

Digitally Enhanced? An Examination of the Information Behaviours of Visually Impaired Post-secondary Students

Numériquement amélioré ? Étude des comporte- ments information- nels des étudiants malvoyants de niveau postsecon- daire

Kristie Saumure
Digital Librarian and Research Coordinator
University of Alberta
kdh@ualberta.ca

Lisa M. Given
Assistant Professor
School of Library & Information Studies, University of Alberta
3-20 Rutherford South
Edmonton, AB T6G 2J4
lisa.given@ualberta.ca

Abstract: In-depth qualitative interviews were conducted in order to examine the academic information behaviours of visually impaired undergraduates, with a focus on adaptive technology. Initial findings reveal that students' information behaviours are enhanced by technology, active support networks, and personal determination. The results also show that students struggle with time constraints, feelings of dependence, others' lack of understanding, and limitations on their access to electronic materials. The article explores possible improvements to library services, including inter-library sharing of adapted resources (e.g., Braille materials) and the creation of services to facilitate visually impaired students' information behaviours while allowing them to maintain personal independence.

Résumé: Des entrevues qualitatives en profondeur ont été effectuées afin d'examiner les comportements informationnels universitaires des étudiants malvoyants de 1^{er} cycle, et plus spécifiquement la technologie adaptative. Les résultats préliminaires révèlent que les comportements informationnels des étudiants sont améliorés par la technologie, les réseaux actifs de soutien, et la détermination personnelle des étudiants. Les résultats démontrent également que les étudiants luttent contre les contraintes de temps, le sentiment de dépendance, le manque de compréhension de la part d'autrui et l'accès limité au matériel électronique. L'article explore les possibilités d'améliorations pour les services de bibliothèque, incluant les échanges entre

bibliothèques des ressources adaptées (par exemple, le matériel braille) et la création de services facilitant les comportements informationnels des étudiants malvoyants, tout en maintenant l'indépendance personnelle.

Introduction

Blind and partially sighted post-secondary students must access the materials that they need for their studies in the context of their disability. That is, because these students are unable to use traditional print materials, they are forced to locate alternative means of accessing academic information. The non-traditional formats (e.g., Braille) that visually impaired students require are not as readily available as are print formats. In fact, less than 5% of print materials are available in an alternative format (CNIB 2004). This leaves these students marginalized in their quest for information, compared to their sighted peers. Due to this marginalization, it is critical to examine the information behaviours of visually impaired students. Only by gaining an understanding of how these students access information can information professionals provide them with the best possible access to academic materials.

Information behaviour is a highly researched topic within the field of library and information studies, and many models and theories have been developed to explain the ways that individuals seek and use information in a range of contexts (Wilson 1997, 551). A review of the work that has already been done in this area shows that marginalized groups exhibit different information behaviours from those that have typically been viewed as "normal" seekers of information. For example, the older adults in Kirsty Williamson's (1997) study chose to use information from the mass media instead of libraries, as information from the latter was not as easy to access. In addition, much of their information behaviour was construed as "passive," with information coming to them through serendipitous channels (e.g., television programs; conversations overheard on the bus) rather than through an active process of seeking information (Williamson 1997). As people differ in the ways that they approach the location and use of information, librarians and other information professionals should heed Lisa M. Given's (2000) suggestion that they view information behaviour as an individualized process—without characterizing certain behaviours as atypical or "incorrect."

Identifying certain information behaviours as "normal" has disadvantaged visually impaired individuals, as this approach does not take into account

the unique activities and needs involved in their quests for information. Unfortunately, there have yet to be any studies that address the specific information behaviours of blind and partially sighted individuals. Raising awareness of certain information behaviours may optimize information access for this group, as identifying these behaviours can aid information professionals in providing appropriate services. With recent advances in adaptive technology, people with visual impairments are gaining ground in the struggle for equal access to information, and their ability to locate information has been enhanced (Mates 2000). Rejecting the concept of a "normal" or typical approach to information seeking, while embracing the concept of individualized information behaviours, will help to ensure that marginalized populations (including visually impaired persons) benefit from the principle of universal access that defines librarians' service ethic (CLA 1997).

In an effort to address this gap in the literature, this study explored visually impaired post-secondary students' perceptions of their ability to locate and use information, with a particular focus on the role of adaptive technology. Adaptive technologies are those that convert print materials into forms that are accessible to persons with visual impairments, through magnification or the conversion to tactile (e.g., Braille) or audio formats. Traditionally, literature discussing library services to visually impaired individuals has taken the form of needs assessments, anecdotal accounts, or discussions of new technologies. Rebecca Smale's (1992) work provides one example of a needs assessment. Her study focused on visually impaired students' needs while in the library but did not address the means by which these students seek and locate information. Smale looked at the needs of visually impaired students in the contexts of managerial commitment and the availability of resource officers, reading aids, materials in alternative formats, and building services, without considering how students located information once these needs were met. Michael Schuyler's (1999) article, describing the library experiences of a few individuals, is one example of an anecdotal discussion of library services to visually impaired patrons. Although such studies are valuable for providing some direction in serving the information *needs* of the visually impaired, more formal research is needed to examine their information *behaviours* and the ways that library services can best meet their needs.

It is also worth noting, here, the value of recent discussions of adaptive technology. Sarah Forgrave and Lynne McKechnie's (2001) work, for example, is some of the first to discuss the ways that library Web sites can help (or hinder) information access for visually impaired library patrons.

Other studies point to a number of considerations that educators and librarians must heed in serving this student population. Anne L. Corn and Robert S. Wall (2002), for example, note that materials are often adapted in a simpler, less technological way that may not be appropriate for optimizing the visually impaired students' access to that item. For example, the information providers may be distributing Braille documents when the student would prefer audio output. Corn and Wall also note the need to provide appropriate assistive technology to students, based on their level of vision loss. In addition, studies such as that conducted by Gerald H. Abner and Elizabeth A. Lahm (2002) are beginning to examine the availability of adaptive technologies to students for use in their academic work; often, educational institutions lack the resources to allow open access to equipment or one-on-one technological support. The Adaptech project (Fichten, Barile, and Asuncion 1999) explores how adaptive technology can alter the ways that visually impaired individuals locate information; the project points to the need to market the availability of current technology on campus, as well as the need to lobby for increased funding for assistive technology at post-secondary institutions. In considering these articles (among others), it is evident that technology has played and will likely continue to play a significant role in the information behaviours of blind and partially sighted individuals. For this reason, it is important to pay special attention to the role of technology in either impeding or enhancing the information behaviours of visually impaired post-secondary students.

Research goals

Four research goals were developed for this study. First, the study was designed to examine visually impaired students' perceptions of their own information behaviours. Second, it set out to explore the ways that visually impaired students perceive their success at finding academic information and to identify any factors that might impede (or enhance) this success. Third, the study sought to determine key sources of information for visually impaired students. And finally, the study was designed to assess the role of adaptive technology in relation to students' information behaviours.

Data collection and analysis

A total of six participants for this pilot project were recruited through the offices of support and disability services at one university and one community college in a large Canadian city. A purposive sampling approach was

used to identify individuals who were either totally blind or partially sighted and were, therefore, unable to read conventional print resources. The students were enrolled in either their first or second year of post-secondary study. Three of the four university students were enrolled in the Faculty of Arts (the fourth was in the Faculty of Science), and the two community college students were enrolled in business-related programs.

Semi-structured interviews were conducted, using a variety of open-ended questions about demographics (e.g., year of study), information-searching processes, use of adaptive technologies, use of specific sources of information, the affective state of the information seekers, and the challenges and successes they faced in locating academic information. These interviews, which lasted 30 to 90 minutes each, were audiotaped and fully transcribed. As all of the participants were visually impaired, they were asked, before the interview commenced, to consent verbally to participation in the study.

After the audiotape transcription was complete, a qualitative thematic analysis was conducted, using guidelines outlined by Lisa M. Given and Hope A. Olson (2003), as well as Matthew B. Miles and Michael A. Huberman (1994). A further influence on the analysis was the theory of phenomenography. Although the analysis did not adopt a strict phenomenographic framework, phenomenography highlighted the importance of attending to individual perceptions in the analysis (Richardson 1999). The goal of the analysis was to locate common and important themes that emerged in the interviews and that addressed the four research questions. Some of the thematic codes were created based on the content of the research questions (e.g., use of adaptive technology), while others emerged in discussions with the interviewees (e.g., feelings related to personal independence).

Major findings

The major findings are divided between two key sections that follow. The first addresses the context in which visually impaired students look for information, with a specific focus on the ways that their information behaviours may differ from those of sighted students. The second discusses core themes in the way the students' perceive their own information behaviours, highlighting both personal challenges and successes.

The visual impairment context: Information resources and adaptive technologies

In order to understand how visually impaired students perceive their information behaviours, it is important first to understand the context in which they locate academic information. There are a number of resources that the interviewees mentioned as being central to their quest for academic information. Textbooks were by far the most prevalent source they used for accessing academic information. However, it is important to note that gaining access to textbooks is not as straightforward for visually impaired students as it may be for sighted students, in that blind or partially sighted students must have access to texts in alternate formats. While sighted students can go to the bookstore, purchase their texts, and begin their course readings immediately, visually impaired students must purchase their texts, wait while these texts are adapted in another format, and only then begin their reading.

Adaptive technology has become critical in the academic lives of visually impaired students by enabling access to previously inaccessible materials through the use of adapted formats (e.g., audio, Braille). The visually impaired students in this study used adaptive technology in a variety of information-seeking capacities. When readings were scanned into electronic form, for example, print materials could then be transformed into audio or tactile forms. Speech synthesizers (e.g., JAWS for Windows) allowed students to access information on the Internet, including the academic library's catalogue, databases, and other supplementary Web materials. This access was particularly useful in helping the students to download full-text journal articles, thereby increasing the speed with which they were able to use academic information. This supports Catherine S. Fichten, Maria Barile, and Jennison V. Asuncion's (1999) point that Web pages at post-secondary institutions must be universally accessible (159). In addition, it suggests that library terminals should be equipped with software that enables visually impaired students to access the OPAC and other electronic resources. Given the number of capacities in which adaptive technologies are used to locate academic information, it is clear that they are essential to the successful academic experiences of blind and partially sighted post-secondary students.

The problem of material adaptation also extends to the process involved in conducting academic research. While sighted students may enter the library, scan the bookshelves for materials, and borrow books appropriate for their assignments, visually impaired students rely on reference librari-

ans or fellow students to select and retrieve materials on their behalf. This material must then be transformed into an appropriate adapted format, which can delay studying and library research beyond typical timelines. One interviewee (Zeena) mentioned that, while she successfully visited the library to retrieve academic information, this process involved several steps and was, therefore, not as timely as locating materials in an electronic format. One of Zeena's assignments asked students to locate and copy a research article—a quick process for sighted students. Zeena approached the university's office of support and disability services (OSDS) to convert the assignment; visited the library, where a librarian retrieved the article; returned to OSDS to digitize the work; and then listened to it. This process extended over many days, and required Zeena to visit different sites on campus in order to retrieve and adapt the article. Other interviewees commented on the inconvenience of this type of library-research process, but only one (Hennie) raised a possible solution—the creation of adaptive technology centres within academic libraries, in order to facilitate the adaptation process.

Due to the additional time involved in this type of information-seeking process—as well as the common practice of involving an intermediary in materials selection—the interviewees noted a preference for Internet resources. These resources are easily accessible through the use of speech synthesizers—technologies that adapt Web texts into audio format for the visually impaired Web searcher. As Internet resources are already in digital form, the materials can be more quickly adapted to an accessible format, and the students do not need to rely on another person's judgment for selection and retrieval. Electronic journals were one Internet resource that these students cited as particularly useful in accessing academic information. This preference for digital resources supports Loise Limberg's (2000) phenomenographic work, in that, where a sighted student might perceive an assignment to be quick and easy to complete, a visually impaired student (as noted above, in Zeena's experience) may perceive the same task as difficult and time-intensive.

The interviewees also mentioned the importance of interpersonal contacts as valuable sources of academic information. Librarians, university support staff, and fellow students often enabled access for visually impaired students to the print materials that they could not otherwise use. These individuals were able to scan written documents into digital form (which could later be adapted to audio or other formats), take notes in class, or read information aloud to the interviewees. Stratton, for example, was studying *Pride and Prejudice* in his English class at the same time as his sighted

brother, who was able to read the book aloud so that they could study it together. This example also reinforces Roma M. Harris and Patricia Dewdney's (1994) finding that people turn first to those sources closest to them. In this case, the interviewee's brother was a readily accessible source of information—and saved Stratton the time that would have been needed to adapt the novel to audio or another appropriate format.

The visual impairment context: Students' perceptions of information behaviours

It is interesting to note that while students perceived themselves to be reasonably successful in locating academic information, they also mentioned a number of difficulties involved in the process. The themes that defined these students' information behaviours (as well as their perceptions of the successes and challenges involved) are discussed in the subsections that follow.

Adaptive technology

Given technology's ability to enable access, it is not surprising that this topic dominated the interviewees' discussions of information seeking. Alan noted that adaptive technology improved his "ability to find information 100 per cent," while Stratton stressed that he "could not cope" without it. However, the students did have problems locating adapted materials. Although textbooks were important resources, the time-intensive adaptation process dramatically lessened available reading time. Often, visually impaired students wrote exams without completing preparatory readings because they could not access adapted texts.

Fichten, Barile, and Asuncion (1999) confirm that adaptive technology is key to a successful post-secondary education (166). This technology allows students to access information digitally and then translate that information into an accessible audio, Braille, or magnified format. Adaptive technology helps reduce the students' reliance on volunteers to read aloud to them and thereby enhances their independence. The authors also point out that adaptive technology enables students to work according to their own schedules (155). This point was confirmed by one of the interviewees, who noted that her lack of access to an adapted laptop impeded her ability to study between classes.

Access to electronic information

Another theme that emerged from the interviewees' comments was their ability to access information more efficiently when the material was already available in electronic form. Zeena, for example, noted that she was able to access her entire psychology textbook at the start of term because she had been given an audio version of the text that had been adapted previously for another visually impaired student. In general, the interviewees found that both electronic journals and the Internet offered readily accessible sources of information. Accessing information in this fashion allowed the students to skip the step that involved having print material scanned and then converted into electronic form (not to mention the physical trip to libraries and other offices on campus)—saving them a great deal of time and energy. As Stratton noted, "Information on the Internet is already in a form that I can work with and copy. I can take notes from that easier than from library materials."

Grant also described how accessing information via the computer, as compared to print, is preferable for a visually impaired student. In his case, being able to access information directly through the computer diminished the stress of completing assignments. He stated, "Well ... we have to do a research project in one of the courses that I'm taking. We're expected to develop a report on technical support, etc. ... Since it is on the computer [this] makes it very, like, simple. [It's] much more difficult to access a book. Doing it on the computer made it a lot more relaxing." Further to this point, Grant compared the accessibility of print to that of digital information: "A book needs to be on CD. I tried to manage with just a book [once]. It didn't work [and even] delayed the study process. I got the electronic version on CD and that made it a lot easier."

These three quotations illustrate that electronic materials enable information access for the visually impaired. Students with access to electronic information are less dependent on others to provide them with needed information and are also able to access information in a more timely manner. When accessing electronic information, students do not have to struggle through the process (described earlier) that Zeena went through in having print material translated into electronic format.

Access to a support network

Currently, electronic information (and textbooks, in particular) is not as readily available as it could be. Thus, visually impaired students recognize

the importance of a support network in providing them with adapted academic information. The staff and volunteers at the OSDS played an integral role in helping these students to locate and access relevant information. In discussing OSDS and her own information seeking, Dinah stated,

I don't see how they can do any more ... They're helpful and wonderful. I have burst [in on them in the past] and said "Pop quiz. I have seven minutes and I need someone to read it to me ... *now*." Anything they have to do to make it possible, they make it possible ... [and] whatever format I want, is done ... I'm one of those students who says "Well, I don't want everything in Braille but I want some in Braille, some electronically, and some audio." It all depends. I like textbooks on tape, summaries and glossaries in Braille, and assignments on disk.

In addition, these offices teach the students how to use adaptive technology so that they can later access academic information (e.g., journals) on their own.

Librarians also played significant roles in these students' experiences—by retrieving materials and conducting on-line searches. This accords with Fichten, Barile, and Asuncion (1999), who see librarians as key facilitators in disabled students' information seeking (166). In this study, the students who were interviewed noted that librarians frequently help visually impaired students retrieve material from the stacks and stated that, without that help, these materials would remain inaccessible. This supports Scott Johnston's (1999) assertion that human resources can play an important role in a student's information behaviour (424). However, the students were also frustrated by feelings of dependence. Volunteer scribes were often unavailable (leaving students without any class notes) or did not provide thorough descriptions. And the offices of support and disability services often did not have the requisite staff to scan print materials into electronic form in a timely manner. Where librarians were not available to help, students often had to forego particular texts or other needed information.

Fichten, Barile, and Asuncion (1999) suggest that technology may one day level the playing field for sighted and visually impaired individuals (155); in this context, new technology (e.g., an adaptive-enabled laptop) may allow students to take their own notes in class or scan materials themselves, in the library or other locations. The interviewees in this study wanted speech synthesizers in the library so they could review electronic resources on their own. Dinah found that reference strategies designed for sighted students were inappropriate to her needs. She noted,

Librarians are nice but ... most [sighted] people who are doing research want as much information as possible so that they have lots of information that they can sift through, so that they can come up with ideas. I don't want lots of information because it just means more stuff to adapt. I want accurate information. I want the information I need quickly ... I'd much rather get a book that's got the information I want, because I am not going to look for other information ... Being able to look on the computer yourselves, you can narrow it down a lot easier.

Lack of human understanding

The students also stressed that not everyone is as helpful as those who regularly facilitate information access for visually impaired individuals. Many people—even inadvertently—impede information access by not understanding these students' particular needs. As Grant noted, "If the teacher was to mention something in the class—write it on the board or provide it on a handout—without verbally discussing it, then that information would pass me by ... So, if it was really important for my research ... I wouldn't be able to find information as easily as the sighted student would." Zeena echoed Grant's observation, "Profs will start writing on the board or on the overhead and sometimes not say what they are writing. When this happens, I don't know what is going on." As Hennie noted, others were simply unwilling to help:

In every class [the professor] gives a bunch of diagrams ... from the text and they have figure numbers. So he's like "Use the figure numbers to find what pages to read ..." But how am I supposed to do that? I can't find the page number. And [at OSDS] we're like "Well how are we going to scan this?" We don't know where to start, where to end ... It's very visual ... So, I talked to [the professor] and said, "Can you give me page numbers, because this is a problem?" He said, "No." So [OSDS] e-mailed him and politely asked him ... He said, "No" ... I was so ready to drop [the course] ... But, out of spite, I stayed. I've got something to prove now. [Otherwise], it's going to be set in stone for him—"blind or visually impaired students can't do this class."

Similar problems arose in the library. Hennie noted that library staff who were unaware of unique circulation policies with respect to visually impaired students could also make the retrieval of needed information much more difficult. At her institution, the library's policies allow visually impaired students to borrow non-circulating items (e.g., display journals) for an extended period of time. However, as Hennie noted here, a policy is only effective if staff are aware of it and implement it:

[One woman at circulation] was quarrelling with me, [saying] "Who do you think you are? You don't have a right to say how long you get to take materials out for." And I'm like, "Well, they said I could." And she says, "I don't know why they said you could ..." She was just not wanting to help me and not wanting to think that she could be wrong and that I do have the right to take material out ... And I'm like, "Why don't you find someone who does know?" So [the circulation staff] get the head librarian, and this woman was actually nice. She's showing the other two, "This girl's card is tagged [to borrow these materials]" ... But they should *know*. I shouldn't have to put up with that.

These examples reflect the truth of Given's (2000) assertion that information resources and policies for accessing information resources are often targeted towards typical or "normal" students (85). In the classroom, sighted students are seen as "normal" and are often presented with information on the chalkboard or through other visual means. Atypical, visually impaired students are not able to access this information unless the professors themselves are aware that there is a visually impaired student in their class and ensure that they read the information aloud while they write it on the board. In the library, some circulation staff may cater to typical, sighted students' needs, without considering the special accommodations required by visually impaired students. Even when library policies exist, front-line staff must be aware of these policies and of how they apply to particular sectors of the student population.

Lack of independence

A lack of independence also characterized the information-seeking processes of the visually impaired students in this study. This is demonstrated by the students' reliance on other people to access information. For example, the interviewees were often forced to rely on scribes to take notes for them in class or on others to read study materials aloud. Hennie stated, "I rely on other people's notes and those are personal. [The scribes] may understand them, but often no one else does ... [at other times] I've even asked another student sitting at the same table as me to read me my notes."

Not only are these students' feelings of independence undermined by their reliance on scribes; they are also unable to access information independently in the library context. Dinah offered an excellent illustration of this point: "Not having access in LRC [Learning Resources Center] to, uh, their computer setup where you can go and look up articles. Not being able to use those without assistance is difficult. It'd be nice to have a voice

synthesizer on them to do the search myself. I mean, the staff are very helpful but it'd be nice if there was [a machine] that could be utilized by yourself because the staff are pretty busy, you know."

These students' information behaviours were characterized by the inability, in many cases, to access and locate information independently. This stemmed from both the lack of electronic resources and the limitations on the access to adaptive technology. Archie W.N. Roy and Gilbert F. MacKay (2002) describe this lack of independence as resulting from the visually impaired students' external locus of control. That is, their ability to locate information independently is often impeded by forces outside of the students' control (e.g., limited availability of electronic resources).

Time

Related to the students' lack of independence is the issue of time. Overall, these visually impaired students felt that the time they had to spend in locating and waiting for information was excessive compared to the time spent by sighted students to do the same work. The interviewees most often relied on the office of support and disability services to scan the print materials into an alternate format and therefore had to work within the office's timelines (and not their own). Students discussed the fact, for example, that they encountered situations in which they had to write exams without being able to read the requisite chapters in advance. Stratton, for example, said, "I think it's probably more time consuming [for me, than for sighted students, because the information was not available on time in an adapted format] for my economics exam, I was only able to read about three of the chapters ... [but] there were eight."

Some students also believed that wasted time was another challenge facing visually impaired students. For example, Hennie stated, "Sighted students are able to study between classes because they can see their texts—I often find myself just sitting and waiting for my next class to begin because I do not have time to visit the [adaptive technology] lab at the office for students with disabilities."

Yet another student noted the need to be aware of the time constraints that exist for visually impaired students, who need to locate information and to plan accordingly. Grant noted, "The problem is that I have to make sure ahead of time, for example, if I need a book. The book needs to be on CD [and it takes additional time to transform a book into an alternative format]."

These examples confirm Thomas D. Wilson's (1999) assertion that barriers are an undeniable part of the information "seeking" process (256). In these cases, time itself was a barrier to the location of information.

Student determination

Although barriers and problems clearly impeded these students' information seeking processes, they did not let these barriers stand in their way. The interviewees experienced successes in their quests for academic information because of their own determination to succeed. They simply would not give up until they had acquired the requisite information. Dinah put this into context when she stated, "I am the type of person that I would have found a way to do it. If I had to take the book, scan it and whatever, I would have done it." Dinah's determination in accessing information is further illustrated in the way that she approached her professors for information: "I walk in and go, 'If you're going to give stuff [class hand-outs] to me two days after you give it to everyone else, you better expect to hand me a couple of extra percent on the exam or give me a couple of [extra] days.'" Hennie, when describing her experience with the professor who wouldn't give page numbers, noted, "This is one thing I've noticed about having a disability is that I have to make a mark. If I turn away, next time someone blind or visually impaired approaches him, he's going to be like, 'Well there was once someone blind or visually impaired here but they couldn't do it.'" It's going to be set in stone for him—blind or visually impaired students can't do this class and that's why I feel like I had to do it."

Determination seems to be extremely important for visually impaired students who are trying to locate academic information successfully. This finding is supported by Roy and MacKay's (2002) study of 16 college students: They noted that, despite the perceived externality of the visually impaired students' locus of control, they generally fought successfully against the barriers that they encountered. As noted by Corn and Wall (2002), a pervasive external locus of control may result from teachers who employ traditional solutions that are not appropriate to the visually impaired student's personal context.

Conclusions and implications

Although additional research is needed to explore these findings fully, this exploratory study highlights critical issues relating to visually impaired stu-

dents' information-seeking strategies and the role that adaptive technology plays in these electronic behaviour activities. Time constraints, the lack of independence in information seeking, the lack of a support network, and limitations on and/or slowness in the availability of electronic information were all identified as negative characteristics of the visually impaired student's information behaviour. While additional interviews are needed to support the trends discussed in this paper, the following four initial recommendations may help reduce the impact of these issues on visually impaired students' information behaviours.

First, on-campus offices for students with disabilities and academic libraries must work together to ensure that academic materials are translated into alternative formats and shared among post-secondary institutions (Taskforce on Access to Information for Print-Disabled Canadians 2000). For example, the Specialized Support for Disabled Students Office at the University of Alberta could contact its counterpart at the University of Calgary to see if a given text has been adapted for some previous course. By borrowing the adapted material from another institution, the University of Alberta would save the time and money required to translate a book into an alternative format. Reciprocal sharing agreements would benefit both institutions, doubling the material available to students at both locations. It is important to note that, because most alternative-format production at post-secondary institutions is based on scanning original documents, inter-institutional sharing of adapted resources would be facilitated if institutions were required to list available scanned materials at a central institution. Academic libraries could be involved in this process, by implementing inter-library loan policies that facilitated sharing adapted resources. As Wall and Corn (2002) note, this process could be enhanced further if resource sharing were administered by a centralized agency. To this end, academic libraries in Canada could be encouraged to report to and use the National Library's AMICUS system, which is currently the centralized agency for resource sharing of alternative resources (Council on Access to Information for Print-Disabled Canadians 2000).

The second recommendation is that electronic information be made available directly from publishers. For this to happen, information providers would need to lobby publishing companies to encourage them to provide materials in both print and electronic form (Taskforce on Access to Information for Print-Disabled Canadians 2000). Most published material is currently in electronic form before it is converted to print; it would, therefore, be little or no extra work for publishers to make electronic versions of texts available to visually impaired individuals at the time of publication.

This direct access would decrease the time required for visually impaired individuals to locate information, increase access to a wider range of academic information, and support individual students' feelings of independence. As Elfreda A. Chatman (2000) suggests, a lack of information can lead to feelings of powerlessness (5). Independence would be increased and powerlessness would be diminished, as visually impaired students would no longer be as reliant on intermediaries to ensure that their information was converted to electronic form. Their locus of control would thereby be further internalized.

Third, specific standards could also be developed for professors to follow when teaching classes to visually impaired students. Many professors use visual aids in their teaching, such as PowerPoint slides of course content, digital images of paintings, or chalkboard notes as they work through mathematical formulae. For example, anatomy professors might need to learn how best to describe visual cues, such as anatomical structures of the human body (University of Michigan Offices of Services for Students with Disabilities 2004). With adequate support and defined guidelines for how best to present textual information to visually impaired students, all professors could make their lectures accessible in a consistent and timely manner.

A final recommendation that arises out of this research relates to adaptive technology. In all cases, the interviewees in this study cited the fact that adaptive technology has been essential in providing them with access to information. In order to ensure their continued success in locating information, academic libraries and other agencies that work with visually impaired students should continue to lobby for grants that could be applied to the purchase of adaptive technology (Fichten, Barile, and Asuncion 1999, 169). In addition, as was suggested by one of the interviewees, universities and colleges should provide adaptive technology labs in every library to allow visually impaired students to feel as comfortable accessing information as any sighted student.

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