Toward Accessible Course Content: Challenges and Opportunities for Libraries and Information Systems

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ABSTRACT

The population of students with disabilities in post-secondary institutions is significant and rising. The U.S. Department of Education reports that 11% of students, or more than two million students, in post-secondary education report having a disability. Providing accessible versions of materials for courses is a core service of disability-services offices in schools. Finding, obtaining, or generating accessible course content is a challenging process for disability-services providers at institutions ranging from community colleges to research universities, many of which receive hundreds of individualized requests for content each semester. Although a range of sources and services to assist in this process have emerged, they are insufficient and inefficient because they keep people from working together on a complex, shared problem. In the summer of 2015, we conducted a qualitative study of the challenges facing disability services providers in U.S. post-secondary institutions, in order to design and implement information systems that would enable large-scale sharing of locally improved, accessible course content with qualified students in the U.S. This paper reports on the subset of our findings that addresses challenges to providing, sharing, and reusing accessible digital content. Our findings suggest that there are substantial opportunities for the LIS and library communities to apply our expertise to this gap in information services for an expanding population of students.

Keywords

Accessibility, disabilities, universal design, resource sharing, repositories.

INTRODUCTION

The population of students with disabilities in post-secondary institutions is significant and rising. Under the provisions of the Americans with Disabilities Act (ADA), schools in the U.S. are legally required to provide accommodations to qualifying students who request them, and to do so in a timely fashion. One of the core services is to provide accessible versions of instructional materials required for courses. Instructional materials include published materials as well as faculty-created slides, syllabi, etc.; but in this project our focus is the former (hereafter referred to as accessible course content). Faculty created content is designed to be used locally in the classroom, and therefore is not appropriate for large-scale sharing. To create accessible course content, each school must locate and reformat the material (i.e. textbooks, articles, video, etc.) to meet the individual needs of the student by creating accessible equivalents such as screen-readable text versions, interpreted graphics, or film captions. Although a range of sources and services to assist in this process have emerged, they are insufficient and inefficient because they keep people from working together on a complex shared problem. In order to recommend remedies, we conducted a study of the challenges facing disability services providers in post-secondary institutions as a means to understanding how best to design and implement information systems that would enable large-scale sharing of accessible course content to qualified students.

In this paper, we report on a subset of the findings of our study that address two of our key research questions: What are the challenges to providing accessible digital course content to instructors and students? And what are the challenges to sharing and reuse of accessible digital content? This study was conducted in the U.S. context; while findings may be specific to the legal, educational, and other contexts surrounding service-provision in the U.S., it seems likely that challenges described are shared by disability-services providers elsewhere. Our findings suggest that there are substantial opportunities for the LIS and library communities to apply our expertise to this gap in information services for an expanding population of students. We will describe three themes identified in the research and the implications these findings hold for technical and socio-technological work to address them.

BACKGROUND

The U.S. Department of Education reports that 11% of students in post-secondary education report having a disability; some other authorities put the percentage much higher. 11% represents more than two million students and is likely to increase. The vast majority of post-secondary schools enroll students with disabilities, including 99% of public 2-year and 4-year institutions and 100% of medium and large institutions (Raue and Lewis, 2011). Disabilities may include one or more of the following conditions: a specific learning disability, a visual disability, a hearing impairment, deafness, a speech disability, an orthopedic disability, or other health impairment.

Estimates of the number of students with a print disability in particular range from 6.4% (American College Health Association, 2015) to 34% (National Center for Education Statistics, 2011), or between 128,000 and 680,000. A student with a print disability is one who experiences barriers to accessing instructional materials in nonspecialized formats. Disclosure of a disability is voluntary. When students request ADA accommodations for a disability and can demonstrate need, schools are legally obligated to provide the accommodations for students who qualify. A critical factor in this obligation is the timeliness of the services.

Regarding instructional materials, any institution may be required to provide accessible versions of course content for any course taken by students with disabilities. From a series of legal settlements between universities and the U. S. Department of Education Office of Civil Rights, a standard for accessibility is emerging.[1] "'Accessible' means a person with a disability is afforded the opportunity to acquire the same information, engage in the same interactions, and enjoy the same services as a person without a disability in an equally effective and equally integrated manner, with substantially equivalent ease of use. The person with a disability must be able to obtain the information as fully, equally and independently as a person without a disability."[2] This standard puts a substantial responsibility on the school to obtain or create accessible course content, and to do so in a timely way.

The growth in demand for accessible course content is well documented. One indicator of this growth is the requests made to one of the service providers for accessible content, AccessText Network. Over the past five years, growth in the number of requests has been substantial, with some tapering in the most recent statistics (see Figure 1).
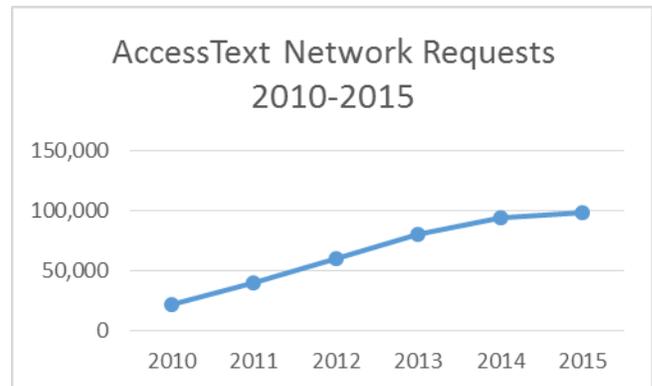

Figure 1. Growth in AccessText Network requests for accessible materials 2010-2015[3]

In response to these national legal requirements and growing requests, each institution for higher education has devised a process for delivering these services. With accessible course content, the process includes identifying which materials are needed, searching for accessible options, and then modifying or creating from whole cloth a version to meet the individual's needs. The Office for Disability Services (ODS) at any college or university is typically a small unit with limited staff whose goal is delivering custom services to a minority population. Over time, however, these units tend to create a substantial library of electronic files in varying formats. These files are stored, somehow, given the amount of labor involved to generate the files, and typically are protected carefully, as the material is under copyright.

Schools do not have an effective way to store and share these files for easy reuse. This lack of infrastructure was the impetus behind Institute for Museum and Library Services planning grant, entitled "Repository Services for Accessible Course Content" as part of the National Leadership Grant program for Libraries. A key component of the grant proposal was conducting focus groups with individuals from ODS offices around the country to research the current state of their operations and the major challenges with respect to accessible course content. Additionally, we investigated the extent to which libraries were involved in this work.

After a few semesters of generating accessible files, any school begins to amass a considerable collection of files. The ODS staff must wrestle with storing and organizing these files, and typically do so in relative isolation. In short, they are creating digital libraries on campus without the benefit of expertise that might be provided by the library staff regarding metadata, file naming conventions, storage options, discovery, or retrieval. The time sensitivity of

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[1] See Office of Civil Rights guidance for higher education institutions organized by settlement and by issue at http://www.washington.edu/accessibility/requirements/accessibility-cases-and-settlement-agreements/

[2] Resolution Agreement South Carolina Technical College System OCR Compliance Review No. 11-11-6002. https://www2.ed.gov/about/offices/list/ocr/docs/investigations/11116002-b.pdf

[3] Growth numbers taken from https://www.accesstext.org/

accessible course content makes it exceedingly important that schools have efficient ways to reuse work for subsequent students with recurring courses.

The scale of the problem is difficult to comprehend or measure, but it is significant. Epp (2005) suggests that only 3% of English-language materials in print is ever transcribed into alternate formats for people with disabilities. In our study, while the smallest participating institutions reported just a few requests for accessible content each semester, the quantity of requests is a poor measure of the labor required to provide services. Some materials are extremely difficult to find, convert and/or manipulate, while other materials are simple. At the same time, these difficulties do compound with large request volumes. One large university reported 800-1200 requests per semester. The highest reported number was more than 3,000 requests in one semester, across a system of universities. Creation or acquisition of each accessible digital version ranges widely in cost. Sometimes obtaining an accessible version only costs the time it takes to search and request a resource through AccessText Network. On the other end of the spectrum, a version may need to be hand-keyed or brailled. Production of one accessible book may cost tens of thousands of dollars; two participants reported the creation of individual STEM textbooks costing between $40,000 and $70,000. It may be understood from even vague indications of the quantity of required accessible content, along with the cost of making it, that any improvements to current, limited systems for reuse have very high potential value.

In this paper, we discuss a subset of issues that emerged from our study and the implications these have for the library and LIS communities. The problems are not simple ones, but nor are they insurmountable.

LITERATURE REVIEW

Research in LIS on accessibility has not much broached the question of how to increase and improve the quality of accessible course content – textbooks, books, and articles, in particular – for higher education students and faculty. The literature emphasizes website and digital library conformance to accessibility standards, and usability of the same. While web accessibility is a topic with strong coverage in the literatures of research and best practices, the accessibility of printed and born-digital published materials presents distinct social and technological challenges, of which we need a fuller understanding.

Much of the library literature on accessibility pertains to the challenges and solutions to making libraries, library websites, and instructional and reference services accessible. Despite significant literature on guidance and a number of exemplary services (Booth, 2012; Mulliken & Atkins, 2009; Chodock & Dolinger, 2009), academic libraries continue to struggle to develop accessible web presences. Comeaux and Schmetzke (2013) conducted a longitudinal study of the websites of the 56 ALA-accredited library schools; using the Bobby 3.1.1 testing tool, they determined that only around 60 percent of library pages complied with WCAG 1.0. Southwell and Slater (2012) found that only about 42 percent of digitized documents on academic library web sites in the U.S. were accessible via screen reader. In a study at an Australian university, Billingham (2014) found that the challenges to library compliance with accessibility rules include time and cost, along with libraries' pervasive reliance on inaccessible commercial products. Similarly, Tatomir and Durrance (2010) found that 25 of 32 major database vendors, including ProQuest and JSTOR, proved to have marginally accessible or completely inaccessible platforms.

Research on accessibility in digital libraries and digital education resources exists, but without specific attention to higher-education course content. Xie et al. (2014) studied digital library use by blind users with a qualitative study, and offer design recommendations for digital libraries, related to formatting and organization, help-seeking situations, and information assessment. Walker and Keenan (2015) engaged with the special case of content management systems and digital special collections. Pointing out the need for further research on the accessibility of digital special collections and the software used to manage them, Walker and Keenan speculate on accessibility measures for CONTENTdm and Digital Commons. Cervone (2013) provides a review of free tools and responsive design as a method for developing more accessible digital library projects. In another application to the higher-education setting, Burgstahler, et al. (2005) conducted a case study of a distance learning course and its effectiveness for students and instructors with disabilities. They examined the history and current accessibility of the program and developed benchmarks in course development, support by the institution, students, and faculty. However, there is a gap in the library and information science literature on the potential for library support to help increase the quantity accessible course content – presumably because this has long been the province of disability-services providers and not librarians.

There has been limited research on and implementation of metadata schemes and other tools intended to support discovery of existing, accessible educational resources. The Accessibility Metadata Project[4] created the A11Y Metadata proposal for use with W3C schema.org, in 2013. IMS Global offers Access for All metadata and user preferences standards, which specification consists of a common language for describing and matching users' needs to published resources[5] (see Cooper & Heath, 2009). Ding et al. (2013, 2014) discuss the possibilities of linked data for accessibility, which raises the question of structured description and identification of accessible resources to the

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[4] http://www.a11ymetadata.org/about/

[5] https://www.imsglobal.org/accessibility/

latest web technologies. Despite the existence of standards, there is little available information or empirical evidence of their uptake or efficacy in the wider disability-services community, for sharing and resource-discovery.

METHOD

Focus groups

The study comprised a series of five, semi-structured focus groups held at the Association on Higher Education And Disability (AHEAD) conference, July 15 - 17, 2015, in St. Paul, Minnesota. The AHEAD conference was selected because the annual meeting of "the premiere professional association committed to full participation of persons with disabilities in postsecondary education" draws hundreds of professionals in disability services within higher education from throughout the country. Recruitment was conducted by mass email to conference attendees, printed flyers, and word-of-mouth at the conference. Each focus group took approximately one hour. Sessions were simultaneously recorded and transcribed by captioners. In addition, participants completed an optional demographic survey.

The focus groups broached the following research questions:

Q1. Based on subject matter, what kinds of content do you need to find for students needing accommodations?

Q2. What formats are needed to be accessible to support students with disabilities?

Q3. How are accessible digital resources supplied/sourced?

Q4. How are accessible digital resources managed after they are distributed to a student?

Q5. What are the challenges to providing accessible digital course content to instructors and students?

Q6. How is accessible digital content shared across and between institutions?

Q7. What are the challenges to sharing and reuse of accessible digital content?

Qualitative content analysis

When focus groups were complete, transcripts were anonymized, and then subjected to qualitative content analysis (Zhang & Wildemuth, 2009). Qualitative content analysis is a common method for the systematic description of the meaning of a qualitative dataset in response to research questions (Schreier, 2013).

With the objective of distilling a set of themes from a body of text, qualitative content analysis works by assigning successive parts of a text (in this case, statements made in the focus groups) to the categories of a coding frame (Schreier, 2013). The coding frame was developed inductively, oriented to answering our research questions, but with categories deriving from themes identified in the raw transcripts.

RQ	Code	Short definition
Q1	Subjects	Subject areas of accessible content
Q2	Media/Tools	Media, file formats, tools in use
Q2	Scale	Quantity or scale of accessible content
Q2	Multiple formats	Use or provision of one resource in multiple formats
Q3	Workflow	Any part of the workflow used for obtaining or generating accessible content
Q3	Distribution	Any part of the process for distribution of accessible content to students
Q4	Management	Any aspect of the management of accessible content
Q6,Q7	Sharing	References to sharing content between institutions
Q5, Q7	Challenge	Any challenge encountered in providing accessible content to students
Q5	Quality	Any aspect of the quality of accessible content
Q5	Training	References to training or need for training of faculty, students, staff
Q5	Collaboration	References to collaborations with other units on campus

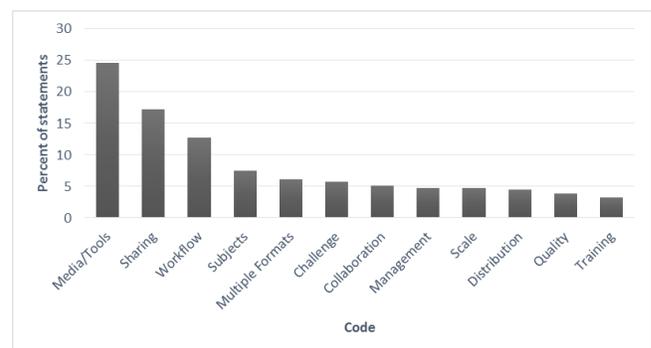**Table 1. Mapping research questions to analytical codes**

Figure 2. Ratio of coded statements

Once the initial coding frame was established, two rounds of coding were completed by independent coders, in order to test consistency in application and the completeness of thematic coverage. After the first two rounds of coding,

uncertainties about code application were resolved, the coding frame and its definitions were refined, and a few codes were added to ensure thematic coverage. A third, independent round of coding was then conducted, in particular to moderate among lingering disagreements in code application. Table 1 gives a synopsis of the final coding frame.

After the final round of coding, agreement among coders stood at approximately 84%. At this point, those statements that failed to obtain consensus among coders were excised from the dataset, so that the data under analysis represents unanimous agreement among the research team.

The final dataset is comprised of approximately 1,050 distinct coded statements, divided among the code-categories as shown in Figure 2.

Certain voices were stronger than others in the resulting dataset, which is to be expected in studies of this kind. Nonetheless, all 28 participants had some representation in the final dataset. The highest proportion of statements in the final dataset belonging to one participant was 9%. The lowest was less than 1%, and the median ratio of participation was 3%.

Demographic synopsis

28 total participants took part in five focus groups. To give a sense of who took part, Table 2 provides a summary of demographic information obtained from the optional questionnaire provided to participants at the outset of each focus group. Not all participants completed the questionnaire.

FINDINGS

This paper reports on a subset of results relevant to the following research questions:

- What are the challenges to providing accessible digital course content to instructors and students?

- What are the challenges to sharing and reuse of accessible digital content?

Technological, social, political, legal, and other challenges reported in response to both of these questions were numerous. Approximately 17% of all coded statements in the dataset pertained to challenges.

Two problems emerged as transcendent or cross-cutting, both contextualizing and compounding the themes we will discuss in this section.

First, there are high-demand "problem areas," in which the nature of content poses a great barrier to conversion for accessibility. These areas include Science, Technology, Engineering, and Math (STEM); foreign language; and music. Materials in these areas often rely heavily on graphical content, which is far more difficult to render accessible than textual content, and which may require substantial manual intervention. In addition, conversion in

Aspect	Summary
Age	Min=25; Max=67; Average=48
Gender	F(22);M(5)
Nationality	USA (25)
Job title	Coordinator /Director of Disability Services; Counselor / Disability Services; Accommodation Specialist; Project Manager; Leadership team; Accessibility Analyst; Alternate Media Coordinator; Assistive Tech Specialist; Director, Academic Support and Disability; Dean of Disabled Student Programs and Services; Disability Specialist; Access specialist, supervisor of e-text production; Associate Director of Assistive Technology; Disability services, Academic compliance and regulation; Project specialist
Type of institution	College/University (19); Technical/community college (4); State services (1); State-level community college services (1); Commercial (1)
Highest degree	BA/BS (5); MA/MS (17); PhD (2)
Educational background	Communications, Special education, Rehabilitation counseling, Education, College counseling, Engineering, Higher education administration, Community health, Educational policy, Social work, Library and information science

Table 2. Demographic synopsis

these areas may demand oversight from a subject expert (e.g., someone with knowledge of a foreign language, or of high-level mathematics). Finally, certain types of materials, such as journal articles, grey literature, supplementary course content, videos, and multimedia materials, are more difficult to convert and manage as accessible resources than books. As one participant noted, "Having a repository for articles and other supplemental materials is going to become the next big thing, I would think" (P17).

Second, there is widespread duplication of conversion labor, both within and across institutions of higher education. This known problem provided the impetus for our study. Its participants confirmed the sense of massive redundancy of effort in the conversion of common course materials, along with the idea that large-scale sharing of accessible instructional content is a potential, albeit complicated, solution. One participant noted, "I'm sure many of us across the country are captioning the same thing and …there's no one place where you can go, repository where you can consider if there's captioned media" (P21).

In the following discussion, we examine a subset of challenges raised by our participants that bear on the design and development of information systems, including an

imaginable system for large-scale sharing of accessible course content. We will address:

Theme 1: Reuse and sharing depends on implementation of standards for identification and description of accessible resources

Theme 2: Born-digital content is often born inaccessible

Theme 3: Forging connections with libraries is vital to institutional effectiveness.

A detailed exploration of other challenges that came to light in our analysis is outside of the scope of this paper, but will be broached by subsequent publications of our findings. Those challenges include: substantial obstacles posed by publishers of course content; conflicting interpretations of copyright law and its implications for accessibility conversion and sharing; insufficient or short-term resources for collaborative efforts, which lead them to falter; inadequate physical and digital storage or space for sharing resources; a need for increased outreach to faculty and students on requirements and available resources for accessibility; and the difficulty of measuring and evaluating services provided.

Theme 1: Identification and description

Disability-services providers do not commonly employ standardized schemes for the identification and description of accessible course content. Our results do not indicate a de facto standard for either unambiguous identification or description of accessibility features and other aspects of accessible course materials, despite the existence of some relevant standards (such as accessibility metadata standards, accessibility guidelines and evaluation tools for the web generally, and best practices for the description of visual content in STEM materials).

This lack of standardization may persist because institutions share and coordinate materials largely haphazardly; systems of information organization are developed minimally, to serve local settings. Inadequate description and identification poses an immediate obstacle both to the long-term organization and management of content within any disability-services department and to potential widespread sharing of materials.

In addition, service providers are confronted with a diversity of formats, and even within a format, materials are often customized for individual student use. In our focus groups, participants described using the following file formats and tools (which produce specific formats): High-resolution, word-searchable PDF, structured MS Word documents, Daisy, MP3, Kesi, RTF, Braille, eBraille, Mobi, AZW (Kindle), OBX, CRT, HTML, MathML, PPT, EPUB, SRTXML, Kurzweil, Claroread, NVDA, Read & Write Gold, JAWS, screen readers generally, refreshable braille displays, various OCR software with plugins, INFTY reader, Duxbury Braille Translation software, MathType (+MS Word), Scientific Notebook, Dancing Dots, Lime

Aloud, GOODFEEL (a software suite) for music, Balabolka for text to speech, Central Access Reader, Amara, Open Book, and more. What appears to be an inevitable lack of standardization in the tools and software in use exacerbates the complexity of applying descriptive standards to resulting resources.

Accessibility is relative; what works for one student will not necessarily work for another. This places differential demands on the quality of content, and eventually complicates description and identification of related objects. Disability-services providers must customize resources to individual student preference and need. The purpose of these institutional offices for accessibility services (and thus the framework for evaluating their success) is to meet the local, individualized accommodation needs of their students who qualify for services. For customization to happen, providers must be able to locate and identify starting-point materials of a certain quality.

The quality of document necessary for customization or post-processing of this sort varies substantially between institutions, and even between individual requests. For example, there may be a minimum DPI required to successfully OCR mathematical formulas in a scanned STEM text -- a DPI not usually obtained in a standard scanning process. P10 states,

> "The biggest challenge that we noticed, and I think it was because we were an extremely high-quality production house, was if we got something from someone else, it usually didn't meet our quality standards."

In tandem with quality, document provenance is a critical aspect of usability. How was a document made, and what affordances does that leave to providers and students for further conversion or for use with different accessibility tools? The variance in need places a high demand on what about a document must be described, in order for it to be reusable.

> "I don't think there is true consensus around which characteristics should be noted and how they should be described. I think that even knowing the file format is one step ... but whether that is a PDF that is tagged, structured or created from an accessible document, or created by scanning and running OCR, that's critical information in the actual usability of the document. And that's information that you often don't have up front, you have to actually download the thing, open it up and test-drive it to figure out whether or not it's actually usable." -P20

There may be extant standards or guidelines for the description of accessibility features of items, but providers do not have solutions -- or do not commonly employ them -- for identifying and describing document quality and provenance. P19 reiterates the difficulty of item

identification and description in light of heavy customization of individual works for students:

> "Let's say there are several institutions that have already created their own in-house alternate format of the same publisher textbook. If all those are added into the repository, how is someone going to be able to discern which of those iterations is actually the closest to what they have a need for?" -P19

Even setting aside the problem of quality, participants noted that existing standards are increasingly inadequate to identify the documents they need, in light of the proliferation of subtly different versions of works: "I think that the rapid turnover rate of new editions coupled with custom editions [means that] ISBNs don't match" (P20). And,

> "having the association of all of the associated ISBNs for a particular media-type—just that…—would be huge, because, like you said, there're so many ISBNs associated with one piece of media, and knowing it's, yes, the same exact thing. That was the soft copy with the companion CD and this is the hard copy." (P1)

As P1 goes on to note, this kind of information organization and disambiguation is "what libraries are good at." Indeed, the problems described here are by no means technologically unworkable. Applicable metadata solutions may exist -- indeed, they may turn on effectively navigating the FRBR levels of a work, a challenge familiar to information scientists and library professionals. But these problems remain unsolved for this community.

Theme 2: Born-inaccessible content
Conversion of digital content into accessible formats is more difficult for our participants than the conversion of print, despite the presumed flexibility and manipulability of digital forms. This is particularly true when that content is born digital. One participant notes that the increase of digital content means a tandem increase in both locked content and born-inaccessible content:

> "if it's being produced inaccessibly, or if it's being locked ... locking you can deal with a lot easier [than] you can deal with a totally inaccessible production process" -P10

Participants commonly encounter the misconception that digital resources are by nature more accessible or more amenable to conversion for accessibility: "I keep telling faculty, eBook does not mean accessible book...And I have to explain to them what the differences are" (P6).

Certain digital publishing trends amplify this problem.

First, digital publishing has enabled the proliferation of custom editions of textbooks. Custom textbooks complicate the processes of finding, converting, and reusing accessible materials. One participant notes,

> "I'm seeing more of the custom editions where folks are electing to cut out certain portions to lower the cost, and it's actually not always helpful in terms of work that needs to be done to ensure we have a variety of formats" (P20).

Second, digital textbooks are often marketed directly to faculty with sets of supplementary materials, which are often produced such that converting content is impossible.

> "What used to be the supplement is now the center. All the ancillary products, all the things that aren't fixed, printed materials, are becoming very important ... the online quiz banks, et cetera, and those are pre-packaged, pre-programmed, and almost impossible to manipulate. They either have accessibility built in or they don't...there's no [real] way to negotiate it" -P26

Third, even outside of conventional publishing, digital platforms that faculty themselves use to create and distribute course content may limit accessibility. This includes presentation platforms and multimedia publishing tools. One participant notes,

> "talking about tools used in course management systems, I've got ... people that love PREZI and that's completely inaccessible. So we have kind of a protocol if they want to use PREZI to reach a different style of learner they have to ... start with the accessible PowerPoint first" -P4

As this last comment suggests, when confronted with intractable, born-digital content, the solutions that service-providers reach for are not technological but social. They develop protocols for and train faculty in the use of accessible formats in the classroom, and they intervene in purchasing decisions at the campus level where possible, either collaborating with bookstores or the library to ensure accessibility measures are written into contracts with vendors, or blocking the purchase of inaccessible materials altogether.

Theme 3: Forging connections with libraries
A third challenge to the provision and sharing of accessible course content is the difficulty of forging a connection with campus libraries in order to take advantage of those points where organizational missions of libraries and disability-services providers intersect. Naturally, a significant portion of the materials students need in higher education is not purchased directly from publishers, but is obtained through the library.

Our participants suggested that the content of libraries themselves remain too inaccessible to students, especially in any direct way. One participant notes,

> "If a student with a print disability does not have access to library materials, they cannot ultimately be a successful student ... having access to the library is just as critical as having access to the textbook materials" -P10

Some library catalogs themselves remain inaccessible: "[It would] be nice if the library catalogs themselves were more accessible. That's a complaint I hear all the time" (P1).

But the gap in direct library access for students and faculty alike may also stem from the historically disjoint operations of library collections, access-provision, and maintenance, from disability-services' acquisition, conversion, provision, and maintenance. While some participants cited strong working relationships with their libraries, most suggested that forging this connection has been difficult:

> "I have literally been trying to reach out to the libraries for the last fourteen years and everybody I tried either said, no, that's not my area, or no, that's not what we do." -P1

Roles for the library in the process of providing accessible higher education content are potentially myriad. For example, participants suggested that library involvement was important for negotiation with publishers:

> "So can we do that at the library during the purchase of journal articles or journal subscriptions? ... Tell us the status of the WCAG level 2A, of your article. It's an online article. We need [it] to be accessible. You have to provide us accessible content; if it's not accessible, when will it be?" -P3

Participants cited collaborations with the library for conversion, captioning, and storage of materials. In addition, participants noted the role libraries can play in providing guidance on or actually helping develop solutions to their metadata and description challenges (see theme 1, above).

DISCUSSION AND CONCLUSION
It is not the goal of this paper to diagnose why libraries and offices of disability services have not been collaborating much until now. Pragmatically, we can acknowledge that a population of over 2 million students is substantial and it is in the best interest of each school to have effective means to deliver accessible course content in a timely fashion. Connecting the library and the office of disability services (ODS) may provide some avenues for progress.

It is not surprising that there are few instances of standards being applied to accessible course content, especially to files after they have served their initial use. This is not a technological issue. Metadata standards for accessibility have been developed, and schemes in use in LIS and in the description of scientific datasets already treat things like provenance, quality, and help us both distinguish and associate versions (or, FRBR manifestations) of works. However, the level of complexity of standards is a significant barrier, making this more of a sociotechnical problem. Any solutions offered to the disabilities services community must not tax already limited resources in these departments. On the other hand, solid description and identification practices are essential components of any

system for sharing or unifying collections of accessible materials across departments. Therefore, solutions to the big problems we have identified (in particular, the redundancy of conversion efforts) will rely on rich description of accessible materials. Offices of disability services may or may not be ideal providers for such descriptions. This leaves an open question for disability services, libraries, and college and university administrations to solve regarding the roles and responsibilities for improving this work.

A significant portion of students with disabilities are assisted by the ability to manipulate a text for their needs, whether magnification or use of a screen reader or something else. It would be easy to assume that accommodations would get easier over time with the growth of electronic resources. Sadly, the reverse is true and the growth of digital content in the classroom has created ever higher barriers for some students with disabilities. The publishers are not obligated to produce accessible versions, but if any faculty member selects that content for a class, then the school may be obligated to make it accessible. Libraries, as the foremost purchaser or licensor of content on campus has a huge role to play in investigating the accessibility of products and pressuring publishers to deliver accessibility features and universal design in their offerings. Secondly, whenever LIS staff are involved in the creation of content, an awareness of accessibility features will allow for a conversation about options to make the content "born-accessible" from the start.

A significant amount of material processed for accessibility is textbooks. Many libraries have historically used textbooks as a boundary and thus might use this as a reason not to work together with disability services offices. This would be a mistake. Most academic libraries have numerous services designed to assist students with obtaining their course materials. We provide reserves, first print, now electronic; we offer photocopiers; and many will permit faculty owned textbooks to go on reserve. More recently, the shift to participate in creating Open Educational Resources is a fine example of libraries bringing course content to students. Partnering with colleagues to facilitate success for students with disabilities is a clear way for the library to demonstrate the value of LIS expertise and have impact on students.

There are a number of imaginable solutions to the high-level challenges we have described. In the model of large-scale aggregations of digital collections and datasets, one possible centralized solution takes the form of a repository for sharing accessible content between institutions. This model leverages existing work and infrastructure by facilitating efficient, reliable, large-scale sharing of the products of distributed conversion effort. The Canadian Association of Educational Resource Centres for Alternate Format Materials (CAER) offers another model of centralized service for post-secondary students. CAER is a

consortium of provincial service centers that produce and provide alternate formats and technology to Canadian students with print disabilities; indeed, two of its members are university library services that provide interlibrary loan. However, a solution modeled on CAER would not leverage the massive infrastructure of distributed effort, already well established in U.S. higher education. Other sharing networks exist in the U.S., including AccessText Network and Bookshare. However, those services are limited in scope. Nothwithstanding their great efforts, the problem of redundancy of conversion work across institutions continues to challenge offices of disability services and, ultimately, post-secondary students with disabilities.

The growth of opportunities for students with disabilities to achieve success in post-secondary education is an outcome we can applaud. Yet it is also a change that our institutions must prepare to sustain for the long term. As such, bringing the skills of information sciences to the work of disability services appears to be prudent and overdue. Doing so enhances the lives of our university ODS colleagues through productivity and effectiveness, but more importantly, enhances the educational opportunities of students through more timely production of accessible course content.

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