Academic Communication Equity - BC

Accessibility of online post-secondary education

for students who are Deaf and Hard of Hearing

Prepared for Academic Communication Equity – British Columbia

Table of Contents

Executive summary

This report was developed in response to the impact of COVID-19 on students who are Deaf and hard of hearing. Students with disabilities have been disproportionately impacted by the pandemic. All 26 postsecondary institutions in British Columbia had to pivot and deliver their classes online. The transition to online learning meant some students lacked equitable access either because of not having access to reliable technology and/or because of the challenges of securing disability accommodations.

Students who are Deaf, hard of hearing and Deaf-Blind rely on multiple supports, including sign language interpretation and captioning. The recently passed provincial accessibility legislation will focus on developing accessibility standards in different areas. However, in the absence of these standards now the solutions to resolving the accessibility challenges that emerged from transition to online learning varied across different institutions and posed multiple barriers for students who are Deaf, Hard of Hearing and Deaf-Blind.

The project intended to identify approaches adopted by the institutions in British Columbia to accessibility, identify gaps in online teaching that impact students who are Deaf, hard of hearing and Deaf- Blind, and develop a list of suggestions that address accessibility challenges. The project employed the following methods: literature review, focus groups, and a survey.

The literature review section of the report provided an overview of research on the impact of COVID-19 on students with disabilities, summarized what accommodations in the classroom for students who are Deaf, Hard of Hearing and Deaf-Blind look like, explored the emerging literature on automated captioning and other technologies, and discussed the role of the Universal Design for Learning and social justice in online education.

Two focus groups with students who are Deaf and hard of hearing conducted online revealed the following themes: (1) communicating accessibility needs; (2) navigating accessibility in classroom, and (3) facing systemic barriers. The students reflected on both positive and negative aspects of online education. The positive aspects include such things as ability to revisit recorded materials (if provided) and less background noise. The challenging aspects include poor quality of automatically generated captioning and a negative impact of online settings on physical and mental health.

On campus level, students emphasized the importance of communication in ensuring accessibility in online classroom. Students discussed a critical role of accessibility coordinators as well as instructors in helping them feel part of the classroom. How- ever, the process of securing access to technology and other support can be bureaucratic. On a systems level, accessibility of services and support for students who are Deaf, Hard of Hearing and Deaf- Blind is part of a larger discussion about equity, diversity, and inclusion. For example, the complexity of students' experiences speaks to the need for an intersectional lens, an approach that considers multiple positionalities in shaping an individual's experience. The key considerations emphasized by the respondents include the need for consistent accessibility policies, the importance of inter-departmental collaboration on accessibility, clear guidelines on the new challenges exacerbated during the pandemic (e.g., copyright of teaching materials).

The report included the results of the survey of accessibility coordinators from postsecondary institutions. The survey included several questions that aimed at understanding the kind of services that were available to students who are Deaf, hard of hearing and Deaf-Blind, the kind of services that were requested, and the process of providing these services.

Finally, George Brown College case study provided an overview of the approach to digital accessibility that postsecondary institutions can benefit from. Specifically, this section references the policy that ensures that all media and all events are accessible.

The findings from the literature review, focus groups, and the survey speak to the need of rethinking our approach to accessibility to encourage meaningful participation in class and on campus, strengthen communication between students, instructors and accessibility services and foster a better sense of community. The findings also emphasize that in addition to the importance of ensuring the technical aspects accessibility in online learning contexts, a broader commitment to accessibility in postsecondary institutions is needed. This commitment relies on the importance of collaboration among different stakeholders and the value of students' lived experiences. This commitment inspired us to develop an infographic of the findings to ensure that in addition to the textual version, we also provide a visual one. An infographic that combines the results of the focus groups and the survey is a compelling way of sharing the experiences of people who provide and receive accessibility services on campus.

Please take the time to engage with this infographic that animates the students' experiences in online settings. We recognize that this infographic will not be accessible for everyone due to a multiple elements and layers of information embedded in it. However, we have provided the basic description that we hope will convey the students' experiences in a cogent way.

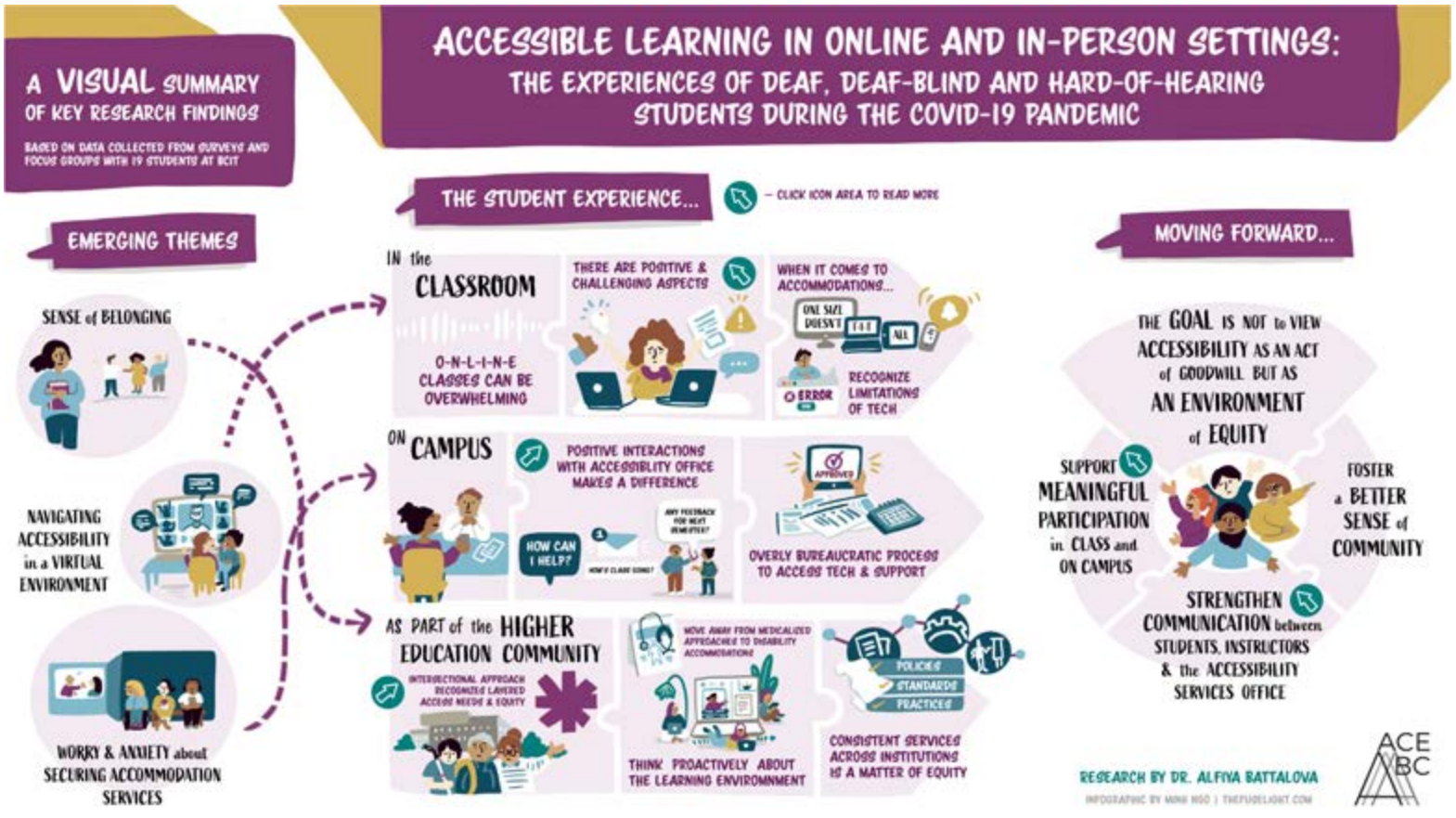

Figure 1. Interactive Infographic

Introduction

Research conducted in various jurisdictions have indicated that the shift to remote learning had disproportionate impacts on students with disabilities. Data derived from the University of Washington Experience survey collected in the spring of 2020 indicated that "students with disabilities/health concerns were more concerned about classes going online than their peers without disabilities" and also "reported that they have experienced more COVID-19 related adversities compared to their peers without disabilities/health concerns" (Zhang et al, 2020, p. 2). Other research, focused on younger children in K-12 education or in other areas of the world indicted clearly that a lack of accessible learning materials in electronic formats was particularly impactful for print impaired students (Battistin et al., 2021; World Bank, 2020). 37% of post-secondary student survey respondents with disabilities in Ontario "disagreed or strongly disagreed with the statement that they could get materials in alternate formats or arrange alternate communication options once the winter 2020 semester moved to remote delivery" (Pichette et al., 2020).

While these reports on student impacts from other jurisdictions and student populations can help guide the understanding of how remote learning may have affected student with disabilities in post-secondary education in BC, they do not provide a fulsome picture of the region-specific context. While the current research in this report focused on the impacts of remote learning on students who are Deaf, hard of hearing, or Deaf-blind, further research on other populations of students with disabilities, including print impairments, specifically within the BC post-secondary context would greatly enhance understanding of the effects remote teaching and learning had on accessibility of education for a broader population of students.

As part of the efforts to understand how the shift to online learning impacted students who are Deaf and hard of hearing, Academic Communication Equity BC (ACE-BC) has set out to conduct a research project that examines the experiences of accessibility services at post-secondary institutions as well as students. The goals of the project are three-fold:

1. Identify the approaches adopted by the institutions in British Columbia to accessibility in the context of transitioning to online teaching

2. Identify the gaps in online teaching that impact students who are Deaf, hard of hearing and Deaf-Blind

3. Develop a list of suggestions that address accessibility challenges.

Methodology

The study's methodology included:

1) Literature review that focused on the academic and grey literature of postsecondary experiences of students who are Deaf and hard of hearing both in in-person and online settings, technical requirements for ensuring equitable access, and the principles and policies to improve the equity of classroom experiences.

2) Survey of academic accessibility offices of postsecondary institutions in British Columbia. The survey intended to assess the changes in accessibility services since the transition to online learning. A total of 19 responses (out of 26) were received. The survey questions can be found in Appendix A.

3) Focus groups with students who are Deaf and hard of hearing. Two (2) focus groups with students from several institutions were held to learn about their experiences of requesting accommodations and adjusting to the online learning environment. A total of 10 students participated in the focus groups. The focus group questions can be found in Appendix B.

In addition, the notes from the COPE (Community of practice) meetings were used to inform that scope of the literature review and its directions as well as the survey and the focus group questions. Multiple methods allowed for the findings to be triangulated. It also increased the validity of the results. By including the perspective of both service providers and service users, this study aimed at building a holistic understanding of what the accessibility looks like from different perspectives and what barriers might exist in achieving a truly accessible postsecondary experience.

TERMINOLOGY

"Deaf and hard of hearing" covers a wide spectrum of hearing losses and communication preferences:

- students with mild hearing loss or hearing loss in only one ear who may or may not have hearing aids to students with more severe hearing loss who use hearing technology and communicate only through spoken language;
- students with profound hearing loss who use cochlear implants and communicate only through spoken language;
- students with any hearing loss who communicate using a combination of spoken language and sign language;
- students who do not use hearing technology or spoken language and who communicate using only sign language.

Study limitations

The study has a number of limitations:

1 The literature review focuses on specific sections of the literature, and it does not provide a scoping review.

2 The survey only captures the perspectives of the accessibility offices staff and has not included staff from other departments in the institutions that might be involved in supporting accessibility at the institutions. As well, not all the institutions completed the survey (19/26), and even though the response rate is high, given the geographic diversity of the institutions in BC, the responses from all the institutions would have strengthened the validity of the responses.

3)We held two (2) focus groups with students, however one of the groups that was missing is a group of students who are Deaf-Blind. We recognize that the format of the focus groups that were conducted in Zoom could have limited the recruitment of these students. To address this gap, we have reviewed the literature that included the experiences of this group of students.

Literature Review

COVID- 19 and students with disabilities

In 2020, the World Health Organization (WHO) stated that 466 million people worldwide have disabling hearing loss, of which 432 million are adults, but only 30% of them are over the age of 65 (World Health Organization [WHO], 2020). The world has faced obvious challenges in different sectors during the COVID-19 pandemic and for the education sector. The quick adaptation to distance learning for all levels and courses has been a struggle for teachers and students (Reimers et al., 2020). That experience may have been even more intense and harder to adapt for students with disabilities (Lazzari & Baroni, 2020). Numerous working components must be included in a "successful" online distance learning experience. The physical equipment, the lack of institutional capacities and resources, the inability to digitize the learning physical resources, and the shortage of students access to digital devices have been the main technical challenges (Lazzari & Baroni, 2020; Reimers et al., 2020).

COVID-19 made online learning a necessity; however, with the many different platforms that are used to deliver the online instruction, accessibility across platforms is difficult to ensure (Massengale & Vasquez, 2016). While many learning management systems (LMS) (i.e., Blackboard, Canvas, and D2L) now have integrated accessibility checkers, such as Ally and Udoit, that flag and report inaccessible components throughout a course, automated checkers cannot replace human knowledge and experience for identifying and addressing accessibility barriers (Lieberman, 2018). In addition, there are different mental health problems related to the COVID-19 pandemic and its subsequent restrictions. Students with disabilities are "among the most vulnerable individuals" in crisis that may affect them and their families' emotional and mental health on the long run (Zhang et al. (2020).

Deaf students in postsecondary courses rely on both assistive technology and accommodations to access content and the instructor. Assistive technology may include both hardware and software and depends on the needs of the student. Examples of assistive technology often include assistive listening devices or captioned videos. Accommodations include, among other things, qualified sign language interpreters and, often, skilled note-takers (National Deaf Center, 2021). Deaf students rely on sign language interpreters and assistive technology to access the instructor and course content (Alshawabkeh et al., 2021).

In response to the challenges of transitioning to online learning, ACE-BC along with CAPER-BC and AT-BC organized a biweekly community of practice meetings that brings together accessibility offices across British Columbia to discuss the challenges and share the solutions to the issues related to improving the students' experiences in online settings.

Students who are Deaf, hard of hearing, and Deaf-Blind routinely rely on different types of technology that facilitate their communication access. Technology used for online education has added another layer of technological intervention that students had to negotiate. Without assessing the value of online education, the goal of this literature review is to provide an overview of a variety of services and technologies that students who are Deaf, hard of hearing and Deaf-Blind rely on both in in-person and online settings.

Ultimately, technology cannot be viewed in a neutral way or as a tool that always facilitates

access. In fact, technology can also isolate people, creating unique forms of social exclusion. These exclusions can be the results of formal, mechanistic processes, such as the discursive practices around assistive technology in primary and secondary school settings, where technology is matched prescriptively to student "impairments". Exclusion, however, can also be subtler. Technology, for instance, privileges particular ways of being, which are grounded in normative, social, cultural, and economic practices, further reified in the design, manufacture, marketing and implementation of technology. In other words, technology is designed in ways that reflect taken-for-granted ideas about what constitutes normal (Foley & Ferri, 2012).

Accommodations in the classroom for students who are Deaf, hard of hearing and Deaf-Blind

Most of the students who are Deaf and hard of hearing rely on sign language interpretation and/or captioning service in a classroom, however in addition to these services, there are other accessibility configurations that students rely on. Their use of a specific configuration might be related not only to what students need based on their sensory limitations but on how they feel about using a specific service/technology and the potential stigma around it. The quote from Burke & Nicodemus (2013) demonstrates just how nuanced and complex the access needs of students who are Deaf and hard of hearing are.

> *One benefit to working with an oral transliterator in class was having only one person to speech-read, rather than whipping my head in every direction to catch every student comment before it was completed. Once I became more comfortable with my transliterator, I asked him why he fidgeted so much while providing oral interpretation. He explained that he was also a sign language interpreter and found it hard not to sign while mouthing the words. I gave him permission to "add his hands," renewing my acquaintance with American Sign Language, which I had put on hold since my undergraduate days…As a hard of hearing child, I had been schooled in how to 'pass' as a hearing person and not call attention to myself. As noted in my first encounter with an interpreter, attracting public awareness as a result of my disability left me feeling vulnerable and exposed… (Burke & Nicodemus, 2013)*

Other factors might include individual level factors, like the requisite academic and personal skills for successful transition to postsecondary settings (Cawthon et al., 2015).

Many Students who are Deaf and Hard of Hearing (SDHH) use accommodations that are commonly used by other eligible students, such as extended time. Accommodations uniquely relevant to SDHH might include American Sign Language (ASL) interpretation of test items or of test directions, note taking during lectures, speech-to-text services during lectures or classroom activities, and use of assistive listening systems and captioning of videos used in class. It is important to note that accommodations are not mutually exclusive; students may use only one accommodation, or they may use many, depending on their unique educational context and preferences (Leppo et al., 2014).

Students with co-occurring disabilities, for example SDHH+ADD/ADHD are more likely to use additional time and less likely to use technology and readers for tests. Students who have ADD/ADHD are less likely to use readers in comparison with other SDHH+, such as students with learning disabilities. It is important to differentiate based on a variety of needs. When one does not disaggregate results by specific disability, even with in the SDHH+ categorization, one loses the meaningful variability that translates to differences in accommodation use (Leppo et al., 2014).

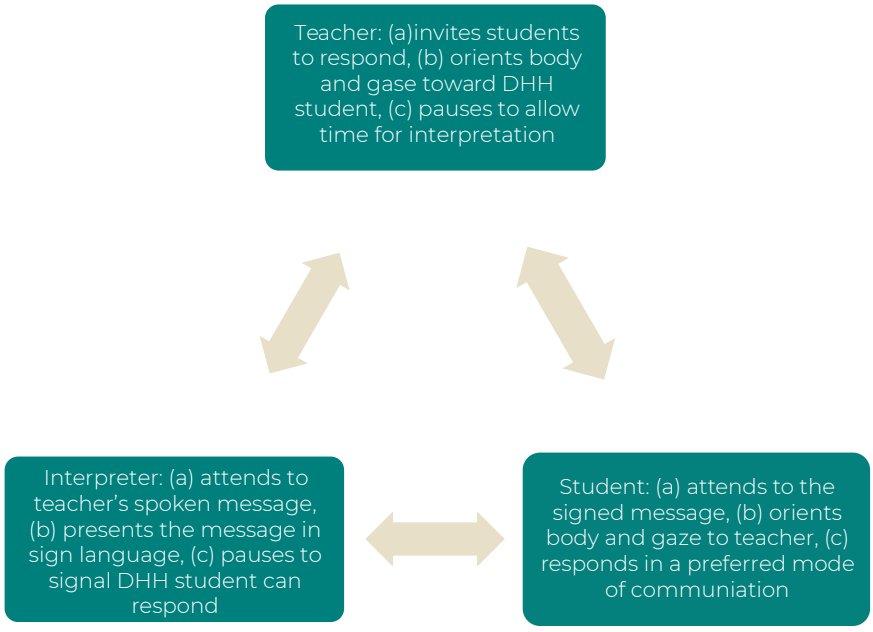

Figure 1. Coordinated interaction between teacher, interpreter, and student

Ultimately, communication between a student and an institution is critical for ensuring a true accessibility is achieved. Using the framework of shared responsibility, Salehomoum (2020) demonstrates how **a combination of technologies, sign language interpretation, and the physical arrangement of people and objects in the classroom are not enough to create an accessible environment if they are not accompanied by the ongoing communication and collaboration between the teacher, interpreter, and student.**

Research indicates that there is no one-size-fits-all solution when it comes to providing either closed captioning or sign language interpretation. There is no inherent advantage or disadvantage to C-Print or CART relative to high-quality sign language in the classroom (Marschark et al., 2006). It all depends on the individual need. Sign language interpretation with ASL being the most common in the Canadian context ensures equity for students who use ASL as their first language. However, there are multiple challenges that students experience when they transition from K-12 to post-secondary system. For example, one barrier to identifying postsecondary Deaf students' ASL skills is the lack of readily available ASL assessments that provide information on ASL subareas.

Self-awareness of one's ASL skills is crucial for students to select appropriate accommodations for full access to college content (Spencer et al., 2018). Several studies have documented that postsecondary students overestimate their ASL skills based on rubric ratings. Those who are less skilled are often unaware of their actual skill level, consequently overestimating their skills even after engaging in tasks that should have shown participants their true skill level (Walton et al., 2019). Overestimation of sign language skills is an important postsecondary issue because "student engagement and retention are related to communication skills" (Spencer et al., 2018, p. 23). These findings suggest that documentation of postsecondary students' present ASL skills and explicit instruction in ASL for some postsecondary signing Deaf students may be needed (Beal et al., 2021). In other words, transition services and a better alignment between K-12 to post-secondary system can address some of these gaps.

Captions

Captioning is the process of converting the audio content of a media product into text and displaying the text on a screen, monitor, or other visual display system. Captions not only display words as the textual equivalent of spoken dialogue or narration, but they also include speaker identification, sound effects, and music description. For captions to be truly accessible, it is important that the captions are (1) synchronized and appear at approximately the same time as the audio is delivered; (2) equivalent and equal in content to that of the audio, including speaker identification and sound effects; and (3) accessible and readily available to those who need or want them. Captions must have sufficient size and contrast to ensure readability, and be timely, accurate, complete, and efficient. When displayed, captions must be in the same line of sight as any corresponding visual information, such as a video, speaker, field of play, activity, or exhibition.

There are two methods for providing captions: offline and online captioning. Offline captions are captions created before a video is played. Conversely, with online, or real-time, captioning, the auditory information of spoken communication is translated in real time into written texts. Captions are an educational visual aid, supporting the learning of DHH students and helping them overcome the linguistic challenges they face in class. Using captions has a role in enhancing the reading skills of DHH students and facilitates their access to discussions and lectures. Using captions is important in helping students learn from instructional videos (Alsalamah, 2020).

Speech-to-text services are provided through three main systems: Communication Access Realtime Translation (Canadian Hearing Society, 2021; National Association of the Deaf, 2021.), C-Print, and TypeWell (Watson et al., 2007). Moreover, there are two systems through which speech-to-text services are provided: verbatim and meaning for meaning. In the verbatim system, each spoken word is written, whereas the meaning-for-meaning system provides a translation of the spoken language in a concise and comprehensive manner. CART is considered to be a verbatim system, while C-Print and TypeWell are meaning-for-meaning systems (Alsalamah, 2020).

Selection of a speech-to-text system is based on DHH students' preferences and the situation in which the system will be used. For instance, DHH students who prefer to see every word and to have full notes from their classes may prefer CART. The system that students choose may also depend on the level of difficult of the vocabulary used in class, how fast the speakers talk, the students' degree of hearing loss, and the availability of a speech-to-text system. The CART service is suitable for students who have strong reading skills, as the spoken words are written verbatim at high speed. On the other hand, C-Print and TypeWell require DHH students to have at least a fourth-grade reading level, as fewer words are produced than with CART. Overall, speech-to-text services are suitable for DHH students who are not proficient in sign language, students who do not benefit from hearing assistive devices, and students who have difficulty following lessons as a result of hearing loss. Also, DHH students who have a visual disability may benefit from the possibility of enlarging the font size of captioning (Alsalamah, 2020).

Because CART requires specialized hardware, software, and skills, it is an expensive accommodation in itself, as well as requiring significant administrative resources to ensure the service is available for each student, for each class. Expense and complicated administrative logistics have meant that this extremely effective accommodation has not been routinely available for most Deaf and hard of hearing students (Millett, 2021).

Expanded captions that in addition to text include nonverbal information, including shapes, colors, symbols, and animation, increase Deaf individuals' comprehension when used with captions. Although the expanded caption technology has yet to demonstrate its efficacy, it still seems promising because it addresses two key challenges Deaf students often face in learning: First, the

opportunity for more thorough review of material can help Deaf students deal with language processing issues that these students often face; second, the opportunity for students to obtain definitions, illustrations, concepts maps, or other information can help them overcome challenges that result from limited content knowledge (Stinson & Stevenson, 2013).

Captions have been demonstrated to benefit all learners. While adding captions, transcripts, and/or audio descriptions is essential for students with specific sensory impairments, it benefits other students as well. Students whose primary language is different than the language spoken in the video can use captions to increase comprehension. Students with learning disabilities can read transcripts at their own pace, in case of a recorded video, they can use rewind and fast-forward controls to review a concept multiple times, and/or pause the video if they need a break. Other students can turn the volume off and read captions if they must watch videos in a quiet environment and not disturb others or in a loud environment and cannot hear the audio (McCarron, 2021).

When using captioning services, DHH students may face challenges, some of which are related to the speed of captions, which may be not appropriate to their reading abilities. The presence of another source of information, such as a sign language interpreter, in addition to the speech-to-text service, may affect the ability of DHH students to focus on the subject of a lecture, as they will be focusing on two different sources of information (Alsalamah, 2020), however that is not the case for everyone.

There are multiple tools for creating captions. In addition to outsourcing these services which takes time and can be expensive, there are other tools, including for manual captioning. Media Access Generator (MAGpie) was the original free caption-authoring tool. Subtitle Workshop is another popular free tool that can be downloaded and used to create a caption file. Amara, which is browser-based, provides a space for the captions to be entered and a timeline to sync the captions with the audio. Third-party tools usually create a separate file for the captions, although Amara instead publishes the new captioned video on their own server. The need for these and other tools has diminished since YouTube integrated its own captioning tool. Users can now add a language track to their YouTube videos. Some of the concerns about YouTube's auto-captioning feature is accuracy. Even though students might prefer to watch videos with captions generated from automatic speech recognition than to have no captions at all (Shiver & Wolfe, 2015), advocates are concerned that automated captions may be seen as an acceptable alternative by Deaf users and a substitute for professionally created captions (Parton, 2016).

Automatic Speech Recognition (ASR) Captions

The most frequent issue with ASR is accuracy and its impact on the ability to understand spoken content. Students might also be resistant to ASR for a variety of reasons, including concern about replacing ASL interpreting, the lack of bidirectional communication, and lacking reliable access to technology for impromptu ASR interactions (Berke et al., 2017). Accuracy of transcribed material can be defined as both a Total Accuracy score indicating % of words transcribed accurately, and as a Meaning Accuracy score, which considers transcription errors which impacted the meaning of the message (Millett, 2021). Millet (2021) evaluated Interact Streamer, Ava, Otter, Google Slides, Microsoft Stream, Microsoft Translator, Camtasia Studio and YouTube. For the lecture condition, 4 of 5 technologies evaluated exceeded 90% accuracy, with Google Slides and Otter achieving 98 and 99%% accuracy. Overall accuracy for video captioning was highest, with 5 of 6 technologies achieving greater than 90% accuracy, and accuracy rates for YouTube, Microsoft Stream and Otter of 98-99%.

Answering the question of "when is accuracy good enough?", then, requires identifying variables which most interfere with, or facilitate comprehension by, each individual user. What happens in the moment when errors occur (i.e., what strategies does the student have when they encounter

comprehension difficulties)? And, perhaps most importantly, how do instructors and users evaluate whether captioning has supported learning or not (i.e., how does one evaluate whether a student has better comprehension with captioning than without it)? (Millett, 2021).

Despite the prevalence of ASR, it is important to understand the limitations of speech recognition technology. Poor captioning produced by speech recognition software is in fact worse than no captioning, as it is distracting and requires extra processing time on the part of the reader to identify whether it is in fact an error, to decide whether to ignore it or not. If it is a meaning-laden word or term, the listener must then use precious time and cognitive processing resources to figure out what was actually said. (Millett, 2021; Stinson & Stevenson, 2013).

The acoustic and linguistic characteristics of speech associated with DHH people is different from non-DHH people, and usually varies dramatically as a function of hearing loss and onset. As a consequence, Auto¬matic Speech Recognition (ASR) systems trained on speech from non-DHH people perform poorly for recognizing Deaf speech. In particular, even if the Deaf person had highly intelligible speech, commercial ASR services could not recog¬nize many spoken words, and participants were dissatisfied with the service (Glasser et al., 2017).

Other factors for ASR usability include:

- Noise (e.g., music)
- Speech produced with an accent
- Multi-talker speech or side conversation
- Disfluent speech or speakers with emotion (Glasser et al., 2017).

National Deaf Centre (2020) reports that ASR cannot be viewed as equitable access. To the untrained eye, ASR may seem "good enough" when testing its application in a quiet office with a single speaker. When you introduce environmental and other factors — such as accents, female speakers, multiple or overlapping speakers in group discussion, and audio distortion — the technology has yet to be proven comparable to a trained speech-to-text professional.

Research shows ASR often does not typically include:

- Proper grammar and punctuation markers
- Multiple speaker identification and changes
- Technical vocabulary, jargon, or proper nouns
- Homonym differentiation
- Environmental sounds or background noises
- Ability to ask for clarification or request that a presenter speak louder

Barriers in online post-secondary settings

Some of the challenges reported by students with disabilities in post-secondary settings include the negative attitudes displayed by faculty members when they do not adapt the teaching projects and questioned their capacity to study in the university. Additional challenges include architectural barriers and inaccessible information and technology. A successful transition during the first year seems to be critical to the student's ultimate retention and success (Moriña, 2017). Students often register with the disability support services but do not access them. A significant number of students choose not to engage, or to minimize their involvement, with disability support services because they feel that staff attitudes and communication were less than ideal. Participants reported that disability support staff often lacked the knowledge necessary to understand or assess DHH students' needs effectively and had no understanding of their cultural needs. (Powell et al., 2014). The pandemic has either exacerbated the existing challenges or highlighted new ones, specifically in the area of technology.

There are a number of drawbacks to an online setting for SDHH that may not be obvious on the surface. First, online learning requires a significant level of reading and writing skills. As noted earlier,

many individuals who are DHH may not have reading skills that match the reading level of postsecondary instructional materials. There is also an affective component to engagement in any setting, including online. For SDHH with below-grade level writing skills, there may also be a reluctance to participate in a setting where an individual's writing skills are evaluated by peers (Cawthon et al., 2014).

While there is video editing software that allows an instructor to caption videos (such as Camtasia Studio), it is unlikely that the average instructor will have the financial or technological resources to do this. In fact, instructor attitudes towards professorial accommodations (i.e., situations which required the professor to change or do something extra or different) are not favorable. Access to captioned audio and video material used in class therefore remains a significant problem for students who are Deaf or hard of hearing (Millett, 2021).

Students who are Deaf-Blind experience a unique set of challenges. Most, if not all, Deaf-Blind individuals rely on additional modes of learning and communication, such as touch to receive reliable access to clear visual and auditory information. Research shows that access has a significant impact on Deaf-Blind college students' academic experiences and how they navigate through the academic world. Deaf-Blind students require different levels of access and support to function academically. Access to information and communication is the defining core category to survive not only academics, but also to achieve personal independence and involvement at a college (Wolsey, 2017). In addition to ongoing access to information and communication in all aspects of college life, not only academics, Deaf-Blind students have an additional challenge to be aware of their vision changes through different stages of life, advocate for themselves regarding what they need, and fight for the right to be "seen". They have to be assertive about their need for close vision or TASL (National Consortium of Interpreter Education Centers, 2013). Deaf-Blind students also face challenges of not being accepted by the Deaf community (Arndt, 2011).

Technological and Spatial Solutions to Inaccessibility

Crowd Captioning has been offered to address some of the limitations of ASRs. First, it is potentially much cheaper than hiring a professional captionist because non-expert caption¬ists do not need extensive training to acquire a specific skill set, and thus may be drawn from a variety of sources, e.g., classmates, audience members, microtask marketplaces, vol¬unteers, or affordable and readily available employees. While non-experts cannot type as quickly as the natural speaking rate, the research found that crowd captions outperform ASR in many real settings (Kushalnagar et al., 2012). The reason is that a single cap¬tioner cannot optimize their dictionary fully, as they have to adapt to various teachers, lecture content and their context. Classmates are much better positioned to adapt to all of these, and fully optimize their typing, spelling, and flow. Crowd captioning enables the software and users to effectively adapt to a variety of environments that a single captionist and dictionary cannot handle (Kushalnagar et al., 2012). However, the feasibility of implementing this strategy in a typical postsecondary classroom seems low, and the limited body of research on speech-to-text technology in real classrooms continues to highlight difficulties with accuracy that are not easy to solve (Millett, 2021).

DAVEE, a Virtual Reality (VR) classroom experience facilitates live interpretation. During live sessions, DHH students can ask questions, receive feedback and have interactions with other students. A VR classroom environment has the potential to address some accessibility challenges while enabling the DHH students to reap the benefits of massive open online courses (MOOCs). However, fundamental design decisions must be made to ensure accessibility. DAVEE has three different

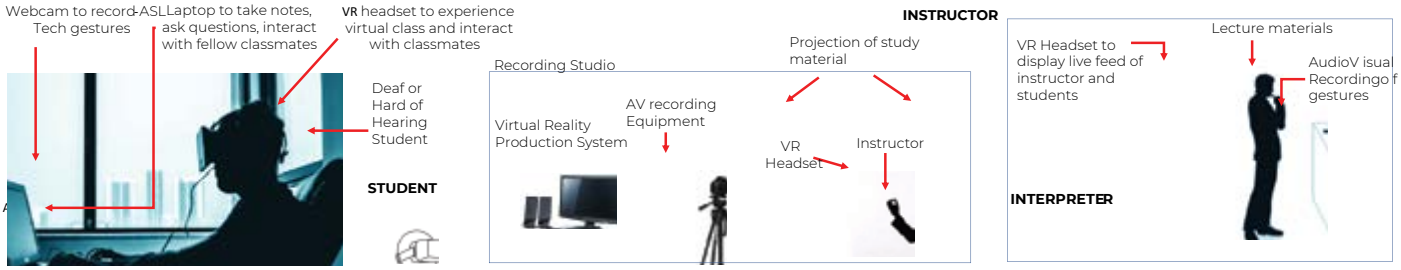

Figure 2. Student, Instructor, and Interpreter setup

experiences: the student, the instructor and the interpreter (Paudyal et al., 2019).

Instructors who play a critical role in designing the courses that are accessible to all students can rely on several tools. Applications such as the Microsoft and Adobe suites offer tools for designing accessible documents and slide presentations. These features include the ability to add alt text for images, plus headings and styles for screen readers (Moorefield-Lang, 2019). Nonetheless, assistive technology is ineffective if the content is not designed to be accessible (Acosta et al., 2020). Currently, employing student workers or assigning a course development team member (if available) to captioning or transcription tasks may be a more cost-efficient option for institutions (Cifuentes et al., 2016) in addition to relying on service providers and vendors that provide these services.

In addition to applications for creating accessible instructional materials, there are tools for identifying and correcting accessibility issues, including Microsoft and Adobe products with accessibility checkers. Web Accessibility in Mind (WebAim) also offers web-based services, such as a color contrast checker and a web accessibility evaluation tool (WAVE) that scan applications and websites to determine their level of digital accessibility. Most learning management systems (LMS) (i.e., Blackboard, Canvas, and D2L) now have integrated accessibility checkers, such as Ally and Udoit, that flag and report inaccessible components throughout a course. Nonetheless, automated checkers cannot replace human knowledge and experience for identifying and addressing accessibility barriers (Lieberman, 2018).

Online instruction formats may be one way that institutions can increase their level of readiness to serve SDHH. In contrast with the speech-heavy communication in face-to-face lectures, most online programs impart the vast majority of information in a text format. The bulk of online teaching and feedback activities are conducted not "live" but asynchronously; faculty post discussion threads, students respond in dialogue, and student feedback can be provided individually via online portals. Materials can also be viewed at a pace that does not require a note taker service to supplement classroom attendance. Videos can be captioned and, once captioned, made available to all students who may need them in the future (Cawthon et al., 2014).

But despite the benefits of online education, there are multiple barriers. Students with invisible disabilities (including students who are Deaf and Hard of Hearing) have more positive attitudes toward requesting accommodations in online learning versus face-to-face than those with hidden disabilities (Catalano, 2014). In describing the different levels of accessibility barriers for students with disabilities, McKeown and McKeown (2019) describe that the first layer is the LMS or course portal level. The second layer of barriers might exist in course materials, such as lectures, videos, or documents.

Any one of these barriers could cause a student to be unable to access important instruction and content, yet many accessibility efforts address only one or two of these layers while leaving other barriers firmly in place. Not included in this model are the barriers that potentially keep students from even reaching this point, such as course enrollment

APP/SOFTWARE	VERSION	DESCRIPTION AND NOTES
3Play	N/A	
YouTube (www.youtube.com)	N/A	YouTube offers an option to click on CC, and choose "English (autogenerated)" for captions
Microsoft Stream (https://products.office.com/en- ca/microsoft-stream)	N/A	Stream is a platform included in the Microsoft Office 365 suite, and is intended to allow users to create and share video for meetings and online learning.
Camtasia Studio (https://www.techsmith.com/)	Camtasia Studio 8	Camtasia Studio is video content creation and editing software developed by TechSmith which includes a Speech to Text option to create video captions.
Ava https://www.ava.me	2.0.9	App available for Android and iOS. Note: Accuracy level set to default (Auto 95%); Curse Words Filter set to No curse words.
Google Slides https://www.google.com/slides/about/	N/A	Available for free as part of the office suite in Google Drive. Software will provide real time captioning by opening a blank powerpoint slide, clicking "Present," and then Ctrl + Shift + c. Only works with Chrome browser, and only does not work in the Google Slides app.
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processes or university marketing materials. The third layer of accessibility barriers is communication and language, for example complexity of the language used in instruction.

Communication in the online environment is one of the key factors to ensure online instruction is accessible. Often, students who are Deaf and hard of hearing feel that they did not get to know the instructor as well in Web-based courses compared to those offered on campus (Luetke, 2009). Some of the strategies that proved to be successful in online settings are weekly "debriefing" sessions among the professor, technologists, and interpreters as soon as possible after each class to determine areas needing improvement for subsequent classes. Other strategies include the establishment of protocol for proper class management (turn taking, recognizing the need for flexibility from all participants, etc.) (Slike et al., 2008).

From the spatial perspective, the concept of "Deaf space" is an essential part of access for Deaf students that helps us think beyond merely installing visual fire alarms. Deaf space asks us to think deeper about how Deaf people navigate physical space, considering visual space, sight lines, light, color, and acoustics (Palmer et al., 2019). Students build social capital when they develop relationships and networks based on shared values that allow them to exchange information and resources. Accessible social networks are valuable for Deaf individuals to share tips, strategies, and tools to navigate campus life. The full inclusion of Deaf students means that social networks are accessible, both in formal and informal settings (Palmer et al., 2019).

Online education and UDL

Universal Design (UD) has become a means of reorienting not just priorities but also conversations and theories. The design dimension of UD suggests that UD is a way to plan, to foresee, to imagine the future. The "Universal" of UD also suggests that disability is something that is always a part of our worldview. Thus, when UD is successful, it is hopeful and realistic—allowing teachers to structure space and pedagogy in the broadest possible manner. Dolmage (2017) suggests that Universal Design is about building community, building better pedagogy.

Universal design includes at least 5 levels of access:

1. Movement—getting there—how we get to an event or class.
2. Sense—being there—how we access the material, the conversation.
3. Architecture—orienting—how the space and layout structure our belonging and understanding.
4. Communication—how we join the conversation, engage, understand and are understood.
5. Agency—autonomy—how we can come to have a shaping role in the event or class, as well as the right to define our own identity and involvement.

Universal Design for Learning (UDL) is a proactive rather than reactive approach. By designing learning environments to be accessible for all learners, you are mitigating the need for assistive technology or for having to react to the need for a special accommodation by adapting or creating a specialized design. UDL also improves the learning environment for students without special needs. For example, students for whom English is a second language may find reading a challenge in the same way as those with learning disabilities. Therefore, providing captioning on an audio lecture can help the reader decode language. Even those who experience one-time or sporadic Internet failures may appreciate the benefits that come from materials in multiple formats (e.g., a printed lecture for when the audio is not working) (Catalano, 2014).

The framework and guidelines for UDL guide the critical elements of teaching and learning and address a wide range of individual differences. UDL is not just for students with disabilities, it is for all the students because a flexible curriculum will support all learners while still individualizing learning. However, the advantage is that, changes teachers will make in order to provide access and participation for students with accessibility needs can benefit all the children in the classroom. UDL guidelines are (CAST, 2018): (1) Providing multiple means of engagement; (2) Providing multiple means of representation; (3) Providing multiple means of action and expression.

UDL focus on providing options is essential in the context of inclusive education. Both in synchronous or asynchronous online activities it is recommended to use multiple media so that information is accessible to all students and learner-friendly (use of voice along with written or graphic representations, slides with text or images doubled by voice explanations, practical demonstrations and discussions, digital text, symbols, graphics, with audio recordings, video with subtitles, notes sent in advance, work sheets that can be enlarged or printed, etc.). Students' progress is centered on curricular goals and not on overcoming the curricular barriers with challenging goals and allowable scaffolds (Frumos, 2020).

UDL goes beyond the classroom and includes changes at multiple levels. First, university spaces should be fully accessible, with no physical barriers of any type. In this context, it is crucial that spaces be based on the universal design principle so that environments are accessible to all users (Powell et al., 2014). Second, universities should consider the especially sensitive transition of students with disabilities during their first year and even the first weeks of attendance. The university should take proactive action in transition planning to avoid early leaving and to foster academic success for students with disabilities. Strategies might include

special orientation sessions, tutorials (e.g., assigning a student in a higher year or an instructor as a counsellor) or having reference persons or groups related to the disability among the faculty. Third, higher education should support training the faculty, not only in the discipline they teach and investigate, but also in how to teach. Instructional and methodological strategies to address the needs of students with disabilities should be mandatory for all personnel. Faculty members should be sensitised, informed and trained in how to carry out inclusive pedagogy and universal designs for learning. Fourth, it is not enough for the university to just guarantee access to students with disabilities. Its policies and practices must be revised to ensure that education is inclusive – guaranteeing that all the students can participate fully and that all can benefit from a process of quality teaching and learning (Moriña, 2017).

Dolmage (2017) argues that the alternative to planning for diversity is dire, leaving access as an afterthought, situating it as something nice to be done out of a spirit of charity, or as something people with disabilities are being unfairly given. Without Universal Design, the alternatives are the "steep steps" that are set out in front of many people with disabilities, or the "retrofits" that might remove barriers or provide access for disabled people, but do so in ways that physically and ideologically locate disability as either deserving exclusion or as an afterthought. Universal design cannot be uncoupled from the discussions of social justice. Disability Studies emphasizes social and societal barriers and challenges, reject the (bio)medical model of a body at fault, and seek to embrace disability as an asset and as a different way of working. Within academia, where perfectionism, productivity and excellence are internalized, the concepts of ableism and normalcy provide a helpful theoretical framework and an effective lens to theorize and make sense of personal experiences (Brown, 2020).

Social justice

In working toward fostering a campus environment that is inclusive of students with disabilities, the notion of normalcy perpetuated at the institutional level can be associated with practices that prioritize students without impairments as the ideal norm. Creating attitudinal shifts in relation to the notion of normalcy can therefore help minimize the culture that perpetuates the perception of students with disabilities as inferior and marginal. Any model of disability support that focuses on individual difference can be characterized as medical-oriented, focusing exclusively on the perceived deficits. Shifting the focus from the learner to the wider context of the learning environment can increase awareness and have broader positive implications for all students (Green et al., 2017). Education that is inclusive of students with disabilities must move beyond simply fulfilling legally required accommodations and embrace a social justice framework that can empower students with disabilities to be active participants in creating change at the cultural level on campus.

Focus Group Analysis

Communicating accessibility needs

Positive interactions with accessibility office

Accessibility offices play an important role in helping students identify their needs and ensuring that these needs are met in classroom settings. Engaging in a process of conveying accessibility needs and translating them into practice is essential for a positive learning experience.

Students reflect on the process in the following way:

> *I would ask for extra time for tests and for written assignments. And the counsellor would ask me some more questions that I then answered. They wrote it all down. They passed on my needs to the instructor. And there was paperwork to sign for the instructor to approve that and I would say that the office, the accessibility office, did a great job.*

Similarly, the student below commended the work of accessibility advisors.

> *They always make an effort to reach out to me. And They always make an effort to reach out to me. And before this, it was always, you know, just a quick maybe 15-minute in-person meeting, just to go over accommodations for the new semester, but it's always felt nice and personalized, always there for me, ask how I do. It's not an accommodation thing and more of a how are you doing and how can we help you kind of meeting. So that definitely makes a big difference for me.*

Both of the above students described the positive experiences they've had with accessibility offices. A clarity of the process and a personalized attitude contributed to this experience. Additional steps for improving the communication process include:

- Clarity across the institution about what the expectations are related to accessibility;
- Clear policy
- Better communication among different players
- More FAQ's for students and instructors
- Having a go to person for students, instructors and various services within the college
- Availability of in-house workshops to better educate faculty and staff
- More forethought and planning for accessibility
- Working collaboratively

Getting access to technology

In addition to communication, access to technology was mentioned as an important component of accessibility. Students experienced barriers when trying to secure technology. Specifically, students mentioned the bureaucracy of loaning a laptop like the student below:

> *I would have to go to the library and try to borrow a laptop, and they'd say, well, you can only have it for two weeks. And I would say: can't I borrow it for the whole semester? And they'd say no, you have to reloan it -- borrow it every two weeks. And, you know, I think maybe there might have been the possibility of applying for, like, some sort of government-issued laptop. But it was going to take paperwork and a couple of months' time that I didn't have before I would get that.*

As well, students discussed that despite the opportunities that technology opens up, it creates multiple barriers for students who Deaf and hard of hearing, and availability is not the same as access.

> *And I just think that even though the technology allows for certain things to happen online it also makes it really hard for a Deaf student to fully participate. If we were ever in a pandemic situation again, I think quite a few things could be improved and people should be planning ahead now just in case.*

Navigating accessibility in classroom

The layered access needs

The experiences of students also demonstrated that there is a no one-size-fits-all approach when it comes to providing accommodations, specifically sign language interpretation, speech-to-text, automated captions, note-taking.

Some of the positive aspects of online learning mentioned by the students and the literature:

- Ability to revisit recorded materials, more flexibility
- More course materials are available in alternative formats
- Increased use of captioning
- Less background noise than in a classroom, less peripheral distraction
- Increased interests from the instructors to explore accessibility of their courses, including UDL
- More collaborative work to improve accessibility

Some of the main challenges that students who are Deaf, hard of hearing and Deaf-Blind experience in online learning environment include:

- Technology access (bandwidth, access to hardware and software, shortage of TypeWell providers)
- Navigating the use of hardware and software
- Lack of captioning or a poor quality of captioning
- Timeliness of getting the materials and/or getting the materials in accessible format
- Isolation from their classmates and access to the instructor.
- Impact on physical and mental health (e.g., eye strain, fatigue)
- The challenges of ensuring accessibility of STEM classes
- Falling behind in class (not being able to follow due to lack of accessibility, lack of awareness about Zoom etiquette).

Depending on the individual needs, both ASL and captions might be beneficial for a student's learning. One student from the focus group described their access needs in the following way:

> *And also I benefit from being be able to see English captions and see that way of capturing the information. And I often rely on both. I read the captions and I feel that I know exactly what people are saying but I participate myself in ASL. You know, I don't want to get information only through captions, you know, word for word in English.*

One of the challenges that some students experience in online synchronous settings revolves around the need to split their attention when there are multiple sources of information on the screen at the same time. As one student noted, it is very distracting to have messages popping up and people speaking at the same time or too quickly for sign language interpreter to follow along.

> *But also sometimes on zoom I feel like when people are showing things on the screen and different things are popping up, that can be sort of distracting, hard to know where to look.*

Given the overwhelming environment of synchronous online classes, some students have a preference to specific accommodation. For example, some Deaf students prefer sign language interpreter rather than CART. Automated captions have been discussed in detail in the literature review, and most of the students in the focus group agreed that ASR is not a sufficient accessible solution.

> *I've tried to use that [captions] before but it wasn't a good accommodation for me because the CART person would be typing every word that the teacher said and it was lot for me to read and I found it complicated for me to understand.*

In addition to the amount of information conveyed in online media, the level of English used can also create a barrier, especially if the courses have a lot of specialized terms and language.

> *And just trying to keep track of all that was not — not working. And then trying to just communicate all in written English, like typing English messages, that was not the answer for me either, because then they -- the English that people are using is -- is at a different level that I'm not comfortable reading at.*

A combination of individual access needs, a student's level of English and ASL, and a subject matter are some of the factors that need to be considered when creating an accessible environment.

Class content and equity

Students also talked about how specific accommodations work in online classroom settings. In addition to access to ASL and TypeWell/CART, the instructors can facilitate and improve the access by providing the class materials ahead of time and by recording the synchronous class, thus allowing students who are Deaf and hard of hearing to re-watch the lecture.

> *I think the teachers were trying to — classes but weren't always so great at what I needed ahead of time.*

But even if the recording is available, it is often inaccessible because no captioning or sign language interpretation was used.

> *I'll also, sometimes the teacher will record and it's possible that there wasn't an interpreter or caption for something that was recorded and I can't access it later the way other students can. So instructors need to consider when can a Deaf student have access to what was done online.*

Sometimes, the structure of the class (watching pre-recorded lecture) and having a class that focuses on discussion (flipped classroom) was quite challenging for students who are Deaf and hard of hearing, especially if the pre-recorded lecture did not have any captions.

> *But with this — in the online environment, they were trying to, like, do both [watch pre-recorded video and discuss it] at once. And I just couldn't possibly follow all of the Q&A that was taking place. And the interpreter — we decided that the interpreter would just focus on interpreting the video content of the prerecorded class that was the — sort of the main thing going on and just ignore the chatter and just ignore the teacher having these side — this side Q&A at the same time.*

It must be noted that some of the institutional concerns related to lecture recordings include drop in class attendance and increase in surface learning. However, Seifert (2019) established that the availability of lecture recordings caters for students with various learning needs, and these would have little effect on lecture attendance. The availability of lecture recordings provides students with the following: ability to clarify confusing topics, prepare for exams, learn at their own pace, help

them take better notes at their own time and catch up on missed lectures as well as help them balance their schedules between their studies and other obligations (Chapin, 2018). Key findings indicated student's perceptions towards lecture recordings were generally positive and lecture attendance was not overly affected. Overall, students in different years of their programs stated that access to lecture recordings enhanced their engagement with learning (Nkomo & Daniel, 2021).

Meaningful participation in class

The value of accessibility in a classroom and a thoughtful approach to teaching, including the incorporation of the principles of Universal Design, will help create an environment of meaningful participation of students who are Deaf and hard of hearing. The goal is not to view accessibility as an act of goodwill but as an environment of equity irrespective of access needs.

> *And I also had to say to the group, you know, can we set things up with enough time, like with a couple days for me to get an interpreter in place? And it was always cumbersome, and I think it was just a lot of awkwardness about trying to do the small group work online.*

In reflecting on the environment of the group work, one student described that a meaningful participation is not about someone doing the work for the student to bypass the need for accessibility. Rather, it is an opportunity to do the work independently using the accessible tools available.

> *And then sometimes I'm getting lost just because of the process and another student will say oh, don't worry I'll fix it for you and I'm like that's not the point. I want to be participating and I want to do this myself... I can do this assignment.*

Facing systemic barriers

Intersectional approaches

Intersectionality is an idea that allows us to think of our lived experiences in a nuanced way, through recognition of the multiple social locations that we occupy (Crenshaw, 2017). Students who are Deaf and hard of hearing also want other aspects of their identities to be recognized and reflected in policies and practices. For example, by having to choose between a Deaf experience and an immigrant experience, students might miss out on the valuable aspects of both.

> *In the Deaf and hard of hearing class the focus was only on the English language, only on English structure, and I felt disappointed that I had to miss out on the other aspects of the LINC program as an immigrant because I was Deaf and I had to go into the Deaf and hard of hearing class...Other immigrants who aren't Deaf I see them move to Canada and plug into the programs there are there for them and it seems a smooth journey for them. Not like mine.*

Accessibility approaches need to take account of these multiple aspects of a person's life (Opini, 2008).

Consistency of services across institutions

To ensure that students who are Deaf and hard of hearing can make decisions about their education in the same way that other students can, it is important for institutions to have consistency in terms of their policies and practices around accessibility.

> *And so I wanted to try to transfer and they said, well we won't be able to provide interpreting. At [College A] that was provided but trying to transfer to another institution I was told I wouldn't get the same accommodations. That was a struggle.*

Belonging

The postsecondary experience is not limited to the classroom and includes broader campus experiences. Students who are Deaf and hard of hearing might feel disconnected and alienated, and it is important to ensure that different services and departments foster a sense of belonging by making all the aspects of the institutional life accessible and inclusive.

> *As a Deaf person and always being the only one on campus it was lonely and very challenging. And didn't feel much like I was connected to a community. As a student doing some work with a disability organization that was -- I felt more connected but for students who attend university I think the key advice would be to get involved with the alumni association, with a club, sorry, interpreter error.*

Survey Analysis

The survey included several questions that aimed at understanding the kind of services that were available to students who are Deaf, hard of hearing and Deaf-Blind, the kind of services that were requested, and the process of providing these services.

Among the types of accommodations that were provided most of the times hardware (14), live speech to text (12), and extended test time (12) were the top three requested services followed by sign language interpretation (11), assistive listening devices (11), tutoring (10), software (10), and note-taking services (10) (Figure 4).

his process for securing software/hardware for students varies for different institutions. For some, it involves working with AT-BC (5 respondents), whereas for others, this process involves submitting requests to IT and Finance departments. This process is closely tied to individual student's eligibility criteria. It is often a determination of whether a student is eligible for one of the funding streams (e.g., CSG-PD). One respondent indicated that a majority of students already have software/hardware as part of preparation process for taking courses online.

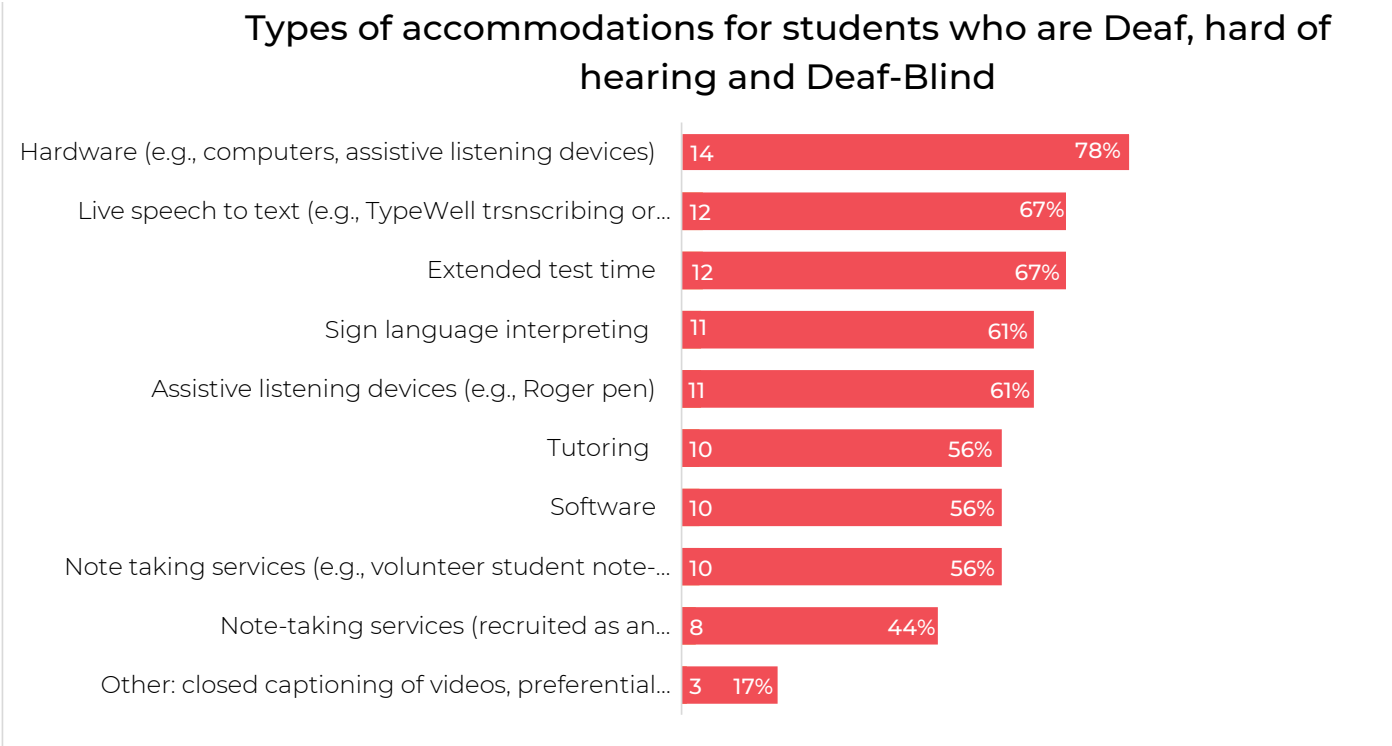

Figure 4. Types of accommodations for students who are Deaf, hard of hearing and Deaf-Blind

Changes in the process, ordering and purchasing of software/ equipment since COVID-19

Among the changes that were mentioned by the coordinators are the greater access to equipment in the institutions' library, increased flexibility in the process of requesting software/equipment via email/online instead of in-person. One institution mentioned the process of purchasing additional ClockWork modules to continue streamline online/ virtual processes for students.

A variety of learning management systems are used throughout the institutions. The top three most common LMS among the respondents are

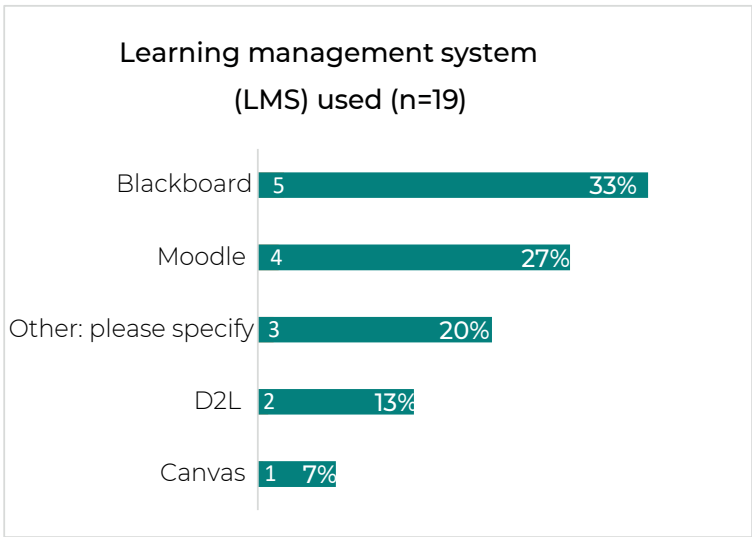

Figure 5. Learning Management Systems (LMS) used Blind

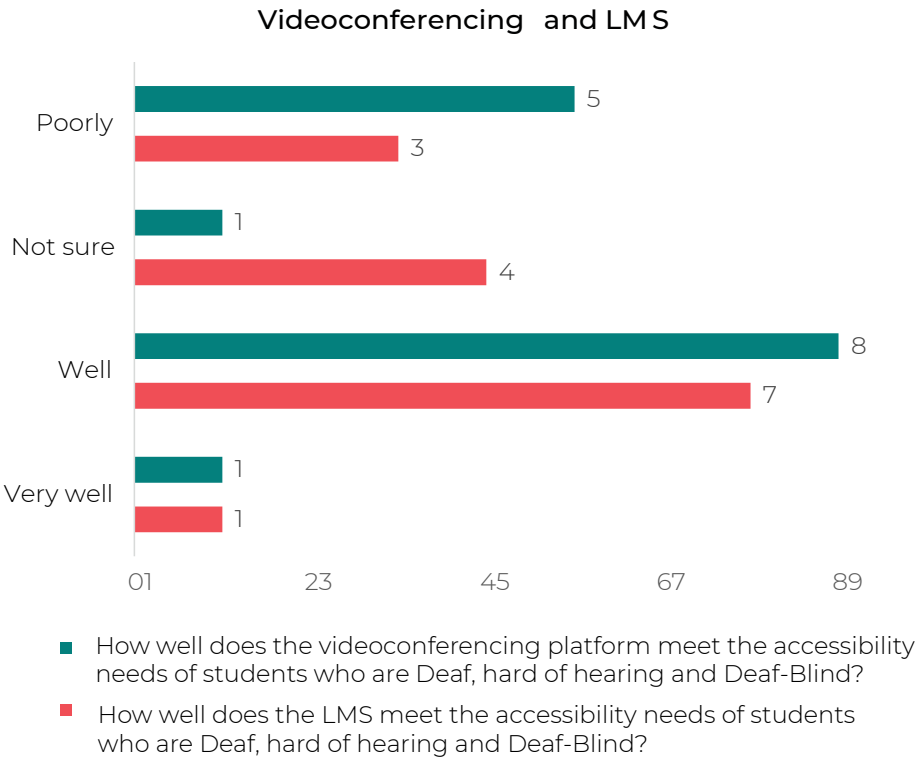

Figure 6. Videoconferencing and LMS

(2) and other platforms. Overall, the respondents felt that the videoconferencing platform used at their institutions meets accessibility needs of students who are Deaf, hard of hearing and Deaf-Blind "Well" (8, 53%); however 5 respondents (33%) nevertheless assessed it as "Poor".

Most of the times, captions for pre-recorded Blackboard, Moodle, and Other (Figure 5).

In assessing how well videoconferencing platform and LMS meet accessibility needs of students who are Deaf, hard of hearing and Deaf-Blind, most of the respondents responded "Well", however 5 and 3 respondents respectively assessed it as "Poorly" (Figure 6).

In terms of the most frequently used videoconferencing platform used at BC institutions, Zoom ranks first (11), followed by Big Blue Button

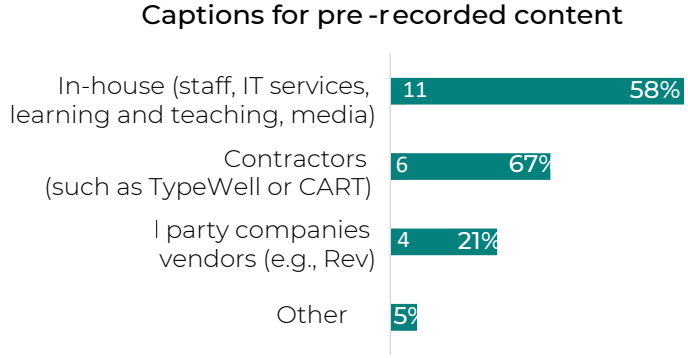

Figure 7. Captions for pre-recorded content

content are completed in-house (11) with contractors and third-party companies and vendors being used less often (Figure 7).

Overall, demand for captioning irrespective of the type of captioning and their source, has increased by about 30% either slightly or moderately during the transition. Demand for contracted captioning services, however, has mostly remained the same (43%) (Figure 8).

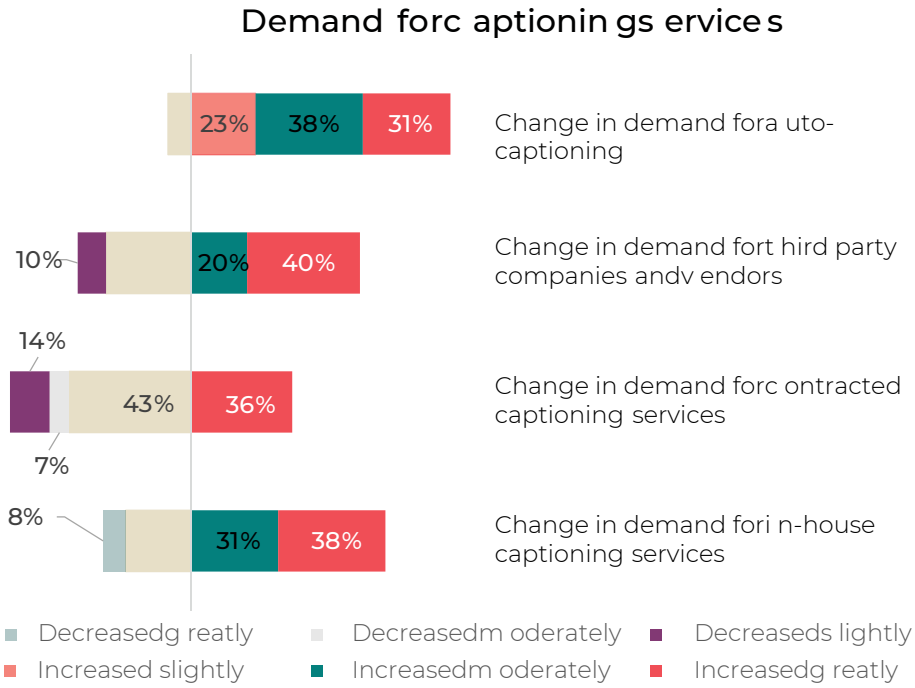

Figure 8. Demand for captioning services

In terms of the kind of captioning that has been provided in synchronous classes, TypeWell and CART were the most common (12) (Figure 9).

The main mode of online teaching adopted in response to COVID-19 was a mix of synchronous and asynchronous online modes (80%) followed by synchronous classes.

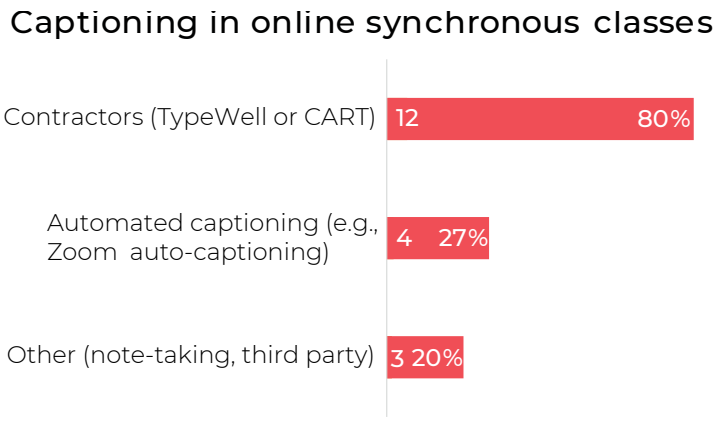

Figure 9. Captioning in online synchronous classes

Impact of synchronous online teaching

Students in synchronous online settings often need to follow along the instructor, the presentation shared on the screen, sign language interpreter and/or captioning chat as well as other interactive components during the class. Multiple sources of information on screen make it challenging for students who are Deaf and hard of hearing to follow along. Even if captioning and sign language interpretation are provided during the class, it does not reduce all the inequities of accessing the information. The onus often is on instructors to ensure the delivery and class interaction are inclusive of students who are Deaf and hard of hearing. This might require making pauses and speaking at a pace that an interpreter can keep up with, indicating who is speaking/signing at any given moment and ensuring that the breakout rooms are accessible.

At least 2 respondents indicated that real-time access to courses is limited for many students who are Deaf and hard of hearing because of the challenges related to participation, being able to access the instructor, and lack of access to closed captions either due to unavailability of this service at any given time and/or poor quality of the existing automated captions. There seems to be a gap in understanding among some instructors who might think that automated captions provide the needed access and might lack knowledge about the best practices of having both sign language interpretation and TypeWell/CART services.

The responses reflect a continuum of needs among students who have a varying degree of hearing loss. One of the challenges for students who rely on lip-reading is the turned off cameras as well as failure to repeat the questions/comments made in the chat verbally. At the same time, synchronous online learning can be easier for some students with hearing loss who might have less background noise and ability to connect to their devices using the hearing aids.
Ultimately, how accessible a class depends on how supportive and collaborative instructors are in planning and arranging for services.

Majority of respondents noted that their institutions do not have policies that specify the instructors' responsibilities in ensuring accessibility of online teaching (53%), whereas only 20% responded that their institutions have such policies. Almost a third of the respondents were not sure about the existence of such policies.

For majority of institutions, accessibility offices serve as a go-to place for requesting accommodations for events outside the classroom. Most of the institutions are not aware of the specific policies that focus on accessibility of campus events and rely on the accessibility services to provide accommodations for them. Students are encouraged to let the accessibility services know about their need for specific accommodations. Only one of the accessibility office survey respondents said that each department is responsible for paying for service providers out of their own budgets, and their department only takes care of classroom and related needs.

Almost half of the respondents (47%) observed an increase in requests for services from instructors after transition to online teaching, and almost another half has not seen any change in number of requests (Figure 10). Only 12 respondents answered the question whether their institutions' policies and procedures incorporate the principles of Universal Design. Out of 12, 3 responded that none of these policies incorporate UDL, 6 responded that some of them do, and 3 were unsure.

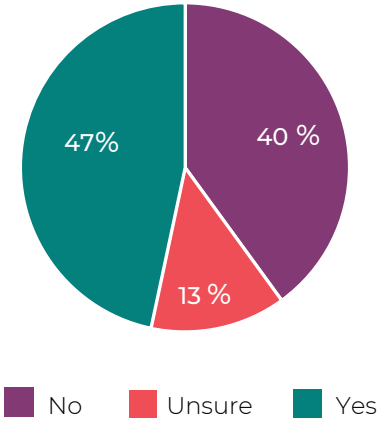

Figure 10. Requests for services from instructors after transition to online teaching

There were only two responses to this question, which might suggest that UDL is viewed as a best practice that is not in place at the moment. One respondent emphasized that UDL is not mandated, and the second respondent mentioned that incorporation of the UDL was contentious issue in the review of the current policy.

Sign language interpretation

Usually, sign language interpreters are hired on a contract basis depending on the needs. Alternatively, institutions have a roster of interpreters employees that they work with, sometimes as auxiliary CUPE interpreters. Some of the challenges related to the use of interpreters and captioning services included:

- Technical setup
- Coordination, including communication, scheduling
- Training and faculty capacity to integrate sign language interpreters.

Intellectual property was also mentioned as a consideration in sharing the captioned media. Instructors might be reluctant to share downloadable files.

One of the uncertainties related to the videoconferencing and LMS platforms used is how well they incorporate sign language interpretations. The survey responses reflect this uncertainly with 6 people (40%) being "Unsure" about it. However, 5

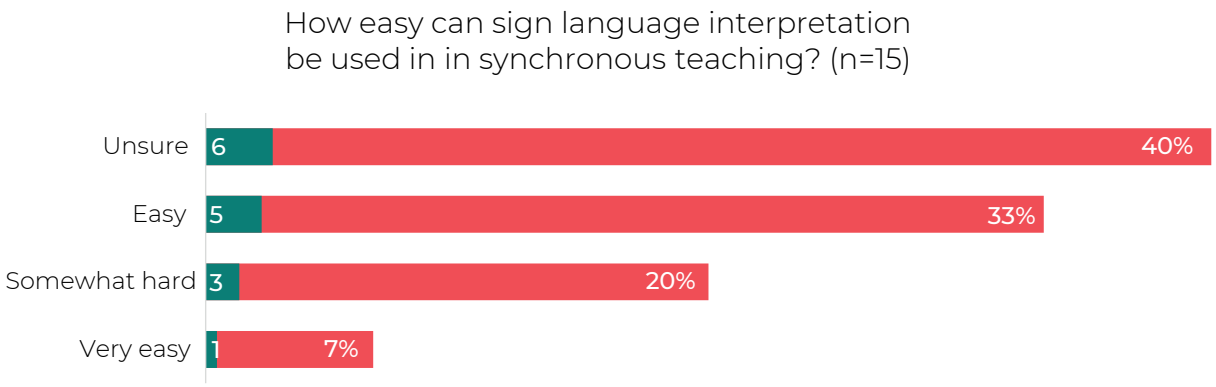

Figure 11. Ease of use of sign language interpretation

respondents (33%) felt it is easy (Figure 11).

Most of the staff from accessibility offices who responded to this survey received support from other departments, including IT, media, teaching and learning) (12, 86%) during the transition to online learning. Academic technology services/ IT departments have been critical in the process of supporting the transition to online teaching and learning. The department's support included the adjustments to the LMS to ensure it is more accessible (e.g., adding in extra exam time), requests for professional captioning, requests for transcriber equipment and license renewals. This department also provides support in troubleshooting the technical challenges and difficulties.

Alternatively, some of these supports were provided by the teaching and learning services that provided their support in securing third-party vendors for post-production captioning. The centre also encouraged instructors to create auto-captions through services like Camtasia. The need to pivot also encouraged some institutions to develop creative solutions. For example, one college is hoping to use student work—ops to caption and edits all the videos in an online, first year course. Teaching and learning centres have also been vital for helping instructors to adjust their teaching strategies to make them more accessible through provision of UDL trainings.

In addition to these, additional support was also provided by procurement offices who set up contracts and finance teams. Despite the increased collaboration in the last few months, some institutions emphasized the need for a more consistent collaborative approve in the future.

Privacy, copyright and accessibility

Some institutions have an agreement that states a series of expectations regarding student's sharing, or making public, the information from recording and copying the recordings. For instance, students cannot share this info outside the college. And/or if it is just the instructor's voice being recorded, only need instructor's permission. And furthermore, if recording group discussions or student questions, one needs to obtain permission from student(s). If a transcript is generated, student(s) can be named in the transcript, thus creating privacy concerns.

Impact of COVID-19 on accessibility policies

The impact of COVID-19 has been mixed. On the one hand, the pandemic increased the barriers for students who had to adjust to new meeting format and had challenges securing the equipment needed for online learning. On other hand, the pandemic has increased the awareness of the existing inequities in the online environment and brought forward the need to address them. For some institutions, this increased awareness resulted in the revision of their access and accommodation policies for both students and instructors.

Two respondents noted that although the policy itself did not change, the practices did.

> *Our Accessibility policy did not need to change. However, some of our practices changed. For example, how some accommodations were facilitated changed because of the online environment (e.g., instructors needed to change some settings in the LMS for students who use text-to-speech software; human exam readers/ scribes were set-up remotely via Zoom; instructors facilitated all online exam accommodations, etc.). Additional resources were created and provided for instructors to assist with facilitating technology-related accommodations. AS also made alterations to our online case management system.*

Another respondent noted that depending on the processes, some of them were adapted faster than others.

> *The impact was in processes to provide services. We adapted some processes fast, others that involved several departments and other policies took more time.*

The following steps to improve the online experiences of Deaf, hard of hearing and Deaf-Blind students at institutions were mentioned:

- Ensuring that LMS platforms are accessible and making sure approaches to accessibility are consistent
- Ensuring all videos are captioned
- Having accurate real-time captioning
- Having access to recorded and captioned lectures
- Applying best practices of accessibility in synchronous online classes
- Educating students about different tools that enhance accessibility

Accessible Media Policy

According to the report by (Mancilla & Frey, 2021), digital accessibility policies are not the norm at most institutions despite their importance for online learners with disabilities. . Yet, policy plays an important role in establishing an accessibility infrastructure.

There are key administrative processes for digital accessibility:

George Brown College Case Study

1. Institutional administration that can include presidents, provosts, deans, coordinators, managers, supervisors, and other campus leaders who otherwise might be nested in different academic departments and service units. Together they establish the institutional culture of accessibility by making it a strategic priority.
2. Budgeting is a key factor in strategic planning for digital accessibility. A budget is necessary for creating a robust infrastructure for accessibility that maps cycles for course review and evaluation, policy and procedure review, recruitment of experts, training and professional development of faculty and staff, and procurement of technology and tools. Generally, budgets should provide for purchasing specialized tools, such as screen readers, accessibility checkers, and captioning software, which are necessary for inclusive course design. Similarly, budgets should account for instructional design staff, who support faculty in making courses accessible.
3. Institutional administration also plays an important role in establishing a quality assurance process that prioritizes the accessibility of online course materials through regular review cycles. Auditing courses for accessibility involves verifying that media is accompanied by transcripts or captions, high contrast colors are used for text and images, alternative text is provided for images, and content can be navigated using a screen reader.

George Brown College has developed Accessible Media Policy in response to the provincial legislation and the students' concerns about their learning needs not being met in a timely manner. This issue was brought to the attention of the Accessibility for Ontarians with Disabilities Act (AODA) committee at the time. It represented all areas of the college, faculty, staff and students. The vague nature of the legislation coupled with the gaps in service provision, specifically related to the lack of support personnel for faculty and students. The purpose of the policy was to ensure that all media use at the college is accessible and all events are made accessible, with live captioning and ASL. The components included in the policy are:

1. Library made the media collection accessible. No new titles were purchased unless they were captioned or included the option to caption them. Despite the initial resistance, the demand for accessible media increased among other institutions.
2. The position of accessibility consultants was introduced to provide support to students and faculty. They were assigned to students at intake. Some consultants are fluent at ASL.
3. The Web team had to ensure that web content is accessible before it is posted.
4. A position of a UDL Integration Lead was also created as part of the Learning and Teaching Exchange unit. This person makes sure faculty uses UD. Universal Design for Learning and Integration provides support for faculty to integrate UD in their courses.
5. The staff development team started offering workshops to create accessible documents.
6. There are also 2 people who schedule the ASL interpreters and computerized note-takers. In addition to having their own service providers, computerized note-takers, interpreters, George Brown also works with vendors who are external to the college who do pre-recorded captioning and described video (AI Media).

One of the key strengths of George Brown's approach is that it has a designated budget for these services. Lack of funding creates barriers for faculty to request support. It took some effort and advocacy to ensure funding is available. One of the arguments that proved to be successful was based on the idea that a centralized budget will eradicate the culture of fear that prevents faculty and stuff from asking for help, thus jeopardizing the quality of education and services provided to students.

The services do not cover captioning of material produced by students. Instead, students and instructors are encouraged to use the principles of UDL. It took several years and many instructor trainings to raise the awareness and understanding about UDL.

As well, the College has an AODA committee that discusses any accessible related issues that might arise. As part of the AODA, the College has a built-in environment standard applied to facilities on campus. Signage, colour contrast, access points, and other elements are important when thinking about the overall accessibility. For example, to set up multiple ways of communicating emergency information, blue flashing lights were installed, the security warning system was revamped to include both an audio and a text version, all the relevant information is shared on screens throughout campus.

As the organizational chart in the Appendix X demonstrates, it is a team effort to build the environment that is working toward accessibility.

Discussion and Recommendations

The focus groups and the survey demonstrated that different perspectives need to be accounted for to create an environment that respects the principles of equity, diversity, and inclusion. Accessibility plays an important role in creating such an environment. It encompasses not only the technical solutions and specialized services but also a commitment to accessibility as a process rather than an end point. When accessibility is thought of in terms of belonging, it reflects a shift in values from simply accommodating someone with a disability to ensuring the environment is welcoming from the very beginning.

Online education has revealed multiple challenges related to accessibility that pre-date the pandemic. The assumption that online education solves the issues around equitable access to education has been critiqued for many years. For example, many researchers have demonstrated that learning at a distance requires higher metacognitive skills than learning in classroom settings, with higher dropout rates among distance learners compared with face-to-face students been known for some time (Lee, 2017). Those who tend to actually benefit from distance education are those individuals who are well-prepared (with high pre-existing academic skills) and well-resourced (including with funds, abilities, time, and technological or cultural access). Beyond the technological aspect of online education, a thorough evaluation of the conditions that create these challenges is required.

The aim of increasing diversity in higher education must be accompanied by parallel commitments to student retention and providing the necessary supports to integrate all learners into the academic and social environments of respective institutions. If delivered in a truly comprehensive and integrated fashion, the various elements should strengthen the development of supportive social networks (social capital) and provide validation of their worth and respect for their emerging identities (cultural capital) (Michalski et al., 2017).
Using an example of King's University College in Ontario, Michalski et al. (2017) describe that faculty and staff contribute significantly to the development and appreciation of diversity on campus, such as through their completion of online training on "accessibility in teaching". The faculty members work closely with the Services for Students with Disabilities Office. The use of a secure, electronic system reduces the pressures and anxieties for both faculty and students to have professional, third-party expertise to deal with access needs and, in many cases, medical issues. Regular workshops on creating healthy workplaces and classrooms are provided free of charge, as well as professional development initiatives are aimed at fostering the development of cross-cultural competencies. Undoubtedly, institutional leadership plays a key role in enacting these changes.

The passage of the BC Accessibility Legislation is a promising first step in providing the foundation for stronger commitment to accessibility in many areas, including higher education. However, it cannot be seen as the only necessary step. The tensions between providing equity and working within the budgetary limits and academic standards are often played out in the language of policy. The latter fulfills the legal requirements for access and accommodation, but can fall far short of achieving equity by relying on overly medicalized assumptions about disability (Hibbs & Pothier, 2006). Traditional efforts to improve the campus climate for diversity typically involve strategies that create immediately noticeable change, but such efforts rarely promote change at a level deep enough to ensure a truly transformational change (Williams & McClendon, 2005). Policies, organizational changes as well as

financial commitment (as the case study of George Brown College demonstrates) are all critical pieces of the puzzle in a journey toward what Lee (2017) calls "authentic accessibility". The benefits of this approach include not only the increased sense of belonging among students with disabilities but also among faculty and staff who might be disabled (Smith & Andrews, 2015).

Without denying the role of the structural changes that need to supplement campus-based changes, Palmer et al. (2019) developed a list of recommendations broken down by type of purpose. Depending on how much work a particular institution has done around accessibility for students who Deaf, hard of hearing and Deaf-Blind, some of these recommendations might be more applicable than others. As well, some of them do have significant policy and financial implications. This list is thus intended not only for accessibility offices staff and/or instructors of the institutions but also for staff in other departments (e.g., Student Services, IT), institutions' leadership, policymakers at the provincial level, and researchers who can develop evidence-based solutions to achieve some of these goals.

To improve attitudes on campus:

- Provide faculty members, staff members, and students with ongoing training and information about engaging, interacting, and partnering with Deaf students.
- Establish inclusive classroom communication protocols with students to facilitate meaningful interactions and learning opportunities.
- Seek opportunities to include Deaf role models on campus; consider partnering with campus clubs and organizations to bring Deaf presenters to campus.

To improve campus technology:

- Establish standard accessibility requirements for course development and classroom activities.
- Make communication technology available at offices, information desks, campus security, and in residence halls where students are likely to have frequent brief interactions with staff members.
- Create opportunities for students to explore technology and apps that increase accessibility, communication, and autonomy on campus.

To improve communications on campus:

- Ensure that important campus announcements are accessible. Consider using multiple systems for communicating campus announcements.
- Include with all communications standard language on how to request accommodations for campus activities and related programming.
- Proactively plan for and grant requests for accommodations for academic and social activities occurring outside the classroom setting.

To improve environment on campus:

- Consider integrating both visual and auditory systems within the architectural and physical surroundings of buildings and classrooms (e.g., visual fire alarms, loop systems in auditoriums, televisions with captions).
- Establish working groups to address the accessibility of information across campus platforms, including emergency communications and audio-visual displays.
- Encourage flexible classroom setups that allow students to maximize visual and auditory access to content, peers, and auxiliary aids.

To improve services on campus:

- Outline expectations and responsibilities for students, faculty members, and access providers related to effective implementation of accommodations.
- Establish protocols for collecting regular feedback from students regarding accommodations and auxiliary services; conduct periodic evaluations of services for quality and effectiveness.
- Create and implement institution wide accessibility policies and practices.
- Collaborate across departments to arrange and pay for services; foster a community responsibility for inclusion.
- Offer, introduce, and train students to use a range of accommodations to maximize experiences and learning across campus.

To improve social engagement on campus:

- Encourage Deaf student participation in campus wide leadership, clubs, and related activities to infuse the values, experiences, and perspectives of Deaf students on campus.
- In student life and residence life offices, increase knowledge about how to request accommodations; shift responsibility for accessibility from Deaf students to event planners.
- Encourage networking opportunities, like internships, teaching assistant positions, job shadowing, or mentoring, that will strengthen relationships among faculty members, students, and the larger college community.

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Appendix A. Survey for accessibility advisors

Accessibility services for students who are Deaf, hard of hearing and Deaf-Blind in British Columbia

As part of the research project that explores the accessibility of online teaching in British Columbia, ACE-BC is asking you to complete this survey. Your responses will help inform how online teaching and learning has impacted students who are Deaf, hard of hearing and Deaf-Blind.

This project has three overarching objectives:

- Identify the approaches adopted by the institutions in British Columbia to accessibility in the context of transitioning to online teaching
- Identify the gaps in online teaching that impact students with mobility, sensory, and print disabilities
- Develop a list of suggestions that address accessibility challenges to institutions participating in the project

In addition to this survey, focus groups with students are being planned. This survey is intended for accessibility coordinators and other staff within and outside the accessibility offices (e.g., IT, media, learning and teaching department). You are welcome to invite your colleagues to help you answer some of the questions.

The survey should take approximately 15-30 minutes to complete. Your participation in the survey process is entirely voluntary. You may skip any question that you do not want to answer and you may end the survey at any time. Any information that is collected will be reported in thematic and/or summary format only. Your responses will remain anonymous, unless you provide written consent to have a specific comment attributed to you or your organization. The survey data will be stored in a password-protected computer. The data will be de-identified and used to summarize the findings for the final report.

You can either complete this survey in Qualtrics or complete the survey over the phone. Please reach out to the project's lead Alfiya Battalova at alfiya.battalova@ubc.ca or at (604) 313-2686 to schedule an interview.

By participating in this interview, you are consenting to have this information used by ACE-BC to complete an overview of the services for Deaf, hard of hearing and Deaf-Blind students.

If you have any questions about this project, please reach out to ACE-BC's Coordinator Deloris "Piper" Piper at dpiper4@bcit.ca.

Please answer the following questions

Q1 What institution in BC do you work in?

_____

_____

Q2 What is your role at your institution?

Q3 What accommodations do you provide for students who are Deaf, hard of hearing and Deaf-Blind? (mark all that apply)

- ☐ Note taking services (electronic note-taking) (1)
- ☐ Note taking services (e.g., hiring a student and having that student take notes) (2)
- ☐ Extended test time (3)
- ☐ Hardware (e.g., computers, assistive listening devices) (4)
- ☐ Software (5)
- ☐ Sign language interpreting (6)
- ☐ Live speech to text (e.g., TypeWell transcribing or CART real-time captioning) (7)
- ☐ Tutoring (8)
- ☐ Other: please specify (9) _____

Q4 What strategies do you use for captioning pre-recorded content (mark all that apply)

- ☐ In-house (staff, IT services, learning and teaching, media) (1)
- ☐ Contractors (such as TypeWell or CART) (2)
- ☐ Third party companies and vendors (e.g, Rev) (3)
- ☐ Other: please specify (4) _____

Q5 What strategies do you use for captioning live synchronous classes? (mark all that apply)

- ☐ Contractors (TypeWell or CART) (1)
- ☐ Automated captioning (e.g., Zoom auto-captioning) (2)
- ☐ Other: please specify (3) _____

Q6 How has the demand for the captioning services above changed after the institution's transition to online teaching during COVID-19?

	I ncreased greatly (1)	Increased moderately (2)	Increased slightly (3)	Remained the same (4)	De creased slightly (5)	Decreased moderate-ly (6)	Decreased greatly (7)
In-house (1)	o	o	o	o	o	o	o
Contractors (2)	o	o	o	o	o	o	o
Third party companies and ven-dors (3)	o	o	o	o	o	o	o
Auto-cap-tioning (4)	o	o	o	o	o	o	o
Other: please specify (5)	o	o	o	o	o	o	o

Q7 What is the main mode of teaching adopted at your institution in response to COVID-19?

- ☐ Synchronous online (1)
- ☐ Asynchronous online (2)
- ☐ A mix of both: please specify the ratio of both (3) _____

Q8 Does your institution have any policies that specify the instructors' responsibilities in ensuring accessibility of online teaching?

- ☐ Yes (1)
- ☐ No (2)
- ☐ Unsure (3)

Q9 Have you seen an increase in requests for services from instructors after transition to online teaching?

- ☐ Yes (please explain): (1) _____
- ☐ No (2)
- ☐ Unsure (3)

Q10 What learning management system (LMS) does your institution use?

- ☐ Blackboard (1)
- ☐ Canvas (2)
- ☐ Moodle (3)
- ☐ D2L (4)
- ☐ Other: please specify (5) _____

Q11 How well does the LMS meet the accessibility needs of students who are Deaf, hard of hearing and Deaf-Blind?

- ☐ Very well (1)
- ☐ Well (2)
- ☐ Not sure (3)
- ☐ Poorly (4)
- ☐ Very poorly (5)

Q11 If asynchronous online teaching is provided, what videoconferencing platform is used?

- ☐ Zoom (1)
- ☐ BlueJeans (2)
- ☐ MS Teams (3)
- ☐ WebEx (4)
- ☐ Big Blue Button (5)
- ☐ Other: please specify (6) _____
- ☐ N/A (7)

Q12 How well does the videoconferencing platform meet the accessibility needs of students who are Deaf, hard of hearing and Deaf-Blind?

- ☐ Very well (1)
- ☐ Well (2)
- ☐ Not sure (3)
- ☐ Poorly (4)
- ☐ Very poorly (5)

Q13 If you provide sign language interpretation, what is the process of securing and providing this service?

_____

_____

_____

_____

_____

Q14 Are there any challenges related to the use of interpreters, captioning or transcribing, and assistive listening technology (for both students and teachers in synchronous and asynchronous settings: technical challenges, training needs, privacy concerns, intellectual property concerns, etc.)

☐ Yes: please explain (1) _____
_____

☐ No (2)

☐ Unsure (3)

Q15 What is the process of securing software/hardware for students' accessibility needs (budget, information about the software/hardware, pricing, etc.)?

_____
_____

Q16 How easy can sign language interpretation be used in synchronous teaching?

☐ Very easy (1)

☐ Easy (2)

☐ Unsure (3)

☐ Somewhat hard (4)

☐ Very hard (5)

Q17 What is your sense about how synchronous online teaching has impacted students who are Deaf, hard-of-hearing and Deaf-Blind?

_____
_____
_____
_____
_____

Q18 What is your sense about how asynchronous online teaching has impacted students who are Deaf, hard-of-hearing and Deaf-Blind?

_____
_____
_____
_____
_____

Q19 How did COVID-19 impact accessibility policies at your institution if at all (as it relates to accessible technologies/services)?

_____
_____

Q20 Have there been any changes in terms of process, ordering and purchasing of software/equipment since COVID-19?

_____
_____

Q21 What can be improved in ensuring a better communication between students, instructors and the accessibility services office?

_____
_____
_____
_____
_____
_____

Q22 Do you receive support from other departments (e.g., IT, media, teaching and learning) in providing the services to students who are Deaf, hard of hearing and Deaf-Blind?

☐ Yes (4)

☐ No (5)

☐ Unsure (6)

Q23 If you receive support from other departments, can you describe what it looks like?

_____

_____

_____

_____

_____

Q24 Does your institution have accessibility policies and procedures that apply to student experiences outside the classroom (e.g., major events such as institute-wide program expos, orientation, extracurricular, graduation, departmental or institutional special lectures)?

- ☐ Yes (please explain): (1) _____
- ☐ No (2)
- ☐ Unsure (3)

Q25 If such policies and procedures exist, do they incorporate the principles of Universal Design?

- ☐ None of them do (please explain): (1) _____
  _____
- ☐ Some of them do (please explain): (2) _____
  _____
- ☐ All of them do (please explain): (3) _____
  _____
- ☐ Unsure (4)
- ☐ N/A (5)

Q26 What are some of the main challenges that students who are Deaf, hard of hearing and Deaf-Blind experience with online learning environment?

_____

_____

_____

_____

Q27 What do you think needs to be done to improve the online experiences of Deaf, hard of hearing and Deaf-Blind students at your institution?

_____

Q28 What are the positive aspects of online learning that you think students who are Deaf, hard of hearing and Deaf-Blind benefit from?

_____

Q29 Do you have any other comments?

_____

_____

Q3 What accommodations do you provide for students who are Deaf, hard of hearing and Deaf-Blind? (mark all that apply)

- ☐ Note taking services (electronic note-taking) (1)
- ☐ Note taking services (e.g., hiring a student and having that student take notes) (2)
- ☐ Extended test time (3)
- ☐ Hardware (e.g., computers, assistive listening devices) (4)
- ☐ Software (5)
- ☐ Sign language interpreting (6)
- ☐ Live speech to text (e.g., TypeWell transcribing or CART real-time captioning) (7)
- ☐ Tutoring (8)
- ☐ Other: please specify (9) _____
  _____

Q4 What strategies do you use for captioning pre-recorded content (mark all that apply)

- ☐ In-house (staff, IT services, learning and teaching, media) (1)
- ☐ Contractors (such as TypeWell or CART) (2)
- ☐ Third party companies and vendors (e.g, Rev) (3)
- ☐ Other: please specify (4) _____
  _____

Q5 What strategies do you use for captioning live synchronous classes? (mark all that apply)

- ☐ Contractors (TypeWell or CART) (1)
- ☐ Automated captioning (e.g., Zoom auto-captioning) (2)
- ☐ Other: please specify (3) _____

Q6 How has the demand for the captioning services above changed after the institution's transition to online teaching during COVID-19?

_____

Q7 What is the main mode of teaching adopted at your institution in response to COVID-19?

- ☐ Synchronous online (1)
- ☐ Asynchronous online (2)
- ☐ A mix of both: please specify the ratio of both (3) _____

Q8 Does your institution have any policies that specify the instructors' responsibilities in ensuring accessibility of online teaching?

- ☐ Yes (1)
- ☐ No (2)
- ☐ Unsure (3)

Q9 Have you seen an increase in requests for services from instructors after transition to online teaching?

- ☐ Yes (please explain): (1) _____
- ☐ No (2)
- ☐ Unsure (3)

Q10 What learning management system (LMS) does your institution use?

- ☐ Blackboard (1)
- ☐ Canvas (2)
- ☐ Moodle (3)
- ☐ D2L (4)
- ☐ Other: please specify (5) _____

Q11 How well does the LMS meet the accessibility needs of students who are Deaf, hard of hearing and Deaf-Blind?

- ☐ Very well (1)
- ☐ Well (2)
- ☐ Not sure (3)
- ☐ Poorly (4)
- ☐ Very poorly (5)

Q11 If asynchronous online teaching is provided, what videoconferencing platform is used?

- ☐ Zoom (1)
- ☐ BlueJeans (2)
- ☐ MS Teams (3)
- ☐ WebEx (4)
- ☐ Big Blue Button (5)
- ☐ Other: please specify (6) _____
- ☐ N/A (7)

Q12 How well does the videoconferencing platform meet the accessibility needs of students who are Deaf, hard of hearing and Deaf-Blind?

- ☐ Very well (1)
- ☐ Well (2)
- ☐ Not sure (3)
- ☐ Poorly (4)
- ☐ Very poorly (5)

Q13 If you provide sign language interpretation, what is the process of securing and providing this service?

_____

_____

_____

_____

_____

Appendix B. Focus Group Questions

1. Can you describe what academic accommodations do you use?

2. What was transition to online learning during COVID-19 like for you?

- **a.** *Probe: What has the experience of taking online classes been like for you? (synchronous and asynchronous)*
- **b.** *Probe: What worked well?*
- **c.** *Probe: What were some of the challenges?*
- **d.** *Probe: How were these challenges addressed/overcome?*
- **e.** *Probe: What is your preferred mode of learning in a post-pandemic world?*

3. *What has the process of requesting accommodations been like during COVID-19?*

- **a**. *Probe: Through accessibility offices/instructors?*
- **b.** *Probe: Were there situations when your accessibility needs were not met? If yes, please provide examples.*

4. Thinking about specific technology (e.g., software, hardware, online tools), what worked well for your learning needs? Why?

5. What LMS does your institution use? What worked well and/or not so well with this system?

6. What would you recommend for improving accessibility of online classes?

7. What would you recommend for improving accessibility of in-person classes?

8. What would you recommend for improving accessibility on campus outside the classrooms?

9. Thinking about your experiences navigating the postsecondary institutions, how any of the examples of success or challenges make you feel?

- **a.** *Probe: Can you reflect on any feeling you might have about being a student at this institution? Feeling of belonging or non-belonging?*

10. Is there anything else which has not been discussed that you feel strongly about and would like to add?

Appendix C. Accessible Media Policy

Category: Academic Affairs

PolicyNumber: 011

Responsible Authority: Director, Academic Services and Learning Resources

Approval Authority: Office of the Vice-President, Academic Date of

Original Policy Approval: 2006 (originally Captioned Media & E-text Policy)

Date of Last Revision: N/A (to be used for minor revisions)

Last Reviewed: 2020-09-01

Mandatory Review Date: 2027-09-01

CONTENTS

PURPOSE

This policy establishes guidelines and procedures for ensuring all media resources, including audio-visual, audio-only and print materials are accessible to and inclusive of the diverse learning and teaching needs of all students and employees of the college.

SCOPE

TThis policy applies to all employees of the college as well as volunteers, guest speakers and any others, including third parties, who design, adopt, or procure educational materials and resources including, but not limited to: audio-visual media, audio recordings, print materials, e-books, course packs, e-learning platforms, online networking or conferencing platforms, interactive and instructional online management systems. Media produced by students as part of course requirements is not governed by this policy; however, students are strongly encouraged to follow universal design best practices to produce accessible and inclusive media. George Brown College's Accessible Media Policy will govern how accessibility will be achieved through meeting and exceeding the requirements referred to in the O. Reg. 191/11: Integrated Accessibility Standards of the Accessibility for Ontarians with Disabilities Act, 2005, S.O. 2005, c.11.

DEFINITIONS

This section includes an explanation of terms and abbreviations used with in this document.

Word/Term	**Definition**
Accessible Media	Communication in the form of live or pre- recorded audio-visual media, audio recordings or live events designed to be inclusive of users' diverse range of abilities with closed captioning, described video, transcript or live captioning
Audio Recording	Digital or physical media containing a voice recording (i.e. podcast)
Blackboard Collaborate Live Captioning	Available for Blackboard Collaborate online sessions, remote caption writers provide live, synchronous closed captioning during the session.
CART (Communication Access Real-time Translation)	A service provided by a caption writer either in person or remotely for a live event (i.e.) convocation ceremony. Captioning is projected on a screen for the audience to read in real-time with the dialogue.
Closed Captioning	Audio-visual media that has the option to displayon-screen the verbatim, synchronized text of thedialogue and other-auditory information. Typically indicated by this symbol CC
Described Video	Narrated voice-over description of a program'skey visual elements necessary to providecontext, such as setting, body language and costumes. Typically indicated by thissymbol D))

E-text	An accessible, electronic file version of traditional print material (textbooks, course packs) that can be converted or adapted to the users' needs such as Braille, audio, large print and compatible with adaptive technology
OCROpticalcharacterrecognition	A technology that enables the conversion of different types of documents into editable and searchable data. OCR software is required to extract and re-purpose data from scanned documents, camera images or image-only PDFs, so that the original document can be accessed and edited.

POLICY

1.1 Background

George Brown College is dedicated to the fundamental principles of equity and accessibility by supporting an inclusive and universally designed learning and working environment that provides all students, employees and members of the community equitable access to print materials, audio-visual media, audio recordings and live events made available on various applications and platforms. Since 2005, the college has taken a leadership role with accessible media, exceeding the requirements and timelines of the AODA by establishing and implementing a universal design approach to reducing and removing barriers to an inclusive and equitable teaching, learning and working environment.

1.2. Accessibility for Ontarians with Disabilities Act

The AODA became law on June 13, 2005. Under this landmark legislation, the government of Ontario developed mandatory accessibility standards that identify, remove and prevent barriers for people with disabilities. Effective July 1, 2016, the Information and Communications Standards (which came into effect on January 1, 2008), have been consolidated with the Integrated Accessibility Standards into one regulation, the O. Reg. 191/11: Integrated Accessibility Standards (under Accessibility for Ontarians with Disabilities Act, 2005, S.O. 2005, c. 11).

Relevant sections from the Integrated Accessibility Standards include:

- Section 17 (1), (2) which stipulates that producers of educational or training textbooks for educational or training institutions will, upon request, make accessible or conversion ready versions of textbooks; and producers of print-based educational or training supplementary learning resources for educational or training institutions will, upon request, make accessible or conversion ready versions of the printed materials available to the institutions.
- Section 18 (1) which requires libraries of educational and training institutions to provide, procure or acquire an accessible or conversion ready format of print, digital or multimedia resources or materials for a person with a disability, upon request.

1.3. College Policy

In accordance with George Brown College policy, all audio-visual media and all print materials purchased, produced, or used by employees or any materials published on any college platform (websites, social me-

dia, intranets, etc.), must be available in an accessible format. The college's Accessible Media Co-ordinator facilitates accessible media services by request, such as closed captioning, described video and transcription services, as required. They are also responsible for collaborating with all employees in the review, selection and quality assurance of accessible educational materials, resources and platforms in advance of use, publication or adoption.

All audio-visual media, audio recordings and live events produced, presented or procured by the college must be accessible with closed captioning, described video, transcripts or real-time captioning and must comply with the accessibility standards as approved by the college's Accessible Media Co-ordinator.

All print materials produced or provided by employees of the college must be available in an accessible, OCR electronic format, compatible with adaptive technology. This includes: promotional materials, textbooks, course packs, course outlines, reading lists, assignments, articles, tests, examinations, notes and any other handouts, pamphlets or materials distributed or assigned to students.

This policy will provide clear guidelines on the process for requesting accessible services for media (including pre- recorded and real-time audio-visual) and for print materials.

1.4. Compliance

The college's Accessible Media policy is not a replacement or substitution for the requirements established under the Human Rights Code, nor does it limit any obligations owed to persons with disabilities under any other legislation (O. Reg. 191/11, s.1 (2)).

George Brown College will ensure compliance with all related college policies and all other applicable legislation, including:

- Human Rights Code, R.S.O. 1990, c. H.19
- Accessibility for Ontarians with Disabilities Act, 2005, S.O. 2005, c.11
- O. Reg. 191/11: Integrated Accessibility Standards

If any such laws conflict, the provision that provides the highest level of accessibility for persons with disabilities with respect to goods, services or accommodations is the law that will be followed (Accessibility for Ontarians with Disabilities Act, 2005, S.O. 2005, c.11, s.38).

1.5. Budgetary Requirements

As part of the commitment to accessibility and inclusion, George Brown College will allocate a centralized budget for accessible media services including closed captioning, described video, transcription, live captioning and CART.

2.1. Accessible Media

2.2 Materials Selection

AAll employees at George Brown College have obligations related to principles of accommodation and accessible resources, including the selection and procurement of materials:

- All audio-visual media purchased, produced or used by an employee of the college for such purposes as

instruction, information, marketing and promotion must be closed captioned; or permission to caption must be granted by the copyright owner prior to procuring or using.

- When selecting materials, please be advised that transcripts are not a substitute for the closed captioning of audio-visual media and service providers such as American Sign Language interpreters and computerized notetakers. They do not translate or transcribe audio-visual media as a substitute for closed captioning.
- All media available through the college library collection is either closed captioned or can be closed captioned upon request. Library resources provide many options for the selection of accessible materials, including: traditional, streamed and subscription-based media.
- The consideration or utilization of applications and platforms containing audio-visual media for use, purchase or subscription must have closed captioning and must be evaluated by the Accessible Media Co-ordinator prior to procurement to ensure compliance with accessibility standards, in advance.

2.3. Roles and Responsibilities

All employees at George Brown College are responsible for ensuring they are providing access to accessible audio-visual media that is purchased, produced, published or used at the college.

2.4. Accessible Media Services

The college offers several services that support accessible media, as outlined below.

2.3.1. Closed Captioning

Closed captioning is required for all audio-visual media used by employees of the college for such purposes as instruction, information, marketing and promotion. It is the employee's responsibility to provide the media to the Accessible Media Co-ordinator to facilitate this service.

2.3.2 Described Video

This service is provided upon request by an employee of the college or on behalf of a student with an accommodation plan. When described video is required, it is the employee's responsibility to provide the media to the Accessible Media Co-ordinator to facilitate this service.

2.3.3 Transcription

This service is provided for media with an audio-only component (i.e. podcast). For such audio recordings, a verbatim transcript of the dialogue must accompany the recording. When transcription is required, it is the employee's responsibility to provide the media to the Accessible Media Co-ordinator to facilitate this service.

2.3.4 Blackboard Collaborate Live Captioning

This service provides live captioning for online course sessions. Requests for live captioning must be made to the Accessible Media Co-ordinator.

2.3.5 CART

This service is available upon request for college-wide events (i.e. convocation ceremony) and facilitated by the Accessible Learning Services.

3.1. Accessible Print Materials

3.2. Materials Selection

All employees at George Brown College have obligations related to principles of accommodation and accessible resources, including the selection of materials. All printed materials selected, produced or provided by employees of the college must be available in an accessible, OCR conversion-ready format, compatible with adaptive technologies. This includes textbooks, course packs, promotional materials, course outlines, reading lists, assignments, articles, tests, examinations, notes and any other handouts distributed or assigned to students.

3.3. Roles and Responsibilities

The college offers several services that support accessible print materials and facilitate the provision of print materials in accessible, electronic formats, in accordance with the following roles and responsibilities:

- The college bookstore and copyright clearance vendor are responsible for reviewing print material to determine availability of textbooks and course packs in accessible, electronic formats and compliance with copyright regulations.

- The college's liaison librarians are available to consult on alternatives to printed course packs using electronic library materials. Links to library journal articles, eBooks, streamed audio-visual media, can be integrated within the course management system.

- Accessible Learning Services is responsible for advising faculty on accessible course materials to ensure compliance with accessibility standards and provide conversion-ready accessible materials in multiple formats, as required.

- E-Learning and Innovation is responsible for the college's course management system. Integrated with this system is Ally, a software that automatically evaluates uploaded documents for compliance with accessibility standards and provides guidance on improving document accessibility.

- Employee Learning & Development and the Teaching and Learning Exchange offer sessions that support principles of universal design for learning as well as training for creating accessible documents. Additional teaching and learning support and resources can be found on the college website.

NON-COMPLIANCE IMPLICATIONS

This policy has been sanctioned by the Board of Governors, requiring compliance across the college.

In accordance with the Accessibility for Ontarians with Disabilities Act, George Brown College is also subject to the administrative penalties outlined in the GBC AODA Accessibility Policy, if deemed non-compliant by the Director of the Accessibility Directorate.

All employees are expected to abide by the relevant Employee Code of Conduct and operational policies of the college.

SUPPORTING DOCUMENTATION

Appendix 1: Procedures under this Policy

RELATED POLICIES

The following policies, procedures and resources can be located on the George Brown College Policies page or on the college's intranet site:

- Accessible Learning Policy
- AODA Accessibility Policy
- Copyright Policy
- Employee Code of Conduct – Academic Staff
- Employee Code of Conduct – Administrative Staff
- Employee Code of Conduct – Support Staff
- Human Rights Discrimination and Harassment Policy

APPENDIX 1: PROCEDURES

Actions and Responsibilities for Accessible Services

	Action	**Responsibility**	**Timeline for Requesting Service**
1	Closed captioning for pre-recorded media	Accessible Media Co-ordinator, Academic Services & Learning Resources	1 to 2 weeks inadvance. Expedited service is available.
2	Described video for pre-recorded media	Accessible Media Co-ordinator, Academic Service & Learning Resources	3 to 4 weeks in advance. This service is only available forstudents with an accommodation plan or for employees upon request.
3	Transcription for audio recordings, (i.e.)podcasts	Accessible Media Co-ordinator,Academic Services & Learning Resources	1weekinadvance. Expedited service i savailable.
4	Blackboard Collaborate livecaptioning for online course sessions	Accessible Media Co-ordinator, Academic Services & Learning Resources	2 business days in advance of session. This service is only available for students with an accommodation plan or for employees upon request.
5	CART for college events(i.e.) convocation ceremony	ASL Interpreter for GBC Employees	2 weeks in advance
6	Textbooks and accessible-course packs in electronic-format	Manager,BusinessServices StudentExperienceandBusinessServices	4 months in advance
7	Convert textbooks andaccessible course materials into alternative formats (Braille, large print, audio)	Adaptive Technologist, Accessible Learning Services	2 to 4 weeks, depending on format requested.

Appendix D. Historical timeline of the Accessible Media policy

2001-2002 – Ontarians with Disabilities Act (ODA) becomes law and college establishes ODA committee with cross-representation from college community.

2005 – Accessibility for Ontarians with Disabilities (AODA) becomes law and repeals ODA. Position of accessible media co-ordinator (AMC) is created as part of a strategic initiative to implement specific requirements of AODA and in response to students concerns regarding timely accommodations for captioned media. AMC position is part of the library with a college wide scope for providing service.

2006 – The accessible media policy is approved by the college Board of Governors. The purpose of the policy is to only purchase media that is captioned or permission to caption is provided as a condition of purchase; all faculty use captioned media for instructional purposes; and all college audio-visual communication be captioned. Policy is written and promoted from a universal design perspective rather than accommodation/disability. All departments are responsible for budgeting for the cost of captioning media used by their respective faculty and staff.

2006 to 2007 – Position of AMC becomes permanent. Policy implementation phase involves AMC attending divisional meetings and holding workshops to introduce the policy and supports available to faculty and staff. Advocacy work begins with external stakeholder and partners such as media producers and distributors, raising awareness for compliance with AODA and accessible media policy. 2008-2018 – Advocacy efforts were challenging in the beginning as the college was the only institution to have an accessible media policy and requiring captioning (or permission to caption) as a condition or purpose. AODA compliance for media producers and distributors was not required until a later implementation phase but demands from educational institutions encouraged them to comply earlier. The other issue was independent producers did not have the necessary funding to add closed captioning to their films. As more institutions began requiring captioning, it became more commonplace. Producers and distributors started to identify the accessibility features of media titles on their websites and catalogue collections. Physical media began to change over this time from VHS tapes to DVD to streaming. This change better facilitated the feature of closed captioning and became increasingly available. The introduction of video sharing platforms such as YouTube, social media and content platforms such as Netflix has influenced and changed teaching and learning. Due to increased awareness and availability, captioning has become established and expected, as with ASL during news conferences and described video for TV shows. During this time, the Ontario College Library Service (OCLS) purchased shared media resources on behalf of all Ontario colleges and made the commitment to ensure that all titles were closed captioned. The college's media collection changed significantly with more streamed content being made available which has been advantageous over physical media in the current virtual learning environment.

2019 – The accessible media policy was due to be updated and required extensive meetings and consultations with various college departments and stakeholders.

2020 – The updated accessible media policy was approved by the college Board of Governors. The policy was updated to reflect the change in technology as well as the addition of services such as described video and live captioning with the most significant change being the approval of a centralized budget for accessible media services. Individual departments are no longer required to budget for these services and the college covers all costs, resulting in a much more efficient work flow.

2020-2021 – With the move to a virtual teaching, learning, and working environment, there has been a significant demand for accessible media services, particularly live captioning, described video and ASL interpretation of lectures, orientation sessions and meetings; captioning of recorded lectures, marketing and communication videos. While the demand for these services will change with the return to in-person teaching, learning and working, these services are now well established and have raised awareness and expectations around accessibility. The virtual environment has provided benefits such as greater collaboration between colleagues and departments which has led to finding new and improved ways to make our college community more accessible to students and staff.

Appendix E. Survey for accessibility advisors

In support of students, faculty and all employees, these departments work collaboratively to uphold the requirements of the Accessibility for Ontarians with Disabilities Act (AODA) and the Accessible Media policy in working towards reducing barriers to provide an accessible learning, teaching and working environment.

Academic Service and Learning Resources (Library)

- Accessible Media Co-ordinator: co-ordinates all accessible media requests college-wide
- Accessible Library Services provided by librarians and technicians: requests for accessible formats through Centre for Equitable Library Access (CELA) as well as providing assistance with extended loan, assistive devices, etcetera.

Student Success

- Accessibility Consultants: provide academic supports and service for students with disabilities and collaborating with faculty to make courses accessible
- ASL and Computerized Notetaker Schedulers: co-ordinate services for Deaf and hard of hearing students

Marketing & Recruitment

Web team: verifies all forms of media are accessible on the website (i.e.) captioned videos, images with alt tags, accessible documents, screen reader compatibility

Office of Anti-Racism, Equity and Human Rights Services

- Addresses accessibility issues on an ongoing basis
- Implements accessibility initiatives and AODA regulations
- Oversees AODA committee

Human Resources

Learning and Employee Development: provide training and orientation for new and current employees on responsibilities related to AODA awareness and Accessible Media policy

IT Services

Supports all hardware, applications and platforms that are compliant with accessibility requirements such as the learning management system, website and classroom AV equipment.

President's Office and Board of Governors

Approval and continued support of the Accessible Media policy by dedicating a centralized budget for all costs associated with the provision of accessible media services. Includes the President, VP Academic and VP Student Success.