SOCIAL CONNECTEDNESS
FELLOWSHIP PROGRAM

Building Connectedness in the Classroom and on Campus: A Look at McGill University's Architecture and Infrastructure

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TABLE OF CONTENTS

ABSTRACT

According to research, over 60% of Canadian university students felt lonely at least once in the preceding year. Thi report focuses on three interventions meant to address social isolation in the classroom: Universal Design, student-centered learning through Active Learning Classrooms, and Universal Design for Learning. By exploring isolation, both inside and outside the classroom at McGill University in Montreal, this report begins to identify various programs and initiatives aimed at fostering social connectedness within higher education. Recommendations are informed by literature analysis, interviews, and a survey of students at McGill. Moreover, this report looks to create social connectedness through changes in the physical spaces on campus, thus employing theories of architectural determinism.

1. INTRODUCTION

A student's sense of social connectedness can affect their physical and mental health, and overall performance and success at university. Social isolation relates to the quantity and quality of one's relationships and can be considered internally or externally. External social isolation considers the number of relationships a person has, whereas internal social isolation focuses on the perceptions of those relationships.[1] This report focuses on the latter based on the perspectives of various staff, students, and faculty members at McGill University. Using a mixed method examination, a set of recommendations are offered promoting the application of Universal Design, Universal Design for Learning, and student-centered learning through the implementation of Active Learning Classrooms.

For many students at university, social isolation is a constant reality plaguing their everyday educational experience. The Canadian National College Health Assessment of Spring 2016 surveyed over 43,000 students. It found that 66 percent felt lonely at least once in the preceding year and 30 percent "felt very lonely" within the preceding two weeks.[2] Some experience difficulty being physically far removed from familiar places and people, while others struggle with the pressures of higher education. The classrooms and learning environments in which students spend much of their time at university also factor in. This report explores how these physical spaces at universities may contribute to social isolation among students, both inside and outside the classroom, with a focus on McGill University in Montreal. It also explores how spaces interact with pedagogy and non-educational university policies and practices. By looking at classrooms, social spaces, study spaces, and outdoor spaces, in combination with the

university layout as a whole, I will begin to explore the relationship between physical spaces and the development of social connectedness.

This report focuses on three key approaches to design and student learning. The first is Universal Design (UD). UD prioritizes equal accessibility in terms of architecture for both people with and without disabilities — for example, replacing stairs with ramps, which can be used by everyone regardless of mobility concerns. The second is student-centered learning, facilitated through Active Learning Classrooms (ALCs). ALCs are currently the focus of a large initiative at McGill University, spearheaded by the Department of Teaching and Learning Services (TLS). ALCs are classrooms designed to promote active and collaborative learning by using innovative technologies, flexible furniture, and a new layout (see Appendix A for examples at McGill). The third is Universal Design for Learning (UDL), which maintains the concept of UD but also addresses non-visible disabilities, such as learning differences, to create an inclusive classroom and accessible course materials (thus also addressing teaching methodologies).[3] UDL is based on three foundational concepts: multiple means of engagement, multiple means of action and expression, and multiple means of representation.

2. METHODS, DATA, AND STAKEHOLDER DISCUSSION

The findings of this report are based on literature analysis, a survey, and semi-structured interviews with subject matter experts. Multiple methodologies were used in an effort to consider perspectives from as many stakeholders as possible and to incorporate both quantitative and qualitative data. Additionally, the recommendations offered are supplemented by examples from other institutions.

The literature analysis (section 3) contains two parts. The first is an overview of existing academic topics relating to the themes of social isolation and architectural determinism, social isolation and higher education, and social isolation and classrooms. The second is an analysis of reports produced by McGill University departments, including Teaching and Learning Services (TLS) and the Office for Students with Disabilities (OSD). These reports serve to supplement the perspectives of departments I was unable to interview, such as Campus and Space Planning or Enrollment Services.

The recommendations offered in this report are informed by a series of semi-structured interviews conducted during the summer of 2017 with various stakeholders involved in campus learning spaces and student wellbeing. Interviews were voluntary and anonymity was preserved when requested. In total, six professors were interviewed representing the following departments or faculties at McGill: law, arts, continuing studies, architecture, music, and science. These professors represent opinions ranging from full support for Active Learning Classrooms to heavy critiques of them. Professors were also asked questions regarding student-centered pedagogies and creating a sense of belonging on campus. In addition, two staff members were interviewed. The first was Jennie Ferris from McGill Teaching and Learning Services. Ferris offered a broad view of campus initiatives and spoke to the Teaching and Learning Spaces Working Group (TLSWG), which involves various university stakeholders (staff, students, and faculty). The TLSWG sets the university's priorities in terms of learning spaces and decides which spaces to renovate. The second staff member interviewed was Tanja Beck, Associate Director at the Office for Students with Disabilities. Beck shared perspective on her

interactions with other departments, faculty, and students, and spoke to the university's goals for UD and UDL, as well as ensuring equal accessibility on campus.

The other key perspective was of course that of students. To encapsulate the views of as many students as possible, I administered an online survey through social media pages associated with the university. In total, 106 people completed the survey, including 76 current McGill students and 28 alumni. The remaining two respondents were removed from the analysis. Participants were asked various questions regarding Active Learning Classrooms and their experience with social isolation. Additionally, respondents were asked to rate different classroom types on a scale from 1 to 5, where 1 represented most socially isolating, and 5 most socially connected. Students and alumni were also asked which ALC they had taken courses in and were asked to rate satisfaction with different elements of the ALC (seating type, desk type, visibility of screens, integration of technology, acoustics, ability to work with peers, accessibility of professor, and overall classroom layout). Students and alumni that had not taken a course in an ALC were asked about their interest in these classroom elements. They were also asked to rate the following in comparison to a traditional classroom: engagement with material, student-student relationships, student-professor relationships, satisfaction with the course, and final grades. Finally, respondents were asked what changes should be made to improve social connectedness in the classroom. In brief, about half the respondents had taken at least one course in an ALC, with the most popular two also being the first two built at McGill: Burnside 511 and Education 627 (See Appendix B for detailed survey results).

To further supplement the student perspective, I interviewed the co-leaders of McGill Spaces Project (MSP). MSP is a student group dedicated to creating inclusive and accessible

public spaces on campus. The co-leaders spoke to the disconnection between departments, the inaccessibility of certain student spaces, the lack of spaces to socialize (indoor and outdoor), and the barriers students face in engaging the administration to suggest changes. Additionally, in 2014 and 2015, MSP conducted a situational analysis that included an online survey of campus spaces. The group concluded that preferences for indoor spaces were decentralized based on faculty. Furthermore, the analysis on informal spaces concluded that there was a lack of spaces and seating for socializing (See Appendix C for more results).[4]

Stakeholders that could not be engaged for this report due to time and resource constraints include local residents, tourists that use McGill's outdoor spaces, various municipal actors that have influence over campus spaces, and the Quebec government, which provides funding and adopts relevant legislation.

3. LITERATURE REVIEW

3.1: Academic Secondary Sources

This report is guided by theories of architectural determinism, which dictate that the built environment and physical layout or architecture of a space directly affects the social behaviour and attitudes of those within that space.[5] Further, architectural theory encourages forethought about the human experience within a space.[6] Few studies expand on these theories to specifically measure what design and architectural principles facilitate social connectedness; however, Levasseur et al. conclude that the proximity to resources and recreational facilities, social support, having a driver's license, and access to public

transportation are all directly related to the social participation of older adults.[7] In another neighborhood-level example, Naomi Carmon explores different social goals of housing planning, including social relations between neighbors — for example, the orientation of front doors or the distance between houses.[8] Another study looks at the wider picture of environmental determinants on social isolation for certain demographic groups. Importantly, many of these authors acknowledge that the physical factors are only one of several influential factors with respect to social relations between people, and there is little consensus as to the full extent that physical factors influence social factors.[9] [10] [11]

The second relevant body of literature addresses the social isolation of students. While there is some literature that addresses social isolation among high school students,[12] or even younger students, there is less research on higher education. That which is available tends to focus either on one demographic or faculty within universities. In one example of such research, the social experiences of first-generation undergraduate students and non-first-generation ones are compared. The results found that first-generation students report less social support from family and friends, more single-event traumatic stress, and less life satisfaction.[13] In another study, on- and off-campus graduate programs were compared in terms of student experience. Using a survey and focus groups, researchers concluded that off-campus students are less connected to their home departments and feel a greater sense of social isolation than on-campus students.[14] In a third example, loneliness of international students in Australia is measured. Based on 200 interviews, the researchers found that two-thirds of the group experienced problems of loneliness and/or isolation because of the loss of social networks.[15] In a final example, researchers examine the perceived stress of Australian law

students by looking at academic demands, social isolation, career pressure, and study/life imbalance. The results found that the social isolation experienced by law students was related to reduced life satisfaction and overall wellbeing, in addition to greater symptoms of depression and anxiety.[16] Though this research acknowledges the existence of social isolation within the realm of higher education, there is a gap in connecting the overall university environment as a contributing factor to student social isolation.

Social connectedness within university environments is mentioned in the book, *Multiculturalism on Campus: Theory, Models, and Practices for Understanding Diversity and Creating Inclusion.* The author notes that the physical design and layout of the campus influences student behaviours and can foster or hinder a sense of belonging. The author also mentions that architecture impacts students differently. For example, a lack of outdoor seating or few open plazas may hinder spontaneous collective social interactions of certain demographic groups more than others. Further, artwork or the location of certain facilities can deliver non-verbal messages of exclusion to certain groups.[17]

Other research looks at the effect of university and college dormitory architecture on social relationships. Though the research doesn't look at social isolation specifically, it explores a sense of community. The results conclude that there is a lower sense of community in dorms designed in clusters or suites, whereas the traditional corridor design offers more opportunities for friendship with a larger base.[18]

Lastly, there is a body of literature on the design and architecture of higher learning teaching spaces and social isolation. Many of these studies are published in the *Journal of Learning Spaces*. One paper focuses on student perceptions of 21st century learning spaces that

are moving towards student-centered design through the addition of flexible furniture and integrating technology. The research found six main benefits: adaptability, comfort, ease of use, instructor-student interactions, variety, and concentration.[19] Another study that looked at the impact of active learning design on student engagement found that the classroom (specifically the flexible chairs and portable whiteboards) fostered community by minimizing the divide between instructor and student, and encouraged movement and social interaction.[20] Other studies looked at the influence of roundtables on student engagement,[21] or how classroom seating types and swivel desks can maximize student interactions.[22] [23] One of them found that the redesign of teaching and learning spaces to facilitate student-centered active learning needs to consider comfort levels, aesthetic impact, layout, and the type and range of facilities provided.[24]

One particularly notable paper addressed the design of teaching spaces at McGill. Written by staff at McGill Teaching and Learning Services, *Research-Informed Principles for (re)Designing Teaching and Learning Spaces* lists the guidelines used to plan the new classrooms at McGill. The design principles referenced in the paper are rooted in pedagogical theory from the National Survey of Student Engagement (NSSE): first, learning spaces should support challenging students academically through active learning and incorporating technology; second, classroom design should facilitate group learning and student-student interactions; third, the new designs should foster relationships between instructor and student; fourth, high quality learning spaces that are consistent with the university's culture and priorities should be created throughout campus; and finally, high-impact practices inside and outside the classroom should be implemented so that learning spaces encourage a diversity in

student learning. Furthermore, the paper identifies the physical and design elements that can be used in tiered lecture halls, flat classrooms, and active learning classrooms to implement these five principles (See Appendix A).[25]

This report aims to build on these three bodies of literature through the examination of social connectedness and spaces at McGill University.

3.2: Non-Academic Secondary Sources

To supplement both the interviews and surveys conducted, various reports produced by the university were referenced to incorporate its point of view and that of its stakeholders, as well as to shed light on existing policies and initiatives at the university. At the widest scope, two documents were reviewed from the Office of the Provost and Vice-Principal (Academic) (OPVPA). The first is the Strategic Academic Plan 2017-2022. This report establishes various university wide goals, including to foster connectedness among the local and global communities and within the university across disciplines. Moreover, there is an explicit commitment to increase the numbers of collaborative and active learning classrooms in an effort to lead innovation.[26] One initiative of OPVPA is MILE: McGill Innovative Learning Environments. MILE is based on four inter-related pillars:

1. State-of-the-art communication technologies enhanced through innovative partnerships
2. Developing and implementing cutting edge, evidence-based pedagogical methods
3. Building new physical spaces for teaching and learning
4. Creating digital libraries and transforming our existing library space[27]

MILE underscores the importance of physical spaces on campus in terms of influencing the learning experiences of students. For example, it supports the need for open and interactive library spaces in addition to cutting-edge active learning classrooms.

Narrowly speaking, I referenced reports relating to classroom designs and ALCs. In an early report from Teaching and Learning Services, the intent of the ALC initiative is explained in terms of the NSSE principles, and an analysis is given of the first ALCs implemented. During the first year, with only two ALCs, 1,277 students from seven faculties, taught by 31 instructors experienced the space.[29] Another publication by the working group (TLSWG) provides guidelines and standards for McGill classrooms, again based on the NSSE guidelines (see Appendix A, Table 2). This document focuses on the design and construction or renovation of formal learning spaces on campus, including layout and furniture, to encourage collaborative learning and student-faculty interaction; enrich educational experiences through technologies; and ensure both livability (considerations around ventilation, temperature, aesthetics, etc.) and a supportive campus environment. These principles and guidelines are not limited to ALCs; they also apply to lecture halls, tiered classrooms, flat classrooms, and auditoriums.[30] A second similar document focuses on the physical properties associated with different physical elements (these are expanded upon in section 4.2).[31]

Also relevant to physical design are the Facilities Management and Ancillary Services Building Design Standards, the purpose of which are "to assure maximum quality and value in construction projects at McGill University, through uniformity, system or component quality, compatibility, functionality, and ease of maintenance." In terms of classroom design, relevant factors include acoustic specifications, building material guidelines, and accessibility

requirements.[32] More relevant to social connectedness are the Standards for a Barrier Free Campus, which acknowledge accessibility concerns and the need for Universal Design to make the campus inclusive for all people. This includes Universal Design for entrances, washrooms, and classrooms.[33] These documents all inform McGill policies towards building social connectedness through learning practices and space improvements. The following section offers additional programs and recommendations in continuing on this trajectory, as well as useful examples from other institutions and successes at McGill.

4. INTERVIEWS AND RECOMMENDATIONS

4.1: Universal Design and Inclusion through Physical Spaces

Universal Design — "the design of products and environment to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" — can greatly impact social connectedness on campus. UD is guided by seven principles:

1. Equitable use
2. Flexibility in use
3. Simple and intuitive use
4. Perceptible information
5. Tolerance for error
6. Low physical effort
7. Size and space for approach and use[34]

These principles are already being implemented at McGill to some extent. For example, both Facilities and the Office for Students with Disabilities (OSD) work to create accessible entranceways and washrooms, in addition to parking; however, these are not always universally designed entrances. Notably, many of the older buildings on campus maintain issues of physical accessibility. Associate Director of the OSD Tanja Beck lamented that a lot of times

Universal Design is not considered during initial renovations, and that entrances, for example, need to be retrofitted. This affects efficiency in the construction process at the university. Moreover, during recent construction on McTavish Street, many students experienced accessibility issues. Because this space is under the jurisdiction of the municipal government, greater communication is needed to ensure access of outdoor campus spaces that overlap with public spaces. Beck emphasized the importance of continuing to view campus changes through the lens of Universal Design.

The OSD is further inspired by other institutions that are fully accessible, such as the Ed Roberts Campus in Berkeley, California, which is a universally designed building. The design is guided by accessibility as a social justice issue where everybody deserves the right to an inspired and dignified space for work. Indeed, the design is all about inclusion, with lots of open spaces, ramps, and special colours on the floor for people with visual impairments, all while still maintaining modern aesthetics. Other elements include automatic doors, wide corridors, and hands-free sensors and timers controlling lighting.[35] McGill's campus is still far from wholly embracing Universal Design, especially its indoor spaces. While noting the costs of doing so, specific renovations could begin to incorporate some of the elements mentioned.

Figure 1 Ed Roberts Campus, Berkeley, California

Additionally, in order to build social connectedness on campus, there needs to be more places to socialize. This issue arose multiple times throughout this study. Foremost, it was a major issue brought up by the McGill Spaces Project (MSP) leaders, supported by their

situational analysis. For example, the building containing the McGill Students' Society (SSMU) is located in an area that is hard to access for many students. Other spaces that have potential for fostering connectedness, such as lounges or cafeterias, tend to either become study spaces, nap spaces, or can just be too uncomfortable to stay for long periods of time. The MSP leaders thus suggested there be more spaces like the lounge areas in the McLennan Library, where there is comfortable seating and students are allowed to talk freely and eat. Architecture professor Michael Jemtrud also made a similar suggestion of providing multiple smaller spaces to socialize around campus, instead of just one large student center. Professor Jemtrud also commented on the recent closure of the architecture café due to administrative issues. This student-run initiative provided an opportunity for placemaking — for creating spaces where students felt they belonged. Jemtrud expressed disappointment about the loss of this space, as it was a hub for connectedness both within his department and between nearby departments.

Faculty of Law Professor Tina Piper noted a number of spaces students use to socialize within the department, but questioned the quality of the relationships between her students due to competitiveness. Consequently, Piper suggested more events to facilitate social connectedness between different departments. Professor Jemtrud referenced the Thompson House as an opportune location for such events, noting its generous space and quality architecture. MSP leaders also recognized a need for more interdepartmental relationships. One initiative they are planning is the creation of an outdoor stage in the centre of downtown campus, with the idea of connecting the Faculty of Music to the rest of the university (it is situated in an isolated location). In addition, MSP wants to foster belonging and inclusion

through placemaking on campus, as well as through events that bring together students from varying faculties.

Furthermore, more administrative support of these types of programs is needed. Currently there are very few pathways for students to take ownership of campus spaces and few opportunities to be involved in their evolution. Student involvement in university decision-making processes would foster connectedness between students, faculty, and staff. However, navigating the administrative system can be very difficult for students. Tanja Beck at the OSD commented on how her office has become a point of contact for students with varying needs, despite not all requests being under its jurisdiction. It would be useful to have an official or support system in place to help students navigate the administrative structures of the university and bring concerns forward. This would further support student placemaking and foster belonging on campus.

4.2 Student-Centered Teaching through Active Learning Classrooms

The creation of more Active Learning Classrooms is supported by the theory of architectural determinism, which in this case suggests that physical environments will affect the learning experiences of students. Various universities are implementing policies that shift traditional teaching away from lecture style (one-way teaching) to student-centered learning. This approach involves both active learning and collaborative learning practices, with Active Learning Classrooms serving as a catalyst.

At McGill, ALCs were inspired by research from other universities and programs like TEAL (Technology Enhanced Active Learning) at MIT and SCALE-UP (Student-Centered Active

Learning Environments for Undergraduate Programs). For example, TEAL classrooms include multiple projectors, video cameras, white boards, an instructor work station, group tables, and networked laptops. Many of these elements were brought to McGill's ALCs, though they are all a bit different and implement different technologies to varying extents. For example, Burnside 511 has individual computers for every student, but does not have round tables, whereas Education 627 has larger round tables and only a few computers per group. The elements of ALCs that facilitate student-student interactions include infrastructure that promote face-to-face group work, such as round tables; movable furniture and rolling chairs, to allow for movement and reconfigurations; and shared workspaces, such as computers or whiteboards. Layout, flexible furniture, and technologies like screen sharing also foster communication and relationships between students and faculty. Centre-positioned podiums and multiple projection points allow for teachers to be closer to students, while thoughtfully designed sightlines and acoustics invite all students to participate. Finally, aesthetics, lighting, temperatures, and air quality also effect learning experiences and are highly considered in the design of ALCs (see Appendix A, Tables 2 and 3 for more details on the rooms).

Because ALCs are so different, they have mixed reviews. Professor Tina Piper who teaches in Education 627 is a supporter of ALCs. Piper said the layout and round tables in that classroom fostered a sense of intimacy, where she was not only able to get more in depth with the material but also get to know her students better. Piper stated:

> It just opened everything up. They talked to each other more, they talked to me more…it was just a very social place…One of the interesting things was kind of encouraging them that learning is a social thing, a social process. They learn as much from each other as they learn from me, and the classroom time has to be used effectively, and effectively doesn't just mean just me repeating the readings.

Professor Bruno Tremblay from the Department of Atmospheric and Oceanic Sciences also preferred teaching in an ALC (Burnside 511). He noted that the room supported group work and active learning, students shared more frequently, and the room's technology allowed them to learn by doing. Students surveyed as part of this study seemed most satisfied with how the room improved their ability to work with peers and engage their professors. When students were asked to rate how socially isolating or connected a classroom type was on a scale from 1 to 5 (worst to best), ALCs received a score of 4.31 compared with lecture halls at 1.51.

However, ALCs at McGill are not perfect. Professor Joe Sullivan, who teaches Jazz composition in the New Music Building, Room A-412, found the layout did not work for his discipline due to the location of the piano, inability to see all students at once, and lack of space for performances. He also said the technology was complicated and unreliable, which made for inefficient teaching. From the student perspective, survey respondents noted issues with technology, sightlines, and acoustics in certain rooms. For example, many said the support columns in Burnside 511 hindered their view of the front of the room and there was not enough desk space because of the computers.

Therefore, while ALCs can indeed foster connectedness in the classroom, attention needs to be given to the courses taught in them so that the spaces are used to their maximum potential. Some students suggested that the ALCs were used too much for lecturing, and that they would prefer instructors to be better trained to make use of the spaces. Additional follow-up is also needed to ensure that technology functions properly and that classroom layouts work for both students and professors. Jennie Ferris from McGill Teaching and Learning Services (TLS) noted that where TLS can't build an active learning space, they attempt to apply the same

principles and design elements to other room types (e.g., flat classrooms, tiered classrooms, and lecture halls). One idea is to create two rows on each tier with movable chairs so that reconfiguration for group work is easier. While most professors noted that there is still a need for lecturing, lots of students desire smaller classrooms, such as ALCs, or seminars with active learning pedagogies. Thus, there should be a larger effort to minimize big lecture style classes and ensure that all students have opportunities in smaller rooms, whether they are ALCs or seminars.

4.3 Universal Design for Learning

Universal Design for Learning (UDL) is important because, as one professor noted, it facilitates student-centered learning. UDL can also be applied in other types of classrooms and is easier to implement, considering that the transition to, and creation of, more ALCs can go slowly. McGill's OSD office currently offers many resources for professors to help them implement UDL in their classrooms, including one-on-one consultations and workshops.

UDL fosters inclusion and equal accessibility in that it benefits all students regardless of physical disability, learning disability, or even learning preferences. By allowing all students to feel comfortable and maximize their learning potential, UDL fosters a sense of belonging. In terms of instruction, UDL is anchored in three main ideas: first, multiple means of representation, to give learners various ways of acquiring information and knowledge; second, multiple means of action and expression, to provide learners alternatives for demonstrating what they know; and third, multiple means of action and engagement, to tap into learners' interests, offer appropriate challenges, and increase motivation.[36]

Some specific changes that can be made in the classroom to implement UDL include changes to course materials and evaluation methods. Tanja Beck from McGill's OSD suggests that exams prioritize the assessment only of critical information — for example, by providing formulas to avoid unnecessary memorization. Another change could be to provide alternative options for specific assignments and exams. Beck also encourages dialogue between faculty and students to ensure all needs are met. In terms of course materials, she explains that PDFs are the easiest and most affordable, and can be used with screen readers. Other changes could include ensuring that videos shown in class are captioned and come with transcripts, which may be essential for some learners; and providing course syllabi ahead of time to allow students to choose classes that fit their learning preferences, in addition to creating a balance between types of courses that affect work load and stress levels. Further, syllabi should continue to list clear goals and objectives for courses, which is supported by Teaching and Learning Services. Cooperation with enrollment services could facilitate a system for implementation.

UDL also shares similarities with UD and ALCs in several respects. In addition to promoting adequate lighting and acoustics, it emphasizes accessible layouts and buildings. Indeed, students should not have to choose classes based on building accessibility. UDL also promotes the use of different technologies and encourages multiple pathways for student engagement. One key way UDL should be incorporated is in the accessibility of campus wide resources — for example, ensuring support be delivered in multiple ways and creating different formats for providing feedback on university services. Finally, university wide regulations could encourage professors to make the shift towards UDL. For instance, other universities have UDL

checklists for instructors. At times, UDL cannot be implemented fully due to a lack of resources or teaching assistants, thus support should be available to facilitate the transition.

5. CONCLUSION

This report seeks to further the discussion on how to foster social connectedness on university campuses, with a focus on McGill, by changing policies around spaces and teaching. The three main approaches recommended in this report are informed by the research conducted at McGill University; however, they do not represent the only solutions to social isolation on campus. With additional research — incorporating the views of other demographics, departments, and stakeholders, as well as graduate students (this study focused on the undergraduate level) — these recommendations could be improved further.

Further research should also look beyond McGill University and compare social isolation not only at other universities but also within other institutions. Additionally, research should consider connectedness of faculty and staff in higher education. A final interesting point for further analysis would be to do a longitudinal study of the long-term effects of social isolation during higher education experiences. While there is already some research that begins to examine social isolation, it is still a relatively new field. More than that, it is a lens that university actors need to apply when making policy changes and implementing programs and regulations. To that end, Universal Design, Universal Design for Learning, and student-centered classrooms are critical starting points, particularly due to their ability to foster social connectedness.

APPENDIX A: MCGILL'S ACTIVE LEARNING CLASSROOMS

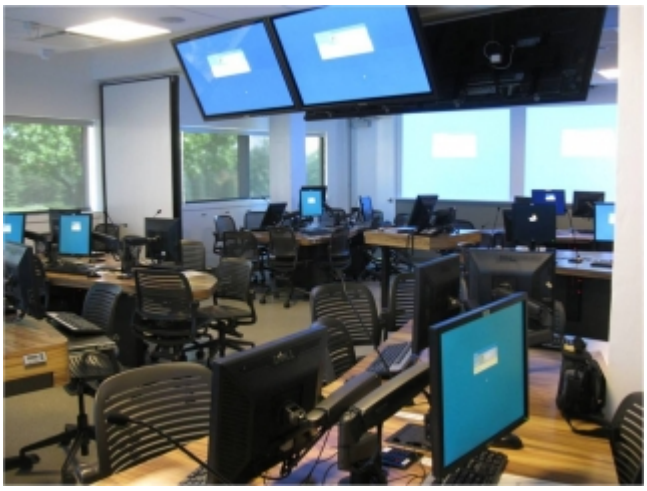
As of this writing, there are nine Active Learning Classrooms at McGill University (all images from the Recent Learning Spaces Improvement page on the TLS website (http://www.mcgill.ca/tls/spaces/classrooms#activelearningroom):

McIntyre Medical Building 206/208/2010 (each with 80-person capacity)

New Music Building A-412 (24-person capacity)

688 Sherbrooke room 1265 (24-person capacity)

Macdonald-Steward Building 2-028/2-029 (each with 24-person capacity)



Burnside 511 (38-person capacity)

Education 627 (72-person capacity)

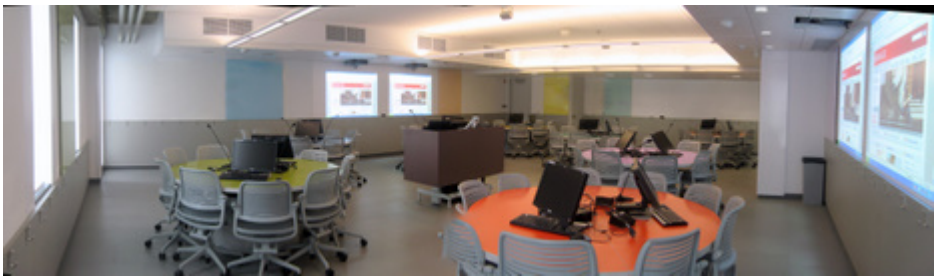


Table 1: Features of first three ALCs explained[29]

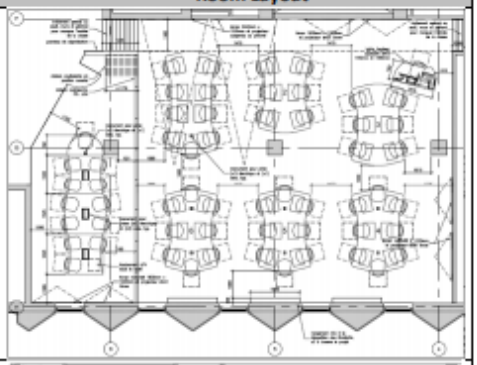
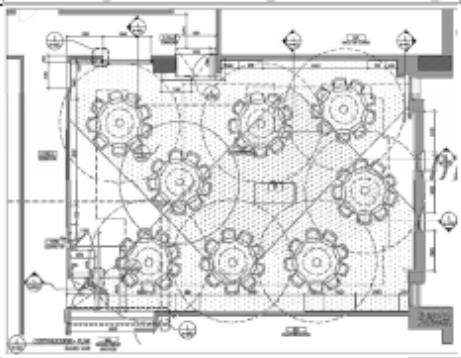
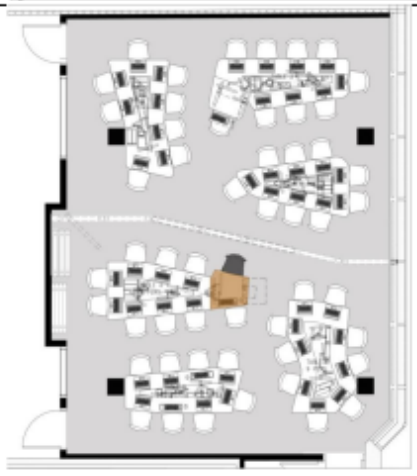
	Features	Room Layout
Burnside 511	• Movable wall allows for room to be split into two smaller rooms: a classroom of ~23 (6 tables of 6-8 students), and one small seminar room of ~10 that can be used for breakout sessions • Every student has access to a high-powered computer with specialized software • Presenter can show two sources • Furniture facilitates interaction and collaboration among students • Software can be used to share students' screens with entire classroom	
Education 627	• 8 round tables of ~9 students • Students have access to 2 computers per table (plus laptops) • Presenter can show two sources • Furniture facilitates interaction and collaboration among students • Students can share their screens at their table and with the entire classroom • Students have writing space on walls for collaboration	
Macdonald Stewart 2-028,2-029	• Movable wall allows for room to be split into two smaller rooms of ~25 (total of 6 large tables of 8-9 students) • Students have access to 4 computers per table (plus laptops connections) • Presenter can show three sources • The furniture facilitates interaction and collaboration among students • Students can share their screens at their table and with the entire classroom • Students have writing space on walls for collaboration	

Table 2: Physical room elements related to Principles for Designing Teaching and Learning Spaces[25]

	Layout	Furniture	Technologies	Acoustics	Lighting/colour
Academic challenge: Promote individual, active engagement with content	☐ Work surfaces for notebooks, laptops, textbooks	☐ Comfortable furniture; ☐ Varied furniture to support different types of tasks and preferences	☐ Access to infrastructure (e.g., printing, power for student laptops) ☐ Access to resources (e.g., LMS, internet, virtual labs, specialized software) ☐ Multiple sources and screens for simultaneous display of different learning materials	☐ Acoustic design to avoid distraction from outside and inside sources	☐ Appropriate lighting for individual work ☐ Intentional use of colour to promote focus
Learning with peers: Promote active engagement with one another	☐ Promote face-to-face communication (e.g., two rows of students on a tier, small groups) ☐ Individuals can move about easily ☐ Unobstructed sightlines	☐ Flexible seating(e.g., fixed chairs that rotate, movable tables and chairs, tablet chairs on wheels) ☐ Intentional use of furniture of different heights and shapes	☐ Shared workspaces (e.g., writable walls, digital workspace)	☐ Sound zones support multiple simultaneous conversations ☐ Appropriate amplification available (e.g., student table microphones)	☐ Different lighting patterns to support different activities ☐ Using colour to define groups' use of space
Experiences with faculty: Promote interaction and communication	☐ Easy access to all students (e.g., multiple aisles, unobstructed sightlines)	☐ Podium doesn't interfere with sightlines, movement and interaction, while being large enough for instructional materials. ☐ Flexible furniture to support different teaching strategies (e.g., movable, variable heights)	☐ Screen sharing ☐ Ability to control classroom technologies away from the podium (e.g., remote mouse, wireless projection)	☐ Sound zones support multiple simultaneous conversations ☐ Appropriate amplification available (e.g., wireless audio amplification)	☐ Different lighting patterns to support multiple types of teaching tasks ☐ Colours distinguish purposes (e.g., where chairs go, what groups work on what surfaces/with whom)
Campus environment: Promoting high-quality learning spaces across campus	This category relates to the campus environment as a whole. It provides opportunities for supporting students' learning through consistently high-quality learning spaces through the application of standards and design principles. For example: ☐ University standards applied, e.g., classroom and IT standards; accessibility guidelines; recognized sustainability practices, materials and technologies; regulated building operations (e.g., temperature and ventilation). For further details and/ context, see McGill University Classroom Guidelines and Standards ☐ Design classrooms for flexible future use where possible (e.g., raised floors for conduits to permit future classroom reconfiguration). ☐ Design classrooms, consistent with the principles of Universal Design and Universal Design for Learning, to meet the needs of and be used by all populations using these spaces (e.g., natural light, sufficient storage, and universal control panels to simplify instructors' use of equipment in classrooms across campus). ☐ Design classrooms to integrate with surrounding space (informal spaces, etc.) ☐ All classrooms are thought of within the campus master plan.				
High-Impact Practices (HIPs)	Multiple types of campus physical environments are needed to support a variety of HIPs. Ensure availability of, and support for, a diverse range of affordances (both physical and virtual) to maximize HIPs for student learning.				

APPENDIX B: STUDENT SURVEY

The following are the results from the student survey administered online via social media as part of this study, from July 7 to July 28, 2017.

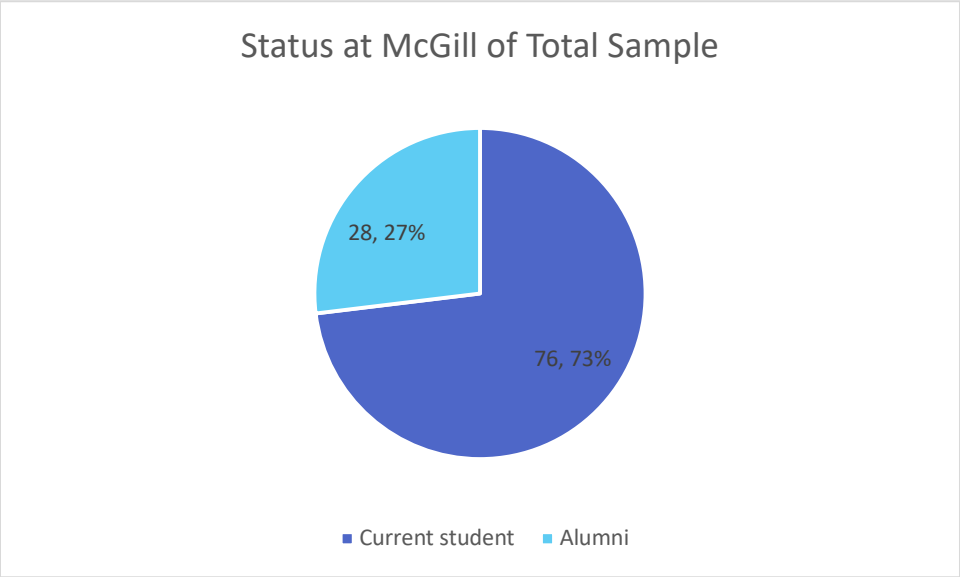


Figure 1: Counts and percentage of respondents' status at McGill University

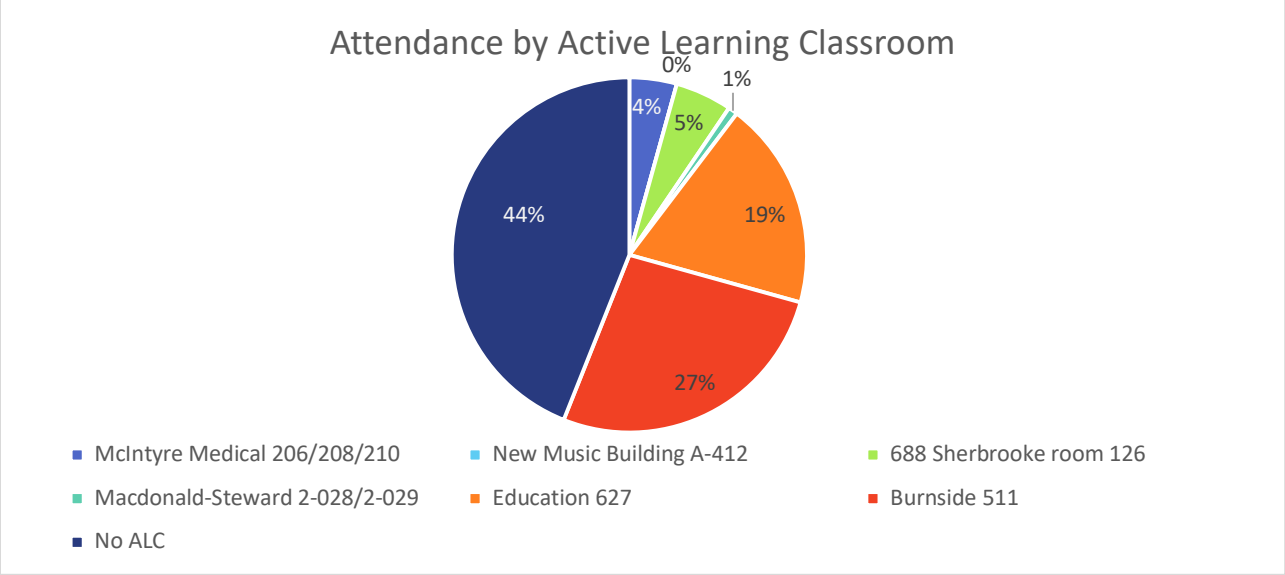


Figure 2: Respondents were asked about which rooms they have taken a course in

Table 1: Average rating from 1 to 5 (very unsatisfied to very satisfied) of ALC room features by respondents who had at least one course in an ALC

Room Features	Averages
Seating type	3.94
Desk type	3.7
Visibility of screens	3.66
Integration of technology	4.08
Acoustics	1.89
Ability to work with peers	4.04
Accessibility of professor	4.11
Overall classroom layout	3.72

Table 2: Average rating from 1 to 5 (very uninterested to very interested) of ALC room features by respondents who had never taken a course in an ALC

Room Features	Averages
Flexible layout	3.64
Moveable seating	3.62
Integration of technology	3.98
Multiple screens	3.7
Potential to collaborate with peers	4.13
No front podium for instructor	3.23

Table 3: Students/alumni were asked to rate different class types from most socially isolating (1) to most socially connected (5).

Classroom Type	Average
Lecture hall	1.51
Tiered classroom	2.41
Flat classroom	2.59
Seminar room	4.11
Active learning classrooms*	4.31

**Average represents responses only from those who have taken at least one course in an ALC*

Table 4: Students/alumni that took at least one course in an ALC were asked to rate the following experiences in comparison to a traditional classroom from 1 to 5 (worst to best)

ALC experiences	Average
Engagement with material	4.0
Student-student relationships	4.23
Student-professor relationships	3.92
Satisfaction with the course	3.9
Final grade	3.71

Other Statistics:

- 53 out of 104 students and alumni surveyed had taken at least one course in an ALC
- Students that had not taken a course in an ALC were asked, on a scale from 1 to 5, how interested they would be in taking a course in an ALC (1 being very uninterested, 5 being very interested). The average response was 3.94.
- Respondents who had taken at least one course in an ALC were asked: What changes do you think could be made to improve the existing active learning classrooms? Some sample responses were:
    - Instructors' having a better understanding of technology
    - Using rooms to their maximum potential
    - Changing computer screen location, to help avoid distractions and visibility issues
    - More engaging group work
    - More desk space
    - Having microphones at tables to communicate across the room more easily
    - Integrating group chat

- All students and alumni were asked the following question: In terms of improving social connectedness in the classroom, what changes do you think should be made? Some sample responses were:
    - Smaller classes
    - More opportunities for group work and conversations with students
    - More teacher-student interactions
    - More seminars and labs
    - Alternative seating options, e.g., rolling chairs
    - Larger desks and work spaces
    - Reducing the use of laptops

APPENDIX C: MCGILL SPACES PROJECT SITUATIONAL ANALYSIS

The following are select results from the situational analysis conducted by the McGill Spaces Project during 2014-2015. A total of 205 students responded to the survey.[4]

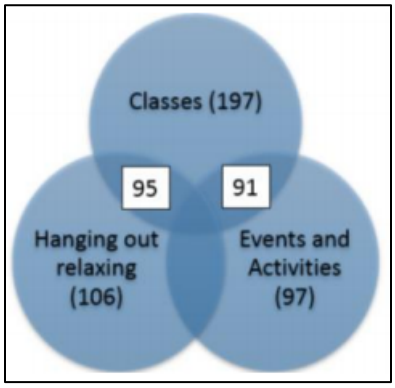


Figure 1: Respondents were asked about the nature of their campus space usage

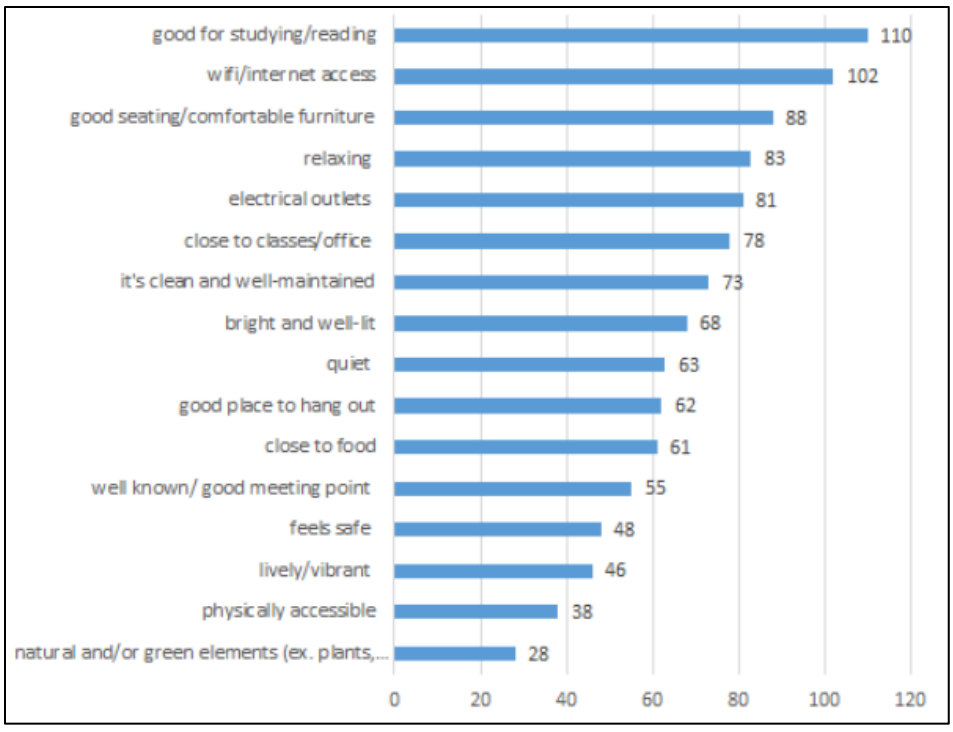


Figure 2: Counts for reasons why favourite indoor space was chosen

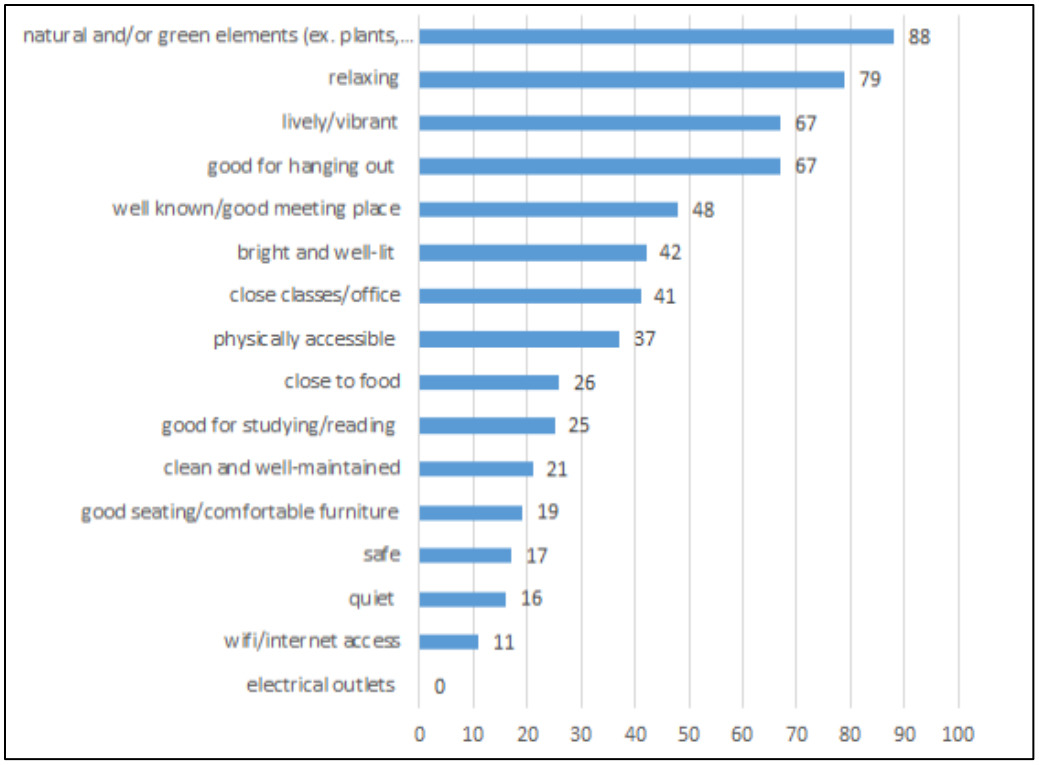


Figure 3: Counts for reasons why favourite outdoor space was chosen

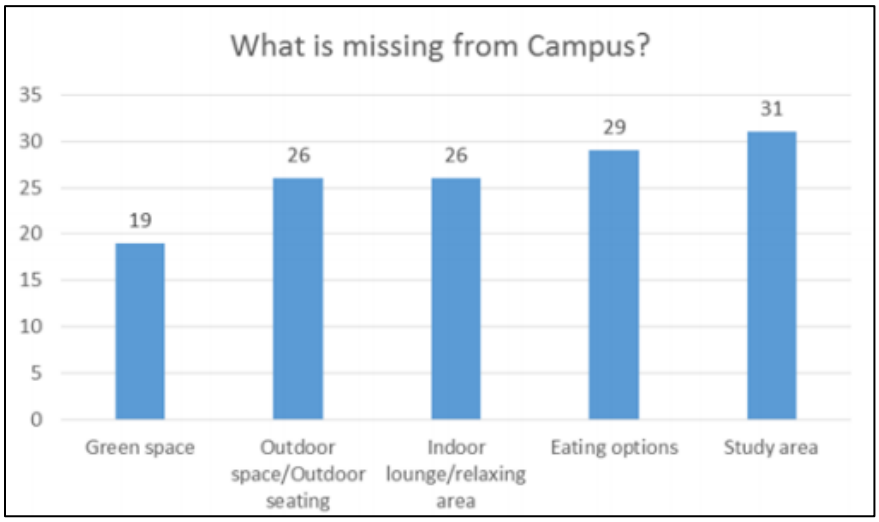


Figure 4: Frequently mentioned elements perceived as missing from campus

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