

“There is Nothing Inherently Mysterious about Assistive Technology”

A Qualitative Study about Blind User Experiences in US Academic Libraries

Eighteen academic library users who are blind were interviewed about their experiences with academic libraries and the libraries' websites using an open-ended questionnaire and recorded telephone interviews. The study approaches these topics from a user-centered perspective, with the idea that blind users themselves can provide particularly reliable insights into the issues and potential solutions that are most critical to them. Most participants used reference librarians' assistance, and most had positive experiences. High-level screen reader users requested help with specific needs. A larger number of participants reported contacting a librarian because of feeling overwhelmed by the library website. In some cases, blind users and librarians worked verbally without the screen reader. Users were appreciative of librarians' help but outcomes were not entirely positive. Other times, librarians worked with users to navigate with a screen reader, which sometimes led to greater independence. Some users expressed satisfaction with working with librarians verbally, particularly if websites did not seem screen reader user friendly, but many users preferred independence. Participants agreed it would be helpful if

librarians knew how to use screen readers, or at least if librarians were familiar enough with screen readers to provide relevant verbal cues. Many users liked and used chat reference and many preferred Purdue Online Writing Lab (OWL) to learn citation style, though learning citation style was challenging. Questions such as reference librarians' role when e-resources are not equally accessible deserve wider discussion in the library literature and in practice. Given the challenges described by the research participants and legal requirements for equally effective electronic and information technologies, libraries and librarians should approach reference services for blind users more proactively. Recommendations are provided.

Equal access to online resources is an important social justice issue, one that has increasingly been investigated and enforced by the federal Office for Civil Rights at institutions of higher education since at least 2011.¹ Although all resources provided by academic libraries are required to be “equally effective” for users with disabilities,² studies continue to find lack of accessibility and usability

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The author would like to thank the participants of this study for their time and willingness to openly discuss the issues they have experienced. She would also like to thank Laura DeLancey for her encouragement and editing assistance and PSC-CUNY for granting the funding for this project, which made the project achievable, particularly by covering transcription costs.

Reference & User Services Quarterly, vol. 57, no. 2, pp. 115–126
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of library websites and vendor provided e-resources.³ Therefore, when a blind user requests reference assistance navigating a library's online resources, librarians and users can be put in a difficult situation. The American Library Association and independent experts in the field have agreed that librarians should be knowledgeable about adaptive technology.⁴ However, numerous studies have documented librarians' lack of education about assistive technology and related digital accessibility issues.⁵ Librarians are not always aware, for example, that blind individuals use screen reader software with a keyboard (not a mouse) to read computer device interfaces aloud or that websites and applications need to follow standards to function effectively with screen readers.

Even librarians who do have some understanding of digital accessibility may find it difficult to know how to respond to a user who is asking for assistance with a resource the librarian knows has not been checked for "equal effectiveness" or that has accessibility problems. Questions that arise include the extent to which the librarian should attempt to make up for lack of accessibility and usability by providing extra services; the extent to which the librarian should attempt to foster—or insist on—-independent library use, particularly with users for whom this appears to be difficult or unrealistic; whether librarians should rely partially or entirely on disability office staff in such situations; and the extent to which librarians should teach the user to navigate using their screen reader, as librarians teach sighted users to navigate visually with a mouse. Similar questions can arise for users regarding how best to make use of librarians' assistance, campus disability office assistance, and their own time and effort to navigate resources that are not always reasonably accessible and usable. These issues deserve wider discussion, in the library literature and in practice. This study attempts to provide some context for such discussion.

Eighteen academic library users who are blind were interviewed about their experiences using academic libraries and library websites. This article focuses on reference assistance for users who are blind, including in-person reference services, chat reference, and teaching citation style.

LITERATURE REVIEW

Many introductions to digital accessibility technology, policy, and ethics are available.⁶ A full introduction is impractical within the scope of this article, so this review mentions some relevant points.⁷ Accessibility and usability overlap. However, generally, accessible web design may be described as compliance with specific technical standards that allow users with disabilities to access websites. One component of accessible sites is that they are designed so screen reader users can navigate to and read all the information on each page independently of sighted human assistance. Website accessibility is commonly measured by compliance with the World Wide Web Consortium's Web Content Accessibility Guidelines 2.0 success criteria.⁸

Usable web design may be described as a "decent" level of user friendliness and navigability.⁹ Usable web design is less easily quantifiable than accessible web design. Although usability is not always easily quantifiable, many aspects of design that might be described as "usability" are required by the WCAG 2.0 success criteria. While technical compliance with accessibility guidelines would be a first step, websites may be technically compliant without being particularly usable for screen reader users. For example, a webpage may comply with the technical guideline to provide heading tags in the code, which allows screen reader users to discern the important headings on a page, the way a sighted user scans the visually prominent headings. However, to be effective these headings must be logically placed on the page. If they are not logically placed, they do not allow blind users to identify the most significant content. For example, on a library homepage, the first-level headings sometimes jump to repetitive navigational links at the top of a page instead of the large, visually prominent search boxes in the middle of the page, which are the central content of the page. If neither headings or other navigational methods, such as skip links or landmarks, are included on the page, blind users could have to listen through very extensive content, such as logos, tiny links for logins, and long lists of navigational links and submenus (depending on what is present on the library's homepage) before finding what most users immediately notice is important content. Ahmed et al. explain, "A screen reader typically reads *all* of the content while allowing users to navigate within it . . . screen reader users often cannot determine whether the content in webpages is worth listening to unless they hear at least some of it. As a result, blind users often suffer from information overload."¹⁰

Pages with a very large amount of content, such as many library and vendor pages, can be particularly overwhelming, especially if not coded with logically placed headings and other features to allow a sensible navigational path for blind users. WCAG 2.0 requires that the relationship and structure of information be "determinable," or intelligible, by screen readers, which can be accomplished by using headings and other methods.

Although it is not current, Rike's 2002 blind user study illustrates the increased impediments that website navigation not infrequently imposes for blind users. Rike conducted a usability test at Western Michigan University Libraries. He reported, "All of the sighted subjects tested were able to complete the usability test within one hour. . . . None of the blind or visually impaired students were able to complete the usability test. Even if two or three hours had been allowed, it is doubtful that the blind participants would have been able to complete the test."¹¹

More recently, Dermody and Majekodummi had ten students with print disabilities, mostly visual disabilities, test three library databases. The success rate in locating two scholarly articles was 53 percent. Students rated the search interfaces from "difficult to somewhat challenging on a scale from difficult to easy."¹²

At least two articles discuss academic reference services for blind users. In 2004, Saumure and Given did in-depth interviews with six blind and partially sighted students at two schools. Students talked about librarians finding information for them rather than about librarians teaching the students to find the information for themselves.¹³ Power and LeBeau offered recommendations about reference services, such as following the user's lead regarding working verbally versus with a screen reader, although they did not directly study users.¹⁴

One challenge that screen reader users in this study described was learning citation style. The Online Writing Lab (OWL) at Purdue studied the accessibility of their site, including their guides to citation style. They did a survey and found that 5.86 percent of respondents accessed their website using assistive technology. Of these, 22.5 percent used screen readers for blindness. They then did a usability test with two "blind/low vision" students. They realized navigation of the site needed to be improved, and made plans to "reorganize OWL homepage so important navigation elements are higher on the page, . . . add descriptions in the text for citation pages that describe formatting, verify that heading levels are used properly, . . . [and] design OWL while using JAWS [screen reader]."¹⁵

Naturally, there is wide variation in level of experience and expertise with screen readers among blind users for various reasons. Blind users may have become blind later in life and so did not learn to use a screen reader in school, older people graduated before screen readers became common, and students come from countries where they do not readily have access to technology. Poggrund and Smith reviewed literature regarding assistive technology education for blind students: "Since 1990, five studies have evaluated the assistive technology knowledge of teachers of students with visual impairments (Abner & Lahm, 2002; Candela, 2003; Edwards & Lewis, 1998; Kapperman et al., 2002; Zhou, Smith, Parker, & Griffin-Shirley, 2011), with a recurring theme emerging that teachers of students with visual impairments are not prepared to use and teach their students how to use assistive technology in the classroom."¹⁶

For these reasons, even current, traditional-age college students may not have good screen reader training. Usability must be considered within this context. Webpages should be coded so that users without a high level of screen reader expertise have equally effective access. Librarians should understand that, although they may have encountered some screen reader users who are adept, not all screen reader users can be expected to have a high level of screen reader expertise.

RESEARCH METHODS

Procedure

The study approaches its topics from a user-centered perspective, with the idea that blind users themselves can

provide particularly reliable insights into the issues and potential solutions that are most critical to them. In 2013 Hill argued that "most of the [library literature] is from the perspective of information providers rather than users as noted by Kinnell, Yu, and Creaser (2000). Overall, the literature focuses on what the library has and how users operate within those parameters. Little research explored the more fundamental questions of what people with disabilities might want from an information provider and how best to provide that service."¹⁷

This study attempts to help fill this gap.

The study used qualitative methodology for two reasons. First, the population of interest is small and not easily targeted, which makes statistically significant quantitative research more difficult. In 2015, visually impaired individuals were 1 percent of US sixteen-to-twenty-year-olds,¹⁸ which is the age group for which available statistics most closely approximate those for traditional college students. Second, the nature of qualitative research allows a richer opportunity to explore topics in depth without preconceived questions limiting the responses.¹⁹

The study used an open-ended questionnaire and recorded telephone interviews. Interviewing via telephone allowed easier access to the dispersed population of blind academic library users throughout the United States. Eighteen interviews were completed between summer of 2015 and spring of 2016. The interviews were recorded, transcribed by a transcription service, then coded and analyzed by the researcher for patterns. This method has the limits inherent in lack of statistical significance: results are not proven to be generalizable.

The interviewees were provided with the potential interview questions in advance and encouraged to review them to obtain a general idea of the topic of the interview. All participants gave their verbal consent. This study was reviewed and approved by the Internal Review Board for human subjects research at Hunter College.

Data Analysis

Hill et al. discuss qualitative data analysis. They point out advantages to developing themes or codes, which they call "domains," after collecting the data, rather than using researchers' preconceived notions of what would emerge from the research.²⁰ In keeping with Hill et al.'s recommendations, this research developed themes from the transcripts of the interviews using inductive analysis, instead of using the preconceived topics in the interview question guide to sort the data.

Transcripts were read a minimum of three times and recoded several times. As themes emerged from the interviews, preliminary coding categories were considered by the researcher. Final themes that emerged included: positive and negative experiences using librarians in person, difficulty with library websites, screen reader use during reference transactions, preferences for independence, using

chat, interactions with disability offices, and citation style. Another article based on the same study is intended to focus in more detail on users' experiences with online resources: library homepages, databases, discovery tools, and full text.

The pronouns "he" and "she" have sometimes been changed in this article to protect the identity of participants.

Participants

Study participants were selected using the following criteria: all participants (1) must state that they meet criteria for legal blindness in the United States or comparable criteria; (2) must have experience relying on a screen reader to access computing devices and the internet; and (3) must have stated that they used an academic library, either online or in person, in the United States within the two years preceding the interview at least several times per semester. Users included six graduate students, eight undergraduate students, and four professionals who were current users and have significant academic library experience. Two of the professionals also discussed recent use in a student role. Interviewees were recruited via the researcher's personal contacts as well as via library electronic discussion lists focused on disability topics. Potential participants known closely by the researcher were not recruited or included to avoid conflict of interest. Interviewees were offered a twenty-dollar gift card for their time.

FINDINGS

Table 1 indicates the breakdown of user-librarian interactions described below.

Working with Reference Librarians in Person

Eleven users reported having used a librarian's assistance in person. Topics that emerged from the interviews regarding working with librarians in person included length and frequency of meeting with a librarian, whether the help request was initiated because of difficulty with the library website or a more specific need, whether the experience was positive or negative, and whether the reference help led toward the screen reader user being able to navigate independently.

A few users commented on the frequency and length of their meetings with the librarian. One graduate student met with a librarian for about an hour and a half at a time, once or twice for each of his three classes each semester. Another graduate student, who was a more confident screen reader user, only met with a librarian a few times throughout his program. An undergraduate met with the librarian for about half an hour only two or three times during her program. Another undergraduate reported meeting for an hour and fifteen minutes a few times during the first two years of her program. All users except for one said they usually worked with one particular librarian.

A few high-level screen reader users contacted a librarian only for particular needs and primarily used the library website independently. These users reported positive interactions with librarians. Two of these students used librarians' assistance when they needed hard copy materials. One of them explained,

When I [used human assistance], I mainly resorted to reference librarians. . . . if I found a book in the . . . catalog that was not available in accessible format, I would contact the reference librarian and ask for the book to be scanned. Or, if I needed to look for print materials, I would make an appointment with a reference librarian or I would just come to the library and ask. . . . I told the librarian what I was looking for, and the librarian would . . . go over the titles available . . . with me.

This library scanned and did optical character recognition (OCR) on their print materials to make them accessible upon request. This user also said he consulted with librarians when he needed to "speed things up."

While a few high-level users similarly reported using librarian assistance for specific needs, a larger number of users contacted librarians after becoming frustrated with the library website and then worked with a librarian to complete most of their research. Five users said positive things about librarians in this situation, although they did not always have positive outcomes. These users were not supported by the librarian to use their screen readers to navigate the library website independently. Five users reported working with a librarian without using a screen reader. Four users reported they used a screen reader while working with the librarian, but the librarian did not use the screen reader. (One patron fell in both categories because she used two libraries.)

One user explained that the librarian "basically [did] everything for me. . . . I just told him the stuff I was interested in researching. . . . And so he . . . helped me onto the website. I know how to do it but . . . it's just hard for me to do it. And honestly I'm really not into research anyway. I'd much rather read a book." When asked if they used the screen reader, this user said, "No—unfortunately. That's how I found it was the most easy to do my research because the screen reader just threw me off, the websites for the library just threw me off. They were very overwhelming." And later, "I never really understood how to research the database. . . . I would be able to read the abstracts on my own. But then when I tried to download the e-text of the articles it would never go through. . . . That happened at both schools I went to."

Apparently she knew how to navigate databases enough to get to some abstracts, but not well enough to do the level of research she wanted. Link resolvers could have been an additional problem. She was thankful for the librarian's help but she was left feeling negatively about research. Difficulties with locating full text—accessible or not—will be discussed further elsewhere.

Table 1. Breakdown of User-Librarian Interactions

User Description	Participant*																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Positive Comments about Working with Librarian in Person	X	X	X	X	X						X							
Negative Comments about Working with Librarian in Person						X	X											
Used Screen Reader while with Librarian	X	X						X†	X	X								
Didn't use Screen Reader while with Librarian				X	X	X		X†			X							
Didn't Work with Librarian in Person or Topic of Working with Librarian Didn't Come Up												X	X	X	X	X	X	X
Used Chat Reference*								X			X	X	X	X				
Didn't Use Chat Reference*															X	X		

* Other participants did not comment on chat reference

† At a large university

‡ At a small university

Similarly, another user reported contacting and relying on the librarian because the library website was very difficult to use:

I had trouble using it on my own, because I'm a pretty new JAWS user. I had someone teach me JAWS just this year, because I was reluctant to use it in high school. . . . There was . . . one time . . . where I could not find any articles that would be helpful, so I went in [to the library] and said, "Okay, do you have anything that specifically relates to this certain topic?" . . . The librarian was very helpful. She ended up emailing me a bunch of articles that then my technology person and I went through [to deal with accessibility].

Like the previously discussed user, this user was not taught how to navigate by a librarian. She explained, "I think [the librarian] was a little baffled at first, because . . . she's used to kids . . . getting on one of the library computers, which was a little impossible for me, because they didn't have screen readers on the library computers, and I had my computer with me, . . . She's like, 'Okay, well, why don't I just email you these articles?'"

When asked if she planned to use her own computer, the user said, "Actually, I thought that's how I was going to do it. Because I hadn't expected her to just email stuff to me. I didn't expect anyone to make it that easy, actually. . . . That was only a one time deal."

Instead of continuing to work with the student, this librarian contacted the campus disability office for help. A technology person from the disability office then took over assisting the user. The student explained, "I ended up using the library website, but I had to have help. When I used the library's website, there's so many different tabs and ways of using it, it feels like a maze to me, I don't understand quite how to navigate through it. . . . honestly, that's one thing I'm still a little worried about this year. I still don't get it very well. . . . I even had someone who was blind himself come

in and try to look at it, and he's like, 'I don't understand this, really.'"

Again, the user was appreciative of the librarian's help but found the outcomes not entirely satisfactory because she did not learn to navigate independently.

A third patron had a varied experience of being assisted to navigate with a screen reader at one library and not at another library she used. When asked if she or the librarian used a screen reader at her usual library, this patron explained, "We just talked about how to do it. . . . They actually got the . . . article for me and just told me along the way, 'You click on this, . . . Oh, that didn't work so let's put in these search terms.' You know how it is with librarians."

This industrious patron had also visited a larger university. At the larger library, she reported similarly, "They just explained it as they went. Because they were using the librarian-only computer [at the reference desk]." However, on some occasion they did use a screen reader: "There is JAWS on, I believe, two computers in that library. At one point we did go back to the adaptive technology room and a librarian worked with me . . . with JAWS. But most of the time there was just the librarian at the computer explaining what they're doing."

The patron explained, the librarians did not know how to use JAWS but,

they knew how to use the website well enough that they could tell me, "Find this link," or, "Find this heading." But they obviously didn't know the [JAWS] key command. But they knew to tell me heading, link, table. . . . I'm not sure if this librarian maybe worked in the . . . the assistive technology area, and maybe he learned as he went from other students as well as from me. . . . I think I actually got through it a lot faster with the librarian working at the computer. Since I didn't really know the website that well I just couldn't figure out how to look through the search results or which database to search. . . . They got me some results and

I was fine with that. I did try it on my own a couple of times when I came back but I usually ended up just going to the librarians and going, “Help!”

This interaction was like the first in that the user was not taught to navigate independently; but in this case, there was some effort toward such independence.

A fourth user also contacted librarians or used other human assistants because the library website was difficult. He described the website as a “black hole” and a “massive beast.” He emphasized the time intensive nature of navigating with a screen reader, especially for someone who had not had long-term or high-level training on screen readers:

Because of the nature of how the blind and visually impaired navigate the internet, . . . it can become very time-consuming to have to go through all of those web pages from top to bottom. I could spend maybe eight hours doing something that would probably take a sighted student maybe half or even like a third of that time. . . . So most of the time I . . . prefer to seek a sighted assistant because they’re able to filter through the data a lot quicker than I can. I have been mostly unsuccessful in conducting my own . . . research. . . . And so . . . I schedule appointments with the reference librarians—my gosh I could spend 10 hours in a library and trying to do the research independently as opposed to spending an hour, hour and a half with the research librarian.

As with other users, he was grateful for librarians’ assistance, but the outcome was not ideal since the library website still felt overwhelming to him.

A fifth user also contacted a librarian because of difficulty with the website, and reported appreciation for the librarian’s help: “I had just transferred in . . . it was a little overwhelming, and I had a paper due, and I went to the library. . . . I just [asked for help] about how to find certain articles, . . . keywords to use, . . . you know, what my point was for searching for the articles. And it was great. . . . it was very helpful. . . . [The librarian] was wonderful.”

The librarian attempted to help the user begin learning to navigate the library resources with her screen reader. The user said the librarian understood some about how she was navigating with the screen reader, or picked it up as she was doing it: “It was the first time he worked with a student who was using that kind of technology. But he did. He was very friendly, very patient, and we had kind of a choppy internet connection, so it took a little while.”

This student was fairly new to her school and so longer term outcomes were not yet known.

Other users relied on the screen reader more fully while working with a librarian. One patron said, “She gave me some directions. But she was very visual [laughs], so. I told her, can you repeat that and . . . I . . . basically translated it into the way I do it with the screen reader. . . . I tabbed

through and listened to all the links that [were] on there [to find what the librarian said to go to]. So it was good.”

The patron stated that she only spent about five minutes with the librarian and that she understood how to do the research herself after this assistance.

Another user learned to navigate independently:

She [the librarian] told me where I needed to go on the page because their website is so massive and there’s a lot of links on there. It took a bit longer obviously for the first time. . . . And there were some times where it took me a lot longer to actually find what the librarian was asking me to find compared to the sighted version, which is to click on the link. . . . And the screen reader, sometimes it’s harder to navigate. You’ve got to read everything. The librarian eventually realized the slower pace in how the screen reader operated so she understood why sometimes it took longer or why it took long routes to get to a different link It definitely did [help me overall understand what’s available through the library website]. It . . . taught me the website isn’t so immense and hard to navigate. It’s not easy but you can navigate it.

This user made clear that she had become independent: “I very rarely went [to the library] . . . I would always just go to their website. . . . Sometimes freshman or sophomore year I would go to the library and ask for assistance from the librarian or one of the support staff . . . [for] using the databases because I was a freshman so I was a little uncertain at the time.”

Of those who had consulted with a librarian, including some who had only done so minimally, only two reported a negative experience. One user said,

I guess what sort of threw me off was that while they were helping me do the research, they refused to read the searches to me. It was weird. They would read some things. I was like, “Can you read me the search titles again?” He’s like, “No, I don’t think that’s appropriate.” “Why not?”

Interviewer: . . . It sounds really difficult and awkward.

Interviewee: It was very awkward . . . I thought, “Why wouldn’t it be appropriate? That information is visually available. It’s not as though you’re giving me answers to a test. You’re reading to me what’s on the screen that’s in front of you and would be apparent to someone who can see if you were helping them. Your [computer] doesn’t have a screen reader on it. What’s the benefit of me sitting here with you?”

If this interaction was not a misunderstanding, perhaps the librarian was concerned with what type of time commitment she or he might get into, or generally was unaware

of the resource gaps for blind users and the obligations for libraries to provide equally effective online resources to users with disabilities, which are often unmet, as discussed in the literature review.

The other user who reported a somewhat negative experience is discussed in the independence section of this article. Generally, most users felt positively toward librarians.

Not Using a Reference Librarian’s Assistance

Three users reported having used a librarian’s assistance very minimally or not at all. One seemed to be an especially high-level screen reader user, one was married to a high-level screen reader user and relied on her assistance, and a third had an unhelpful experience using the library in person. This student had asked for help in her first year of college and had gotten an unhelpful response. During the rest of her undergraduate years, she used the library website independently, with some difficulty, and relied on chat reference. At some point, the student realized the unhelpful response came from the circulation desk. She had not known earlier that asking a reference librarian would have been possible.

With four participants, the question of whether they consulted with a librarian did not come up. Most were in roles where they were less likely to request research assistance, such as employees in disability offices.

Preferences for Independence

Users varied but tended to prefer independence. For example, the user quoted earlier who was referred to the disability office said, “[Disability office staff helping with research are] always very helpful. It’s just I know in the future there’s going to be more research projects than there are now. So I don’t want to have to go to him for everything.”

Another user said, “I’m very independent when it comes to technology. I never really went into the library . . . I kind of to a fault try and do things on my own if any way possible. . . . [I’ve] probably done things in ways that are more difficult, just because I thought I could do it independently.”

During the interview, the user and the interviewer realized that he was relying on the discovery tool and having difficulty focusing the results. He was enthusiastic to find out about databases, which might have helped him focus the results, from the interviewer. He might have discovered this more quickly by asking a librarian or by improved library homepage design.

An alumna who preferred independence, and who was an advanced screen reader user, had attended library sessions at various schools. She said, “They would be, inevitably be sort of flustered when I showed up. And I had to reassure them . . . the trainings ended up not being too useful for me because they would say ‘Well click on this and go to the . . . top’ and they wouldn’t articulate which link it would be. . . . So I ended up learning it myself. . . . Half the time I did

it quicker than them. . . . I could use them for . . . ‘Which database might be good for this?’”

She seemed to have done better by relying on herself than on librarians.

Another advanced screen reader user who was quoted earlier readily acknowledged that he used reference librarians to help “speed up” his research a few times during his program. The balance he chose between navigating independently and asking for help seemed to work well for him.

Should Librarians Know How to Use Screen Readers?

When asked, five users responded that they thought it would be helpful if a librarian knew how to use a screen reader, and no one said it would not be helpful. One person said, “I just feel like it could be a lot more interactive that way versus someone just telling you, ‘Go here, go here,’ and then you have to find it on your own.”

Another user said, “I think [librarians] should know how to do accessibility. Just because you never know the level of the [user]. . . . So I think the librarian should be very knowledgeable.”

Here, the participant assumes that some screen reader users will be at a lower level of expertise such that they may need a librarian who is highly knowledgeable about screen readers.

A user who had stronger skills himself suggested it would not be necessary for librarians to have screen reader skills to provide reference to him. He thought it was important for librarians to understand screen readers to effectively help resolve accessibility problems with library resources.

A participant who had recently completed a master’s degree and was now employed assisting other screen reader users said, “Technology education is critical for our community and there is nothing inherently mysterious or hard about using assistive technology. If you learn a few basics it’s [just as] possible to give a blind or visually impaired person a one-hour tour of a database as it is to [do] it in the general population, once you . . . learn how and really network with people in the [blind] community that can help you get started.”

Using Chat Reference

Five users stated they used chat, two reported they did not, and the topic did not come up with others. All five patrons stated or implied satisfaction with using chat. Two users mentioned the librarian’s response was located above the user’s question when they thought, intuitively, it should be below the question. However, this was considered a minor issue by both. One user said, “I found [chat] easier somehow because . . . I felt like I had more direct help, and any articles that I needed, they kind of were able to help me out with that. . . . It seemed fast.”

She did not encounter librarians who seemed familiar with screen readers on chat, but she gave a brief explanation

to the librarians: “I said, ‘The screen reader doesn’t really—since I’m not using my vision to navigate the page, it will load differently.’ But I couldn’t get into specifics necessarily with them, just kind of told them very basic stuff. Sometimes I would tell them, ‘Hey, so I couldn’t find that with the screen reader, so will you be able to help me get the article?’ Then they would do it.”

Because webpages are perceived and navigated differently with the screen readers than with vision, webpages could be understood to “load differently.” The librarians would try to explain where she needed to go on the library website, but offer to do it for her if she had trouble, she said.

Another participant also said that she told the librarians on chat that she was using a screen reader. Both participants who reported telling the librarians on chat that they were using a screen reader seemed unsure how to respond when the interviewer asked if the librarians on chat seemed to have learned about screen readers from the interaction. Both participants guessed the librarians might have learned a little bit.

Learning Citation Style

In addition to assistance researching for information, librarians typically help students with questions about citation style. Reference librarians also typically help with locating citation style guides or even creating brief style guides on the library website. To understand how reference librarians could provide an equal level of service to blind users regarding citation style as is provided to sighted users, it is relevant to understand what screen reader users experience while learning citation style.

Interviewees reported that citation style was challenging. One high-level user said, “That is really tough. I struggled with getting that formatting right. I mean as un-fun as it is you really do have to sit down with a book and read the examples and read about the formatting, especially if you’re totally blind.”

When asked if he had found accessible materials to learn citation style, one person said, “I’m having a horrible time.” When asked about italics and punctuation, another person said, “I can do that pretty well but lining it up and the spacing and stuff are hard for me. . . . Sometimes I don’t know the commas and the periods. It just gets to be all too much for my brain.”

Participants used various strategies including human help, Purdue’s OWL, Braille examples, other electronic citation style guides, and searching Google to see if anyone else had cited the item in the correct format that they could copy and paste. Difficulties included finding out how to format the citation—bold, italics, punctuation, indents, and spacing—as well as learning how to create some of these formats with their screen reader. The most common method participants used to learn what punctuation is supposed to be in the citation was having the screen reader read character by character in a sample citation to hear the punctuation.

For learning placement of italics, bold, and underline, it is possible to change settings in at least some, if not all, screen readers to read these features in a sample citation. However, many steps typically must be learned to change the screen reader settings. Users normally would find it very excessive to have to listen to all these formats announced during all their reading, so would need to learn to turn these announcements on and off.

Moving from identifying formatting within example citations on to creating citations, one user explained, “You have to take your time because . . . for instance the [italics] command, it’s one of those things where [JAWS] says [italics] is on or . . . off, so you have to . . . be very cognizant of what you’re doing because I obviously can’t see if something’s [italicized].” If the setting to read italics was accidentally turned off, the user could miss something.

Another challenge was spacing and hanging indents. One user said, “I didn’t know that the second line of each reference was supposed to be indented. . . . I can’t visualize it, and there was nothing [in style guides] that was descriptive enough to explain the formatting.”

At least eight users mentioned using Purdue’s Online Writing Lab, OWL. Advantages of OWL included heading tags. One user said, “It had headings. You could go right to what you wanted.” Second, in some places OWL includes descriptions of which elements of a citation are in which format, so that the user does not have to change screen reader settings to find out which items are italicized, bolded, etc.

Several users reported creating their own guides or that someone created a guide for them. One user said, “I started typing my own notes, and putting in stuff like last name, and writing the word comma. [Going character by character is] very time-consuming.”

Several people used other style guides. One person said, “My professor actually posted a detailed . . . style guide to Blackboard . . . and the file was accessible, actually, so that was nice.” Another user said he got a current (6th edition) APA guide from Learning Ally in their audio plus format. Then this user said, “As opposed to turning on my audiobook player and spending the time . . . to go through [it], I have that cheat sheet [written by a professor].” Yet another user said she uses a book from Learning Ally titled *LB Brief*. Learning Ally’s website shows four editions of this book published from 2005 to 2014. The most recent has added “up to date documentation guidelines, including the most recent revisions to MLA and APA documentation styles, with numerous models of new media in each style and new annotated sample sources.”²¹

One user had tried to learn citation style by observing how references were laid out in some Braille books she had. However, this user expressed a high level of frustration with citation style.

The interviewer asked several participants if Braille citation style guides would be useful. Responses were that it would be helpful in the new Uniform English Braille because it has unique symbols for bold, italics, and underline, while

American Braille had one symbol for the three. However, participants emphasized that caution would be needed to make sure the translation was accurate.

Another strategy mentioned by several people was copying and pasting a citation found online. At least three people said they found copying and pasting a citation to be a shortcut. However, one of these users cautioned, “These little tools that will paste the citation in your format of choice, you still have to watch out with the bolds and italics and you have to know how to ask your screen reader whether something’s bolded or italicized. . . . So the tools are accessible, it’s not that it can’t be done but you have to be a lot more proactive because your eye is not going to just notice, ‘Oh, this doesn’t look like the example.’”

For these reasons, another person preferred to type out the citation himself so that he does not have to go through the result “with a fine toothed comb.”

Five people reported relying partly or entirely on human assistance for citation style. One paid an editor to check her final thesis. The other four made extensive use of the disability office staff, the librarians, the writing center, a TA, or a friend. One of these students said, “I shouldn’t have but I basically had the librarians create my bibliography for me all the time because I don’t like doing it and I’m horrible at it.” None of these people said that the TA or the staff in the disability office, the library, or the writing center was equipped to teach them to do the citation style themselves using the screen reader. One user explained how she worked with writing center staff. The interviewer asked, “Do any of them know how to use a screen reader, or did they start learning how to use a screen reader at all?” The interviewee replied, “No. They just say stuff that’s relevant to them—they’ll just say, ‘Okay, go down to this paragraph,’ . . . and I do it the way I know how to do it. . . . I have a . . . mouse . . . , so if they need to help me, they can.”

Very few participants reported using citation managers. One particularly high-level screen reader user had, which she summarized: “I used to use Son of Citation where you would just fill in each field manually and then it would generate one for you. I also used . . . Zotero, . . . that had a Microsoft Word plug-in and it would look at a page and try to grab the citation information and stick it into Word. I would not recommend that anyone really do that because I think people lost more time figuring out how to access it than they gained using it but it was an adventure; I did it.”

DISCUSSION

Most of interviewees worked with a reference librarian in person during their program. Of those who did, many did so because of difficulty with the library website. In this situation, most reported positive experience with the librarian; but the outcomes were not always entirely positive. Five users and librarians did not use screen readers during their interaction. Either the librarian did the research with the

user’s verbal input or referred the user to the disability office. Users who were not supported to learn to use their screen reader to navigate the library website independently more often reported continuing to feel overwhelmed or concerned about using the library website and doing research.

There were four interactions that involved using the screen reader with the librarian present. In one of these interactions, the user quickly felt she learned what she needed. In another one, the user and librarian reverted to working verbally. In the other two interactions, the users reported positive outcomes and increased independence, although one of these users was new enough to her program that longer-term outcomes were unknown. Providing reference while navigating with a screen reader has promise for increased independence; however, it seems likely that it requires some time and skill on the part of both the librarian and user.

A minority of participants who had worked with a librarian reported negative experiences. In one case, a graduate student asked the librarian to read some results aloud and, as the student understood it, the librarian refused. In this case, discussion among the library and disability office regarding how to address the unmet needs may have been appropriate. While the Office for Civil Rights requires “equally effective” online resources—not services—the Office for Civil Rights requires equally effective alternatives if such online resources cannot be obtained. According to the literature, many library websites and subscription resources do not even meet minimal accessibility standards, so efforts to provide alternatives likely would be prudent. According to the Office for Civil Rights, alternatives must be available in an “equally timely” and “equally effective manner,”²² meaning the alternative must always be available remotely, just as websites are. The Office for Civil Rights specifies that “all faculty and staff” are responsible for this.²³ Reference librarians are not typically always available, yet the combination of in-person and chat services, if provided competently for blind users, is likely to be able to alleviate some of the problems—and potential for complaints—involved with less than “equally effective” parts of the library website and subscription e-resources.

One user who had originally expected to learn to navigate using the screen reader while meeting with the librarian was referred to the campus disability office. After working with the staff there for over a semester, this user remained confused by the library website and worried about research in upcoming semesters. It is possible that the disability office staff was not proficient with the screen reader or with providing library reference services. In the latter case, it might have been helpful for a librarian to be involved. It is always possible that the student’s academic abilities were at fault, though her initiative and effort suggest this was not likely to be the case.

It is also possible that the library website was not very accessible. In fact, a quick check of the library’s homepage revealed that it contained a “skip to main content” link,

which is a visually hidden link intended to allow users with relevant disabilities to quickly jump over repetitive navigation links. However, on this library's homepage, the "skip to main content" link takes users to the repetitive navigation links. Additionally, the first heading tag takes users to a link for "library home" instead of content that users typically want first, such as the search box area that draws sighted users' attention. This suggests a web developer has followed the letter of accessibility guidelines in a rote way, without understanding how people would typically use the page or, perhaps, without understanding how the skip to content and headings are intended to be helpful for blind users.

Input from public services librarians about where "skip to content" should lead and where headings should be placed could help. Public services librarians are more likely to be familiar with which content users most commonly want to locate first on a page. It is important to keep in mind that any text in small font that sighted users typically skip over will be read by the screen reader, often with no indication that it is in a small font or that it is less important, so headings can help lead screen reader users to find important content without wasting time on such text that sighted users typically ignore. In the author's experience, such problems on library homepages are common. Problems with skip links on academic library websites are documented by Comeaux and Schmetzke.²⁴

A few interviewees who were particularly skilled with their screen readers reported that they only contacted librarians when they needed help locating print sources or to "speed things up." In other words, the highly skilled screen reader users could use the online resources independently, but doing so was time consuming enough that it was sometimes faster to get help from the librarians. They also used librarians help to locate print sources, which naturally they could not do independently. After physically obtaining print sources, blind users would need to have the print sources scanned.

The length of time users met with a librarian varied widely from half an hour during an entire degree program up to a few hours a semester. This may be helpful for reference departments to consider while planning staffing needs, at least in the absence of larger studies or other anecdotal data; however, the number of students who discussed this topic was too small to rely on these numbers. There was a tendency to get to know one librarian and work with them exclusively. Working with one librarian may be particularly beneficial for users if the user needs to educate a librarian on accessibility issues for blind people and for their own specific needs rather than having to educate multiple librarians.

Chat reference was useful to many participants. It is possible that during chat interactions, librarians tend to provide answers and do less of teaching users to navigate independently, which may be the most practical option for students in some situations.

While there was variation, users tended to express a preference for being able to do research independently.

Some users appeared fairly satisfied that librarians would do the navigation with them verbally, and email articles. One screen reader user, Cheryl Spear, who was not part of this study, pointed out that there is intellectual work involved with using sighted assistance, just as there is with using a screen reader: "In general, making use of support persons, which includes [human] readers, requires a lot of independent negotiating and strategizing on the part of the student. But these skills typically are not acknowledged or valued by service providers, counselors and professors."²⁵

Particularly given the state of accessibility and usability of library websites and e-resources, working verbally with a librarian may be a very reasonable option for many screen reader users, particularly those whose abilities are focused in less technical areas. However, even for users who seemed to be fairly satisfied doing research with sighted assistance, it is not clear that they would prefer this option if library resources and reference services were more screen reader user friendly. Participants' beliefs that librarians should learn to use screen readers suggests many of them would prefer to be taught to use the library resources independently with their screen reader, or at least would like to be assisted by a librarian familiar enough with screen readers to provide relevant verbal cues.

CONCLUSIONS AND RECOMMENDATIONS

Blind participants in the study described many challenges using academic libraries and their websites. With these insights, libraries and librarians should approach reference services for blind users more proactively. Librarians can build their understanding of how screen readers navigate. Learning some of the elements on a page to which screen readers can navigate would likely be practical for most librarians. The vendor of the screen reader Jaws, which is the most widely used screen reader in the US according to a survey,²⁶ provides a list of Jaws keystrokes,²⁷ which would be one place to start. Inviting an experienced, qualified screen reader user to lead hands on introductions to using a screen reader for librarians would also be helpful. The free NVDA screen reader could be downloaded,²⁸ and has similar keystrokes to Jaws. Additionally, the Focus Highlight add-on for NVDA can make understanding a screen reader easier for sighted people.²⁹ This add-on visually shows where on the screen NVDA is reading or focused, which can be challenging to follow otherwise.

Perhaps a model like academic libraries' approach to copyright, with all librarians being knowledgeable but typically at least one librarian at each library having more expertise, would be an appropriate aspiration for reference services to screen reader users. As a result of her experiences getting to know students with disabilities, librarian Rebecca Arzola similarly believes "it would . . . behoove librarians to learn more about accessibility options in technology to assist all students during reference interactions."³⁰ It is probably not

practical that all librarians would fully understand the use of all screen readers features or that librarians would all keep up with yearly updates to screen readers’ features as well as frequent changes in webpages’ and databases’ designs as they affect screen reader use. However, at least one librarian could do this.

Furthermore, reference departments could discuss how to provide services for screen reader users and how to consider the limitations in accessibility and usability of library e-resources. Topics for discussion could include

- how to schedule reference consultations depending on the expertise of librarians available at different times;
- logistics to facilitate collaboration between subject expert librarians and accessibility expert librarians as needed;
- how to support screen reader users to learn to navigate library resources independently;
- strategies to support any users who are having difficulty especially with library e-resources that have not been checked and are not known to be equally accessible and usable;
- the role that chat reference might be able to play; and
- when situations arise where accessibility or usability problems are noticed, how to communicate effectively with vendors, in-house developers, and in-house content providers.

Addressing citation style was considered difficult by many participants. This could be improved by assuring that style guides that explain the formatting are available, that librarians steer users to such guides, and that an employee in the library, in a campus writing help center or elsewhere on campus is responsible to know how to teach students to use their screen reader to create and check the formatting, just as librarians and writing center staff teach sighted users to create and format citation style. The role of writing centers commonly overlaps with reference librarians in providing support with citation style. The responsibilities of the librarians versus writing center staff are not usually explicit, but it is likely that collaboration between the two would be beneficial in providing equal service to screen reader users. Rebecca Arzola reports a successful collaboration between her library and her campus’ disability office, including a plagiarism prevention workshop, for students with various disabilities.³¹ It can be important for libraries to follow this lead of taking initiative to provide services to students with disabilities. If a disability office staff person is sufficiently knowledgeable about screen readers, the disability office could be particularly helpful in teaching citation style to screen reader users. However, it should not be assumed that disability office employees have knowledge of screen readers at a level to be able to teach citation style.

It can be difficult for libraries to negotiate effectively with vendors for truly “equally effective” library e-resources without significant leverage from faculty or top school level administration. Such leverage is needed to be able to

credibly insist that vendors must improve to retain license agreements. Top school level support is also needed so the library is provided with the resources of web developer staff expertise and time necessary to competently explain the school’s digital accessibility obligations and requirements to vendors. Librarians might attempt to collaborate with others in the disability office, the writing center, faculty, and the school’s administration to build support for the school to hire experts, such as web accessibility developers and coordinators, to make progress toward accessible e-resources. However, even though wider school level support for accessible e-resources is often not yet as strong as needed, reference librarians may be able to successfully alleviate some difficulties for their blind users by preparing to provide more effective reference services.

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