

A photograph of a woman with dark skin and curly hair, wearing safety glasses and a white lab coat with blue piping. She is smiling and looking towards the camera while working on a piece of electronic equipment. The background shows a laboratory setting with various pieces of equipment and cables.

Technology-to-Engineering Transfer Pathway: Institutional Stakeholders' Experiences and Perspectives

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Introduction

The aim of this research project was to develop a rich understanding of how administrators and faculty members in engineering and engineering technology programs perceive technology-to-engineering bridging transfer programs that specifically improve access for marginalized or underrepresented students. The study's motivation was to provide considerations for developing a flexible province-wide transfer pathway from engineering technology programs to accredited engineering degree programs and to improve institutional practices related to transfers. A better understanding of these motivations may increase marginalized or underrepresented students' access to engineering and enable more students to enter engineering degree programs successfully with the practical skill sets obtained in technology programs. In the Ontario engineering context, time-efficient transfers between engineering technology and engineering programs often require students to take bridging courses due to the significant differences in the order, content, and delivery style of engineering technology and engineering programs and the limited credit recognition given for prior educational experience. Furthermore, even when robust credit transfer processes and bridging opportunities are in place, the supportive structures around these programs are not always complete, leaving students to independently determine the best path forward and lacking the appropriate context and information to make fully informed and effective choices. Some students end up completing the full four years of an engineering degree in addition to their technological diploma. To identify relevant barriers to and facilitators of improving this process, this research focused on pathway transfer programs and their requirements as well as on barriers to and facilitators of bridging programs and more general pathway programs. This was also done to bring greater attention to the recognition of prior student learning and to support the transfer process to make it less daunting and more accessible to all students.

Researchers have gathered insights into the current facilitators and barriers facing both sending and receiving institutions in promoting and supporting their bridging transfer pathway programs, specifically for underrepresented students.

This report details the processes undertaken to determine research approaches, methodologies, participant pools as well as data collection and analysis. However, it is mostly dedicated to findings and recommendations resulting from insights from participants, elaborations on idea generation, and connections to the existing literature. Ultimately, this work will support the ongoing goals of ONCAT and provide insights into greater systematic policies, procedures, and decision-making to improve access for underrepresented students and facilitate the successful transition of all students interested in participating in transfer pathway programs through greater alignment and collaboration across relevant sectors.

Relevant Definitions

To remain consistent with the key terms for both internal and publicly facing audiences, definitions from ONCAT have been used. Please see Table 1, which provides the key definitions that we feel will be helpful for readers who may be unfamiliar with transfer pathway programs.

TABLE 1
Key Terms

Key Term	Definition
Transfer pathway	"[The] defined route from one program or institution to another program or institution that specifies eligibility requirements and how transfer credits will be accepted and applied at the receiving institution. Usually applies to multiple sending institutions and one or more receiving institutions. Does not require formal signed agreement between institutions." (ONCAT, 2024)
Articulation agreement	"Official agreement between two (bilateral) or more (multilateral) postsecondary institutions that defines the terms and conditions enabling students to transfer between specific programs. [It] may also determine which courses or programs taken at the sending institution will apply to graduation requirements at the receiving institution." (ONCAT, 2024)
Credit transfer	"Acceptance or recognition of credit by an institution for courses or programs completed at another institution." (ONCAT, 2024)
Bridging course	"Course or set of courses that students take to fill gaps in their learning from one program in order to enter another program, for example from a diploma to a degree program in the same area of study. Some bridging course/programs are designed to prepare internationally educated professionals to write certification examinations to practice in Canada." (ONCAT, 2024)

Literature Review

Table 2 outlines the common challenges faced by transfer students and the role that sending and receiving institutions can play in improving the transfer experience. Most of the studies discussed here were set in the United States with transfer pathways that granted students a varied number of credits based on their college work. While a bridging transfer pathway offers a predetermined block of transfer credits as well as bridging courses before students can join in the upper years of a program, we believe that the challenges and support are similar across both contexts. It is important to note that although the studies listed recognized that transfer students are a diverse group with diverse needs, few focused specifically on the needs and challenges of underrepresented students within the transfer student cohort. Despite this, these studies offered findings applicable to engineering programs, institutions, transfer students in general, and underrepresented transfer students specifically.

The relevant themes from the literature listed in Table 2 are credit transfer, geography and housing, financial aid, tailored and robust orientation, institutional values and constraints, and transfer-specific information and advising. In each box, the key points from each theme are listed, followed by citations from the relevant studies. Studies set in the Canadian context are indicated with a maple leaf icon (🍁).

TABLE 2
Relevant Themes from Past Studies on Transfer Pathways

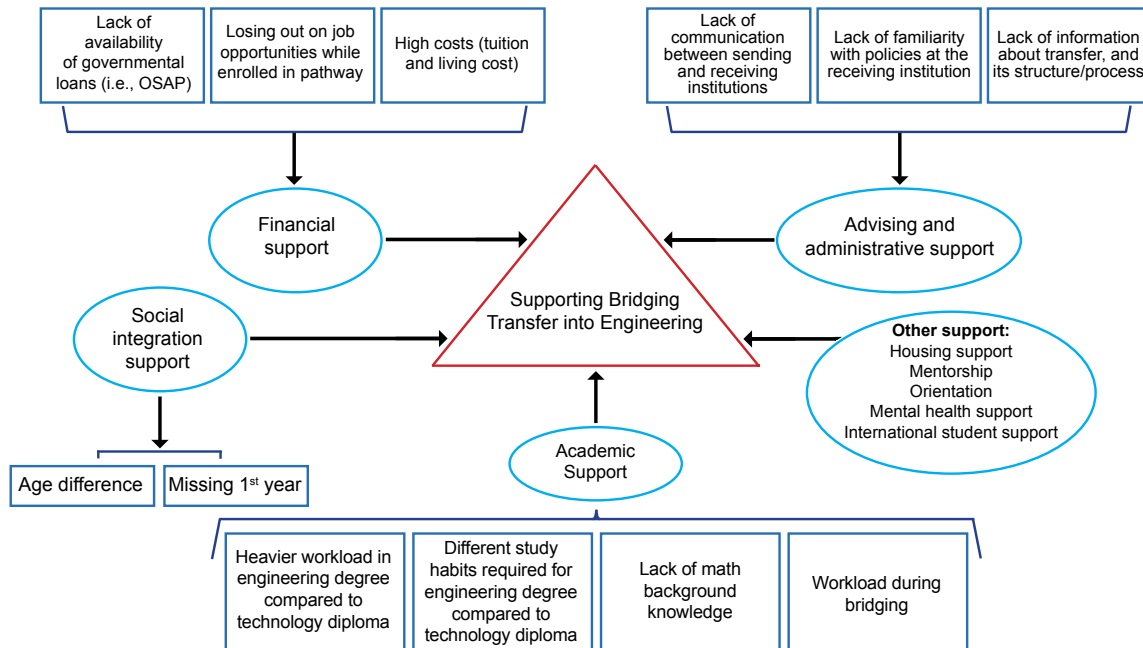
<p>Credit transfer</p> <ul style="list-style-type: none"> • This is a key factor in transfer student decision-making. • Articulation agreements with clear and consistent credit transfer policies are essential. • Credit transfer processes must maximize credit recognition and be complete before transfer students start their programs. <p><i>(Blekic et al., 2020; Dadonna et al., 2021; Decock et al., 2011; Decock & Janzen, 2016 🍁; Ellis, 2013; Gawley & McGowan, 2006 🍁; Green et al., 2020 🍁; Handel, 2012; McCloy et al., 2017 🍁; Miller, 2013; Townsend, 2008; Walker & Okpala, 2017)</i></p>	<p>Geography and housing</p> <ul style="list-style-type: none"> • Leaving a community and an established support network negatively impacts transfer students' success. • Transfer students need dedicated residence or housing options. • Transfer students with families need appropriate on- or near-campus housing. <p><i>(Blekic, 2020; Del Real Viramontes, 2021; DeWine et al., 2017; Handel, 2012; Tobolowsky & Cox, 2012; Townsend, 2008; Umbach et al., 2019)</i></p>
<p>Financial aid</p> <ul style="list-style-type: none"> • There is a need for dedicated financial aid, scholarships, clarity over eligibility, and support for completing applications. • The ability to meet application deadlines is impacted by timely transfer-specific information, advising, and orientation. • There is a need to develop financial literacy. <p><i>(Blekic et al., 2020; Daddona et al., 2021; Del Real Viramontes, 2021; Fink & Jenkins, 2017; Green et al., 2020 🍁; Henderson & McCloy, 2019 🍁; Miller, 2013; Ogilvie & Knight, 2021; Tobolowsky & Cox, 2012; Townsend, 2008)</i></p>	<p>Tailored and robust orientation</p> <ul style="list-style-type: none"> • Transfer students feel alone navigating a new institution and its systems. • There is a need for a tailored, dedicated, and robust orientation. <p><i>(Daddona et al., 2021; Decock & Janzen, 2016 🍁; DeWine et al., 2017; Gawley & McGowan, 2006 🍁; Green et al., 2020 🍁; Handel, 2012; Henderson & McCloy, 2019 🍁; Miller, 2013; Mobley & Brawner, 2013; Ogilvie & Knight, 2021; Percival et al., 2015 🍁; Townsend, 2008; Walker & Okpala, 2017; Young et al., 2020 🍁)</i></p>

Institutional values and constraints	Transfer-specific information and advising
<ul style="list-style-type: none"> • There should be a strategic commitment to transfer pathways with clear messaging on the value of pathways and support from leadership. • There is a need to develop a clear and consistent definition of transfer students that recognizes their diverse and unique needs. • Staff training is needed for consistent policy implementation. • There should be relationship building between institutions to foster smoother articulation agreement development and information sharing. • Resources should be allocated to enable multiple modes of course delivery and to hire dedicated staff. • A lack of data tracking impedes decision-making about institution-specific support. • There is a need to foster inclusive decision-making and broader representation. <p><i>(Ellis, 2013; Fink & Jenkins, 2017; Handel, 2012; Miller, 2013; Monroe, 2006; Tobolowsky & Cox, 2012; Walker & Okpala, 2017; Wang et al., 2021, Young et al., 2020 🍁)</i></p>	<ul style="list-style-type: none"> • Access to timely transfer-specific information and advising is needed at both the sending and receiving institutions. • There is a reliance on institutions' websites when advisors are unable to provide transfer-specific information. • Receiving institutions can make transfer-specific information available to sending institutions at the start of programs. • Transfer students are often unprepared for the mismatch among academic skills, workload, types of work, instructors' office hours, relationship advice, and expectations at colleges and universities. • Strict timelines are difficult for transfer students who have family and work commitments. <p><i>(Blekic et al., 2020; Dadonna et al., 2021; Decock et al., 2011; Decock & Janzen, 2016 🍁; DeWine et al., 2017; Ellis, 2013; Fink & Jenkins, 2017; Gawley & McGowan, 2006 🍁; Green et al., 2020 🍁; Handel, 2012; Henderson & McCloy, 2019 🍁; Laanan, 2001, 2007; Mobley & Brawner, 2013; Monroe, 2006; Packard & Jeffers, 2013; Percival et al., 2015 🍁; Walker & Okpala, 2017; Wang et al., 2021; Young et al., 2020 🍁)</i></p>

Supporting Bridging Transfer to Engineering in Ontario

From interviews with 10 transfer students in Ontario, Moozeh et al. (forthcoming) proposed the framework in Figure 1, which shows what receiving institutions can do to support bridging transfer students (in the ovals) with the challenges transfer students reported (in the boxes). Similar to the studies described above, the transfer students reported barriers to adjusting to different academic requirements, integrating into their new campus life, financial aid, accessing accurate and timely information about transfer pathways, and other issues, such as housing and mentorship.

FIGURE 1
Supporting Bridging Transfer to Engineering



Theoretical Framework

In addition to the principles identified in the literature described in Table 2, the methods used to address the research questions are based on transfer receptive culture (TRC).

Transfer Receptive Culture

TRC recognizes the complex contextual factors impacting student performance and seeks to provide a partnership framework for sending and receiving institutions to holistically support students through these processes, specifically including considerations for underrepresented students (Herrera & Jain, 2013). Jain et al. (2011) introduced five essential elements of TRC:

1. making supporting students from underrepresented groups an institutional priority throughout the transfer process by focusing on accessibility, retention, and graduation
2. providing context-, culture-, and population-specific outreach and resources to meet authentic community needs
3. offering specific and targeted financial and academic support designed to serve transfer students
4. fostering spaces and opportunities for students to share their lived experiences and recognizing the intersectionality of student, family, and community identities
5. creating a framework for ongoing data collection, feedback, and assessment of transfer programs and associated initiatives for continual improvement and ongoing focused scholarship

Research Problem and Questions

This study explores institutional perceptions of factors that contribute to a supportive pre- and post-transfer culture for students moving from college technology programs to university engineering programs. Specifically, it aims to answer the following research questions:

RQ1: What are institutional administrators/faculty perceptions (at both sending and receiving institutions) of factors relevant to developing and maintaining technology-to-engineering bridging transfer programs?

RQ1.1: What are the stated and/or implied purposes, principles, and key factors in existing bridging transfer programs?

RQ1.2: What are the successful strategies and/or potential new strategies to enable underrepresented students access to bridging transfer programs?

RQ1.3: What are the challenges and barriers for students (specifically, underrepresented students) pre-, during, and post-transfer, such as academic, financial, housing, and access to information and advisors?

RQ1.4: What are the existing support system resources and potential new support system resources to support the student transfer process and university adjustment?

Methodology

Table 3 outlines the key structures framing our methodology for completing our interviews and analysis.

TABLE 3
Methodology

Instrument	<ul style="list-style-type: none"> • Conduct semi-structured interviews with open-ended questions (Appendix A) to: <ul style="list-style-type: none"> ◦ maintain consistency and ensure that specific topics are addressed ◦ ensure flexibility to follow up or clarify participants' responses ◦ be aligned with TRC
Participants	<ul style="list-style-type: none"> • Engage a recruitment strategy including known contacts, publicly available institutional information, and snowball sampling. • The participants were college and university administrators, faculty members, and student advisory staff. • Of a total of 17 participants, eight were from colleges and nine were from universities.

Data Collection	<p>The process included:</p> <ul style="list-style-type: none"> • ethical clearance (prior to recruitment) • recruitment via email • verbal consent for interviews • recorded interviews via Zoom lasting 45–60 min • continuing interviews until agreement was reached that saturation had been achieved
Analysis	<p>The analysis process was based on Richards and Hemphill (2018) and Saldaña (2023). The process involved:</p> <ul style="list-style-type: none"> • transcript clean-up and sharing with individual participants for member checking • NVivo Open, inductive coding, and the development of an initial codebook (10 codes and 25 subcodes) • mapping codes to research questions • three subsequent rounds of independent deductive coding and consensus coding (with discussion and cross-checking) with consideration for newly emergent codes • finalizing the codebook (10 codes and 30 subcodes) and recoding original transcripts with any changed or updated codes • developing categories and theming the data • creating a summary of findings and recommendations based on themes to share with the research team and participants for final member-checking and review

Findings

Eight themes with 20 subthemes were mapped from the interview data. The purpose of the transfer pathway and the contributors to student success are described below, with representative quotations from the interview data. These two themes are reported separately from the others because the aim of each question was different from the others and since the participants had options to choose from. For each theme, a table with response tallies is provided.

Purpose of the Transfer Pathway

To answer RQ 1.1, the participants were asked about the purpose of the transfer pathway program at their institution. Table 4 lists the diverse priorities that participants provided, along with the frequency with which they were mentioned. These findings demonstrate that institutions overwhelmingly seek to improve accessibility to education, allowing students to participate in programs they may not have had access to otherwise, whether because of their grades in high school, personal or professional constraints, learning or support needs, and/or other constraints. Please note that when the participants described the purpose of the transfer pathways at their institutions, many referred to multiple purposes. These were all included in the frequency count. Therefore, the total count exceeds the number of participants and does not reflect the emphasis that each institution placed on each purpose.

TABLE 4
Purpose of the Transfer Pathways – Frequency Count

Purpose	Frequency	% of respondents
Improve accessibility to education	17	100%
New or wider career opportunities (Recognition of previous experience for advanced standing in that career path)	9	53%
Providing a diversity of experiences for students (including life and academic experiences)	7	41%
Promotion for marketing and recruitment	5	29%
Provincial/National directive (or funding)	4	24%
Save students money	3	18%
Increase diversity of experience/backgrounds of the participants in the program	2	12%
Fill empty places in the program (from first year attrition)	2	12%
Improve educational alignment	1	6%
Improve relationship/partnership with local colleges/universities	1	6%

For the most part, these results align well with TRC considerations, particularly with regard to accessibility of education and promoting diversity. Unsurprisingly, the responses regarding financial security and support were less of a consideration for staff and advisors than what was represented for students in the literature review, likely due to the institutional roles of participants and areas of focus rather than to a lack of acknowledgement of this concern.

Contributors to Student Success

To answer RQs 1.2 and 1.4, the participants were provided with a list of contributors to transfer student success (see Table 5). It was pointed out that “these are factors of success for any student” (Participant 4) and that their top three choices “don’t exclude the others [from the list]” (Participant 13). While each of the contributors was mentioned by at least one participant, the participants clearly prioritized advice for transfer students:

What’s packed inside the word advising is relationship building, where we have to listen to what this particular individual student is looking for in their journey. What are their needs right now? What are their pain points? And that’s what can unlock pathways across all these particular supports ... The entry point is the advising piece, and making sure you build that particular relationship so that it can truly be a dialogue, and the people can understand what journey they’re embarking on. (Participant 16)

The participants did not discuss specific types of financial support that would address the financial concerns students often face, but they connected financial support to building financial literacy through advising and the availability of transfer-specific information. This was important because it would allow transfer students to understand the differences between college and university before committing financially:

So, from an advising lens again...they need some way of understanding the disparity in work and the disparity of theoretical complexity that they will be responsible for if they move from a college to university, and so, some level of advising or opportunity to pre-engage in materials, to “try before you buy,” so to speak, and make sure that it’s for them. ...These are some of the opportunities you may want to consider would be very value-added from a financial literacy perspective. (Participant 11)

The participants also discussed the importance of mentorship opportunities in contributing to transfer students’ success. Participant 14 explained, “If we were able to build sort of a mentorship network, you know, transfer students helping transfer students sort of thing, I think that could be really impactful.” They also highlighted the importance of having diverse representation among mentors. As Participant 06 explained, “I think mentorship would be ideal. So, if you can find someone who looks like you or has gone through the same experiences, challenges as you. I think that’s essential.”

TABLE 5
Contributors to Student Success

Contributor to student success	Response count/frequency
Advising	14
Availability of transfer-specific Information	10
Orientation sessions	7
Financial support	7
Mentorship opportunities	6
Accommodations	5
Sociocultural integration	4
Housing and childcare support	2
Specific advising for Indigenous students	1
Collaborative training within institutions	1

As part of RQs 1.2 and 1.4, the participants were asked if they would choose different success contributors if they were thinking specifically about underrepresented students. However, there was less clarity overall on what specific support underrepresented groups might need. Many participants stayed with their initial response, even when recognizing that underrepresented students faced additional barriers, while others questioned if there would be a difference in the support needed or if existing support needed to be better tailored to specific groups:

I mean there are other pieces sure, like financial support, mentorship, housing, accommodations, etc. But that’s true, I would say of all EDI students, not necessarily just transfer students ... So, there is help available if they need it. Does that assistance necessarily differ for pathways and transfers? I don’t know that it does. (Participant 1)

Those supports [targeted to different groups] do exist here at [my institution]. But I’m not sure they are tailored to this student that is also coming from a sending institution, you know, into a bridging program, for example. So, some thought might need to be given to those sorts of situations. (Participant 16)

However, other participants identified specific support and plans for underrepresented students, particularly for institutions that served particular underrepresented groups due to their individual contexts (e.g., a large Indigenous population).

The remaining themes are the results of the coding process described in Table 3. The themes of collaboration, underrepresented groups, student-facing barriers, (mis)alignment, the credit recognition process, and measuring program success are listed in Table 6, along with their subthemes, key points, and representative quotes from the interview data.

Table 6
Themes, Subthemes, Key Points, and Representative Quotes from the Interview Data

Theme and subtheme	Key points	Representative quote
<i>Collaboration</i>		
Internal collaboration	Sharing information between departments and faculties could be challenging, often leading to a high amount of manual work.	I think another key piece that often gets forgotten is [that] all of these departments within an institution are very siloed and work within their own departments, and don't necessarily have the information themselves readily available to help these students. So, I would definitely say having cross training within your institution is also super important. ... We have a lot of systems in place. None of them talk to each other right now. And so, there is a ton of manual work. (Participant 2)
Turnover, succession planning, and capacity	Turnover, changing priorities, and large role portfolios can all result in transfer pathways receiving varying levels of staffing and attention.	When people change, we lose some capacity there, you know. Some of these links [with other institutions] disappeared for a variety of reasons. Then we lost some of our contacts. ... [and] when the deans change, things change very, very quickly. The reason is that priorities change ... the responses were not as enthusiastic. And then, you know, the information that was going down to the students was not as before. (Participant 13)

Theme and subtheme	Key points	Representative quote
<i>Collaboration</i>		
External collaboration	<p>A lack of communication between institutions creates barriers at many levels.</p> <p>Transfer-dedicated staff and long-term contacts at the other institutions are significant facilitators.</p> <p>Pathways are sometimes developed without any external collaboration at all.</p>	<p>It would be nice if we had identified people on the other end, within the admissions department, or whatever department is handling the transfer on the university end similar to our path that could liaise with our pathways. ...When you're a generalist, and you've got a million programs, you know, chances are you're not really as aware of these pathways as you could be. (Participant 1)</p> <p>A lot of our pathways are for provincial program standards. And so, we don't actually have one-on-one conversations with those institutions. We just base it on a comparison of the vocational learning outcomes of the diploma, compared to our degree program outcomes and then identify what those gaps would be in in levels of sophistication of knowledge or knowledge itself ... So, I would say, for the majority of our degree pathways or pathways into our degree programs, we don't actually have discussions on that with other institutions in the building of those pathways. (Participant 3)</p>

Underrepresented groups

Diverse backgrounds, needs, and experiences	Very little provision of tailored support, despite the recognition that underrepresented students have diverse needs, different learning preferences, and varying levels of access to required learning tools.	So the challenges are similar, you know, in the onboarding and the support that we need to put in it. But they're nuanced and I think this nuance [is] significant enough that that the program team for the bridging courses needs to have that top of mind. (Participant 16)
Leaving the established community of support	Students may be unwilling to move away from their established communities of support, and institutions may then not focus on strategic planning for underrepresented groups of students.	When you're speaking with indigenous students about coming to a campus. Well, that might seem very, you know, efficient and appropriate from an educational delivery lens. But when you add in the context of residential schools, which are intergenerational traumas that they're still working through, the idea of asking students to leave and attend school in a different city is a very real ask. And it's a something we need to give pause to and think about solutions to help create more flexible opportunities to learn and you know, even if you look at ... what's going on in North Bay, around students who have just disappeared when they've gone to school away from their communities. This is within the last, you know, decade. So, this isn't something that we've figured out how to address as a nation, and it certainly is something that still needs a lot of work. (Participant 11)
Scheduling differences	Supports need to be available outside regular business hours.	Where we lack and where it could be better for all of those students is accessibility services. The reason is mostly because of the fact that these students show up here in the evenings and the weekends. And up until recently, our disability offices were not working during the times [when] there are many courses around at night. (Participant 6)

Underrepresented groups

Representation and inclusion	<p>Transfer students need peers to reach out to for support.</p> <p>Transfer students need to be included in decision-making processes.</p>	<p> Oftentimes, you know, I know that if I don't understand a part of the process, I can call someone on the phone and get the mentorship or help that I need to understand that process. I'm not going to get stuck. And I think that oftentimes in underrepresented communities, they may not have peers to reach out to ask those questions to. They might feel discomfort in reaching out for help, whether it's perceptual or otherwise. And so, I can imagine that there might be a reluctance and their ability to participate, that might look a little bit different than for ethnic groups that have larger levels of representation. (Participant 11)</p> <p>The challenge with all underrepresented groups is a lack of inclusion in decision making and a lack of inclusion in terms of their needs being met both within community and outside of community. (Participant 11)</p>
Reliance on generic supports	<p>There is a reliance on broader institutional-level support and policies on equity, diversity, and inclusion rather than initiatives specific to underrepresented groups in transfer pathways.</p>	<p>We do provide those kinds of assistance to all our students, so there is help available if they need it. The question is always are they going to be aware and take us up on that assistance. (Participant 3)</p>

Student-facing barriers

Attitudes toward college students	<p>Persisting belief that weaker students attend colleges and that college learning is not as academically rigorous as university learning.</p> <p>Institutions do not give transfer students the same level of focus or support as direct entry students.</p>	<p>I think that there's still there's still a disparity in the impression of what a student can accomplish a university and a college and when I speak to my colleagues and friends who are teaching at universities, they're experiencing the same disparity and ability for students that are starting in a first and second year, they're experiencing the same lack of understanding about what career path or potential. Or you know, they're learning how to "adult" and so I still see a little bit of that ivory tower kind of impression of what college students can do and can't do in my conversations with certain institutions. (Participant 11)</p> <p>They all brought work experience that was incredibly valuable to the department. But, as mature students, they had very specific needs and frustrations. You know anything from poor instructors or TAs that sometimes we get away with undergrad because there's volume, and it's just like, push them through. You don't get away with that in a bridging program. They know they are paying a lot of their hard-earned money for this, and they expect every ounce of return on their investment. (Participant 15)</p>
Addressing pathway students' needs	<p>Transfer students have a huge diversity of needs, experiences, or barriers requiring much greater individualization or situational consideration than direct entry students.</p>	<p>Every student has their own unique experiences that have led them to completing post-secondary and then also coming to another institution, and it's hard to bump them all into one community because it really is very individualized. Everyone is facing different stressors or barriers within that. (Participant 2)</p>
Financial barriers	<p>Transfer students may experience more financial barriers, which turns them off transfer pathways that grant few transfer credits or other support.</p>	<p>Any post-secondary experience is very expensive, and there's a housing shortage. And I think that's, you know, a key factor in people's decisions to continue their education. Can I afford this? Is there going to be a return on my investment? And where am I going to live that's safe and accessible and is going to enable me to go to class? (Participant 3)</p> <hr/>

Student-facing barriers

Navigating application processes

Accessing timely information, accessing human support, getting specific responses, or obtaining required documents can be extremely difficult.

We ask students to do a lot in their own right. You go in, you select your courses, you pull up your fee statements. You know you're responsible for doing all this stuff They're kind of on their own, and if they do try to apply for credit transfer, and they put in a request it gets denied, and then they try different combinations [of courses to reapply for the same credit]. It takes a lot of resources. And honestly, it's emotionally exhausting for them sometimes. This year I found a lot of students who are coming from different institutions who don't necessarily have a front facing database of course outlines have to go through a really vigorous process in order to obtain these, ... and sometimes it also costs [money]. So, getting us supporting documentation is not only like an administration barrier for them. But it is also a financial barrier as well.
(Participant 1)

(Mis)alignment

Marketing materials versus transfer pathway reality	Oversimplified marketing messages on public-facing websites can mislead students about the transfer pathway process, making it difficult for them to make decisions about pursuing a pathway.	Perhaps in an effort to synthesize messaging, sometimes you will see some branding in the marketplace that oversimplifies the experience. You know things like, oh, yeah, just come to our university, and for an extra year and a half, and you've got an engineering degree. Those are very over simplified statements that sometimes you will see in the market and it makes it very difficult, I feel, for a student who's really trying to make it decision about their future to compare the possible experience that they're going to get with their education at institution A versus institution B versus institution C, because not all the same messaging across those institutions is easily comparable by, you know, the students and their families, or whoever is helping to make the decisions. So, I think that our industry could do better there if we sought to standardize a little bit the kinds of information that we put on our websites so the students could better compare. (Participant 16)
Institutional values	Institutions approach transfer pathways with differing motivations and values for creating transfer pathways.	It really emphasizes the need for transfer pathways that restrict the number of additional requirements. And I think that's the part where you know, with the partners that we are working with. They are the partners who have reviewed that and understand that that's the goal. (Participant 11)
Standardization across programs and frameworks	<p>Programs that meet government and provincial guidelines are not necessarily aligned.</p> <p>Many professional organizations use different frameworks than those of the ministry.</p>	We love to out-document ourselves in this system and I've been pushing back a lot on certification and credentialing institutions that operate outside of the framework of the Ministry of Training, Colleges, and Universities because we have a very robust certification process at the college and university level. But a lot of our professional organizations seem to ignore that fact and have their own formats and requirements for certification which adds time and labour and cost to trying to do these large-scale collaborative projects ... I do think there's a real opportunity to leverage the strong frameworks that we have around learning outcomes and course objectives, and we already have frameworks for all of this. So, it would be lovely if there was a way for us to figure out how to standardize some of it, you know, and have sort of an agreement of principle that we review rather than starting over every 3 to 5 years. (Participant 11)

Credit recognition process

Process difficulties	The credit recognition process is often long, slow, complex, resource intensive, inflexible, difficult to navigate, and difficult to understand.	“A transfer credit evaluation process is very painful ... So, there’s a there’s a central person in the register office who coordinates everything and gets everything out for evaluation, but every faculty from there handles it differently ... So, everything has to go to a faculty [member] to evaluate. And so here comes to the Associate Dean’s office and [they] issue it to the department heads, or just issue it to direct faculty members who teach the courses. And it’s just there’s too much variance and not enough training to help these people do it efficiently ... It takes a long time to get decisions and so students are waiting a long time to get their transfer credits. (Participant 14)
Flexibility/Inflexibility	While some institutions have very inflexible processes, a strong facilitator is being able to recognize (formally and informally) unique student experiences and skills.	If we [the assessment team] see that we have questions about something or something is unexpected inside that transcript, like, maybe they have extra courses that aren’t typical to this kind of student at this point in their academic career, Great! You know, we love to see those kinds of wrinkles and we would probably refer that again, to the academic chair ... to see if it changes the way that we perceive the bridge for this applicant. Inside those internal negotiations sometimes we make a comment to the student, ask for more details, you know. Other times we may just be communicating back to this student a piece of good news that would say ... here is the general thing that we have posted on our website, but maybe you don’t need first year calculus, you know, based on the fact of X Y Z that we noticed in the final analysis. So, it’s certainly a dialogue. (Participant 16)
Professional credentialing requirements	Professional credentialing bodies’ requirements may currently work against the development of more transfer pathways.	So licensing was a big hurdle to overcome if you’re looking at it from a transfer student perspective. But the back-end politics with managing the accrediting bodies, the reviewing bodies for accredited programs, like, we’re in the process of going through those hurdles now and it certainly doesn’t feel like this is a provincial or national want to do this thing. Like you have to really sort of roll against the grain and kind of push through. (Participant 15)

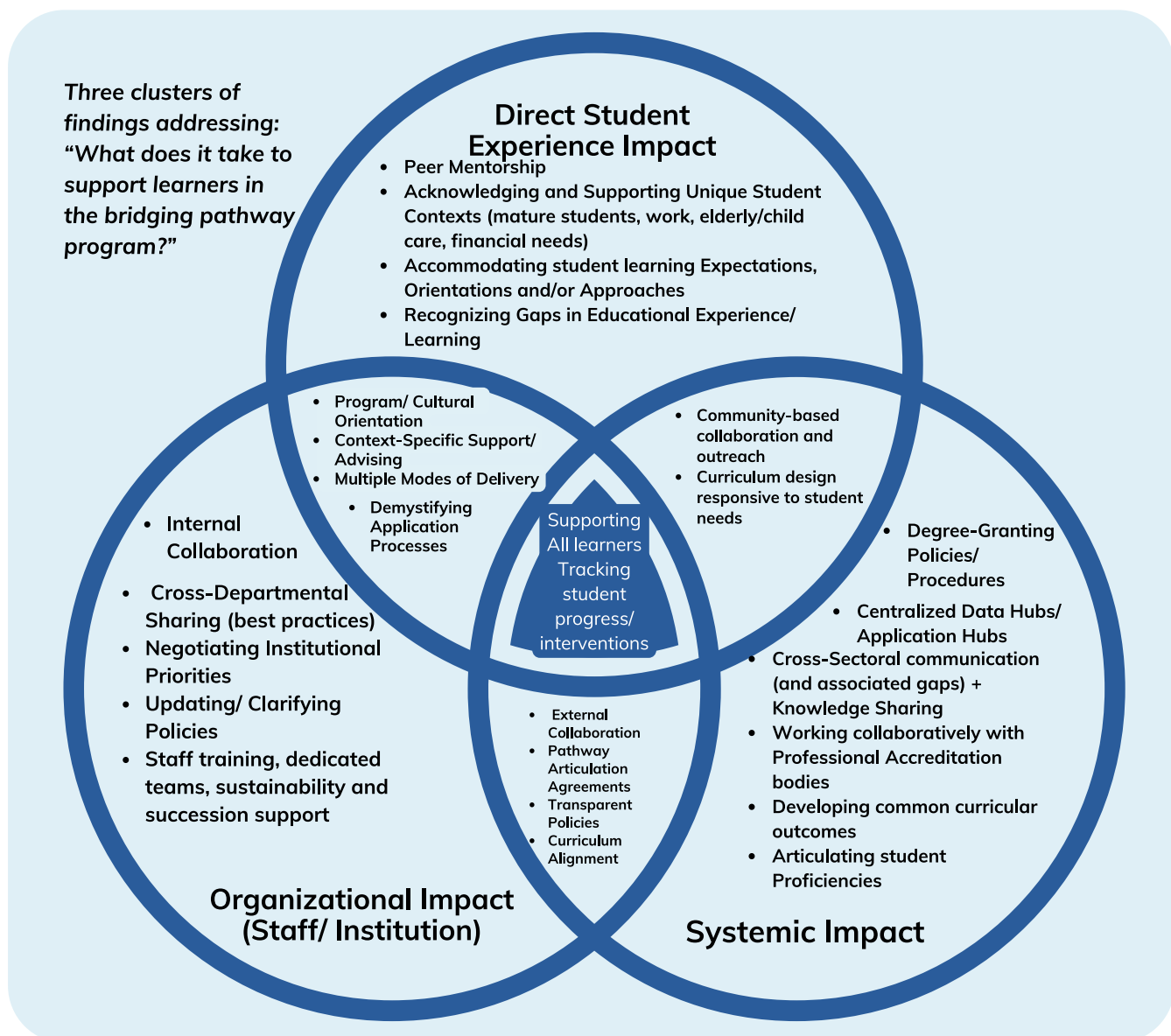
Measuring program success

Need for data-informed decision-making	There is often no clear idea of how many students are pursuing pathways because neither the sending nor the receiving institution tracks students.	We have a lot of these pathways, but we don't have a good handle on how many students are using them. And it's difficult. We ask, you know, the university partners whenever we renew the agreements, we'll say, hey, you know, did anybody ever take this, take us up on this offer? And they often don't know, either. They don't keep track of it ... We don't have a good handle on [using pathways for recruitment] right? We can promote and students come, you know, with that intention. But we don't have a good handle on how well it's utilized quite honestly. So, my guess would be that it's a small fraction that actually do go on to use a pathway whether they intended to or not. My guess would be probably, you know, 5 to 10% of graduates actually pursue one of these pathways. But that's completely anecdotal on my part, like, I don't have good data on it. (Participant 1)
Desire for data tracking and sharing	The participants were keen to gather, analyze, and share data. Data sharing can be included in articulation agreements.	So, something to consider, which doesn't exist in any of our articulation agreements, is asking for data sharing between the institutions. That's not something that has ever been, like strictly set in one of our articulation agreements. Honestly, I think that's the biggest thing for us right now is because we are always saying, okay, let's create an articulation agreement. But let's create a successful articulation agreement. And what is a successful articulation agreement? (Participant 2)

Transfer Pathway Impact Diagram

Figure 2 shows the types of action and collaboration required to support learners in a bridging pathway program. Each section of the Venn diagram is divided into the relevant stakeholder category that best reflects these actions: students, organizations, or systems (referring to inter-institutional collaborations, certifying bodies, educational landscape, and ministries). The overlapping action items require the input, inclusive decision-making, and/or active participation of multiple stakeholders, ultimately leading to the main shared goal of successfully supporting learners in a bridging pathway program(s). This perspective is in alignment with TRC, as the focus is maintained not only on supportive structures but also on specific areas where action and improvement can take place.

FIGURE 2
Transfer Pathway Impact Diagram

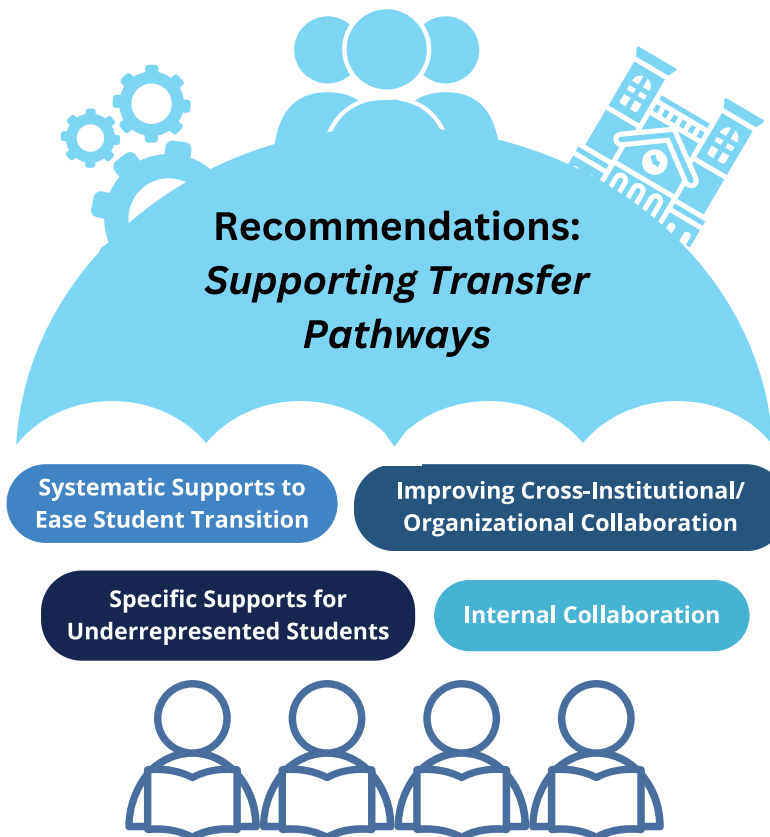


Recommendations

The following recommendations reflect suggestions, actionable steps, and considerations extracted from the participants' interviews or by considering and drawing connections between the participants' recommendations and the relevant literature. They further unpack the support actions from Figure 3. The recommendations are divided into four major categories: (a) systematic support to ease student transition; (b) specific support for underrepresented students; (c) improving internal collaboration; and (d) improving cross-institutional or organizational collaboration (see Figure 4). This means of organization outlines the organizational structure from earlier mapping and aligns with specific recommendations from TRC, particularly with regard to supporting the transition for underrepresented students, while paying specific attention to contextual/cultural outreach and support, alignment, and robust data tracking and formalizing supportive transfer processes as an institutional priority.

FIGURE 3

Summary of Recommendations to Support Transfer Pathways



Systematic Support to Ease Student Transition

Transparency and Accessibility of Information

- Assign a designated support person or advisor with a public-facing phone number and email to address questions and hold individual meetings before transfer students start a program. This will allow students to have meaningful human contact prior to their transfer, building their confidence and understanding of the program and avoiding miscommunication.
- Support staff should work in tandem with website administrators to ensure that all information is up to date on the relevant web pages and that any articulation agreements, including formalized credit transfers, are clearly displayed. Where possible, historic credit recognition examples should also be shared from informal transfers to give students an idea of what they can expect.
- Staff should work collaboratively and meet regularly to share information and updates to ensure that all points of contact with students, parents, other staff, and credentialing bodies share consistent information.

Pre-Mapping Transfer Credits

- Clearly list in multiple formats and in multiple places the transfer credits that have already been mapped (either historically or through formal articulation agreements) in public-facing materials (e.g., transfer brochures and webpages) to give students a clearer idea of what credits they can expect to receive should they choose to apply for a transfer. This recommendation comes with the recognition that courses and content are subject to change and that caveats should also be visible.
- In student acceptance letters and at multiple points in the enrolment process, students should be provided with concrete information about the credits they will receive (i.e., pre-map transfer credits prior to making an admission offer to students or finalizing their transfer). It is imperative that students do not finalize their enrolment without knowing what they will and will not be awarded to avoid the extra time or financial costs of retaking courses and other complications due to incomplete information.

Multi-Modal Program Delivery

- Make deliberate and informed choices regarding course delivery and course content to respond to diverse students' needs (e.g., international students or mature students working full time).
- Provide multiple options for program delivery to accommodate student circumstances, such as online courses, in-person classes, and evening classes, including synchronous and asynchronous options, where possible.
- Both universities and colleges should be passionate advocates for the validity of online learning, especially considering students needing to relocate for in-person classes due to the rising cost of living and the lack of affordable housing. Some courses are limited in their available modes (e.g., lab classes), but these options should be provided whenever possible, and institutions and organizations should work collaboratively with credentialing bodies to ensure that they recognize online learning.

Concurrent Credits

- Enable students to take concurrent credits at the university while they are completing college credits to either “upskill” or complete the requirements for upper-year transfers without having to repeat multiple elements that they have already done in college.

Orientation

- Provide a comprehensive tailored orientation for all transfer students, regardless of the year of entry (equivalent to a first-year direct entry student). This will ensure that students have the same familiarity with institutional policies and procedures as direct entry students and prevent professors and support staff from the misinformed assumption that students are equally familiar with the program, expectations, and institutional procedures.

Specific Support for Underrepresented Students

Dedicated Advisors and Tailored Support

- Offer specific counsellors and advisors for Indigenous students, international students, mature students, and/or other underrepresented groups, depending on institutional demographics.
- Plan for the support needs of even relatively small groups of underrepresented students.
- All institutions and professional organizations should ensure that they hold holistic conversations with Indigenous partner groups for better systematic support for Indigenous students and plan how to integrate Indigenous ways of knowing more meaningfully into the curriculum.

Student Representation in Decision-Making

- Add transfer pathway students to key decision-making committees, invite underrepresented students to open forums on programmatic changes and decision-making (e.g., funding support, curriculum requirements), and ensure that there are specific spots on student councils/equity groups on campus for transfer pathway students, international students, and students from underrepresented groups.

Culturally Responsive Design

- Conduct a resource audit of equity-related resources available at the institutional level and in pathway programs.
- Recruit volunteer peer mentors from diverse backgrounds.

Community Engagement and Partnerships

- Strengthen and prioritize same-area partnerships and outreach efforts. Potentially, these could even be multi-university/college networks to collaborate in developing support for students in their established communities.

Improving Internal Collaboration

Diverse Voices in Decision-Making

- Whenever possible, include all relevant partners and collaborators, including advisors, counsellors, professors, deans, and administrators, in pathway decision-making and related student support decisions.
- Leverage or create dedicated teaching and learning teams to support program sustainability and succession planning and to empower expertise.

Improving Cross-Institutional/Organizational Collaboration

Networking, Professional Development, and Relationship-Building

- Host annual networking events to build connections between institutions and partnership groups to maintain contact between university and college representatives.
- Hold open and transparent ongoing conversations and experience sharing across organizations.
- Have candid and ongoing conversations about what a “successful” credit recognition process can and should look like between institutions. It is critical to include specific references to data sharing within articulation agreements.
- Leverage existing relationships and prioritize forging new ones to better facilitate the development of articulation agreements. Open communication between designated sending and receiving advisors and counsellors can support student transitions.
- Find existing knowledge-sharing and personal development opportunities and promote transfer pathways as a focus topic at these sessions/workshops/events (e.g., ONCAT Student Mobility and Pathways Conference, “Panels of Excellence”).

Increasing Alignment

- Increase alignment and standardization for transfer processes and requirements (e.g., BC Transfer Guide).
- Work collaboratively with credentialing agencies to clarify requirements and objectives for both sending and receiving institutions.
- Centralize applications/documentation hubs (e.g., through OUAC), including professional accreditation requirements, course outlines for assessing transfers, and student data collection for courses/content).

“I do think there’s a real opportunity to leverage the strong frameworks that we have around learning outcomes and course objectives ... if there was a way for us to figure out how to standardize some of it ... rather than starting over every three to five years.” (Participant 11)

Data Sharing and Progress Monitoring

- Track and share attrition/graduation rates plus specific support/needs for underrepresented students.
- Add to the requirements for student data tracking and pathway student-specific codes and metrics across institutions (e.g., common additional codes for transfer students' files).
- Include ongoing and robust data sharing as part of a formalized process/agreement.
- Formalize processes to review changes/programmatic developments and improvement planning to align with TRC principles.

Formalizing Collaborative Processes, Policies, and Documentation

- Formalize processes through articulation agreements, memorandums of understanding, or centralized hubs for course outlines and outcome tracking. This will reduce complicated, confusing, time-consuming, and limited credit recognition processes and free up more time and resources to focus on student support and advising. It is important to recognize and note that this must be done within institutional limitations.
- Create clear and detailed policies so that advisors and staff provide (and students get) consistent information.
- Develop a multi-institutional agreement to identify the “standard” minimum course content needed for automatic acceptance as a transfer credit. These policies should also be published publicly so that other institutions can choose to align their curricula and/or credit granting decisions with the requirements.

“Articulation agreements are golden.” (Participant 6)

Conclusion

The findings and recommendations in this report are specific to the Canadian context. Similar to other literature in the field, it was common for the participants to know what was needed to support transfer pathway students, and there was an emerging recognition of the further specific needs of underrepresented students though a lack of formal supporting structures. The challenge now is to put thoughts into action to avoid what has been described in past studies as “the admission that they were unlikely to actually take further action to address transfer student needs” (Tobolowsky & Cox, 2012, p. 397). While it is easy to recognize the huge amount of work still to be done, this report has hopefully made evident the incredible passion, commitment, and efforts occurring among institutions. It is our hope that the insights gained from this study will serve as an optimistic recognition of the next steps to be taken and allow staff and institutions to consider what is possible. These changes are possible through motivation, collaboration, and commitment.

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Appendix A

Interview Protocol

Introduction/verbal consent (5 min)

Hello, thank you for joining me today to chat about the engineering technology pathway. My name is _____. I am a research assistant with the project helping to do the interviews.

The aim of this research project is to inform development of a flexible province-wide pathway from engineering technology programs into accredited engineering degree programs by supporting transfer student needs and specifically underrepresented students. Thus, we are interested to hear and learn about your success and/or challenges in developing and maintaining transfer pathways and the types of support provided to help students adjust. Specifically, the focus is on bridging transfer, a transfer structure allowing post-diploma college students to complete an undergraduate degree in less than four years through bridging courses and credit transfer. We are also looking for success/challenges relevant to in-between institutions for transfer.

As you know from the letter we sent you previously, we are going to be talking today for about one hour so that we can learn more about your experiences with developing and maintaining the transfer pathway. I want to remind you that your participation today is voluntary, in no way will your participation affect your role with your employer. At any time, you can end the interview by leaving the zoom meeting or you can let me know if you want to skip a question. You have not waived any legal rights by consenting to participate in this study. We are recording this meeting today to help us respond to our research questions. Your name and identifying information will be de-identified.

- Do you have any questions before we start?
- Are you consenting to participate and for us to audio and video record, and for us to use de-identified quotes?

[Ensure to fill in a verbal consent log]

START TO RECORD

Thank you for going through the consent process.

1. Please describe your role in the transfer process at your institution.
2. What type of an institution is yours in the pathway? Sending, receiving or both?
 - a. If receiving institution- Does your institution have a specific group(s) of underrepresented students which you are working to attract through the transfer pathway?
 - b. If sending institution- Are there any particular group of underrepresented students, your institution is trying to support/attract in general? **Note for interviewer: Not necessarily through the pathway as this might not apply to sending institutions- please ask this in general terms.**

- Prompt examples: Examples/notes for the interviewer: BIPOC students, religious minority groups, 2SLGBTQI+ students, Mature students, first-in-family students, students from low SES backgrounds, Students with disabilities, refugees/newcomers to Canada, Multilingual learners,
- *Note: Please prompt specifically for women/Indigenous students if the participants do not mention them. Women students would be specific to STEM disciplines.

Typical pathway overview (5 min)

3. Walk me through the student transfer process from beginning to end.
Prompts: What are the disciplines with pathways? Examples of partner institutions?
4. What would/could/should the ideal process look like?
*Note: If the college is both a receiving and sending, should be prompted to speak to both

Purpose (5 min)

5. In your own words, can you describe the purpose of the transfer pathway in your unit/department/school? If sending college rephrase to ask about what values does the transfer add to their college?
6. How well does the transfer process meet its purpose?
*Note: If the college is both a receiving and sending, should be prompted to speak to both

Institutional support in transfer

We would like to know more about how your institution informs, supports, and facilitates the successful transfer of students. (7 min)

7. Looking at the list on the screen, which three do you think are the most important contributors to transfer student success at your institutions? Why? *Note: If the college is both a receiving and sending, should be prompted to speak to both
 - **List**
 - Availability of transfer specific information/communication
 - Advising
 - Financial support
 - Academic/Language Supports
 - Orientation sessions
 - Social/Cultural integration &/or networking
 - Mentorship opportunities
 - Housing/Childcare support
 - Accommodating special needs
8. Is there a difference in your response if you only consider underrepresented transfer students?
9. What additional resources/supports would you like to provide if possible (if budget, staffing, time etc....were not an issue?) *Note: Prompt for underrepresented students

Institutional policies and procedures (5 min)

10. What policies and procedures are already in place to enable transfer students' success? (Prompts: Articulation agreements/admission policies)
11. What policies and procedures should be in place to impact transfer students' success?
Note: If the college is both a receiving and sending, should be prompted to speak to both.

Accreditation (3 min)

12. Is there accreditation in your discipline?
 - a. If yes- Are there policies and procedures in place that specifically take accreditation into account.

Sending-receiving relationship (5 min)

13. Describe how and in what ways you collaborate with the (college/university depending on who we are asking) to facilitate the transfer process? (**Ask only if there is time**)

Common issues (5 min)

14. In your experience, what challenges do transfer pathways students face and where do they tend to occur in the process? *Note: prompt for underrepresented students
15. What kind of problem-solving has been useful/necessary in the past to resolve these issues? *Note: prompt for underrepresented students

Concluding Questions (8 min)

16. Evaluation: How do you define and measure success of the transfer pathway? (*Ask only if there is time*)
17. Who else should we talk to, to get more information/ greater insights on this topic?
There is no obligation for you to pass along this information, and there will be no penalty if you do not provide this information. We will be letting potential participants whom you refer to know that you were the source of the referral. You also have the right to request that you are given time to notify the potential participants prior to us contacting them.
18. Is there anything else about the transfer program we have not asked you about, but that you think is important to highlight?

