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Shared Ownership of an Engineering Success Centre to Support Students and Develop Leaders

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ABSTRACT

An Engineering Success Centre was formed with the long-term goals of providing targeted first-year support, increasing retention, and developing leaders. The novelty of the Centre is that the priorities and activities were defined by the students that were employed to run it in a shared leadership model. Student leaders were in various years of undergraduate and graduate engineering degrees, which provided multiple years for leadership opportunities and organizational memory.

The priorities identified by the student leaders were to: (1) guide students through their time in engineering, (2) connect students with campus resources, (3) impact the overall experience for students in a positive way, and (4) assist students with educational needs such as tutoring, writing support, and CAD development. Between the drop-in hours and professional development programs, 145 students (55% of engineering students) interacted over 400 times in formal Centre activities throughout the year, and at least 77% of students engaged in online or asynchronous platforms. This paper was written by two of the student leaders and the faculty coordinator to document the motivations, successes, and challenges of the Centre in its inaugural year and promote shared ownership in academic support centres. Goals were derived, and a model was developed to map Centre activities, priorities, and goals to assess the success of the Centre.

Key words: Academic Support; Leadership; Retention

INTRODUCTION

Transitioning from high school to university is an especially stressful time for students. They must adapt to a new learning environment, take on adult responsibilities, and develop new social

networks (Taylor, Doane, and Eisenberg 2014, 105). The persistence rate in engineering programs hovers around 75% for first-year engineering students, and on average, 55% of engineering students graduate within six years (ASEE 2016, 9–10). The lack of academic support, individualistic nature of engineering programs, low self-confidence levels of students, and lack of preparation from high school contribute to the attrition rate (Geisinger and Raman 2013, 918). During a global pandemic, these factors are amplified as students and instructors must adapt to a changing learning environment (Browning et al. 2021, 1). Students' mental, emotional, and physical reality is constantly shifting, and instructors are scrambling to provide the necessary support.

To support engineering students throughout the 2020-2021 academic year at the University of Prince Edward Island (UPEI) in Atlantic Canada, the first-year design instructor was asked to develop an academic support centre. The administration gave the Centre a mandate to provide targeted support for first-year students and develop leaders by employing students, with the long-term goal of improving retention. To accomplish this ambitious mandate, a shared leadership model was selected wherein the priorities and activities are driven by the student-leaders, distributing the responsibility and decision-making throughout the team.

Written by two of the student leaders and the faculty coordinator, this paper extols the virtues of shared ownership (through a shared leadership model), documents the evolution and priorities of the Engineering Success Centre, and assesses the success of the Centre in its inaugural year. Admittedly, academic support centres exist in some form in most universities, yet the value of this paper is to share praxes that were derived and developed by the students themselves.

LITERATURE REVIEW

This section contains a literature review examining the impact that an academic support centre could have on retention, followed by a presentation of foundational literature on shared leadership models.

Retention

The literature indicates that retention can be improved by: (1) providing academic and social integration in a welcoming environment, (2) developing students' study habits for both in-person and online learning, and (3) bridging the gap between high school and university with targeted support for first-year students.

Lee and Matusovich (2016, 417) performed a study of six academic support centres at four institutions and spoke with both students and providers to produce a model of co-curricular support. The

study identified 23 outputs that were classified into six categories: academic performance, faculty/staff interactions, extracurricular involvement, peer-group interaction, professional development, and special circumstances. The underlying focus of the study was on retention efforts, recognizing that academic support centres often provide targeted support for students from traditionally underrepresented groups.

A study on the retention of female students noted that women leave engineering programs when they do not feel connected, welcomed, or engaged, identifying that this can undermine their confidence in their abilities (Brown et al. 2020, 10). Especially during a pandemic when most programs have moved online, student-run academic support centres can provide a connecting point for students to create community. Similarly, mentoring was selected as the most important service that academic support centres can offer to support the retention of female students due to the low financial cost and high gain of building academic and social support (Knight and Cunningham 2004).

A comprehensive study of nearly 112,000 engineering students defined retention in a specific discipline as "stickiness" (Lord et al. 2019, 33). They concluded, "Engineering students do not navigate higher education in isolation; rather, many support networks sustain student persistence" (Lord et al. 2019, 51). As students transition from the family environment, both academic integration and social integration are necessary to ensure they persist, as retention can be impacted by pre-college characteristics such as study habits, commitment to the college, academic achievement in high school, and family support (Veenstra, Dey, and Herrin 2009, 8). An academic support centre can help students who are at risk of leaving based on pre-college characteristics by building relationships with students and faculty, which creates social and academic integration.

In a study focused on creativity, Atwood and Pretz (2016, 554) concluded that students who are supported in their first year can overcome the effect of lower pre-college academic achievement. As students proceed from chemistry and math coursework they saw in high school and in first-year university to new courses in second-year university, pre-college academic achievement becomes less impactful because the information is new for all students. Academic support centres can bridge the disparity in preparation for first-year courses.

Atwood and Pretz (2016, 552) found that perception of fit in the major and conscientiousness are larger predictors of persistence than previous achievement. Considering this in two parts, the perception of fit is how connected a student feels to the discipline. An academic support centre can connect students to extracurricular clubs to feel more engaged, as well as provide domain-specific supports, which Fox and Artemeva (2017, 150) identify as a key variable in retention. Syed et al. (2019, 13) relate domain-specific support with self-efficacy, connecting to the second predictor of persistence: conscientiousness. Langie and Pinxten (2018, 12) encourage the development of

academic and non-academic skills to support retention efforts, which can be accomplished through study skill development in academic support centres.

Due to the global pandemic, the demands of an academic support centre necessitate blended learning models. Students must now possess a level of independence and self-organization immediately upon entry into university. Blended education methods can support the development of this independent self-monitoring (Obukhova et al. 2020, 123). However, academic support centres must be able to respond to both online and in-person support and help develop the skills necessary for both. One study of nearly 1,300 students found that student performance and retention rates were higher for students who received online or in-person tutoring than for those who were not tutored (Rennar-Potacco et al. 2019, 464). They found no significant differences in retention rates or student performance whether students were tutored online or in-person, indicating that both modes of tutoring are beneficial. Obukhova et al. suggest that in-person support is also necessary to develop social and cultural skills and facilitate knowledge transfer (122). Additionally, as the ongoing pandemic affects each student differently, trauma-informed teaching considerations are necessary to develop a culture of support and respond to students with a stance of compassionate care (Crosby, Howell, and Thomas 2018, 17).

In summary, academic support centres can provide a transition between high school and university, establish a community for academic and social integration, and offer opportunities to develop online and in-person study habits, which the literature indicates can improve persistence.

Leadership Models

We reviewed the literature on leadership models and found that incorporating a shared leadership model empowers students, develops their interpersonal skills, and ensures activities are relevant to students.

First, a leadership model by Kouzes and Posner (2012) categorizes leadership in five ways: modeling the way, inspiring to create a shared vision, challenging the process, enabling others to act, and encouraging the contributions of others. In a multi-institutional study, Knight and Novoselich (2017) found that co-curricular experiences are linked to leadership skills, and wisdom gained through experience is required for leadership. An academic support centre creates opportunities for students to formally develop and practice leadership skills. For example, tutoring is a valuable experience for both the student receiving support as well as the student providing support (Nolan et al. 2018). The tutor realizes their role as a knowledge-holder, and their understanding of the material is reinforced through the act of transmission, further bolstering their confidence. When the student leader is properly supported by returning students or faculty/staff members, both the tutor and the student seeking assistance are supported by someone with more experience, creating multiple mentoring relationships (Orkwis et al. 1997; Rich et al. 2018; Marques, Restivo and Chouzal 2013).

A Korean university successfully adapted an institutional-centric academic support model to a student-centric support model to promote leadership and professional development (Jung et al. 2018). Instead of a hierarchical structure wherein the faculty/staff member supervises the student leaders, a more egalitarian approach utilizes a shared leadership model to recognize the importance of the perspective, experience, and potential of each student leader. Shared leadership is defined as "a dynamic, interactive influence process among individuals in work groups in which the objective is to lead one another to the achievement of group goals" (Pearce and Conger 2003, 286), wherein responsibilities are distributed instead of centralized, and student leaders are treated as peers, each with a unique contribution and capability. This level of "deep engagement" (Hrabowski, Rous, and Henderson 2019, xii) empowers students to take ownership and work wholeheartedly towards the success of the endeavor. Shared leadership helps students to develop autonomy (Liang, van Knippenbery, and Gu 2021, 70), solve problems (Morgeson, DeRue, and Karam 2010, 10), and feel valued (Radvany 2021, 343). "Shared leadership provides an element of adaptability enabling members to lead and follow as the situation dictates" (Ramthun and Matkin 2012, 307). They learn to trust (Klasmeier and Rowold 2020), be creative (Liang, van Knippenberg, and Gu 2021, 69), and establish goals, thus defining the overall mission (Morgeson, DeRue, and Karam 2010, 10).

A shared leadership model welcomes multiple stakeholders to solve complex challenges that would otherwise be "beyond the scope of any individual person to confront…no matter how skilled" (Yukl and Lepsinger 2007, 11). For an academic support centre, students can identify problems that their peers are facing that might be invisible to faculty and staff. Additionally, the student leaders can recognize supports that are available that faculty and staff might be unaware of, and they can develop creative solutions. Expanding the number of stakeholders increases the knowledge base. According to Rao (2020, 3), "it is imperative for universities to prepare their students to graduate on time, be employable, and be successful in the workforce." Since engineering is a team-based profession, a shared leadership model allows students to regularly practice teamwork, learning when to lead and when to follow.

Radvandy (2021, 317) recommends thoughtfully selecting student leaders who are deemed "worthy of following" and respected by the students they are supporting. Qualities of potential leaders include strong interpersonal skills, emotional intelligence, and a strong work ethic (Radvany 2021). To ensure students feel welcome in the academic support centre, student leaders should reflect the diversity of the student population. A shared leadership model is especially effective for culturally diverse teams as it embraces "intercultural competence to enable multicultural team members to form and maintain the relational and social bonds facilitating the practice of shared leadership" (Ramthun and Matkin 2012, 310). The collegiality inherent in a shared leadership model can create "a school culture of equity and excellence for all students" (Khourey-Bowers, Dinko, and Hart 2005, 23).

By incorporating a shared leadership model, students share the responsibility for decision-making and success, broaden the knowledge base of potential needs and solutions, and become more effective leaders.

EVOLUTION OF THE CENTRE

This section describes the development of the Centre in three stages: planning, Fall, and Winter. The major initiatives are highlighted, and the section concludes with a commentary on the impact of operating in a pandemic.

Planning Stages

Reflective of the rapidly changing world in the Fall of 2020, the decision to open a help centre was made three weeks before classes began. During that time, the Centre name was selected, an online presence was developed, a physical location was secured, student leaders were hired, and a planning workshop was held. Decisions were made quickly.

It was challenging to select a descriptive name for the Centre that was also positively oriented, as it was feared that the negative connotation of *Help Centre* would prevent students from seeking support. The *Engineering Success Centre* was selected due to its orientation towards success and broad inclusion of non-academic support. In response to the pandemic, the Faculty of Sustainable Design Engineering at UPEI employed a blended (or hybrid) teaching model with three hours online and up to three hours in-person per week for each course, so the Centre had to be available to students who were in the building as well as online. The university learning management system Moodle was selected as the digital home for the Centre, as its content could be updated frequently and is already accessible to students.

Fall Semester

Four student-leaders were hired as Student Success Associates (SSAs) for the Fall semester (September through December) based on their academic ability, writing skills, CAD skills, interpersonal communication, and approachability. The number of SSAs that could be employed was determined by the amount of funds that were available to pay them. As the leaders of the Centre, SSAs represented the student body, so equity, diversity, and inclusion (EDI) principles were incorporated into the recruitment and hiring process to ensure the team consisted of students from underrepresented groups, specifically considering students' gender identity, race, and ethnicity. Each SSA was in a different year of study, with one graduate student and one student from each of the second, third, and fourth years, ensuring broad perspectives, increasing levels of experience,

Figure 1. Engineering Success Centre Logo Designed by SSAs.

varying class schedules, and evolving mentorship. If tutoring was the sole priority, SSAs should be fourth-year students and graduate students to be able to tutor more classes (having taken more courses). However, that would cause annual turnover in staff with a small window for leadership development and a short organizational memory. Rather, if a student works as an SSA for multiple years, they will become a leader both in the Centre and in their class.

SSAs participated in a week-long orientation before classes began to develop Centre priorities, brainstorm ideas for the semester, set up the Centre office, design a logo, and welcome students in a virtual orientation. Figure 1 shows the Centre logo, which was designed, developed, and digitized by the four SSAs. The stairs represented the gradual development necessary for success. Basecamp was selected by the SSAs as the platform for team communication, goal setting, and file management, as it was used in most design classes.

The Centre was open 20 hours a week in four-hour shifts, based on the SSAs' class schedules, first-year students' design assignment deadlines, and when students were in the building. As the Centre was new, it took time for students to learn about the available services. The main supports provided during the Fall semester were: (1) CAD software installation and tutorials for the first-year students, (2) tutoring for first- through fourth-year students, and (3) establishing a social media presence on Instagram to advertise events, share Centre videos, and profile student excellence.

Winter Semester

In the Winter semester (January through April), the number of Centre staff grew to include students who assisted in the wood shop or tutored CAD, colocating existing student-provided support. As a result, eight SSAs were hired to cover 33 hours per week over five days, and there were three second-year, two third-year, and three fourth-year students. Three SSAs who returned for a second semester provided mentorship and training for the new SSAs.

An apprenticeship model was piloted, which paired five SSAs with one of the engineering staff technologists in the wood shop, machine shop, additive manufacturing lab, or electronics lab. After rigorous training, the SSAs could provide support to students in these labs. SSAs were responsible for documenting what they learned during the apprenticeship in handbooks for future apprentices.

Typically during the Winter semester, fourth-year students applied for industrial positions, and students in all years of study sought summer jobs. Recognizing the need for professional development training, the Centre teamed up with the Experiential Education department to offer workshops on career readiness such as resume and cover letter preparation, networking, interviewing skills, and digital presence. Dubbed the *professionalism cohort*, students who attended all ten workshops and submitted their resumes for feedback earned a micro-credential that they could display on their LinkedIn page. For one of the workshops, an SSA organized an industrial professionalism panel. He was responsible for corresponding with three professional engineers, organizing the virtual meeting, advertising the event, and moderating the panel. A different SSA organized an event with a photographer to provide students with professional headshots to make their digital presence more impressive (on LinkedIn, Zoom, and email). Two additional SSAs collaborated to design the professionalism cohort badge shown in Figure 2.

Providing tutoring was again a focus of the Centre. Because students had a blended schedule with both in-person and online experiences, it was more difficult to form relationships with other students. As a result, the information that was normally spread by word-of-mouth, such

Figure 2. Professionalism Cohort Badge.

as how to print to the shared printer, was not being disseminated. The SSAs made instructional videos to help students acquire this knowledge and to fill the gap that could exist in between classes, such as sketching techniques and an introduction to Arduino chips. This helped to build community.

Operating in a Pandemic

The largest challenge for the Centre was also the impetus for its inception; the global pandemic necessitated a Centre to provide additional support to transition incoming students to the university environment. Throughout the year, waves of COVID-19 cases required the Centre to pivot online until in-person support could resume safely. The building hours were restricted, preventing in-person evening and weekend access to the Centre. Physical distancing requirements reduced the number of people that could be in the Centre and required ingenuity to provide computer support. Cleaning protocols and the constant use of masks were inconvenient but necessary.

Attempts were made to reduce the isolation that students experienced. Students requested a place where they could study, as they were used to the comradery of studying together in the building. To combat this sense of isolation (Rassudov and Korunets 2020), a lecture hall was used on Wednesday mornings for students to study together following physical distancing protocols. This was a band-aid effort that was hindered by each wave of cases, varying study schedules, and the reality of a post-COVID world.

SUCCESS OF THE CENTRE

This section presents an informal assessment of the Centre in four parts: (1) a model of the priorities, goals, and activities, (2) reflections from SSAs on Centre priorities, (3) connections between newly defined themes to the literature, and (4) student engagement data. Success was determined to be student engagement in activities that addressed the goals.

A Model of Centre Priorities, Goals, and Activities

According to the administration, the Centre's goals were to provide targeted first-year support, develop leaders, and improve retention. The shared ownership of the Centre positioned SSAs to have the dominant voice while the coordinator acted as a mentor and facilitator. Embodying this ideal, the Centre goals were adapted into priorities by SSAs in the Fall semester by identifying and organizing needs into the following priorities: (1) guide students through their time in engineering, (2) connect students with campus resources, (3) impact of overall experience for students in a

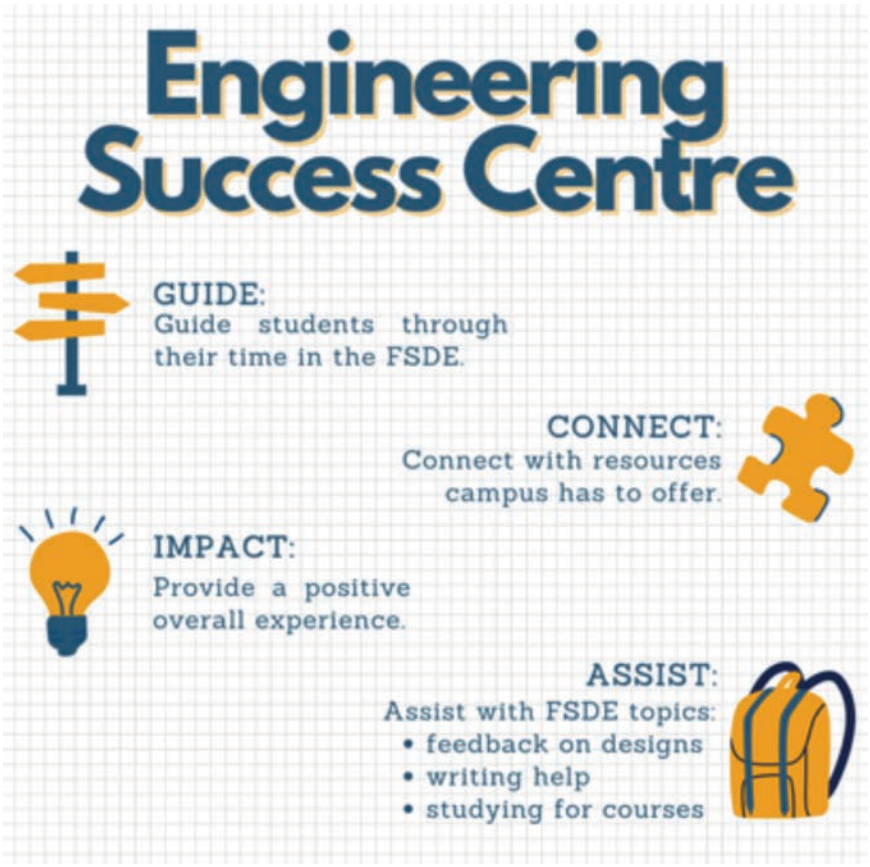

Figure 3. Engineering Success Centre Priorities.

positive way, and (4) assist students with educational needs such as tutoring, writing support, and CAD development. Figure 3 was created by an SSA to advertise the services offered by the Centre and displays the priorities.

The priorities were reviewed and affirmed by the SSAs in the Winter semester and were realized in 37 Centre activities throughout the year. Note that the priorities do not map directly to one of the three goals because they were derived from student needs. This disconnect presented an opportunity to assess whether the Centre's activities work towards the three goals. Figure 4 contains a model of the validation process. The priorities produced activities, which were organized into themes. Informed by the literature, the themes were mapped to the goals.

Figure 5 shows the detailed activities, priorities, goals, and themes. The four SSA-defined priorities were supplemented with a coordinator priority focused on the operation of the Centre. The 37 activities were supplemented with 13 coordinator decisions and activities exclusively for SSAs, such as the

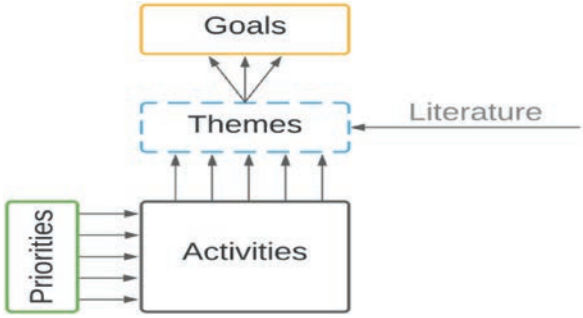

Figure 4. Validation model to ensure activities address goals.

		Goals: Improve retention		Goals: Provide targeted 1st year support		Goals: Develop leaders
		Themes: Develop community	Support academic instruction of courses	Provide holistic support	Provide professional readiness & development	Target SSA leadership development
SSA Priorities	Guide	• SSA intro videos • Tutorial videos • Extracurricular info • Greening the Centre • Newsletter • Laptop selection	• CAD installation • CAD intro videos • Study skills videos			• SSAs identify needs and create videos
	Connect	• Moodle page for asynchronous communication	• Connect to: math, writing & chemistry help centres	Connect to: • Health services • Counseling • Library • Academic coaching	• Professionalism cohort • Resume review • Industry panel	• SSAs maintain Moodle page • SSAs participate in professionalism cohort
	Impact	• Highlight successes on Instagram • Textbook swap • Transfer institutional knowledge • Informal study sessions	• Study skills tutoring	• Provide computers & printers • Elective selection advice	• Headshots for digital presence • Team dynamics support	• Apprenticeship program
	Assist	• Drop-in support	• Formal study sessions • Tutoring • Design advice • SSA course contact • SSA design build support		• Writing review • Presentation practice	• SSAs provide drop-in support • SSAs provide tutoring
Coordinator	Centre Operations	• Incorporate equity, diversity & inclusion in hiring, meetings, & activities	• Hire SSAs from different years of study	• Shared leadership model • Supportive social media posts	• Support design courses (builds, CAD, writing)	• SSAs develop activities • Mentorship among SSAs • Centre meetings & training

Figure 5. Model of Centre goals, priorities, activities, and themes.

apprenticeship program. The themes that developed from the 50 total activities were to: (1) Develop community, (2) Support academic instruction of courses, (3) Provide holistic support, (4) Provide professional readiness and development, and (5) Target SSA leadership development.

Reflections on Centre Priorities and Activities

The following reflections from SSAs highlight specific activities for each priority.

Guide Students into Program

The first priority was to guide students to success. It was important to the SSAs to distinguish how students were guided rather than helped or tutored, to destigmatize the desire to seek study support. In the fall, when new students began their university careers, there was a significant transition period. There was a need to provide students with a sense of guidance and community, such as advising which laptop to buy or what clubs are available to join. During this transition period, students needed support with installing and learning new computer programs, particularly for CAD. In the Winter semester, a regular newsletter was sent to students to provide a way to stay up to date. This newsletter was emailed to all students to reach even the students that did not actively utilize the Centre. A fourth-year SSA shared her experience of how the Centre can guide students:

> *"Having been a first-year student before, I know how challenging that transition period can be in the first semester. Being able to guide students through that transition period and provide them with answers to their questions as they learn was very rewarding."*

Connect with Campus Resources

With engineering courses as the focus of the Centre, it was important to connect students to the external help available for their non-engineering concerns. The UPEI campus had other learning centres, including math, chemistry, and writing, that were well-equipped to help students in those subjects. Rather than duplicate the services, the Centre advertised these resources on the Moodle page, in which all engineering students were enrolled. The Moodle page was designed as a launch-pad for students, linking to other campus services such as the counseling centre, library resources, study support, career services, and the health centre. A fourth-year SSA shared her experience of how the Centre can connect students with resources on campus:

> *"Back in first-year, I remember being overwhelmed when trying to find out what services were offered on the UPEI campus. When the Engineering Success Centre can compile all of that information for students, it gives them a way to see everything in one place. This is really valuable as a first-year student navigating through the first semester."*

Impact

The third Centre priority was to positively impact students' overall experience during their time at university. To do this, SSAs gave advice on team dynamics, organized a textbook swap for students to buy and sell their used textbooks, and hosted study sessions to help students come together as a community and make new connections while studying, even with physical distancing. The Centre provided computers and printers for students to complete assignments during drop-in hours. Also, a second-year SSA shared the impact the apprenticeship program had on them:

> *"I really enjoyed the apprenticeship program. I'm more of a hands-on kind of person, so it was nice to be able to learn how to make parts with the laser printer in the Fabrication Lab so I could help students with their projects using that knowledge in the future."*

Assist with Engineering Topics

The final Centre priority was to assist the faculty and provide study support for students. To directly support instructors, each instructor was assigned an SSA to be their Centre contact to facilitate the transfer of materials for tutoring and organize study sessions. In the design courses, SSAs supported instructors during the labs to provide building support to help design students create prototypes. During drop-in hours, SSAs provided feedback to students on their conceptual design ideas, writing support on design reports, and an opportunity to practice design presentations. A second-year SSA shared their experience of giving feedback on the design reports:

> *"Giving advice on design reports, especially to upper-year students, was fairly challenging as a second-year student, but I think in the process of figuring out how to help them, it made me a better writer."*

Connections to Themes in Literature

Of the five themes that mapped the activities to the goals, the first three themes were connected to the goals of improving retention and providing targeted first-year support. In the first theme to develop community, students must feel accepted and establish support networks to ensure long-term retention (Veenstra, Dey, and Herrin 2009, 8; Lord et al. 2019, 51). This was especially necessary for first-year students who were forming their networks during a pandemic. To make the Centre more welcoming, SSAs 'greened' the physical drop-in space with plants and created introductory videos shared on social media so students would feel less intimidated to seek support. The Centre stimulated community development and became a place to gather and provide extracurricular information.

The second theme to support the academic instruction of courses contained activities to support all stakeholders in the learning process: the student, instructor, and support staff. Activities included tutoring for students, assigning an SSA to coordinate tailored support for each instructor, and providing build support for technicians who help teams in design courses to meet tight deadlines. Also, workshops on study skill development supported retention efforts (Langie and Pinxten 2018).

The third theme to provide holistic support contained activities that connected students to the broader university community, which positively impacted students' ability to succeed by addressing their non-academic needs, such as their mental and physical health. With an established social media following, resources were shared from across campus to connect networks, such as food bank hours and grants available for international students. Well-timed posts addressed topics such as de-stressing tips during exams, encouragement during mid-semester lulls, and important deadlines. Providing holistic support considered the wholeness and humanity of the students in all their non-academic needs. Connecting students to the broader university encouraged "stickiness," particularly in engineering (Lord et al. 2019, 33).

The final two themes mapped to the goal of developing leaders. This was achieved by targeting two different audiences: all engineering students and SSAs. For all engineering students, the fourth theme to provide professional readiness and development helped to ensure students were prepared for the workforce, responding to the challenge imposed by Rao (2020). Extracurricular workshops such as resume building and interview preparation alleviated the pressure on instructors to fit these professionalism topics into their classes.

The fifth theme for targeted SSA leadership development included duplicates of five activities to focus on the SSA's involvement, such as identifying student needs and creating tutorial videos, because providing tutoring support can be as valuable for the student as it is for the tutor (Nolan et al. 2018). SSAs developed leadership through conceiving, advertising, and organizing activities while receiving personal mentoring from the coordinator. Appropriate training and support were necessary as student leaders must feel psychologically safe in order to lead and work towards the overall mission (Radvany 2021). The coordinator trained SSAs in organizational practices, pertinent software, and university policies. Practicing the shared leadership model, SSAs trained each other, such as the use of CAD software or how to use a particular machine. SSAs also received one-on-one mentoring from the coordinator that was tailored to the activities they undertook, such as simplified program management training to plan the industry panel. Group leadership development occurred through the professionalism cohort, biweekly Centre meetings, and semester planning sessions. Returning SSAs provided informal mentorship through training new SSAs and developing shift procedures, which supported their leadership development (Orkwis et al. 1997). Regular communication using Basecamp facilitated teamwork and the transfer of knowledge. The coordinator invested time with each SSA during their shifts to understand their capabilities and set goals for further development.

Student Engagement Data

The amount of student engagement in Centre activities contributed to the success of the Centre. If attendance was poor, activities were re-evaluated. This section contains statistics on the asynchronous and synchronous engagement, specifically considering the students' year of study. For context, there were 260 students enrolled in engineering during the 2020–2021 academic year.

In the 65 drop-in shifts during the Fall semester, students received assistance 70 times from the Centre staff. As shown in Figure 6, of the 70 times that SSAs provided support during drop-in shifts, 62% were for students in their first year of study. The size of each number visually conveys the proportion of students in that year of study compared to the overall number of students helped. It is reasonable that most early adopters of the Centre were in their first year, because the coordinator regularly promoted the Centre's services to her first-year design class.

Of the 70 days that the Centre was open during the Winter semester, students were assisted over 165 times during the drop-in hours. This is more than twice as many visits as during the Fall semester. The increase in the number of drop-in visits was attributed to the 65% longer hours, greater awareness about the Centre, and a renewed focus on record-keeping. As shown in Figure 6, most drop-in support was for first-year students (50%), though this number decreased from 61% during the Fall semester. The percentage of second-year students seeking drop-in support increased from 18% to 31%, likely because more second-year students became aware of the Centre and needed academic advisement to select third-year electives. Approximately 20% of the students sought online support, whereas 80% sought in-person support.

The professionalism cohort consisted of 60 students who participated in at least one activity, 30 of whom earned the micro-credential. Despite being targeted to third- and fourth-year students

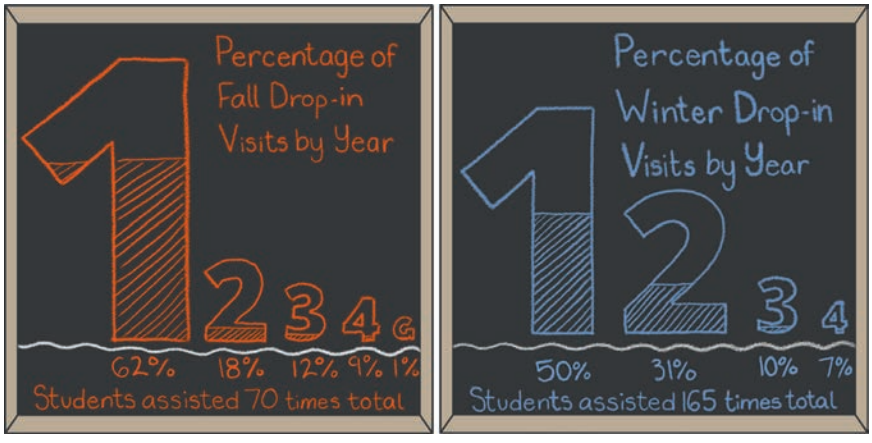

Figure 6. Percentage of Students Supported by Year of Study.

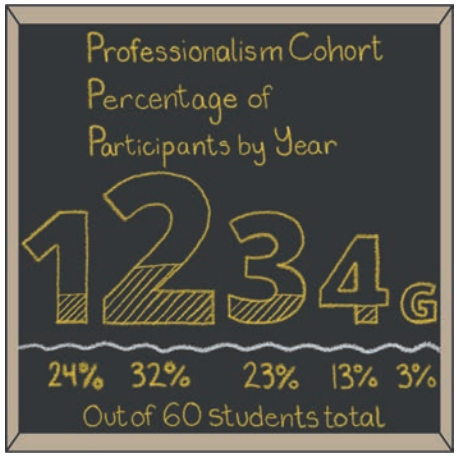

Figure 7. Percentage of Students Supported in Professionalism Cohort.

in anticipation of graduation, 56% of the cohort were in their first- or second-year of study, as shown in Figure 7. One first-year student explained that the cohort acted as an extracurricular activity that allowed physical distancing.

Throughout the year, an average of two students were helped during each drop-in shift. In total, 58% of the 260 undergraduate engineering students and three graduate students interacted over 400 times with the Centre through drop-in support, the professionalism cohort, or headshot photo-shoot. Figure 8 shows the frequency with which students used the Centre, where each punch card

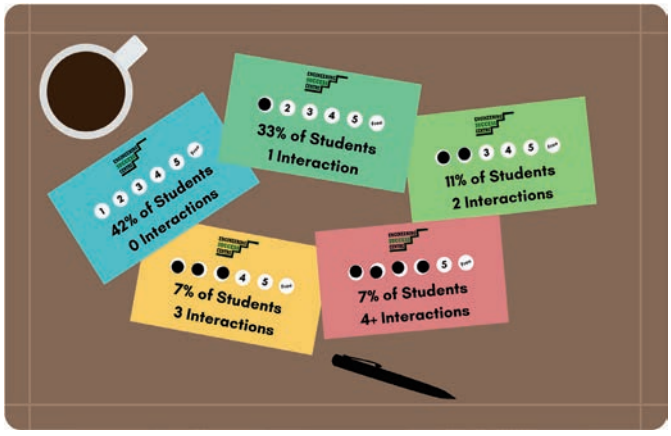

Figure 8. Percentage of Number of Interactions per Student.

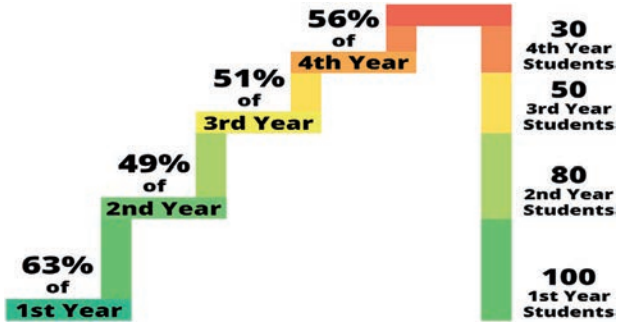

Figure 9. Percentage of Students Supported in Each Year.

displays the number of students who interacted with the Centre at the frequency specified on the card. One-third of engineering students participated in one activity, and a quarter of engineering students participated in more than one activity. Seven percent of students interacted four or more times. For the inaugural year, 25% was a good starting point for multiple interactions with the Centre, but intentional effort is needed to increase this statistic.

Figure 9 shows the percentage of students in each year who engaged with the Centre, with the number of students per year rounded to the nearest 10. First-year students had the highest participation rate (63%), and second-year students had the lowest participation rate (49%). These numbers did not include the study session attendees which had approximately 60 first-year students, 30 second-year students, and a dozen third- and fourth-year students. Because attendance was not recorded during the study sessions and to prevent double-counting students, Figures 8 and 9 show only the verifiable data.

Figure 10 shows the distribution of drop-in requests throughout the year for tutoring, computer help, general information, and other support. Only 29% of drop-in support was for *tutoring,* which is the focus

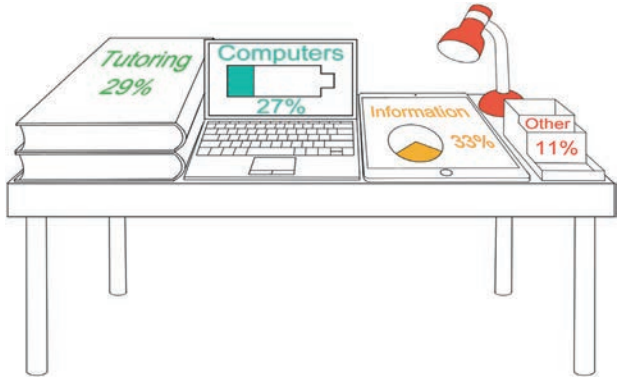

Figure 10. Type of Drop-In Support Provided Throughout the Year.

Figure 11. Online Engagement with the Centre.

of many academic support centres. Computer support (27%) included the installation and explanation of CAD software, internet connectivity issues, and any software support outside of coursework. The largest request for support (33%) was for the transfer of institutional knowledge such as upcoming events, ongoing programs, which electives to pursue, and generic *information*. The remaining 11% related to the development of study skills, professional skills, and design skills, including job preparation, writing support, discussion of design ideas, and presentation practice. These statistics were reviewed each semester and guided activity-planning meetings to ensure that student needs were being addressed.

Students engaged online with the Centre through Instagram (@upei_fsde), YouTube, and Moodle, as shown in Figure 11. Over 150 Instagram posts during the academic year highlighted student success, upcoming events, and videos, culminating in over 4000 interactions in the form of likes and comments. The 28 videos posted on the Youtube and Instagram accounts averaged over 100 views per video between the two platforms. Over 200 of the 260 engineering students (77%) accessed the Moodle page at least once, accumulating over 2,300 page visits during the two semesters. (However, due to the unknown level of engagement with the page, this statistic is not included in earlier figures). The highest viewed resources are the CAD software download instructions, the student club information page, and an explanation of the study space booking system.

The success of the Centre was not defined by a target number of activities or percentage of student engagement. Rather, the process of assessment is ongoing, reflexive to student needs, and driven by the student leaders. Are the activities addressing the SSA priorities? Do the activities map to an overall goal? Are students engaging in the activities? Do SSAs feel supported and encouraged? The activities mapped to goals and were confirmed in the literature. Students engaged with the Centre both online and in-person, through social media and learning management systems, and in informal drop-ins and formal activities. Therefore, the standard outlined at the beginning of this section has been achieved: students engaged in activities that met the goals.

The shared ownership of the Centre allowed for the long-term development of leaders and distributed the responsibility of ongoing assessment onto the students. SSAs had to stay informed of student needs and evaluate whether the Centre's activities met these needs. Perhaps the most informative statistic was how many SSAs returned each semester, which allowed for mentorship and ongoing leadership development.

ONGOING EVALUATION & FUTURE WORK

Ongoing evaluation is required to ensure that the Centre improves retention, develops leaders, and provides responsive support that is targeted to first-year students. In the short term, we recommend performing comparative case studies between the Centre and academic support centres at other institutions.

For a more comprehensive evaluation, we recommend a longitudinal study with three foci. First, assess whether the Centre impacts retention, particularly between first- and second-year. Students could be surveyed on their level of social and academic integration, pre-college characteristics, academic success, and commitment to engineering (elements of the model in Veenstra, Dey, and Herrin 2009). This information could be combined with persistence in engineering and engagement with the Centre to assess the success of the Centre. Next, particular attention to the retention of students from underrepresented groups could gauge whether the shared leadership model is building "a culture of equity and excellence" (Khourey-Bowers, Dinko, and Hart 2005, 23). Lastly, the change in leadership abilities in SSAs could be assessed to determine whether the Centre is effectively developing leaders. While there are other factors that can impact student persistence and leadership development, the impact of the Centre can be distilled from the data through careful study design and with the appropriate instrument.

DISCUSSION & CONCLUSION

Overall, the Centre established a physical presence and an online community and provided academic support, professional development, and SSA leadership opportunities. However, more attention can be given to supporting academic instruction and developing in-person community networks. Though 58% of students were supported through a formal activity and 77% of students engaged at least once through the Moodle page, more efforts can be made to incorporate the students at risk of failing. Centre staff can reach out to students who are failing courses and are not as likely to seek help to bring them into the Centre.

Looking ahead to next year, the Centre will again employ a shared leadership model. Specific activities and plans will be defined by future SSAs to ensure more emphasis is brought to at-risk students. The apprenticeship program will be repeated to allow SSAs to become trained in multiple areas or more skilled in one area of specialization. In the Fall semester, new programming will be offered to prepare interested students for CAD certification exams. In the Winter semester, the professionalism cohort will be repeated. Ultimately, the SSAs will define the remaining details, such as Centre hours, priorities, and activities, as the most impactful strategies to support students derived from the shared ownership of the Centre. The SSAs will continue to be the dominant voice, building their leadership skills by supporting their fellow students.

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