Understanding Accessibility in "Practical Space" Learning Environments Across Disciplines

Prepared on behalf of
the Council of Ontario Universities by:

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Executive Summary

A “practical space” is a learning environment where students have the opportunity to engage in active learning and to demonstrate, through hands-on activities, the understanding of the practical components of a given discipline. In our previous work for the Council of Ontario Universities (COU), we discussed the necessary elements of creating a culture of accessibility in the context of science laboratories (example, chemistry, biology, and psychology labs) in university. In this paper, we extend that research and analysis to practical spaces in other disciplines in postsecondary learning. We highlight general principles of accessibility in practical space learning environments, and discuss these in more detail using several field-specific examples, including occupational and physical therapy, art and design studios, and archival spaces. We focus specifically on the legal requirements for accommodation, in the context of understanding the essential requirements of programs; the key role of faculty in building accessible learning environments; and inclusive teaching practices and universal design of the learning environment.

We highlight three major themes that present as barriers for students in practical spaces, and extend across discipline: physical/mobility barriers; technological barriers; and challenges in accommodating and meeting the needs of different learning styles. We present recommended best practices, focusing on the importance of faculty engagement and collaboration, to address these identified barriers. We also discuss four pillars of faculty engagement: thinking critically about the “essential” requirements of a course or program; being proactive, and not reactive; flexibility and creativity in curriculum delivery; and open and frequent communication with the student and disability service provider. These four themes extend across program and discipline, and are critical for a successful student experience.

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What is a “practical space?”

We define a “practical space” as a learning environment where students have the opportunity to engage in active learning and to demonstrate, through hands-on activities, the understanding of the practical components of a given discipline. Some examples of practical spaces can include basic science laboratories (Sukhai et al., 2014), occupational therapy and physical therapy laboratories, art studios, and archives and museums. Practical spaces can be used to supplement classroom learning, and provide additional opportunities for students to work through practical scenarios typical of their respective disciplines.

Methodology

We conducted a comprehensive review of grey and academic literature, searching for the following terms: “barriers,” “practical spaces,” “occupational therapy,” “physical therapy,” “archives,” and “art and design studios.” We searched databases such as Scholars’ Portal, ProQuest, Google Scholar and ERIC (Education Resources Information Center), as well as websites of Canadian universities that offered relevant programs.

Our review of the literature revealed a very limited pool of grey and academic research pertaining to making practical spaces accessible for postsecondary students with disabilities. The few resources we found focused largely on how to accommodate a student with a disability in an occupational therapy or physical therapy laboratory (Bialocerkowski, Johnson, Allan, and Phillips, 2013). The literature that does exist primarily pertains to students with physical disabilities or to students who are blind or partially sighted (Milligan, 2010). We found very little literature on support and accommodations for students with psychiatric disabilities, hearing loss, chronic health disabilities, etc.

Therefore, to ensure a comprehensive environmental scan for this project, we employed a number of methodologies. At the beginning of our research, we posted an outreach message soliciting resources and contacts on three electronic discussion forums related to disability and education: our own, NEADS-L; the Canadian Association of Disability Service Providers in Post-Secondary Education (CADSPPE) listserv; and the e-forum of the Association on Higher Education and Disability (AHEAD), the American association of college and university disability service providers. Additionally, one of this paper’s lead researchers, who is a graduate of Western University, contacted faculty in Western University’s rehabilitation sciences department. Several faculty and service providers, including individuals who provided commentary during the research phase of our earlier work (Sukhai et al., 2014), were identified based on their knowledge and experience

with students with disabilities in practical spaces, and these individuals took part in telephone or email interviews. Further contacts were provided during interviews with faculty and staff from the disability services office.

Subsequently, we reached out to faculty and staff at universities who had experience with accommodating students with disabilities in practical spaces (Interviews A through G) to arrange an in-person tour of their laboratory set-up (Interviews H and I). These included the Ontario College of Art & Design (OCAD) University, the University of Toronto, and Western University. We consulted an expert in the use of technology in postsecondary education around the issue of simulation learning (Interview J). We also consulted library staff and a student with experience in the archival setting (Interviews K and L) around issues that students with disabilities face in that context.

Wherever possible, we opted to conduct telephone interviews to gain an in-depth understanding of the participants' responses to the research questions, and to be able to probe for further information based on their answers. While the majority of interviews were conducted over the telephone, where this was not feasible, we sent out questionnaires electronically so participants could provide written responses. Follow-up phone calls were conducted upon review of the transcripts if further details were required to fill in gaps in information. Throughout this process, resources were gathered, read, and annotated in order to easily identify common themes and threads between resources. All collected research materials were reviewed independently by at least two authors, to ensure fidelity of interpretation.

Rationale and Approach

The definition of practical spaces was crafted based on the authors' own experiences, and on the results of key informant interviews conducted for this project. Our review of the limited literature elicited, perhaps not surprisingly, a limited theoretical and practical framework from which to draw meaningful and useful conclusions. This highlighted the critical need to develop a comprehensive experiential synthesis for faculty and service providers working with students with disabilities in practical spaces.

Consequently, this work builds upon the authors' previous research for COU that explores what is needed to create a culture of accessibility in basic science laboratories (Sukhai et al., 2014). We also drew upon the key themes that define this culture, highlighting important challenges and potential solutions that foster accessibility in the larger context of practical spaces in higher education. As with our earlier work, this paper takes a holistic approach toward accessibility, considers all disability types, and examines practical spaces at undergraduate and graduate levels.

We and others (NEADS, unpublished; Chambers, Sukhai and Bolton, 2011; Adaptech Research Network; Higher Education Quality Council of Ontario) have captured the distribution of students with disabilities across fields of study in Canada. This distribution is non-random, and often reflects the childhood, early learning and young adult experiences of students with disabilities within their support networks (NEADS, 2010). Because of this non-random program distribution, there is uneven awareness by faculty of disability and the need for accessible practical spaces across disciplines.

Therefore, we chose an inductive approach toward the synthesis of general principles of accessibility in practical spaces, focusing first on those areas in which awareness was highest and we found the greatest information density. Based upon our learning in these "example" disciplines (occupational and physical therapy, art and design and archival spaces), as well as our previous work in the basic sciences (Sukhai et al., 2014), we then drew more global conclusions and perspectives on accessible practical space learning environments.

Evaluative Lenses

We used two lenses to critically evaluate the issues and barriers faced by students with disabilities in practical spaces, as informed by our previous work (Sukhai et al., 2014), and key themes arising from key informant interviews and tours (Interviews A-I). Specifically, we examined the nature of the essential requirements of a course or program; and the role that faculty play in making a course and/or program inclusive to students with disabilities.

Essential requirements

Rose (2009) highlights the essential requirements of a course or program "include (but are not necessarily limited to) the knowledge and skills that must be acquired or demonstrated in order for a student to successfully meet the learning objectives of that course or program" (p. 10). Oakley, Parsons, and Wideman (2012) stated the factors in identifying or defining essential requirements of a course include a:

- Skill that must be necessarily demonstrated in order to meet the objectives of a course; and
- Skill that must be demonstrated in a prescribed manner.

COU states that "learning outcomes are used to align individual courses with degree level expectations… [And] define what a student should know, and be able to do, after successful completion of an assignment, activity, class, course or program" (p. 7). In order to identify what is an essential course requirement, "several questions can be

applied to the requirement that help refine the rationale for its inclusion… [These include]:

- What is being tested?
- What is the nature of the task?
- Does it have to be done in only one way?
- If so, why?" (Roberts, 2013, p. 52)

Role of education providers in accommodating students with disabilities in practical spaces

The Ontario Human Rights Commission (OHRC, 2004) states that the education provider – a term inclusive of faculty members, thesis/research supervisors, and lab or teaching space coordinators – is responsible for supporting students with disabilities in the academic environment. These responsibilities encompass:

- Accepting a student's request for accommodation in good faith, unless legitimate reasons for other action are presented;
- Including students with disabilities in class activities;
- Taking an active role in ensuring that alternative teaching and learning approaches, as well as possible accommodation solutions, are investigated;
- Canvassing possible accommodations and alternative solutions as part of the duty to accommodate; and
- Maximizing a student's right to privacy and confidentiality, by limiting the sharing of information about the student's accommodation need to only those who have a direct involvement in the accommodation process (p. 33-34).

While faculty members have an important role in making practical spaces accessible, they are not alone. The institution, disability services office and students with disabilities themselves all have a critical part to play in identifying needs and participating in discussions to make the laboratory accessible (OHRC, 2004). It is important and beneficial that students develop self-advocacy skills, that they become more aware of their own needs in diverse environments, and that they communicate these needs to faculty and disability services office staff (DO-IT, 2011).

When a request for accommodation is made directly to faculty (as opposed to the campus disability services office), faculty should "uphold institutional policies and procedures" and should refer students to the appropriate institutional channels (Scott and Gregg, 2000, p. 160). When the request for accommodation is made through the

disability services office, faculty should work with its staff to ensure that the appropriate accommodations are in place.

Student entry and the “gatekeeper function”

Our research and the research of others (Higher Education Quality Council of Ontario; Office of Disability Issues, Employment and Social Development Canada) have accumulated historical data on the program choices of students with disabilities. It is of significance that many of the disciplines discussed in the paper and in our previous work are ones where students with disabilities are significantly underrepresented. It is worth noting, however, that some students, depending on their disability and their circumstances, may gravitate toward specific disciplines. For example, evidence suggests a higher-than-expected proportion of students with learning and mental health disabilities in art and design programs at OCAD University. Students may also gravitate toward allied healthcare disciplines, such as occupational and physical therapy or psychology, if a caregiver in that area had a substantive impact on their development (NEADS, 2010).

It is not uncommon for faculty and service providers to sometimes perform a “gatekeeper function” and encourage students with disabilities to enter into fields of study and/or careers where there are fewer barriers, and therefore less need for accommodation (Wolffe, 1996). Conversely, students may be discouraged from entering a field where faculty and service providers may believe the accommodation requirements are unsupportable. Some students find this helpful, and choose to enter into fields that are easier to accommodate. There are many students, however, for whom this path does not work, and they enter into the field of their choice, despite any barriers they may encounter. It must be noted that it is the student’s decision to choose the course of study that meets their interests and needs, and not the responsibility of faculty, departments or the institution to act as “gatekeepers” to desired disciplines.

Barriers and Solutions in Practical Space Learning Environments

The following sections critically review and highlight the barriers faced by students with disabilities in the context of various categories of practical spaces: occupational and physical therapy labs, art and design studios, and archival spaces.

Occupational Therapy and Physical Therapy (OT and PT) Laboratories

The practical space used in OT and PT programs involves the integration of theory with practice, and provides an opportunity for the student to apply classroom knowledge to a practical laboratory setting (Barker and Stier, 2013). In these practical spaces, some examples of skills and core competencies that students learn include how to assess patients, how to create splints, methods of cognitive assessment, and how to conduct patient exercises. This space is used to supplement the theoretical learning that occurs in the classroom, and to provide students with the opportunity to "practice" classroom discussion.

The barriers to students with disabilities in the OT and PT learning environments are similar in nature, due to the convergent practical requirements of these programs of study (Interview H). These barriers include challenges with the physical set-up of the laboratory; attitudinal barriers on the part of faculty; limited time to complete course requirements; and developing accommodations that will be feasible and realistic both during the program and in practice after graduation.

Physical Barriers

One of the major barriers for students with disabilities in OT and PT programs is the physical nature of the practical learning component. Students are required to lift/transfer patients, assist patients in moving from one area to another, and provide assistance in patient exercise. This is particularly challenging for students who have some mobility or physical limitations. In these cases, one possible accommodation may be for the student with a disability to have an assistant who does the physical portion of the lab under the student's specific direction. Though the student with a disability requires an accommodation to "physically" complete some of the laboratory tasks, it is important to note that all direction about the nature of the tasks comes from the student with the disability, and the assistant is simply there to carry out his/her instructions (Sukhai et al., 2014; see *Hiring Lab Assistants for Students with Disabilities*).

Engaging a paid or volunteer lab assistant provides the student with an alternate method of completing a task; however, the ultimate learning outcome does not change. Faculty can be open to "different ways of doing" and have discussions with the student early in the course or program regarding the essential requirements of and learning

outcomes for that course (Interview F). It is important and necessary for faculty and program coordinators to think critically about the course requirements, and to determine which aspects of the course or program content are essential requirements for completion of the curriculum (by the student), and which aspects can be accommodated using a lab assistant (Sukhai et al., 2014; see *Identifying the Essential Requirements of a Course or Program* and *Hiring Lab Assistants for Students with Disabilities*).

Attitudinal barriers

Negative attitudes of faculty and administrators represent a real stumbling block to students with disabilities, especially if a faculty member has a negative attitude around disability or around the student's ability to complete the program requirements (Interview E; see also the "gatekeeper function" mentioned earlier in this paper). There can be an unwillingness to accommodate, or a subjective aversion to disability in the context of the learning environment, program or discipline, and these students who have been labelled as such. These conditions make the learning environment less than ideal for the student by creating barriers to open communication with faculty.

Promoting faculty awareness of disability is one way to counteract this concern. There are two major strategies employed to aid faculty in developing disability-related knowledge. Some faculty simply have not encountered the need for accommodation; once they have had the opportunity to become informed, however, they make the necessary changes to their program, teaching style, assessment of the student's knowledge of the course material, or their points of view. For other teaching staff, negative attitudes may be beyond any amelioration or transformation (Interview F). Nevertheless, if a postsecondary institution has a culture of equity and acceptance, then even those who harbor their own prejudices tend to acquiesce to reasonable accommodations that do not compromise the student's ability to achieve the learning outcomes or the academic integrity of the program of study.

It is a good idea to communicate clearly to faculty about accommodations and the scope of the best practices used for supporting an inclusive environment (Interview F). One way to foster a culture of accessibility and inclusion in the learning environment is to engage in open and frequent communication with the student throughout the course. To encourage open communication, it is important for faculty to make themselves available during regular, posted office hours to discuss any accommodation needs, course or laboratory concerns with students with disabilities (Sukhai et al., 2014; see *Ensuring Effective Faculty-Student Interaction*). For faculty members who have never worked with students with disabilities, mentorship opportunities (from other faculty or staff) help to educate the faculty member on potential strategies, and allow him or her to demonstrate creativity in addressing issues faced by students with disabilities in

practical spaces. Faculty who choose to play mentorship roles to students with disabilities (Sukhai et al., 2014; see *Faculty Mentoring Students with Disabilities*) may also experience positive attitudinal change. From our experience, it is possible that a student with a disability can "mentor" receptive faculty – a form of faculty awareness that warrants separate discussion.

Barriers for students with mental health issues

Students with mental health conditions face a unique set of challenges when negotiating the course and time restrictions imposed in professional programs such as OT and PT (Interview H). Evidence suggests that mental health issues are the most challenging of disability types to accommodate. Difficulties are compounded by the stigma associated with this subject and the reluctance of many students with mental health conditions to self-identify (Interview H). Mental illness can be particularly disruptive to students in a learning environment because there can be effects on judgment, concentration, and insight into their relationships with others. Because such problems can increase or lessen with the state of illness and often improve once the illness is successfully treated or is in remission, it may be very difficult to establish accommodations that will be applicable and feasible throughout the entire course of the student's study. The issue of providing appropriate accommodations also becomes one of time. How long a student can take to complete a professional degree will change in circumstances where their health may fluctuate over the length of the program. The forthcoming *Mental Health Handbook,* developed by COU is an excellent resource, and of particular use to faculty in working with students with mental health conditions.

Course load requirements

Another common barrier in both OT and PT disciplines is the requirement to complete a full-time course load with a placement component. Due to the course sequencing, practicum placement, and time requirements of these programs, there is very little, if any, flexibility given for a part-time or reduced course load. This poses significant challenges for students with disabilities, precluding them from being able to meet the demands of a full-time course load. One method implemented to help ameliorate this barrier is to provide some flexibility to the length of the practicum. For example, a practicum that usually lasts eight weeks could be extended to meet the needs of a student requiring a practicum with fewer hours per week. It should be noted that one significant challenge to extending an OT or PT program for a student is that knowledge changes rapidly, so students who require several years to complete a program will not necessarily have up-to-date knowledge.

Systems-level barriers

There are also several systems-level barriers that exist for students with disabilities in OT and PT, both within the course component and at the professional level once students complete their course work (Interviews C and H). Although modifications can be made to the course or program while the student is in the course, there are challenges when applying accommodations to the performance of essential tasks in the field. One significant challenge is the physical design of the occupational or physical therapy clinic and how this is reflected in the practical space, or in some cases how it is *not* reflected. The reality is that clinics in professional settings may not reflect the accessible practical spaces found in postsecondary learning environments. While it is necessary to provide modifications to the clinic as a student with a disability attends practice, it is also vital to ensure that the student has a realistic understanding and expectations of the professional work space. This is achieved through open dialogue with the student, faculty, and others in the field (Barker and Stier, 2013), and an exploration of physical modifications to the work space that the student may choose to self-select and have implemented.

There are certain aspects of OT and PT practice that require physical assistance to a client that would be difficult for an individual with a mobility impairment. Clinicians with a visual impairment or an impairment that limits coordination have difficulty fabricating splints and doing set-up for assistive technology (both the actual technology as well as assisting the client to set-up and use the equipment). Very few of the materials are provided in an alternate format for individuals with a visual impairment. Similarly, there is little to support the education and practice of an individual who is deaf. The nature of these professions is such that clinicians are often well aware of modifications to the occupation, the environment and the technology that are available to enable professional practice. However, the contextual aspects of the work environment, in particular the funding available, limit how effectively these modifications can be enacted or how much technology can be obtained (Interview A).

Typically, accommodations and modifications in the workplace are not discussed with students in the classroom (Interview D). It is the student's responsibility to research which employer(s) would be suitable for her/his needs, and opt for settings that are likely to provide the necessary accommodations. While there may be few specific discussions around transitioning from accommodations in school to accommodations in work, all students are assigned a faculty advisor/mentor by their university. This individual is available to answer any questions the student has around coursework or professional development. It is important for students to take advantage of such opportunities to enable successful transition into a professional setting for the practicum and planning to enter the field after graduation.

Summary

In the previous sections, we illustrate the barriers for students with disabilities in OT and PT practical spaces, and provide some specific strategies to alleviate these barriers. These barriers are challenges with the physical set-up of the laboratory; attitudinal roadblocks imposed by faculty; limited time to complete course requirements; and developing accommodations that will be feasible and realistic during the program and in practice after graduation. Although we have presented specific strategies to deal with these barriers, it is important to develop solutions based on the individual student's needs, her/his learning styles and preferences, and the program requirements. In order to develop proactive solutions to barriers as they arise, it is necessary to have open, ongoing communication among the student, staff from the disability services office, and faculty members.

Art and Design Studio Spaces

Art and design studios can incorporate a wide range of learning spaces, which include wood and metal shops, visual arts, jewellery-making, and media and graphics (Interviews B, I and J). Each of these spaces poses a unique set of barriers for students with disabilities. These barriers can be broadly grouped into three main categories: physical barriers (the physical set-up of the space is not accessible for students using a mobility device or other aids); technology barriers (some of the technology used in art/design is visual in nature and may be difficult for someone with a visual impairment to independently operate); and barriers to instructing students with multiple learning styles.

Technical assistants

It may be necessary and acceptable to employ a technical assistant (analogous to a laboratory assistant in the sciences; see *Hiring Lab Assistants for Students with Disabilities*) to carry out only those tasks the student cannot physically complete. The student is always responsible for providing direction to the assistant in order to complete the design exercise. Lab assistants can be other peers in the class, a senior student, or another individual brought in from outside the university. (For a detailed description on the role of laboratory assistants, see Sukhai et al., 2014: *Hiring Lab Assistants for Students with Disabilities*.)

Mainstream technology as an accommodation tool

Technology in the studio (such as rapid prototyping) can double as an accommodation tool, and a means of creating art (Interview I). Sculpting may be a challenge for a student with physical limitations; by using technology, such as the rapid prototyping, the student is able to input her/his design into a computer, which is then able to produce a

3D image. This is a form of simulation learning that allows the student, through virtual and electronic means, to gain an understanding of the concepts associated with sculpting without physically having to produce a piece of art using a sculpting technique (Interview J). This virtual form of creating art does not impact the learning outcomes of the course or program, since the requirement is that the student shall possess an understanding of the design concepts, rather than an ability to manipulate machinery and equipment.

Differences in approaches to teaching

Due to the nature of the creative, flexible, and hands-on approach to learning, some institutions have seen an increase in the number of students with mental health and/or learning disabilities (Interview C). For many of these students, the hands-on approach enables them to use and develop skills that they may not have an opportunity to develop in a standard academic setting. For this reason, it is important to broaden our definition of "accessibility" – to move from merely creating "physical accessibility" to creating a culture of accessibility that incorporates a wide range of disabilities and learning styles.

Successfully accommodating the increasing student populations of those with learning disabilities or mental illness requires going beyond examining physical barriers to exploring the barriers to curriculum design. This means being creative in the approach to creating and delivering assignments, methods of assessment, and expectations around laboratory and group work (see *Hiring Lab Assistants for Students with Disabilities*) and *Inclusive Teaching Practices in the Lab Setting*). Students with some forms of learning disabilities may experience more difficulty with abstract thinking and concept development (Interview C). Consequently, it is advisable that faculty be aware of differences in learning styles, and be open to offering varied approaches to content delivery. It is necessary for faculty to consult with the student, learning strategists, and the disability services office staff to determine any accommodations and modifications to the teaching approach.

Essential requirements in art and design studios

When examining essential requirement in the context of practical spaces, some learning environments, such as art and design studios, lend themselves to a more flexible designation for learning outcomes (Interviews C and E; see also *Identifying the Essential Requirements of a Course or Program*). Due to the flexible nature of the art and design programs, accommodations can be highly individualized to meet various student learning needs. It is more about the overall process in learning than about an actual outcome (for example, it is necessary to promote successful integrated learning

that is less a checklist of accommodations put into place and more of an individual plan based on that student and her/his course of study).

In art and design studios, much of the academic evaluation is based on the student's understanding of the concepts involved in designing and creating a piece of art, and her/his ability to articulate key constructs of a piece of art (Interview I). There is creativity inherent in the generation of the end product, and less emphasis on the steps taken to get there. Because evaluation is based largely on conceptual understanding and development, this means that students need not "physically" create art in order to demonstrate their understanding of course content. Given the visual nature of art, concepts may be difficult to articulate and demonstrate for a student who is blind. However, due to the flexibility of the curriculum and as a method of demonstrating mastery of material, alternative methods for assessing a student's understanding of concepts in art can be developed. These can include having the student who is visually impaired verbally describe a piece of art (discuss its meaning and key concepts); permitting the student to work in groups with peers; and allowing a student to use technology (such as rapid prototyping) that can supplement physically creating a piece of art, or providing a lab assistant to a student who cannot physically carry out tasks in the lab (Interview I).

Although there is a large degree of flexibility in the curriculum evaluation in art and design studios, there are some lab spaces, such as wood shop and jewellery studios, where a student with a disability may experience challenges. These challenges may be physical in nature (for example, a student may not be able to physically manipulate equipment in the laboratory). The issue or barrier may also be perceptual (for example, a student may not be able to see the fine details of the equipment to complete tasks in the studio). In these cases, providing technical assistance and using mainstream technology as an accommodation tool may help level the playing field for the student (Interview I).

Summary

It is recognized that the learning style and approach to teaching in art and design spaces differs from other forms of practical spaces. In art and design, there is an increased emphasis on creativity, flexibility, and conceptual understanding. Given this, there is an inherent ability to develop new and alternate methods for students to gain an understanding of the course's key concepts. By using technology (such as prototyping) and lab assistants, and allowing for flexibility of learning styles in the course curriculum, a student is able to achieve the expected learning outcomes of the course or program.

Archival Spaces

Faculty who are instructing or facilitating courses with an archival component should be aware of the multiple barriers that students with disabilities may experience in conducting archival research. While barriers in practical settings often potentiate one another, this occurs more in archival settings, where informational barriers and lack of awareness on the part of archival staff are uniquely connected. For example, staff who may not be familiar with how to convert material into an alternate format present an informational barrier for a student who requires said information for her/his research.

Barriers for students with disabilities

Barriers to accessing archives for students with disabilities can include, but are not limited to informational barriers, physical barriers, and a lack of knowledge as to how to assist a student with a disability. This section outlines the barriers to accessing archives as described by a visually impaired doctoral student who was profiled for this project, and the library staff responsible for accessibility at a medium-sized university (Interviews K and L). Both expert interviews explored the challenges to accessing archival materials for students with disabilities. The barriers that were described included (a) the inaccessibility of the printed information to someone who is blind; (b) the challenges of physically navigating an archival space; (c) the inability to always be able to take a scanned image of archival material; and (d) the lack of knowledge of archive staff surrounding how to work with a person with a disability.

Archives can be challenging and confusing spaces to navigate and to retrieve information even for individuals who possess no visual or physical impairment, so imagine how these challenges are amplified for those who do possess a visual or physical impairment. A major barrier for an individual with a visual disability is the challenge of locating and accessing information. Much of the printed information in archives is located in large books, some of which cannot be physically scanned or removed from storage. Printed materials generally use small font sizes and, due to the often fragile nature of these documents, can be difficult to place onto a flatbed scanner. While archival staff can provide general guidance on where to locate a specific topic, they may not be able to act as a reader and orally read information to a student who is blind, and they are usually not in a position to digitize information stored in the archives.

The student who was interviewed for this project employed two methods to overcome this informational and access barriers. The first: use of a non-flatbed scanner (such as the iPal), which can take a photo of the printed page, and which does not require the user to physically lay the page down to be scanned. The scanning device photographs the page and not only removes the need to physically handle the printed archive

material but also greatly reduces the possibility of compromising the binding of delicate documents. The second method: bringing an assistant to the archives (see *Hiring Lab Assistants for Students with Disabilities*). This assistant would aid the student in locating material on her/his topic, reviewing relevant materials, and record any information the student would be required to review at a later date.

Addressing both barriers listed above involves a cost to the student (Interviews K and L). It may therefore be advisable for students thinking of pursuing archival research to discuss funding possibilities with the disability services office at their institution and/or with their advisor/faculty mentor. It is also critical for faculty to maintain ongoing communication with students as to what their needs will be throughout the course of the term, and to ensure that appropriate accommodations have been put in place. Partnerships and collaborative working relationships should be developed between the student, university faculty/staff, and the archive space to make the experience as successful as possible. By being proactive, planning early, and implementing standard processes and practices, challenges can be minimized (Barker and Stier, 2013).

Proposed solutions

Several recommendations were proposed during our research interviews, in response to the barriers described above (Interviews K and L). These recommendations are aimed at educating those employed in archival research, faculty, and those working with someone who is visually impaired. However, a number of these suggestions can be applied in other contexts, if appropriate (see *Improving Access to Archival Spaces*). Of note, in Ontario, there have been requirements for archives to train all staff who interact with the public on how to communicate with and provide services to persons with disabilities under the Customer Service Standard of the *Accessibility for Ontarians Disabilities Act* (AODA).

Summary

Due to the nature of the environment, archives can rely heavily on a visual means of presenting materials. In the previous sections, we have identified three broad categories of barriers that can exist for students: informational, physical, and a gap in knowledge as to how to assist a student with a disability. The proposed strategies relate to developing means to convert materials into an accessible format; educating faculty and archival staff; and modifying physical spaces where possible. While students need to be proactive in identifying their accommodation needs, it is important for faculty to engage in open communication with the student and other staff members who support their learning needs.

Other Practical Spaces

(See *Creating Accessible Practical Spaces*)

Thus far, we have focused on practical spaces in the contexts of OT and PT, art and design, and archival spaces. Our previous work (Sukhai et al., 2014) focused specifically on creating a culture of accessibility in hard sciences laboratories. Other forms of practical space and lab environments exist within postsecondary institutions, including engineering and applied sciences laboratories, computer labs, and labs within the context of some social and behavioural sciences (for example, anthropology and psychology).

Although we found no potential interviewees or information in literature relevant to these other practical spaces, our research and experience leads us to suggest that faculty and service providers working in these fields could apply the principles discussed in this paper and in our previous work for a critical review of the accessibility of their relevant practical spaces. For example, engineering labs may have significant parallels to applied physics laboratories. Clinical lab learning environments in other allied healthcare disciplines can be considered analogous to OT and PT labs. Anthropology and archaeology labs rely on many of the same tools and technologies found in biological sciences labs (for example, dissections and microscopy) and in the archival setting (for example, specimen preservation and storage). Biological psychology labs are analogous to more traditional biological science spaces. Food science spaces, as well as pharmaceutical labs, can be considered relatable to a chemistry environment.

Computer and IT labs are heavily dependent upon the accessibility of the technology and workstations, and practical spaces in other disciplines reliant upon computing are likewise dependent upon the principles of IT accessibility (Berliss, 1991). Indeed, many institutions have developed or are developing purchasing guidelines around IT accessibility that are being implemented as older platforms are retired. In Ontario, the requirement to consider accessibility in procuring good and services under the AODA's Integrated Accessibility Standard has been in place since January 1, 2013.

Based upon a synthesis of our learning (in this paper, and in Sukhai et al., 2014), we developed the resource guide on *Creating Accessible Practical Spaces*, which suggests a "thought rubric" for faculty, staff, and service providers in understanding, evaluating, and developing solutions for accessibility concerns in practical spaces across disciplines. This rubric poses questions for faculty, staff, and service providers to ask in understanding both barriers and potential solutions to accessibility concerns for students with disabilities, and focuses on the principles of faculty-student engagement, inclusive teaching practices, universal design, and essential requirements.

Conclusions

Throughout the course of the research for this paper and for *Creating an Accessible Science Laboratory Environment for Students with Disabilities*, four themes have emerged that speak to the importance of faculty engagement and communication: thinking critically about the essential requirements of a course or program; being proactive not reactive; advancing flexibility and creativity in curriculum delivery; and fostering open and frequent communication with the student and the Disability Services Office. These four themes extend across program and discipline, and are critical for a successful student experience.

The combination of being flexible and creative, and thinking more critically about course requirements is necessary to determine which aspects of the course or program content are essential for completion, and therefore which aspects can be accommodated. When exploring methods used to complete a task, it is necessary to examine whether modifying the way a specific task is completed will compromise the student's ability to achieve the objective of the task (Roberts, 2013). Being proactive rather than reactive allows for accommodations to be planned for upfront, before any issues arise. Open and frequent communication allows for the student to have a venue where s/he can voice any concerns about the course accessibility and its content to faculty, and for faculty and service providers to be able to respond with proactive solutions.

Though there is a large focus in this paper on rehabilitative sciences, art and design studios, and archival spaces, given the generality of the solutions presented, these strategies can be applied to other contexts and disciplines. The researchers attempted to reach out to faculty from multiple disciplines; however, the areas discussed in this paper elicited the greatest number of informative responses. This may be in part due to the distribution of students with disabilities across disciplines in postsecondary education and the impact this may have on faculty and service provider awareness.

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