24 to 30 transfer credit range, too small to be helpful in regression. While these results are statistically significant, they have small explanatory power, suggesting that the variables presented in this dataset, when coupled with transfer student status, do not explain a substantial amount of variance in time to completion.

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 100% of expected program length (1 year for certificates, 2 years for diplomas, and 4 years for degrees) and 150 of expected program length (1.5 years for certificates, 3 years for diplomas, and 6 years for degrees, rounded up to the nearest academic term). A more detailed definition can be found in

The following graduation rate 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%, 150%, and 200% of expected program completion time, this being the duration nominally assigned to completion of a credential. For MacEwan, we were able to include a preliminary analysis of 200% graduation rate because certificates and diplomas are short enough for this to work in the study period. We note that 200% and longer would be optimal, particularly for part-time students, but the date range for this study is too short to allow for that in degree programs.

For these measures, a proxy number of years for expected program length was used for the purposes of this study:

- Certificates: 1 year
- Diplomas: 2 years
- Applied Degrees: 2 years
- Baccalaureate Degrees: 4 years

Applied degree programs require a total of 4 years of study, but at MacEwan the admission requirements for entry into an applied degree program include the completion of 60 credits of postsecondary work, generally in the form of a diploma. As 2 years of study are completed before entry into the program, the data provided by MacEwan for students in applied degree programs represents only the final 2 years of coursework and time to graduation was calculated from entry into the applied degree program at the beginning of the student's 3rd year.

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 graduation rate at 150% of expected program length for Baccalaureate Degrees, only entering cohorts who had been at the institution for 6 years were included (4 years x 150%).

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 graduation rate will be underestimated until such time as a significant longitudinal dataset (10 entering cohorts or more who have had 10 years to complete) is available. (At MacEwan students are given 10 years to complete a degree program, meaning metrics measuring graduation rate at more than 250% of expected time to

graduation would not be useful.) 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. This is not realistic at this time due to institutional systems changes.

Graduation rate at 100% of expected program length

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

Table 7: Size of entering cohorts by admit type threshold
(Students at or beyond the admit type threshold are coded as transfer students. Others are coded as direct entry.)

		2011 - 12	2011 -12	2012 -13	2012 -13	2013 -14	2013 -14	2014 -15	2014 -15	2015 -16	2015 -16
Plan Type	**Adm Type Thr.**	**DE**	**TR**	**DE**	**TR**	**DE**	**TR**	**DE**	**TR**	**DE**	**TR**
CER	18+	326	N<10	315	21	228	N<10	221	N<10	209	N<10
CER	24+	332	N<10	323	13	232	N<10	222		212	
DIP	18+	2,337	118	2,028	201	1,731	156	1,763	116	1,313	88
DIP	24+	2,385	70	2,069	160	1,772	115	1,809	70	1,338	63
DEG	18+	2,953	353	2,589	387	1,982	284				
DEG	24+	3,004	302	2,643	333	2,030	236				

The charts below show the proportion of entering students who completed their program within the expected program length from different measurement points. Rates are suppressed if there are fewer than 10 students in a particular category.

Figure 14, the unadjusted model, shows that transfer students are more likely to graduate within the normal time to completion (2 years for diploma programs, 4 years for degree programs).

Figure 15 the 24 credit normalized model, shows the reverse effect for diploma students, with direct entry students more likely to finish their diploma within 2 years of the time they complete 24 credits. For degree programs, transfer students are a bit more likely to finish within 4 years of 24 credits being completed, but small numbers may impact this result.

Figure 16, where direct entry students are normalized to 60 credits, shows a mixed effect for degree students. It is likely that as time progresses, more members of the 2012-13 admit cohort will graduate, changing these figures. Note that in this figure there are insufficient diploma transfer students who have also graduated, so no trend is displayed for the transfer group.

Figure 14: Graduation rate at 100% of program length (unadjusted)

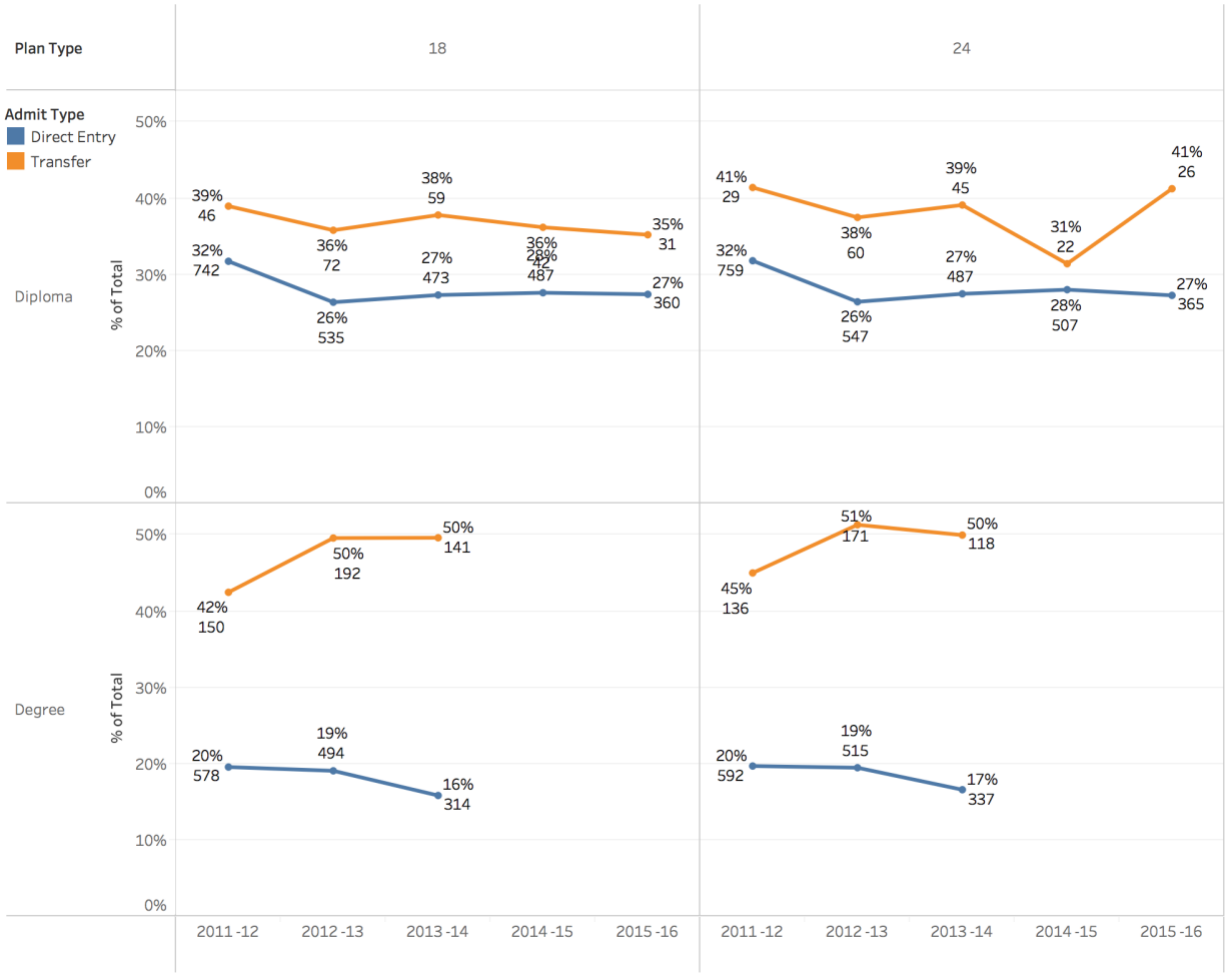


Figure 15: Graduation rate at 100% of program length (normalized to 24 credits)

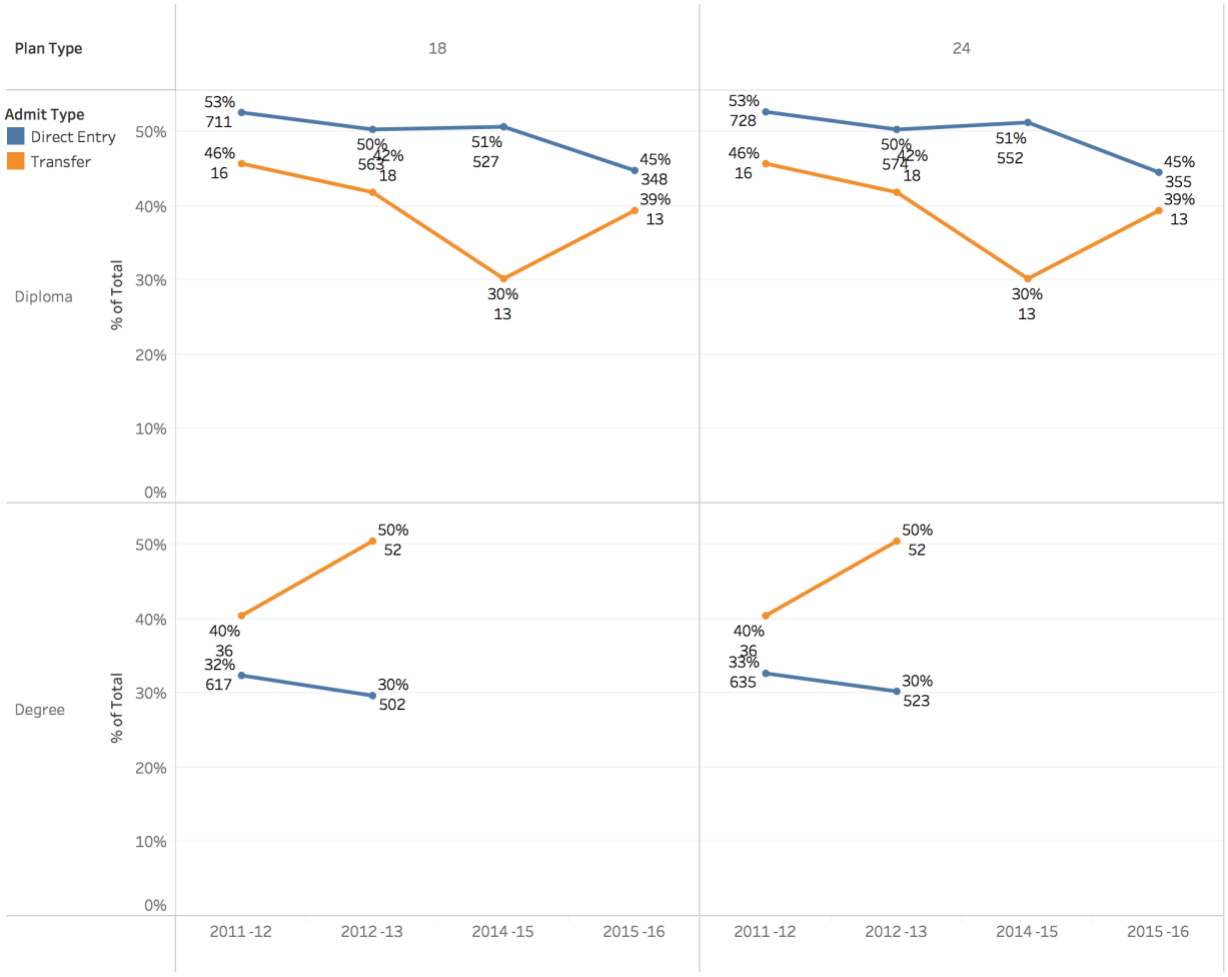


Figure 16: Graduation rate at 100% of program length (normalized to 60 credits)

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 8: Size of entering cohorts by admit type threshold
(Students at or beyond the admit type threshold are coded as transfer students. Others are coded as direct entry.)

(Students at or beyond the admit type threshold are coded as transfer students. Others are coded as direct entry.)

		2011 - 12	2011 -12	2012 -13	2012 -13	2013 -14	2013 -14	2014 -15	2014 -15	2015 -16	2015 -16
Plan Type	**Adm Type Thr.**	**DE**	**TR**	**DE**	**TR**	**DE**	**TR**	**DE**	**TR**	**DE**	**TR**
CER	18+	326	N<10	315	21	228	N<10	221	N<10	209	N<10
CER	24+	332	N<10	323	13	232	N<10	222		212	
DIP	18+	2,337	118	2,028	201	1,731	156	1,460		97	
DIP	24+	2,385	70	2,069	160	1,772	115	1,500		57	
DEG	18+	2,946	353								
DEG	24+	2,997	302								

The charts below show the proportion of entering students who completed their program within 150% of the expected program length. Due to the length of the study period, only certificates and diplomas show in most of this chart, with the exception of a single admit cohort for degrees. This is due to the study length - only the 2011-12 cohort of degrees has had 6 years to complete their studies.

In Figure 17, the unadjusted model shows diploma and degree-seeking transfer students are more likely to graduate within 3 and 6 years respectively. Certificate programs are excluded due to small sample size.

Figure 18, the normalized to 24 credit model, shows a much narrower gap in terms of graduation rate. In this case, transfer students and direct entry students are equally likely to complete their credentials within 150% of normal time. Certificate students are excluded due to small sample size.

There is no 60 credit normalized version for this analysis because the sample size was too small.

Figure 17: Graduation rate at 150% of program length (unadjusted)

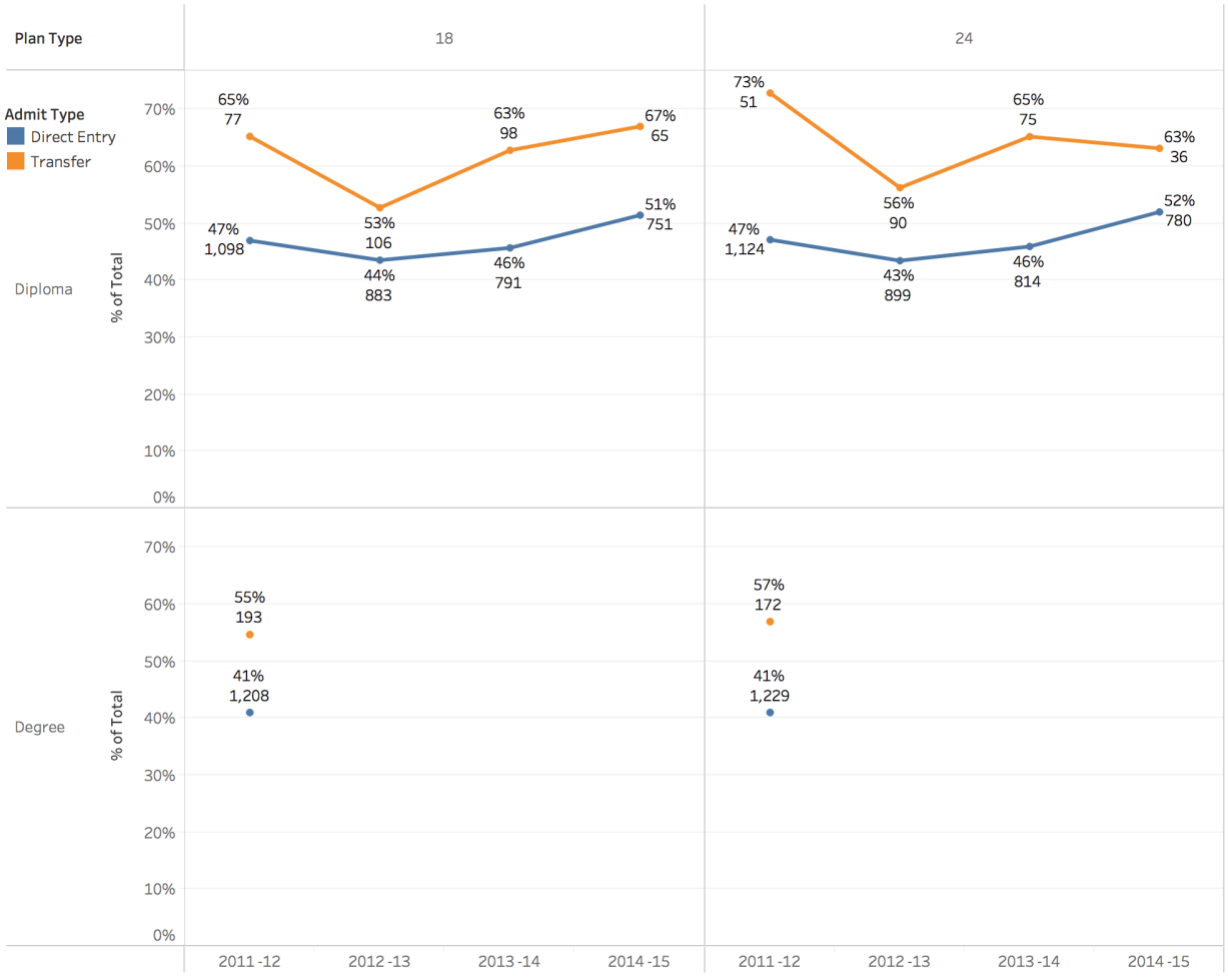
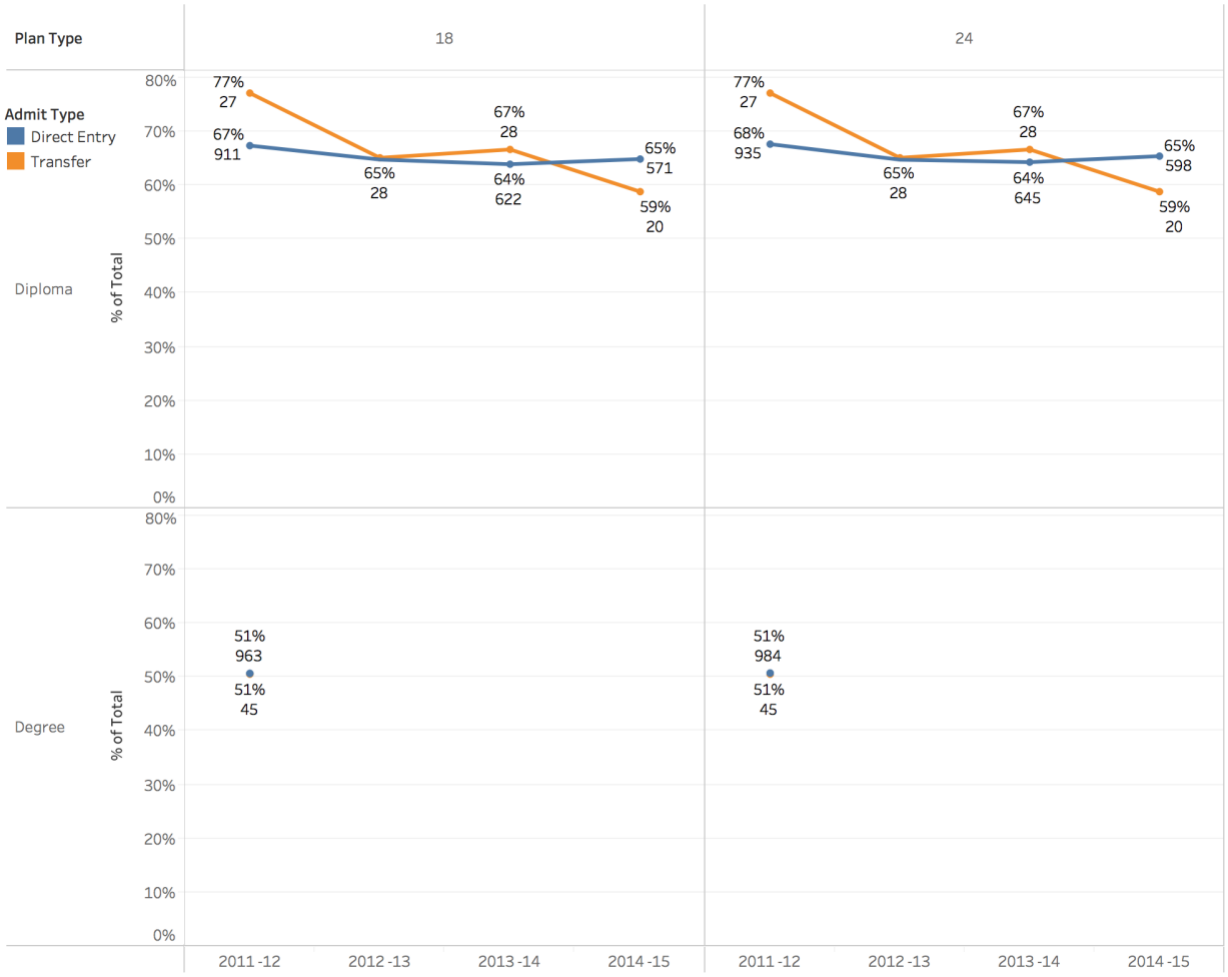


Figure 18: Graduation rate at 150% of program length (normalized to 24 credits)



Graduation rate at 200% of expected program length

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

Table 9: Size of entering cohorts by admit type threshold
(Students at or beyond the admit type threshold are coded as transfer students. Others are coded as direct entry.)

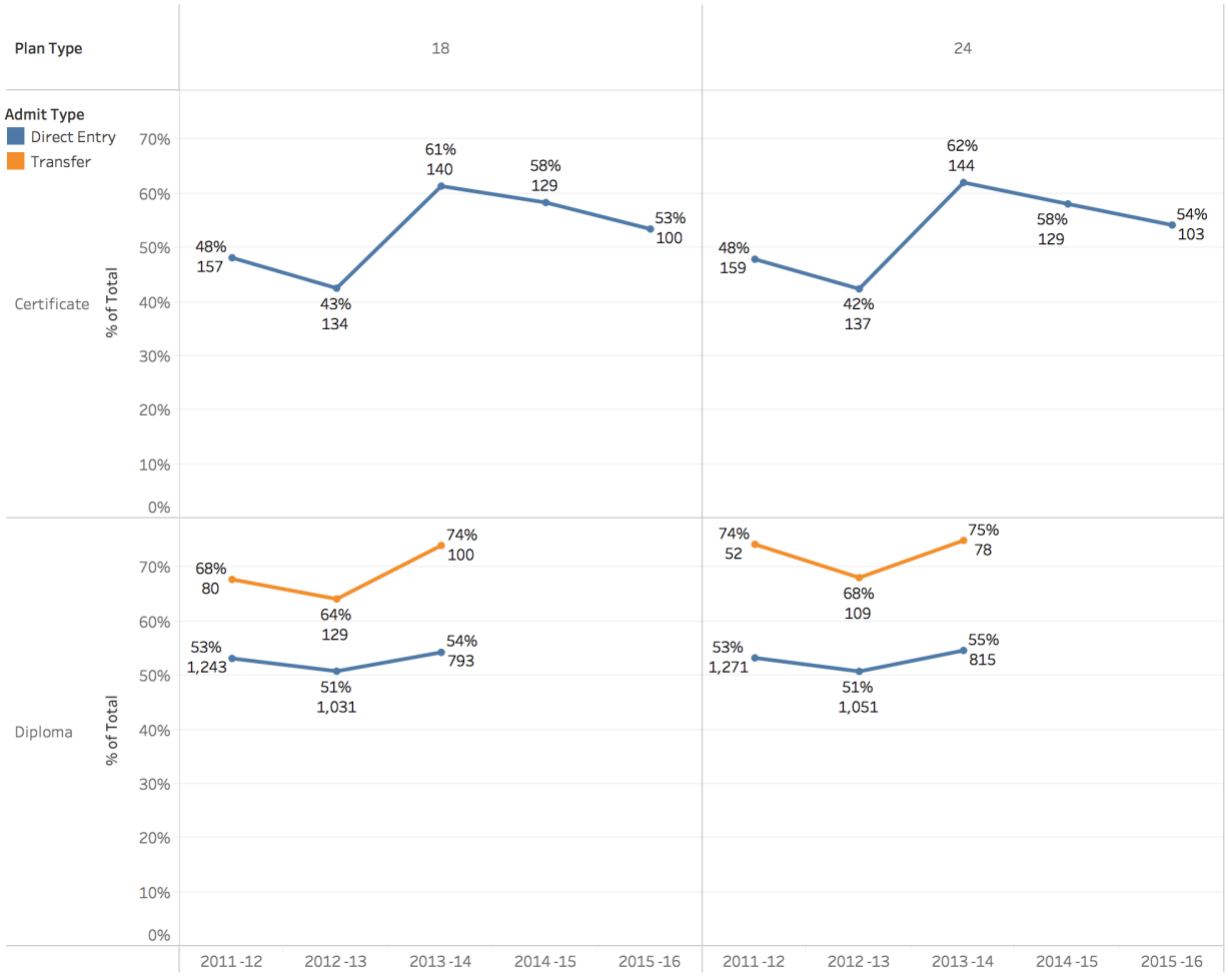
		2011 - 12	2011 -12	2012 -13	2012 -13	2013 -14	2013 -14	2014 -15	2014 -15	2015 -16	2015 -16
Plan Type	**Adm Type Thr.**	**DE**	**TR**	**DE**	**TR**	**DE**	**TR**	**DE**	**TR**	**DE**	**TR**
CER	18+	326	N<10	315	21	228	N<10	221	N<10	187	N<10
CER	24+	332	N<10	323	13	232	N<10	222		190	
DIP	18+	2,337	118	2,028	201	1,460	135				
DIP	24+	2,385	70	2,069	160	1,491	104				

Figure 19 shows transfer students being more likely to finish diploma programs within 200% of the expected program length (2 years). The sample size with certificates is sufficiently small that no conclusion should be drawn.

Due to the length of the study period, only certificates and diplomas show in this chart. Within the certificates group, there was an insufficient number of students to include. The chart below shows that transfer students are more likely to finish diplomas in 200% of normal completion time for the program.

Normalized to 24 credits and 60 credits are not analyzed for this metric as the study period is too short to include degree students who are most likely to have 24 or 60 transfer credits.

Figure 19: Graduation rate at 200% of program length (unadjusted)



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

Figures 20, 21, and 22 show relatively little difference in graduation rate between transfer students (as defined for this study) from across Alberta's 6 Post-Secondary Sectors, with some variability between admit years and small sample sizes.

Figure 20: Graduation rate at 100% of program length by Alberta post-secondary sector (unadjusted)

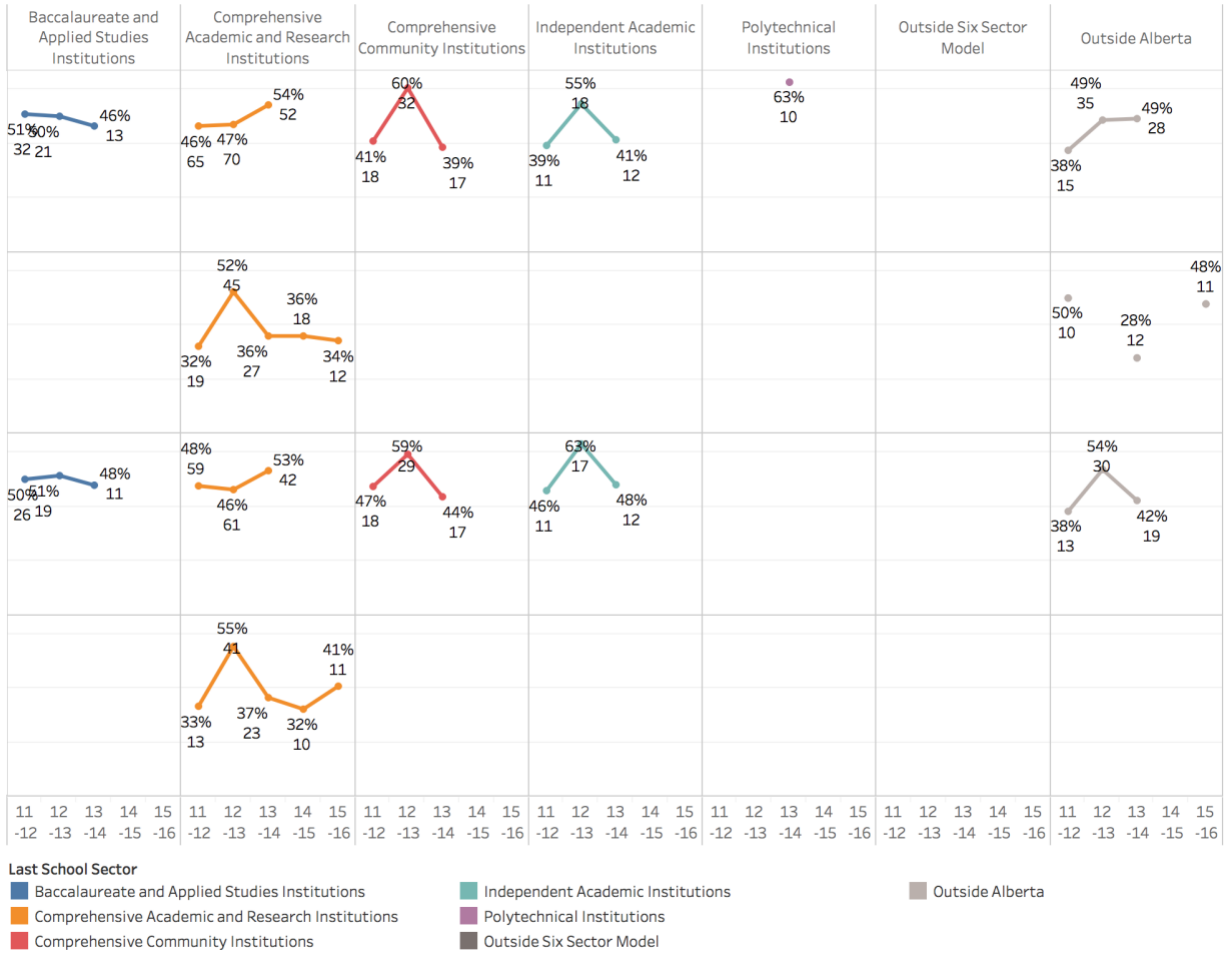


Figure 21: Graduation rate at 100% of program length by Alberta post-secondary sector (normalized to 24 credits)

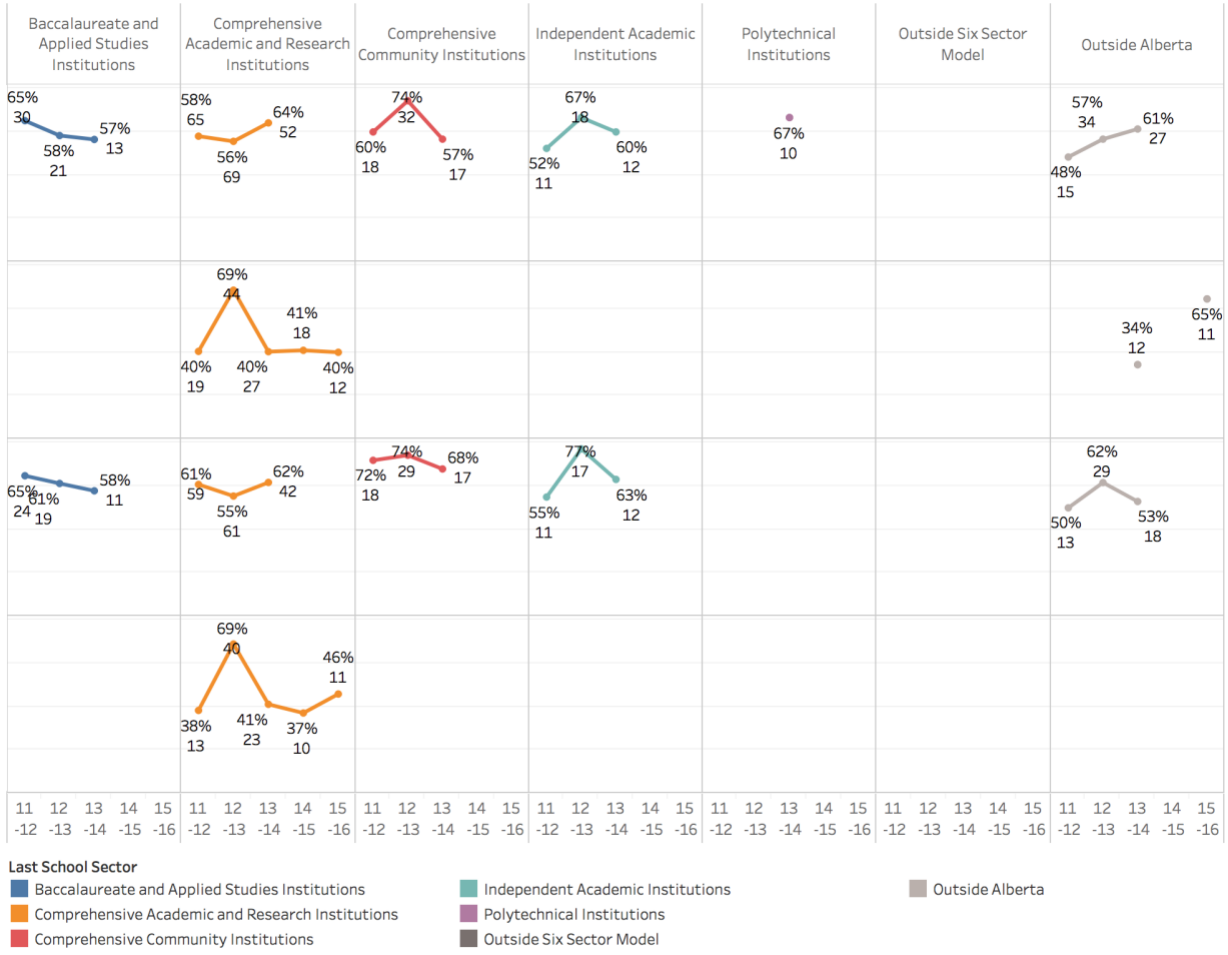
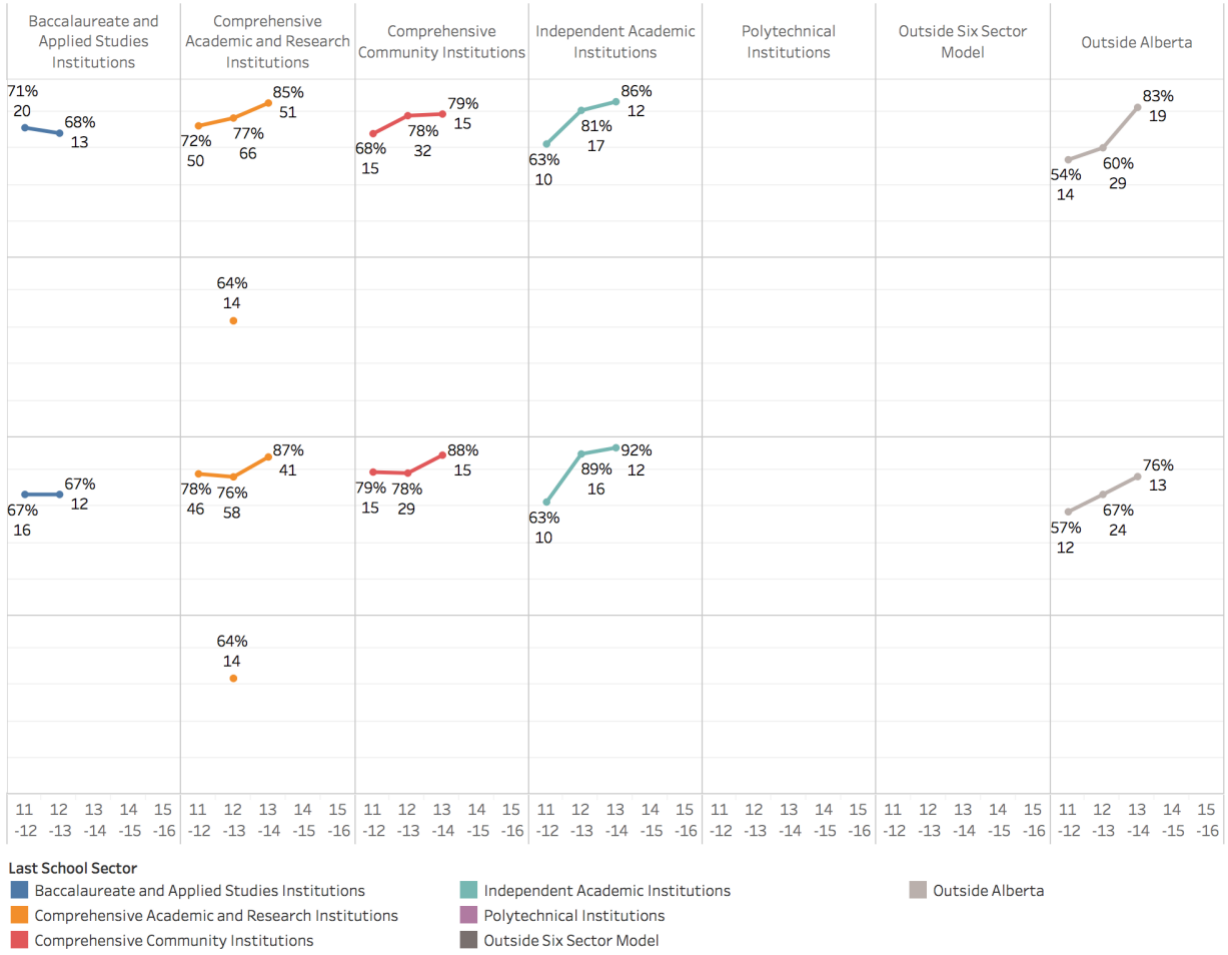


Figure 22: Graduation rate at 100% of program length by Alberta post-secondary sector (normalized to 60 credits)



Study Metric 3: Progression

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

Progression - Fall to Fall, by admit term

This metric looks at student progression from one fall term to the next, and codes students as either registered, active but not registered (and registered again later), graduated, or left.

Similar to the graduation rate at 150% of program length analyses, Progression - Fall to Fall is limited to only students who had attended the institution for at least 150% of the expected program length. In the case of degree programs, this means students were only included if the final term displayed is 6 years or later from their admission term. For diploma programs, students were only included if the final term displayed is 3 years or later from their admission term.

Figure 23 looks at the end of the study cycle, 2017 Fall**, based on the 2011 Fall admit term for the 18, and 24 transfer threshold groups. Of degree students, at the 18-credit threshold, 41% of direct entry students had graduated compared to 54% of transfer students. At the 24-credit threshold, 41% of direct entry students had graduated compared to 57% of transfer students For diplomas, at the 18-credit threshold, 62% of direct entry students had graduated compared to 74% of transfer students. At the 24-credit threshold, 62% of direct entry students had graduated compared to 79% of transfer students

Figure 24 looks at the end of the study cycle, 2017 Fall**, based on the 2012 Fall admit term only for diploma students, as degree students hadn't attended long enough to be included. This shows similar effects to the previous cohort, with 58% of direct entry and 65% of transfer students having graduated by 2017 Fall, based on the 18-credit threshold. Using the 24-credit threshold, 58% of direct entry students had graduated, compared to 65% of transfer students.

**Please note: the data used for this study included graduation dates within the 2017 Fall term, but not enrolment records for that term. Consequently, in the 2017 Fall term, the only statuses are Graduated and Left; it is possible that some students categorized as Left registered in 2017 Fall, after the study period for this report.

Figure 23: Progression over time: 2011 Fall admit term

Figure 24: Progression over time: 2012 Fall 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 Winter 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 can have the unintended effect of suggesting that longer is better, when in fact it is a positive outcome for students to complete their studies in a reasonable amount of time.

Progression to registration term number

The charts below show the number of terms that transfer and direct entry students enrolled at MacEwan. Note that students registering in one or more courses in a given term will have that term counted.

Figure 25 shows the proportion of students registering in subsequent terms following their admit term. For degree students, there is divergence roughly between term 7 and 12. During this time, transfer students are more likely to be finishing their studies as a result of the impact of their transfer credits. Following term 12, both groups are about equally likely to enroll. For diploma students, there is minimal separation in rates, generally seen between terms 3 and 7.

Figure 26 looks at the same problem from the time a direct entry student achieved 24 credits within MacEwan (and a maximum of 30 credits) compared to a transfer student with 24-30 transfer credits. In this view, the patterns are similar to the previous, but shifted earlier. For degree students, the divergence starts to occur as early as term 2 but becomes more pronounced around term 5 with transfer students slightly more likely to continue enrolling than direct entry students until about term 10. For diploma students, transfer students are more likely to continue to enroll between terms 4 and 10.

Figure 27 normalizes the number of credits to 60-66 for both direct entry and transfer students. From this perspective, in diploma programs, transfer students are more than twice as likely to continue to enroll as direct entry students between terms 2 and 7. This may reflect two phenomena: students with 60 or more transfer credits have already gone through the challenges of first and second year post-secondary studies, so attrition is less likely for this group. Additionally, the presence of transfer credits may have little relation to the intended program of study in the diploma, so students with transfer credits may not get the same time advantage they do in a degree program. For degree-seeking students, transfer students have a similar likelihood of registration up until term 6, at which point transfer students become more likely to enroll up to term 10, relative to their direct entry peers.

This analysis is limited only to students who have been studying at MacEwan for 125% of expected program length.

Figure 25: Progression to registration term number (unadjusted)

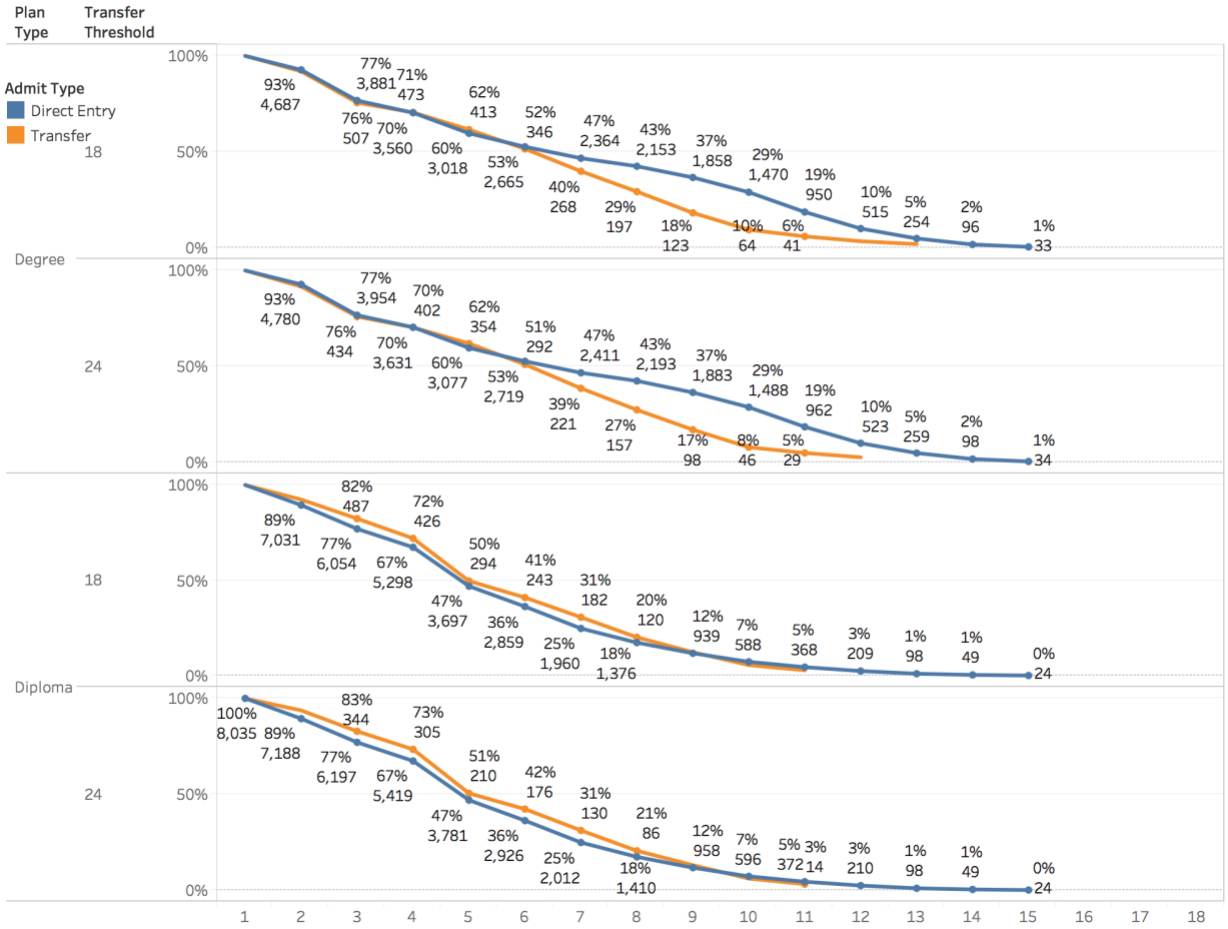


Figure 26: Progression to registration term number (normalized to 24 credits)

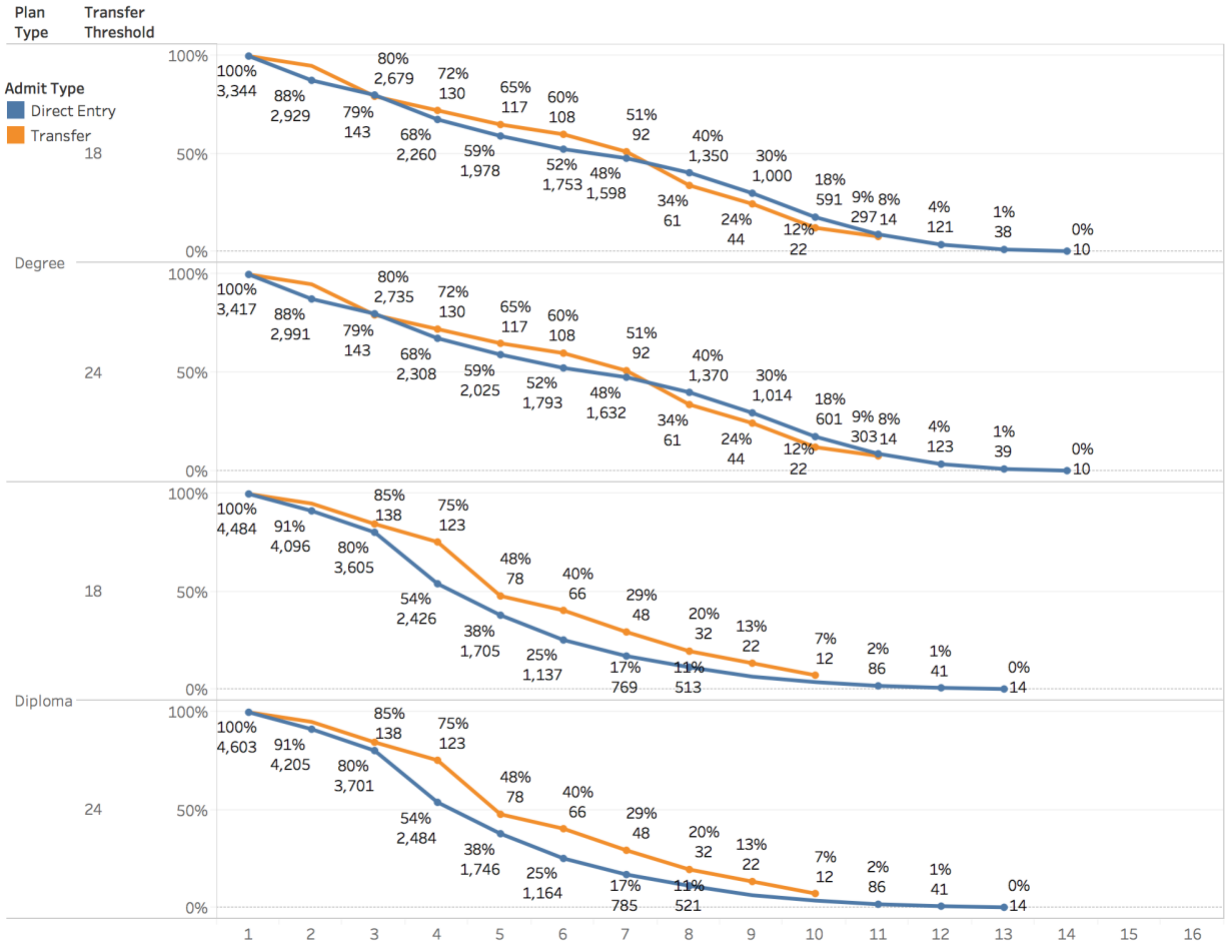
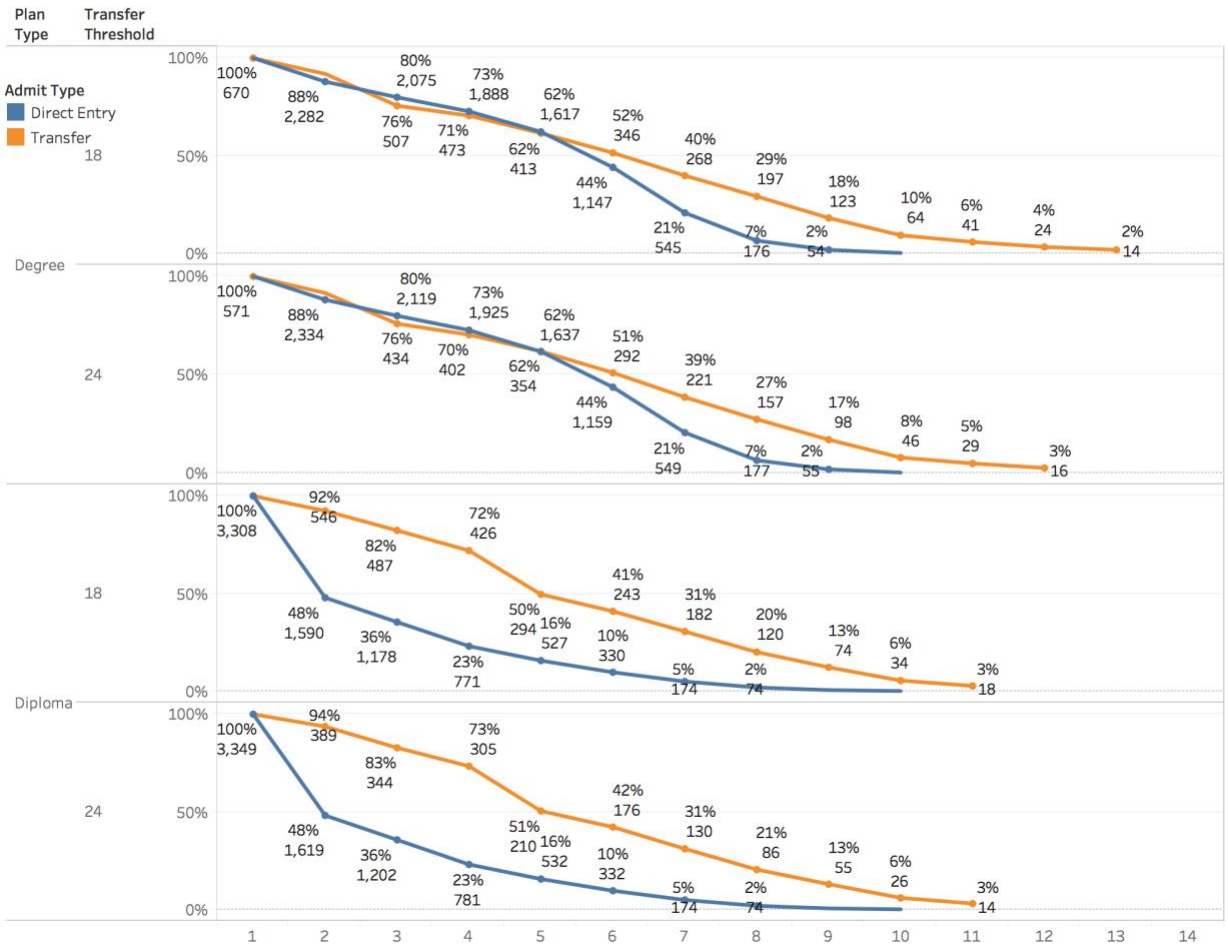


Figure 27: Progression to registration term number (normalized to 60 credits)



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)
- Age at time of admission
- Student program and program type (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; see individual models for reference categories)
    - Some programs allowed students to graduate with different types of credentials, for example a choice between a degree and a diploma or a diploma and a certificate. As the expected time to graduation would be different in these cases, we treated them as separate programs by including the program type.

- Admit academic year (based on the student's first enrolled term at MacEwan, re-coded as dummy variables with 0 indicating the student did not begin at MacEwan in that year and 1 indicating that they did; 2010/11 was used as the reference category)

We included in the model all students who began at MacEwan in Fall 2011 or later and who had graduated by Summer 2017, the last term finalized before the data was produced. We excluded students of other gender (N=1) or who graduated from the certificate programs in Arts & Cultural Management (N=1) and General Studies (N=1), degree program in Psychiatric Nursing (N=1), or diploma program in Child & Youth Care (N=1); in all cases the numbers were sufficiently small that their inclusion in the model could have skewed results. Additionally, we included only students who were admitted at least 125% of their expected program length prior to the end of the study period, to ensure enough time for significant numbers of students to graduate.

Our model datasets included 8,142 students, including 1,010 from certificate programs, 2,435 from degree programs and 4,724 from diploma programs. Programs varied from 796 graduates from the degree program in Commerce to 22 graduates from Holistic Health Practitioner diploma, and admission academic years varied from 3,098 graduates (2011/12) to 250 (2016/17). Due to the criteria that students only be included if they were admitted at least 125% of their expected program length prior to the end of the study period, degree students were included only if they were admitted in between Fall 2011 and Spring/Summer 2013, diploma students included only if admitted between Fall 2011 and Spring/Summer 2015, and certificate students included only if admitted between Fall 2011 and Fall 2016.

The average cumulative GPA at graduation was 3.13 with a standard deviation of 0.48.

Generating the OLS model with only taking the variables listed above (international, female, age, program, and admit academic year) provides an R^2 of 0.115, meaning that 11.5% of the variance in graduation GPA can be explained by these factors alone. (See the Time to completion regression section for information on interpreting the model results.) Students who were international (-0.318) tend to have slightly lower GPAs while females (+0.078) had slightly higher GPAs along with older students (+0.010 for each additional year older at admission). Differences between cohort years were generally not statistically significant, with the exception of 2015/16 admits, who graduated with slightly higher GPAs (+0.075).

We then generated 3 additional OLS models utilizing the original variables plus a single transfer indicator each. One indicator was the number of transfer credits the student had at time of admission to MacEwan, with the remaining 2 being a transfer flag (0=not a transfer student, 1=transfer student) at the different thresholds: 18 and 24 transfer credits awarded. The following table shows the results:

Table 10: GPA at graduation

Indicator	Number of transfer students	Model R^2	Indicator coefficient	Indicator p-value
None	-	.115	-	-
Number of transfer credits	1,740	.126	+0.002	***
Transfer flag, threshold 18	816	.126	+0.128	***
Transfer flag, threshold 24	641	.124	+0.124	***
Indicator p-value: * means p <= 0.05, ** means p <= 0.01, and *** means p <= 0.001.				

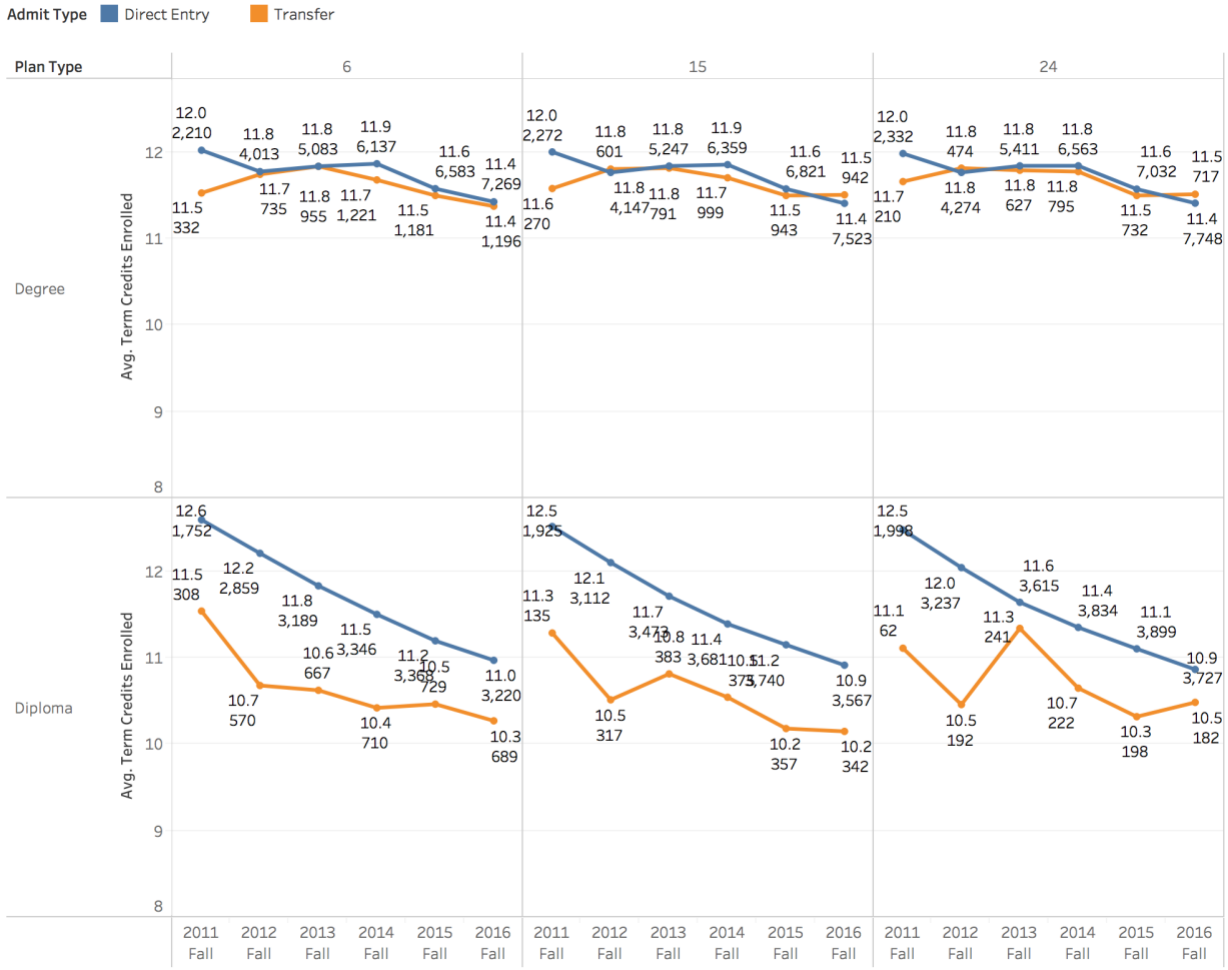
Transfer information provides only very small additional explanation of the variance in graduation GPAs, of about 0.9 to 1.1 percentage points - from an R^2 of 0.115 for the base model to R^2s between 0.124 and 0.126 for the transfer models. Transfer status suggests a student will graduate with a GPA approximately 0.12 higher than an otherwise-similar non-transfer student. While these results are statistically significant, they have relatively small explanatory power, suggesting that the variables presented in this dataset, when coupled with transfer student status, do not explain a substantial amount of the variance in GPA at graduation.

Study Metric 5: Average credits over time

This final metric compares direct entry and transfer students average credits enrolled at the institution over time.

Figure 28 shows a slight decline in the average number of credits per Fall term for both direct entry and transfer students in degree programs, with a negligible difference between the two groups. For diploma students, the average number of credits is declining over time, potentially part of a broader societal trend.

Figure 28: Average credits taken 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 MacEwan 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 MacEwan and in Alberta.

Recommendation #1: Further study the impact of students returning to MacEwan for additional credentials.

During the environmental scan, one of the contextual conversations was that MacEwan has a very large group of students who complete a credential at the institution, and later return to complete another credential. While not the direct focus of this case study, the most obvious impact of this group can be seen in Figure 5, where baccalaureate and applied studies institutions comprise 10.2% (using the 18-credit threshold to determine transfer status) and 9.8% (using the 18-credit threshold) of the students who received transfer credit. Within this group, students with transfer credit earned at MacEwan are the vast majority (85% of each group, with the remainder receiving transfer credits earned at Mount Royal University).

A stronger understanding of the educational pathways of these students could provide further insight into the enrolment patterns of students completing multiple credentials at a single institution. In the case of students who originally transferred to MacEwan (prior to their first credential), such a study would also illuminate a longer term outcome that is not often visible from the perspective of the sending institution.

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 MacEwan University, this study used two normalization points: from the time students had achieved 24 credits or 60 credits. For the purposes of comparing two very different groups of transfer and direct entry students, we recommend normalizing to 24 credits for degree programs. A different normalization point, such as 18 credits, is worth exploring for diploma programs. Certificate programs could use a third number, or may not need to be normalized at all, depending on the number of students with transfer credits entering these programs. Normalizing the data in this way is the fairest way to compare direct entry and transfer students in the absence of knowing information about their study experiences prior to (and potentially after) their time at MacEwan. 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 MacEwan. For example, this study looked at time to completion within MacEwan, 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 MacEwan.

A study similar to Finnie and Qiu (2009) focused on the entire public post-secondary system in Alberta would yield further insight than what this study was able to deliver. Finnie and Qiu used Statistics Canada's Post-Secondary Student Information System (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 for deeper research into student success than is currently possible.

Using PSIS data, future research could mine considerably deeper 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 across Alberta rather than at a single institution.

In the context of MacEwan University, PSIS data could provide insight into the student's academic experience prior to, during, and after their time studying at MacEwan. Information of this type could improve understanding of formal and informal transfer pathways into and out of MacEwan. 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 MacEwan in better understanding outcomes of both direct entry and 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 MacEwan was a participant.

Institutions we spoke with appreciated the recent 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.

Additional insight into labour market outcomes for different types of students can be used in a variety of ways at MacEwan: 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.

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 separate 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 a sector-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 full spectrum of institutions in the public post-secondary system, while protecting individual privacy" (Government of British Columbia, n.d.). The STP also allows for a variety of post-

secondary focused mobility and pathway related analyses between individual post-secondary institutions, sectors, and regions. Note that the STP is distinct from BC's Central Data Warehouse, which research universities do not provide data for. 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 provided additional value beyond Alberta's current mobility reports.

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 MacEwan in better understanding student's academic experiences both prior to and following their studies at MacEwan. 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 MacEwan and other institutions, or new academic programming at MacEwan.

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

Conclusion

This research project on transfer student success at MacEwan University 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 MacEwan University. 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 MacEwan University, which included informal qualitative data in the form of conversations with targeted representatives from MacEwan, and
- focusing the report's core analysis and conclusions on a regression analysis of quantitative MacEwan data that were based on targeted data metrics for analysis of transfer student success in comparison to direct entry students.

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 MacEwan, this is 18 transfer credits for diploma programs, and 24 transfer credits for degree programs). This study is based on the latter concept of basis of admission as the definition for transfer. MacEwan University participants noted additional subsets of transfer students included in but not differentiable in existing provincial definitions, including what the institutional representatives referred to as *incidental transfer* where a student obtains transfer credits not as part of an intentional plan, but as a consequence of transferring; or *intentional transfer*, where a student receives transfer credit as part of a pre-planned program of transfer. Measuring incidental versus intentional transfer is not currently feasible in the absence of knowing student goals over time.

Further defining the cohort to ensure appropriate comparison can be challenging. Traditional measures tend to include only first-time, full-time, degree-seeking students, though this is beginning to shift with the US IPEDS now including part-time and mixed cohorts. The basic difficulty with determining who to include in the cohort boils down to whether a comparison between different groups (full-time versus part-time, or direct entry versus transfer) is a fair comparison to make.

Demographics and previous institution

The average age of direct entry students in this study was just under 23, while the average age of transfer students was just over 24. Females represented about 65% of direct entry students, and 62-63% of transfer students.

In terms of previous institution attended (for students with transfer credit), 38% (based on an admit type threshold of 18 credits) to 40% (based on an admit type threshold of 24 credits) were from Comprehensive Academic and Research Institutions, followed by 19% and 17% respectively from outside Alberta, and 14% from Comprehensive Community Institutions. About 10% came from Baccalaureate and Applied Studies Institutions,, the majority of whom are students who are returning to MacEwan after completing a previous credential.

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 MacEwan as a receiving institution, it lacked full insight into the experience of students prior to their studies at MacEwan. 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 24 credits at MacEwan (for direct entry students) or via transfer (for transfer students); and from the point of achieving 60 credits.

Table 11: Time to completion descriptive statistics (all models). Note that this table is a replication of Table 3.

Model	Admit Type Threshold	Plan Type	Avg. Time to Completion		Number of Students	
			Direct Entry	Transfer	Direct Entry	Transfer
Unadjusted	18+	Certificate	1.64	1.5	984	28
	18+	Diploma	2.48	2.38	4,322	403
	18+	Degree	4.26	3.41	2,199	426
	24+	Certificate	1.63	1.47	1,000	12
	24+	Diploma	2.48	2.37	4,431	294
	24+	Degree	4.25	3.36	2,252	373
Normalized to 24 credits	18+	Certificate	1.18	1.37	520	8
	18+	Diploma	1.95	2.32	3,107	118
	18+	Degree	3.69	3.61	1,698	107
	24+	Certificate	1.18	1	531	8
	24+	Diploma	1.95	2.32	3,200	118
	24+	Degree	3.68	3.61	1,744	107
Normalized to 60 credits	18+	Degree	2.37	2.78	1,326	47
	24+	Degree	2.37	2.78	1,358	47

Of these, the normalized to 24 credits model had the most robust results, as shown in Table 11, providing a meaningful comparison of direct entry versus transfer for both diplomas and degrees, showing transfer students finishing certificates about 2 months sooner, finishing diplomas about 4 months sooner, and finishing degrees about 1 month later than direct entry students. The unadjusted model didn't fairly represent direct entry or transfer students, particularly in degree programs, as it showed transfer students finished nearly 10 months quicker (while ignoring their time spent and experience at the sending

institution). The 60 credit model doesn't apply well to MacEwan's context given the mix of credential types and residency requirements. In summary, the 24 credit normalization method provided a relatively fair point in time based comparison, in the absence of additional information about a student's experience prior to attending MacEwan. 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.

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

Time to Completion

The case study highlights that transfer students at MacEwan, based on the definitions created for this study, are generally successful and complete their credentials. Using the recommended comparison point of normalizing to 24 credits, transfer students in diploma programs take slightly longer than direct entry students to complete their credentials. In degree programs, direct entry students take slightly longer to complete their credentials. Regression analysis conducted on time to completion showed significance but only explained a small amount of the variance in time to completion between direct entry and transfer students..

Graduation Rates

Further, when considering graduation rate in the normalized to 24 credits model, diploma direct entry students are more likely to finish their credentials in the expected program length (in this study, 1 year for certificates, 2 years for diplomas, and 4 years for degrees). Once extended out to 150% of expected time, the two groups converge. Looking at degree programs, transfer students are more likely to finish their credentials in the expected program length and at 150% of expected program length (though only one cohort is available for study at 150%, so this finding may change with the presence of additional cohorts). There was minimal difference in performance among transfer students based on the sector of their last institution.

Progression

Transfer students were less likely to leave the institution and more likely to graduate within the study period than their direct entry counterparts. Progression to a particular registration term was comparable for transfer and direct entry students in degree programs until about 2-3 years into their studies, when more transfer students began to graduate. In diploma programs, there was minimal difference. When normalizing for completion of 24 credits, a similar pattern occurs, but earlier. Degree students start to see divergence around term 5, with transfer students being slightly more likely to continue enrolling than direct entry students until about term 10. For diploma students, this divergence occurs between terms 4 and 10.

Transfer students are also more likely to graduate from their studies at MacEwan than to leave, which may relate to them already having completed some post-secondary education and passed the point of attrition while attending a different institution. This report is limited to the data available for the study period, and will underestimate retention and graduation on an Alberta-wide basis as the data between the institutions is not currently connected.

Perspectives on data challenges

This study has illustrated that the MacEwan 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 made to the metrics to better level the playing field between transfer and direct entry such as normalizing to 24 and 60 credits, show that the lens through which we consider transfer student success influences how the outcomes are reported.

In addition to being able to define the appropriate starting point for the metrics, this study also highlights that having an appropriate length of time available to study 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. In the case of MacEwan, data prior to 2010 was not easily retrieved or fully comparable due to information system changes in 2010. Further, MacEwan's limit of 10 years to complete a credential implies that the maximum time period for graduation rate reporting would currently be 250% for degree programs.

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 studying at MacEwan, where a student completing 24 transferrable credits would be admitted as a post-secondary transfer student for degree programs. Diploma programs use 18 credits as the threshold.

One of the challenges noted as part of the environmental scan is that the provincial definition of transfer is not necessarily the same as how the institutions view transfer. Generally, institutions consider transfer from the vantage point of a basis of admission, with MacEwan using 18 transfer credits for diploma students, and 24 credits for degree students as the threshold that determines whether or not a student's basis of admission will be transfer. The existing provincial definitions look at mobility functions. 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. In addition, MacEwan noted the challenge of determining in advance whether transfer credits will in fact count towards graduation in a particular credential, rather than having to determine it following graduation. While Alberta's research institutions have data spanning many more years than this study focused on, institutions that have more recently experienced information system, program, or structural changes do not have the ability to go back far enough to measure transfer student success in the ways that they would like. 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 MacEwan.

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.

References

Alberta Advanced Education (2007). *Roles and mandates policy framework for Alberta's publicly funded advanced education system*. Retreved April 9, 2018 from: http://advancededucation.alberta.ca/post-secondary/policy/roles/.

Alberta Council on Admissions and Transfer (2017a). *ACAT governance*. Retrieved April 10, 2018 from: https://acat.alberta.ca/about/council-membership-governance/acat-governance/

Alberta Council on Admissions and Transfer (2017b). Mobility reports. Retrieved April 10, 2018 from: https://acat.alberta.ca/research/mobility-reports/

Alberta Council on Admissions and Transfer (2017c). Data dictionary (version 2.1). Retrieved April 10, 2018 from: https://acat.alberta.ca/media/1105/ats_datadictionary_201702.pdf

Consortium for Student Retention Data Exchange (n.d.). *Members: Our members*. Retrieved April 4, 2018 from: https://portal.csrde.ou.edu/members/

Consortium for Student Retention Data Exchange (2016, August 24). *How can we help?* Retrieved April 4, 2018 from: https://csrde.ou.edu/about/news/

Council of Ontario Universities (2017). *Key performance indicators, degree completion rate for undergraduate cohort, new year 1 students (K2A) table notes*. Retrieved April 4, 2018 from: http://cudo.cou.on.ca/

Cook, B.J. (2012, November 8). Incomplete completers: Analysis of a comprehensive graduation rate. Retrieved April 4, 2018 from American Council on Education website: http://www.acenet.edu/news-room/Documents/GradRate-110812.pdf

Donner, A., & Lazar, F. (2000, March 20). *Measuring graduation and attrition at Ontario colleges: A discussion of measurement issues and their usefulness as indicators of student success*. Retrieved April 4, 2018 from Colleges Ontario website: http://www.collegesontario.org/outcomes/accountability/CO_MEASURING_GRADUATION.pdf

Engle, J. (2016). *Answering the call: institutions and states lead the way toward better measures of postsecondary performance.* Retrieved April 4, 2018 from: https://postsecondary.gatesfoundation.org/wp-content/uploads/2016/02/AnsweringtheCall.pdf

Finnie, R., Childs, S., & Qiu, H. (2010). *The patterns of persistence in post-secondary education among college students in Ontario: New evidence from longitudinal data*. Retrieved April 10, 2018 from Colleges Ontario website: http://www.collegesontario.org/research/research_reports/report_patterns_of_persistence_ontario.pdf.

Finnie, R., & Qiu, T. (2009). *Moving through, moving on, persistence in postsecondary education in Atlantic Canada, evidence from the PSIS* (Research Paper, Catalogue no. 81-595-M no. 72). Ottawa, ON: Statistics Canada.

Finnie, R., Dubois, M., Miyairi, M. (2017). H*ow student pathways affect labour market outcomes: Evidence from tax-linked administrative data*. Ottawa, ON: Ontario Council on Articulation and Transfer.

Frenette, M. (2018, April). *Trends in social mobility: Education and labour market outcomes.* Presentation at the meeting of the Higher Education Quality Council of Ontario, Toronto, ON.

Government of Alberta (2018a). Earnings by post-secondary field of study. Retrieved April 10, 2018 from the ALIS website: https://alis.alberta.ca/occinfo/earnings-by-post-secondary-field-of-study/.

Government of Alberta (2018b). *Labour market outcomes of graduates of Alberta post-secondary institutions*. Retrieved April 4, 2018 from Open Alberta: https://open.alberta.ca/publications/9871460137185.

Government of British Columbia (n.d.). *Student transitions project*. Retrieved April 4, 2018 from: http://www2.gov.bc.ca/gov/content/education-training/post-secondary-education/data-research/student-transitions-project

Hango, D. W. (2010). *Labour market experiences of youth after leaving school: Exploring the effect of educational pathways over time* (Research Paper, Catalogue no. 81-595-M no. 87). Ottawa, ON: Statistics Canada.

Heath, N. (2012). *Student mobility in Canada across Canadian jurisdictions*. Retrieved April 4, 2018 from: http://pccatweb.org/media/1244/pccat_mainreport_final-en-full-document-with-logos.pdf

Hosch, B. J. (2008, May 26): *The tension between student persistence and institutional retention: An examination of the relationship between first- semester GPA and student progression rates of first- time students*. Presented at the meeting of Association for Institutional Research. Retrieved from: http://player.slideplayer.com/15/4845367/#

Hossler, D., Shapiro, D., Dundar, A., Ziskin, M., Chen, J., Zerquera, D., Torres, V. (2012). *Transfer & Mobility: A national view of pre-degree student movement in postsecondary institutions*. Retrieved April 4, 2018 from: https://nscresearchcenter.org/wp-content/uploads/NSC_Signature_Report_2.pdf

IPEDS Technical Review Panel (n.d.). Report and suggestions from IPEDS Technical Review Panel #37, select outcomes of the advisory committee on measures of student success. Retrieved April 4, 2018 from: https://edsurveys.rti.org/IPEDS_TRP_DOCS/prod/documents/Report%20and%20Suggestions%20from%20IPEDS%20TRP%2037%20-%20FINAL.pdf

Jones, G. (2017, October 10). Expanding student success rates to reflect today's college students [Web log post]. Retrieved April 4, 2018 from: https://nces.ed.gov/blogs/nces/post/expanding-student-success-rates-to-reflect-today-s-college-students

Lambert, M., Zeman, K., Allen, M., & Bussiere, P. (2004). *Who pursues postsecondary education and why: Results from the youth in transition survey* (Research Paper, Catalogue no. 81-595-MIE no. 26. Ottawa, ON: Statistics Canada.

Ma, J., Baum, S. (2016, April). *Trends in community colleges: Enrollment, prices, student debt, and completion* (Research Brief). Retrieved April 4, 2018 from: https://trends.collegeboard.org/sites/default/files/trends-in-community-colleges-research-brief.pdf

MacEwan University (2017). Comprehensive Institutional Plan. Retrieved May 10, 2018 from: https://www.macewan.ca/contribute/groups/public/documents/document/mdbk/b2nf/~edisp/doc_cip.pdf

MacEwan University (n.d.). Visiting students. Retrieved April 10, 2018 from: https://www.macewan.ca/wcm/Registrar/EnrolmentServices/HowtoEnrol/VisitingStudents/index.htm.

Maritime Provinces Higher Education Commission (n.d.). *The Maritime Provinces Higher Education Commission mandate*. Retrieved April 4, 2018 from: http://www.mphec.ca/about/mandateandact.aspx

Martinello, F. (2008). *Student transitions and adjustments in Canadian post-secondary education* (MESA Project Research Paper 2008-7). Toronto, ON: Canadian Education Project.

Massachusetts Board of Higher Education (2007). *Final report from the task force on retention and completion rates at community colleges*. Retrieved April 4, 2018 from: http://www.mass.edu/bhe/lib/reports/CCTFReport.pdf

McCormick, A. C. (2003). Swirling and double-dipping: New patterns of student attendance and their implications for higher education. *New Directions for Higher Education 2003*(121), pp 13-24. doi: 10.1002/he.98.

McLaughlin, G.W., McLaughlin, J.E., McLaughlin, J.S., Howard, R.D., Whalen, S (2016, June). *Measuring the success of transfer students: A new metric evaluated*. Presented at the meeting of the Association for Institutional Research. Retrieved April 4, 2018 from: https://csrde.ou.edu/wp-content/uploads/Measuring_the_Success_of_Transfer_Students_A-New_Metric_Evaluated.pdf

National Center for Education Statistics (2017). IPEDS: Graduation Rates for Less than 2-year institutions: Does my institution need to report transfers-out? Retrieved May 11, 2018 from: https://surveys.nces.ed.gov/ipeds/VisFaqView.aspx?mode=reg&id=6&show=all - 184

National Center for Education Statistics (n.d.). *IPEDS: Find your college*. Retrieved April 4, 2018 from: https://nces.ed.gov/ipeds/Home/FindYourCollege

Parkin, A., & Baldwin, N. (2009). *Persistence in post-secondary education in Canada: The latest research* (Research Note no. 8). Montréal, QC: Canada Millennium Scholarship Foundation.

Shaienks, D., Eisl-Culkin, J., & Bussiere, P. (2006). *Follow up on education and labour market pathways of young Canadians aged 18 to 20 – Results from YITS Cycle 3* (Research Report, Catalogue no.81-595-MIE no. 45). Ottawa, ON: Statistics Canada.

Soldner, M., Smither, C., Parsons, K., Peek, A. (2016, May). *Toward improved measurement of student persistence and completion*. Washington, DC: American Institutes for Research.

Statistics Canada (2011). *Youth in Transition Survey*. Retrieved April 4, 2018 from: http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=4435

Statistics Canada (2017). *Postsecondary Student Information System*. Retrieved April 4, 2018 from: http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=5017

Student Achievement Measure (2013a). *What is SAM?* Retrieved April 4, 2018 from: http://www.studentachievementmeasure.org/about

U.S. Department of Education (2013, February 13). *Education Department releases college scorecard to help students choose best college for them*. Retrieved April 4, 2018 from: https://www.ed.gov/news/press-releases/education-department-releases-college-scorecard-help-students-choose-best-college-them

Van Stolk, C., Tiessen, J., Clift, J., Ruth Levitt (2007). Student retention inhHigher education courses: International comparison. Cambridge, UK: RAND Corporation.

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 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)

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

Base_Data_GMU

This table contains the base data as provided by MacEwan University.

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	integer	Student Anonymous ID	Originally "ID Number" in Base Data
Term Desc	text	Term Description	Base Data
Academic Program Desc	text	Academic Program	Base Data
Academic Plan Desc	text	Academic Plan	Base Data
Academic Load	text	Full time or part Time	Base Data
credits Attempted	float	Number of credits Attempted (per Term Desc)	Base Data
credits Passed	float	Number of credits Passed (per Term Desc)	Base Data
Current Grade Point Average	float	Grade Point Average (per Term Desc)	Base Data

Student Gender Code	text	Student's Gender	Base Data
Student Age	integer	Student's Age at the start of term	Base Data
Residency Desc	text	Student's Residency	Base Data
Academic Plan Type Desc	text	Academic Plan Type (Degree, Diploma, Certificate, etc).	Base Data
AdmitTerm	text	Admit Term	Base Data
Last School Attended School Desc	text	Last School Attended	Base Data
Last School Attended City	text	Last School Attended City	Base Data
Last School Attended State Id	text	Last School Attended State / Province	Base Data
Last School Attended School Type	text	Last School Attended Type (Secondary, University, etc)	Base Data
Degree Desc	text	Credential description	Base Data
Completed Term Desc	text	Graduation Term description	Base Data
# of Ws	integer	Courses withdrawn (per Term Desc)	Base Data
credits Transferred	float	Transfer credits awarded	Base Data

Term_Tbl

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

Column	Data Type	Description	Source and Notes
institution_id	integer	Institution ID defined for the study (“2”)	Created for the study
term	text	Term code	Recoded to year + term code (01, 03, 04)
institution_code	text	Institution Code (“GMU”))	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 - Winter 03 - Spring/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.

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	3 main cutoffs are used to determine transfer: 6 transfer credits, 15 transfer credits, and 24 transfer credits.	
admit_term	text	Admit term, recoded	Admit term, recoded to match Term_tbl.term
program	text	Program	Institutional
plan	text	Academic Plan	Institutional
plan_type	text	Plan Type as provided by MacEwan	Institutional; options are Certificate, Diploma, Applied Degree, or Degree

graduated	text	Graduation flag (Y or N)	Created
graduated_term	text	Graduated term, if available	Recoded
graduated_date	text	Graduated date, if available	Institutional
transfer_credits	text	Transfer credits awarded at time of admission for previous post-secondary work at institutions recognized by MacEwan	Institutional
transfer_threshold	text	Based on the definition of admit_type	Created
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 (female), M (male), O (other), or U (unknown).
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 Certificates, 1 year. For Diplomas and Applied Degrees, 2 years. 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 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

Student_Term

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

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	3 main cutoffs are used to determine transfer: 6 transfer credits, 15 transfer credits, and 24 transfer credits	Student_Program
admit_term	text	Admit term, recoded	Student_Program
program	text	Program	Student_Program
plan	text	Academic Plan	Student_Program
plan_type	text	Plan Type as provided by MacEwan	Student_Program; options are Certificate, Diploma, Applied Degree, or Degree.
graduated	text	Graduation flag (Y or N)	Student_Program
graduated_term	text	Graduated term, if available	Student_Program
graduated_date	text	Graduated date, if available	Student_Program
transfer_credits	text	Transfer credits at time of admission	Student_Program
transfer_threshold	text	Based on the definition of admit_type.	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