Defining, evaluating, and achieving accessible library resources
A review of theories and methods

Amy Kazuye Kimura

*Rutgers University Libraries, Department of Shared User Services,
Rutgers, The State University of New Jersey, New Brunswick, New Jersey, USA*

Abstract

Purpose – The purpose of this paper is to review the library and information science literature related to the accessibility of digital resources by individuals with mental, physical or other impairments, to assess the state of research in the field and to explore new avenues for investigation.

Design/methodology/approach – There is an increasingly rich body of literature surrounding digital accessibility in libraries, ranging from practical guides for authors of Web content, to principles of universal design, to the ethical considerations of libraries subscribing to packages of digital content, to critical examinations of the accessibility guidelines themselves. This review is intended to be illustrative, not exhaustive; less attention is given to studies of specific tools that will become quickly outdated, and more attention is given to underlying considerations and approaches that will remain relevant even as technologies change.

Findings – Many libraries and vendors have taken steps to provide equal access to websites and electronic resources in recent years. While the literature reflects an increasing level of critical engagement with concepts around disability and diversity, it also demonstrates methodological weaknesses in assessment projects that do not lead to meaningful accessibility.

Originality/value – This review offers theoretical and practical perspectives from recent work that can assist librarians in planning and decision-making, as they deal with an increasingly complex landscape of digital resources.

Keywords Libraries, Accessibility, Diversity, Disabilities, Social justice, Disability theory

Paper type Literature review

Introduction

The library profession has long expressed a commitment to facilitating access to information resources and services for individuals of all abilities. Over a century before US Department of Justice passed the 1990 Americans with Disabilities Act (ADA), public libraries were offering blind users access to embossed books. A recognition of the vital role that libraries play in society, and their dedication to inclusivity and social justice, placed them at the center of governmental efforts to produce and distribute materials to users with print impairments (a term now used to encompass a variety of conditions, either mental or physical, that contribute to an individual's difficulty to use the printed word). As the twentieth century progressed, societal and legal recognition of the diversity of individuals with impairments continued to gain footing, with libraries often at the forefront. Technological developments, too, changed the landscape and dialogue around accessibility. The Library of Congress' chronology of developments in the National Library Service for the Blind and Handicapped shows how technology opened up the printed word to the print

impaired, from the invention of Standard English Braille and the earliest talking books in 1933 to the appearance of the searchable International Union Catalog on the internet in 1994.

The ADA pushed an awareness of accessibility issues across the public and private sectors.

The guidelines focus primarily on physical barriers, as the internet was virtually unknown to the public at the time of its creation. The primary means of regulating internet and electronic technologies, which are the focus of this paper, falls under the 1998 amendment to the Rehabilitation Act of 1973, Section 508, which required federal agencies to make their technologies accessible to people with disabilities. This was recently updated by US Access Board in response to changing technologies in a revision that combines the 508 standards with guidelines from Section 255 of the Rehabilitation Act. Among other goals, the "refresh", which went into effect in January 2018 aims to make the guidelines more sustainable through technological innovations; to make the law's requirements easier to follow; and to incorporate current Web Content Accessibility Guidelines (WCAG) for websites and other electronic software and documents (access-board.gov).

Despite these regulations and guidelines having been in place for a decade or more, the fact remains that many online resources, library and otherwise remain insufficiently or entirely inaccessible for some users with permanent or temporary disabilities. Litigation over accessibility has become a regular occurrence for institutions of higher education (Wang, 2017; Higher Ed Accessibility Lawsuits, Complaints, and Settlements, 2018). University libraries are often singled out as serious offenders because of their substantial digital footprint and their centrality in the educational process. Even as technology has enabled wider access to materials for users with print and other impairments, it continues to present barriers. These barriers are not even necessary; accessibility failures do not come from anything inherent in digital technology but from choices that are made during development and implementation (Wentz *et al.*, 2011). The problem is rooted in the fact that accessibility tends to be reactive rather than proactive; it is retroactively applied, not built into the design process, because that design process usually fails to involve diverse constituents.

The goal of this paper is to review the library and information science (LIS) literature related to the accessibility of digital resources by individuals with mental, physical or other impairments and to critically examine both the practical and scholarly engagement with current discussions of disability theory. This review draws on over 95 peer-reviewed articles written since 2010, as well as some earlier foundational scholarship and scholarly literature and supplementary resources from outside the LIS field. These articles were selected from the results of extensive searches of multiple databases, primarily Library and Information Science Abstracts and Library Literature and Information Science Full Text, as well as the more broadly multidisciplinary databases ERIC, ScienceDirect and Academic Search Premier, to catch relevant literature that may not have been indexed in more discipline-specific databases. I also consulted the open access, peer-reviewed *Code4Lib Journal*, *Weave: Journal of Library User Experience* and *In the Library with the Lead Pipe*. The ASIS&T Digital Library and the Association for Computing Machinery Digital Library offered approaches less focused on libraries in particular, which helped situate the library literature within the broader context of technical and sociocultural accessibility awareness. The articles ultimately selected for inclusion here are generally recent English-language publications offering substantive descriptions of how institutions, primarily but not exclusively academic libraries, evaluated and improved accessibility of their own resources, as well as articles about accessibility principles and practices more generally. This review is intended to be illustrative, not exhaustive, as a means of offering perspectives from recent

work that can assist librarians in planning and decision-making as they deal with an increasingly complex landscape of digital resources. Publications using outdated standards or technologies have been generally excluded unless they represent important historical trends or offer unique insights broadly applicable to current practitioners. Less attention is given to studies of specific tools that will become quickly outdated; more is given to underlying considerations and approaches that will remain relevant even as technologies change.

Definitions
Disability and diverse ability
Language surrounding disability ranges greatly and evolves frequently, complicated by the highly variable manifestations of mental and physical impairments and abilities, and by changing understandings of how individuals' abilities are differently contextualized and perceived by culture and society. The legal definition of a "disabled" person under the ADA is someone who "has a physical or mental impairment that substantially limits one or more major life activities. This includes people who have a record of such an impairment, even if they do not currently have a disability. It also includes individuals who do not have a disability but are regarded as having a disability" (adata.org). Later amendments to the ADA (2010 and 2016) broadened the definition of disability and made it less restrictive. Individuals may consider themselves or others to be disabled if they exhibit, for example, low or no vision; color blindness; hearing or physical impairment; cognitive or learning difference, including autism, attention deficit hyperactivity disorder, dyslexia or other print or language processing conditions; or sensory differences. Psychological conditions such as anxiety or mood disorders have more recently become acceptable as falling under the category of disability.

The World Health Organization (WHO), drawing on the International Classification of Functioning, Disability, and Health, uses disability as "an umbrella term, covering impairments, activity limitations and participation restrictions". The WHO estimates that roughly 15 per cent of the global population, or one billion people, could be considered as disabled under this definition. The organization emphasizes that disability is "not just a health problem but is a complex phenomenon, reflecting the interaction between features of a person's body and features of the society in which he or she lives. Overcoming the difficulties faced by people with disabilities requires interventions to remove environmental and social barriers" (World Health Organization, 2018). This acknowledges the complexity of context and perspective, and reflects a recognition of the "problem" of "disability" as laying with the individual's sociocultural and physical environment, not stemming from the features of individuals themselves.

The language of disability chosen by LIS researchers is often driven by tradition, but it is increasingly sensitive to context and experience or rooted in a specific theoretical underpinning. Acknowledging the lack of consensus between and within individuals and communities regarding language, Clossen and Proces (2017) consciously use the identity-first "disabled people" instead of the person-first "people with disabilities"; Cassner *et al.* (2011) and Copeland (2011) use the term "differently able". Pionke (2017a, 2017b) prefers "functionally diverse", which emphasizes ability and agency and the diversity of lived experience. Rosen (2017) points out that disability is "always an intersectional identity" that also maps closely to diversity. For the purpose of this paper, I recognize "disability" as context sensitive and representative of a gradient; the word is not intended to position ability and disability as dichotomous concepts.

There are two widely recognized theoretical models of disability. The first is the medical model, of which the ADA's definition is an example, which essentially views the person with an impairment as broken. Andreas Kleynhans and Fourie (2014) emphasize that the flaw of the medical model is that it conflates individual impairment with disability and "views disability in terms of disease process, abnormality and personal tragedy". Lewthwaite (2014) adds that standards in the mold of the medical model do not address the complexity and diversity of disabilities across different contexts, and she encourages us to look beyond Western norms and definitions of "disability". The social model separates impairment from disability. Impairment is seen as a fact or a condition; disability is the restriction of activity based on a social context that overlooks the existence of people with impairments. The conditions, then, are what is disabling, not the impairment itself; disability becomes a social construct (Schmetzke, 2002). In the social model, individuals with disabilities, being experts on their individual experience, are empowered to decide for themselves what services they need. Pionke (2017b) also notes the rehabilitation model, which aims to "normalize" functionally diverse individuals by helping them "overcome" a disability. The problem here, besides putting the power in the hands of professionals who determine the needs of an individual, is that it necessitates a view of functional diversity as removed from a supposed baseline normality, which, when one considers the limitless range of human features, abilities, conditions and contexts, begins to seem entirely arbitrary.

Accessibility
In short, an accessible resource is one that does not present barriers to access. In the built environment, this could mean ramps instead of stairs or tactile and audible warning devices at street intersections. In the digital realm, usability and technical accessibility are generally recognized as inseparable components of accessibility (Oud, 2011; Conway *et al.*, 2012; Southwell and Slater, 2012; Andreas Kleynhans and Fourie, 2014; Yesilada *et al.*, 2015). Inclusion is close to the heart of librarianship; everyone agrees that accessibility is desirable and good; we have decades of legal and technical guidance to follow. In theory, the Web removes barriers to communication and understanding that individuals might face in the physical world. In reality, many websites and tools simply present different types of barriers, rendering their content inaccessible to many potential users. We should be at an advantage in the online world: digital information consists of zeroes and ones, and "there is nothing inherently visual or auditory about zeros and ones" (Wentz *et al.*, 2011). It should be easy, then, to create an online environment that is not disabling for users with vision or hearing impairments. Other disabilities typically garner less consideration, perhaps because the "solution" often lies not with technology but through a more complex process of recognition and respect for the vast and context-specific range of functional difference.

The problem is, at least in part, deeply rooted in the problematic constructions of disability aforementioned. Legislation and litigation make it easy to see accessibility as a legal issue. WCAG guidelines and the compliance checklists that reference them make it easy to view accessibility as a technical puzzle, one that can be "solved" by changing an underlying code. But true accessibility means true inclusivity, which requires us to shift our attitudes, question dominant perspectives and think about accessibility instead as a matter of social justice, much as we think about diversity (Jaeger, 2015; Jaeger *et al.*, 2015a, 2015b; Kumbier and Starkey, 2016; Yoon *et al.*, 2016a, 2016b; Rosen, 2017). Diversity is not just something to "celebrate"; it must be actively fostered (Brimhall-Vargas, 2015), and it means including all groups that are "underrepresented, disadvantaged, or underserved in terms of information" (Jaeger *et al.*, 2011). Likewise, digital inclusion – which combines technology skills with information and media literacy – is imperative in a just society in the twenty-first century. Communities with

unequal access to digital information have decreased digital literacy and therefore are disadvantaged, underrepresented and underserved (Jaeger *et al.*, 2012). The digital divide, created when entire classes of people are excluded from accessing digital content, is self-perpetuating if unchecked. Even though libraries mean well and believe that "providing access" to materials is a democratizing force, differential access, Cancro (2016) warns us, may serve to reinforce or actively exacerbate existing inequalities.

Rosen (2017) sees the word "accessibility" as similar to "diversity" in that people agree on its value, but not its meaning. This ambiguity, tied to the legal, technical, philosophical and political discourses that surround (or should surround) it, gives it "radical potential" as a tool for justice. Rosen has come to a working definition of accessibility as "a design philosophy that centers the needs and experiences of people with disabilities". She sees it as applicable to every aspect of librarianship, "from collections to services, to hiring". Certainly, this speaks closely to user-centered design, a framework that is finally beginning to permeate the culture of physical, digital and service design in libraries. The difference here is that rather than working for a one-size-fits-all approach based on the needs of some "representative users", it is the needs and experiences of people with disabilities that are put front and center. Putting those needs first is not exclusionary, and it benefits overall design. Accessibility, like diversity and inclusion, must be part of an active agenda to be truly meaningful.

Evaluating accessibility

The legal–technical perspective on accessibility is self-reinforcing through legal agreements that require an institution to become "compliant" with accessibility standards. This is problematic, if we are concerned with meaningful accessibility, for reasons I will address shortly, but from a pragmatic standpoint, the standards provide a useful place to start. Most librarians with even a passing familiarity with Web accessibility will have heard of WCAG 2.0, a set of guidelines created by the World Wide Web Consortium's (W3C) Web Accessibility Initiative. WCAG 2.0 is intended to serve as a technology-neutral, internationally recognized standard for Web content accessibility. After a long development process (WCAG 1.0 was established in 1999), 2.0 was formalized in 2008, with the goal of helping organizations and developers create barrier-free Web content and tools. It provides information and instruction about ways to make content accessible through 12 guidelines, organized under four principles: perceivable; operable; understandable; and robust. Each guideline has three levels (A, AA and AAA) of success criteria (w3.org).

The WCAG 2.0 standard itself has been subject to a number of criticisms. Clark (2006), who was initially part of the WCAG revision team before being ejected from the process, criticized the W3C for being too opaque and overly reflective of multinational corporate interests. He complained that the process itself was largely inaccessible to users with many types of impairments and to those who do not speak English or have the time or financial resources to attend international meetings. He pointed out that the W3C document purporting to explain WCAG 2.0 is twice as long as the specification itself, indicative of the convoluted process through which the standard was developed and implemented. Kreps and Goff (2015) see it as already irrelevant, doomed by the process of its creation, although they also view it as something of a technical success, either in addition to or in spite of being a political failure. Yesilada *et al.* (2015) conducted over 300 interviews with people interested in accessibility and found that while there was little consensus on what Web accessibility means, there was significant agreement that guidelines alone do not suffice. Despite these criticisms, and the fact that it is now ten years old, WCAG 2.0 remains the "gold standard" by which accessibility is usually measured.

When Hill (2011) conducted a content analysis of accessibility-related LIS literature from 2000 to2010, she found that most articles presented descriptive work recommending solutions to particular issues (reiterated in 2013). She observed a "paucity of information behavior and other qualitative approaches" in favor of "easy-to-perform accessibility testing" (2013). This is a reference to the prevalence of automated tools that can be used to check source code versus a set of standards. A common narrative goes something like this:

- A library – or university-wide push for accessibility is initiated by a lawsuit.
- An academic library is tasked with meeting a particular standard for the library website, usually WCAG 2.0 AA.
- The library staff embarked on an evaluation of using an automated testing, sometimes supplemented with manual checks on a subset of pages.
- The site was found to have multiple accessibility problems, often failing to meet even the most basic criteria.
- A remediation plan was developed and executed by altering source code to boost the compliance percentage.
- Many issues were impossible to remedy because of the reliance on external vendors.

By the numbers, case studies have remained prominent in the literature in recent years even while most in the field acknowledge that this approach does little to meaningfully reveal or solve accessibility challenges. These types of studies are not without value – at the very least, they demonstrate a much-needed engagement with the topic of accessibility – but the problem with focusing on numbers alone is that they are difficult to interpret and may in fact be deceiving (Conway, 2011; Oud, 2011; Comeaux and Schmetzke, 2013). A site might fail a compliance check because of a single error that occurs multiple times on each page. For example, if the hyperlink color failed to contrast sufficiently with the background, it would get "flagged" multiple times on each page, but it might still be reasonably usable and could easily become more so with a single change in the template. On the other hand, a site that ticks all the boxes might not actually be usable, perhaps especially with complicated interfaces such as library discovery platforms.

Playing to the numbers is accessibility by brute force, and while it might adhere to the letter of the law, it does not follow the spirit. If usability is a component of accessibility, evaluations of accessibility must include user testing and must involve of individuals with diverse abilities. The fact that the numbers do not reflect true accessibility has been confirmed by Yoon *et al.* (2016a, 2016b), who conducted a side-by-side comparison of an automated checking tool with six visually impaired testers and found little correlation between what the tool and the users deemed as actual problems. Mixed-method studies are becoming more common, where researchers supplement automated accessibility testing with manual evaluation against checklists to catch additional usability issues (Conway, 2011; Conway *et al.*, 2012; Oud, 2012; Billingham, 2014; Maatta Smith, 2014; Glusker, 2015). Several articles report additional testing with assistive technology, but this was carried out almost exclusively by users who do not identify as disabled. One could argue that this approach runs the risk of engaging with "token accessibility over true accessibility" (Hill, 2013).

Copeland (2011) noted that "pervasive reliance on one dimensional studies that singly investigate library accessibility/inaccessibility from the perspectives of architects, typically-able library professionals, typically-able library patrons, or even from the perspectives of differently-able library patrons themselves, significantly handicap the studies' impact".

Fortunately, recent scholarship has begun to engage more with this deficiency. Several researchers conducted in-depth interviews with library users with disabilities regarding the general level and accessibility of library services (Copeland, 2011; Willis, 2012; Pionke, 2017b). This seems to be a particular strength of the international literature, with holistic, user-centered assessments of accessibility and is being conducted in Pakistan (Awais and Ameen, 2015; Khan *et al.*, 2015), Malaysia (Bodaghi and Zainab, 2017), Sweden (Reitersjö, 2015), Malawi (Chaputula and Mapulanga, 2016), South Africa (Phukubje and Ngoepe, 2017) and Nigeria (Ekwelem, 2013; Zaid and Zaid, 2018). This type of qualitative engagement provides a valuable focus on the lived experience of these individuals, offering a more comprehensive view of the accessibility landscape than quantitative studies can. Even researchers primarily focused on digital access that can benefit from having a broader view of the accessibility challenges faced by users in our libraries.

Of those who did conduct accessibility/usability testing with individuals with disabilities, most worked with users with low or no vision (Dermody and Majekodunmi, 2011; Conway *et al.*, 2012; Hunsucker, 2013; Ekwelem, 2013; Babu and Xie, 2017; Lazar and Briggs, 2015; Yoon *et al.*, 2016a, 2016b; Sorrell *et al.*, 2017). Only Pionke (2017b) went to significant lengths to include perspectives beyond print impairment including individuals with autism, motor impairment, and post-traumatic stress disorder in his research. None of the reviewed literature dealt extensively with other disabilities or disorders; dyslexia in particular is underrepresented, considering how frequently the condition is encountered and recognized in educational settings.

While there remains a heavy focus on library websites in the accessibility literature, other types of online resources have come into question as well, including research databases (Blechner, 2015); online exhibits and collections of digitized and born-digital materials (Walker and Keenan, 2015; Xie *et al.*, 2015; Sorrell *et al.*, 2017; Babu and Xie, 2017); instructional objects (Oud, 2011; Wakimoto and Soules, 2011; Wray, 2013; Classen, 2014; Classen and Proces, 2017); archival finding aids (Southwell and Slater, 2012, 2013); e-books and e-readers (Maatta and Bonnici, 2014; Mune and Agee, 2016; Dobson and McNaught, 2017; Kahler, 2017; McNaught *et al.*, 2018); digital talking books (Lundh and Johnson, 2015); live instruction sessions (Pionke, 2017a); and the widely-used Springshare platform LibGuides (Pionke and Manson, 2018). While many of these studies are good starting points and will serve as useful references for library practitioners concerned with approaching specific technologies from an accessibility perspective, it is impossible in some cases not to notice a persistent lack of direct engagement with users with diverse abilities. Several authors explicitly address this weakness within their own work; therefore, one hopes that future research will actively strive to address this imbalance.

Achieving accessibility

Even as many studies fall short of measuring meaningful accessibility, there are clear implications of how to move forward, both with the research and with our efforts to increase accessibility. The landscape of disability thought in the LIS community is clearly evolving, and every effort to boost awareness and improve accessibility counts. There are some useful, library-specific primers proactively creating accessible content, both for developers and content creators, that will remain relevant for some time despite technological innovations (Baker, 2014; Riley-Huff, 2015; Ng, 2017; Ng and Schofield, 2017). Lee *et al.* (2013) and Beyene (2017, 2018) consider how catalogers could use accessibility-specific metadata to aid users in discovering and identifying accessible resources. Babu and Xie (2017) and Xie *et al.* (2015) provide concrete ideas about how to enhance metadata for digitized and born-digital objects to enhance their accessibility. Dobson and McNaught (2017) and McNaught *et al.* (2018) offer a promising model for crowdsourcing accessibility

data about academic e-book platforms, leading to a tool that could help libraries decide which providers to work with; help students decide which platform might be the best for their particular situation and context; and help suppliers support accessibility features on their platforms. Investigating information-seeking behavior among individuals with functional differences is a promising avenue for gaining a deeper understanding of how to design complex interfaces that are actually usable for everyone (Hunsucker, 2013). Pionke and Manson (2018) created a series of LibGuides that teach readers about disability studies and is serving as an excellent resource for incorporating concepts of universal design and Springshare's built-in capabilities to make accessible LibGuides.

Another interesting area of focus has been the incorporation of accessibility into collection development policies as a mean of using our purchasing power to pressurize vendors into prioritizing accessibility (Dermody and Majekodunmi, 2011; Schmetzke, 2015; Ostergaard, 2015; Delancey and Ostergaard, 2016). Asking vendors to disclose their accessibility policies during the procurement process has become routine at some institutions, often by means of requesting a voluntary product accessibility template (VPAT), a government-created aid to help people buy institutions purchase products that meet Section 508 standards (Wakimoto and Soules, 2011; Billingham, 2014; Blechner, 2015; DeLancey, 2015; Falloon, 2015; Ostergaard, 2015; Riley-Huff, 2015; Delancey and Ostergaard, 2016; Mune and Agee, 2016; Ng, 2017). This has the potential to influence vendors to prioritize accessibility. Unfortunately, a recent examination of VPATs concluded that vendor-supplied accessibility documentation needs to be verified and should not be taken as fact (DeLancey, 2015). Of course, much like WCAG 2.0, the VPAT is standardized; therefore, by its very nature it focuses on meeting minimum technical requirements; it says little about true usability (Wakimoto and Soules, 2011). DeLancey's suggestion is "What is needed is an open repository for both vendor-supplied documentation, and the results of any usability testing. This would give libraries and vendors alike the tools and information needed to make meaningful choices and changes" (2015). If we are complacent with vendors and buy into products that are not universally usable, we are perpetuating the problem, putting our institutions at risk (Farkas, 2015) and, more importantly, adding barriers to accessibility.

Despite the increasing attention to usability of online resources, barriers to accessibility remain widespread. Why is this? Cost is often mentioned as an obstacle, as well as time and lack of understanding (Conway, 2011; Ekwelem, 2013; Hunsucker, 2013; Billingham, 2014). Jaeger et al. (2012) point at two unfortunate findings from earlier literature: policy prioritizes technology over social factors; and librarians are notably absent from higher level policy-making decisions. Many libraries depend on externally controlled decision-making, either by vendors or administrators who are aware of and genuinely concerned about the issue (Small et al., 2015). Wentz et al. (2011) also fault the fact that federal law allows exemptions from conforming to standards for "undue burden". The burden of proof in complaints lies with the individual requesting "special services". They cite Maskery (2007) for reasons commonly given for claiming undue burden, including increased costs and development time, "low-tech" and "uncool" products, difficulties in providing ongoing support and esthetic sacrifice, among others. Organizations will always be able to claim undue burden if accessibility is "retrofitted", but if we instead "incentivize a philosophy that emphasizes born-accessible technologies", undue burden become more challenging to claim (Wentz et al., 2011). Their other criticism of disability law is that "as long as creating parallel versions or applying after-the-fact fixes are acceptable[zelb], it allows, even endorses, a separate but equal approach to accessibility".

Rather than focusing on remediation, what if these barriers were never erected in the first place? Born-accessible technologies and environments are the logical outcome of a user-centered, universal design process that places accessibility at the core. Integrating the lived

experience of functionally diverse users in the design process offers a more "sustainable and culturally relevant way forward than automated 'accessibility checker' tools that adhere to strict WCAG standards, out of context" (Lewthwaite, 2014). "By centering the needs *and experiences* of people with disabilities, accessibility is accountable to the embodied knowledge of real people even as their/our needs change, rather than wed to often outdated standards" (Rosen, 2017).

To build a truly inclusive library, which encompasses physical and virtual accessibility to resources and services (Small *et al.*, 2015), it is imperative that we offer accessibility and disability awareness to librarians (Falloon, 2015; Small *et al.*, 2015) and library staff (Brannen *et al.*, 2017), as well as incorporating it into LIS education (Mulliken and Djenno, 2017). We need to start thinking of the big picture, moving from individual education into organizational strategy, to add a "lens of accessibility" and make accessibility part of our working culture (Rosen, 2017). Research about online resources should turn away from strict standard-based numerical assessment and remediation into true, meaningful accessibility studies that do more than simply pay lip service to importance of involving functionally diverse individuals. We need to question the "facts" of accessibility data and examine the experiences that lie behind it.

Recent LIS scholarship shows an increasing readiness to think and work within the social model of disability and to use that framework to make progress in providing access to library resources. Clossen (2014) demonstrates how to develop accessible video tutorials through a user-centered design process. Pionke (2017c) provides a great example of truly bringing the voices of the functionally diverse into our decision-making (and into the literature). Projects like these, which actively involve diverse individuals and critically engage with theories of disability and diversity, move us toward more inclusive concepts of accessibility, which we understand now cannot be addressed through purely technical means. It is only through engaging deeply with these perspectives and actively involving people with functional differences in every stage of the design process that we can achieve meaningful accessibility and create the conditions in which all library users can succeed.

References

Andreas Kleynhans, S. and Fourie, I. (2014), "Ensuring accessibility of electronic information resources for visually impaired people: the need to clarify concepts such as visually impaired", *Library Hi Tech*, Vol. 32 No. 2, pp. 368-379.

Awais, S. and Ameen, K. (2015), "Information accessibility for students with disabilities: an exploratory study of Pakistan", *Malaysian Journal of Library and Information Science*, Vol. 20 No. 2, pp. 103-115.

Babu, R. and Xie, I. (2017), "Haze in the digital library: design issues hampering accessibility for blind users", *The Electronic Library*, Vol. 35 No. 5, pp. 1052-1065, available at: https://doi.org/10.1108/EL-10-2016-0209

Baker, S.C. (2014), "Making it work for everyone: HTML5 and CSS level 3 for responsive, accessible design on your library's web site", *Journal of Library and Information Services in Distance Learning*, Vol. 8 Nos 3/4, pp. 118-136, available at: https://doi.org/10.1080/1533290X.2014.945825

Beyene, W.M. (2017), "Metadata and universal access in digital library environments", *Library Hi Tech*, Vol. 35, pp. 210-221, available at: https://doi.org/10.1108/LHT-06-2016-0074

Beyene, W.M. (2018), "Digital inclusion in library context: a perspective from users with print disability", *Journal of Web Librarianship*, Vol. 12 No. 2, pp. 1-20, available at: https://doi.org/10.1080/19322909.2018.1427657

Billingham, L. (2014), "Improving academic library website accessibility for people with disabilities", *Library Management*, Vol. 35 Nos 8/9, pp. 565-581, available at: https://doi.org/10.1108/LM-11-2013-0107

Blechner, A.J. (2015), "Improving usability of legal research databases for users with print disabilities", *Legal Reference Services Quarterly*, Vol. 34 No. 2, pp. 138-175, available at: https://doi.org/10.1080/0270319X.2015.1048647

Bodaghi, N.B. and Zainab, A.N. (2017), "My carrel, my second home: inclusion and the sense of belonging among visually impaired students in an academic library", *Malaysian Journal of Library and Information Science*, Vol. 18 No. 1, pp. 39-54.

Brannen, M.H., Milewski, S. and Mack, T. (2017), "Providing staff training and programming to support people with disabilities: an academic library case study", *Public Services Quarterly*, Vol. 13 No. 2, pp. 61-77.

Brimhall-Vargas, M. (2015), "Where the rubber meets the road: the role of libraries and librarians in bringing equitable access to marginalized communities", *The Library Quarterly*, Vol. 85 No. 2, pp. 193-199.

Cancro, P. (2016), "The dark(ish) side of digitization: information equity and the digital divide", *The Serials Librarian*, Vol. 71 No. 1, pp. 57-62, available at: https://doi.org/10.1080/0361526X.2016.1157424

Cassner, M., Maxey-Harris, C. and Anaya, T. (2011), "Differently able: a review of academic library websites for people with disabilities", *Behavioral and Social Sciences Librarian*, Vol. 30 No. 1, pp. 33-51, available at: https://doi.org/10.1080/01639269.2011.548722

Chaputula, A.H. and Mapulanga, P.M. (2016), "Provision of library services to people with disabilities in Malawi", *South African Journal of Libraries and Information Science*, Vol. 82 No. 2, pp. 1-10, available at: https://doi.org/10.7553/82-2-1619

Clark, J. (2006), "To hell with WCAG 2", available at: http://alistapart.com/article/tohellwithwcag2 (accessed 11 March 2018).

Clossen, A.S. (2014), "Beyond the letter of the law: accessibility, universal design, and human-centered design in video tutorials", *Pennsylvania Libraries: Research and Practice*, Vol. 2 No. 1, pp. 27-37, available at: https://doi.org/10.5195/PALRAP.2014.43

Clossen, A. and Proces, P. (2017), "Rating the accessibility of library tutorials from leading research universities", *Portal: Libraries and the Academy*, Vol. 17 No. 4, pp. 803-825, available at: https://doi.org/10.1353/pla.2017.0047

Comeaux, D. and Schmetzke, A. (2013), "Accessibility of academic library web sites in North America: current status and trends (2002-2012)", *Library Hi Tech*, Vol. 31 No. 1, pp. 8-33, available at: https://doi.org/10.1108/07378831311303903

Conway, V. (2011), "Website accessibility in Western Australian public libraries", *Australian Library Journal*, Vol. 60 No. 2, pp. 103-112.

Conway, V., Brown, J., Hollier, S. and Nicholl, C. (2012), "Website accessibility: a comparative analysis of Australian national and state/territory library websites", *Australian Library Journal*, Vol. 61 No. 3, pp. 170-188.

Copeland, C.A. (2011), "Library and information center accessibility: the differently-able patron's perspective", *Technical Services Quarterly*, Vol. 28 No. 2, pp. 223-241, available at: https://doi.org/10.1080/07317131.2011.546281

DeLancey, L. (2015), "Assessing the accuracy of vendor-supplied accessibility documentation", *Library Hi Tech*, Vol. 33 No. 1, pp. 103-113.

Delancey, L. and Ostergaard, K. (2016), "Accessibility for electronic resources librarians", *The Serials Librarian*, Vol. 71 Nos 3/4, pp. 180-185, available at: https://doi.org/10.1080/0361526X.2016.1254134

Dermody, K. and Majekodunmi, N. (2011), "Online databases and the research experience for university students with print disabilities", *Library Hi Tech*, Vol. 29 No. 1, pp. 149-160, available at: http://dx.doi.org.proxy.libraries.rutgers.edu/10.1108/07378831111116976

Dobson, V. and McNaught, A. (2017), "Crowdsourcing e-book accessibility information and the impact on staff development", *Insights the UKSG Journal*, Vol. 30 No. 2, pp. 61-70, available at: https://doi.org/10.1629/uksg.358

Ekwelem, V.O. (2013), "Library services to disabled students in the digital era: challenges for outcome assessment", *Library Philosophy and Practice*, pp. 1-28.

Falloon, K. (2015), "A case study in practice: providing accessibility for persons with disabilities at the College of Staten Island Library", *Advances in Librarianship* Vol. 40, pp. 89-107, available at: https://doi.org/10.1108/S0065-283020150000040014

Farkas, M. (2015), "If not us, then who?", *American Libraries*, Vol. 46, p. 27.

Glusker, A. (2015), "Urban public libraries do not yet meet benchmarks for web accessibility by individuals with disabilities", *Evidence Based Library and Information Practice*, Vol. 10 No. 2, pp. 144-146.

Higher Ed Accessibility Lawsuits, Complaints, and Settlements (2018), available at: www.d.umn.edu/~lcarlson/atteam/lawsuits.html (accessed 21 December 2017).

Hill, H. (2011), "Ontario public libraries, accessibility, and justice: a capability approach", *Canadian Journal of Information & Library Sciences*, Vol. 35 No. 4, pp. 423-435.

Hill, H. (2013), "Disability and accessibility in the library and information science literature: a content analysis", *Library & Information Science Research*, Vol. 35 No. 2, pp. 137-142, available at: https://doi.org/10.1016/j.lisr.2012.11.002

Hunsucker, R.L. (2013), "Making life easier for the visually impaired web searcher: it is now clearer how this should and can be done, but implementation lags", *Evidence Based Library and Information Practice*, Vol. 8 No. 1, pp. 90-93, available at: https://doi.org/10.1002/asi.21696

Jaeger, P.T. (2015), "Disability, human rights, and social justice: the ongoing struggle for online accessibility and equality", *First Monday*, Vol. 20, available at: https://doi.org/10.5210/fm.v20i9.6164

Jaeger, P.T., Wentz, B. and Bertot, J.C. (2015a), "Accessibility, inclusion, and the roles of libraries", *Advances in Librarianship*, Vol. 40, pp. 1-8, available at: https://doi.org/10.1108/S0065-283020150000040008

Jaeger, P.T., Wentz, B. and Bertot, J.C. (2015b), "Libraries and the future of equal access for people with disabilities: legal frameworks, human rights, and social justice", *Advances in Librarianship*, Vol. 40, pp. 237-253, available at: https://doi.org/10.1108/S0065-283020150000040020

Jaeger, P.T., Bertot, J.C., Thompson, K.M., Katz, S.M. and DeCoster, E.J. (2012), "The intersection of public policy and public access: digital divides, digital literacy, digital inclusion, and public libraries", *Public Library Quarterly*, Vol. 31, pp. 1-20, available at: https://doi.org/10.1080/01616846.2012.654728

Jaeger, P.T., Subramaniam, M.M., Jones, C.B. and Bertot, J.C. (2011), "Diversity and LIS Education: inclusion and the age of information", *Journal of Education for Library and Information Science*, Vol. 52 No. 2, pp. 166-183.

Kahler, J.E. (2017), "Accessibility, textbooks, and access services", *Journal of Access Services*, Vol. 14 No. 3, pp. 138-145, available at: https://doi.org/10.1080/15367967.2017.1348901

khan, A., Idrees, H. and Mudassir, K. (2015), "Library web sites for people with disability: accessibility evaluation of library websites in Pakistan", *Library Hi Tech News*, Vol. 32 No. 6, pp. 1-7, available at: https://doi.org/10.1108/LHTN-01-2015-0010

Kreps, D. and Goff, M. (2015), "Code in action: closing the black box of WCAG 2.0, a Latourian reading of web accessibility", *First Monday*, Vol. 20 No. 9.

Kumbier, A. and Starkey, J. (2016), "Access is not problem solving: disability justice and libraries", *Library Trends*, Vol. 64 No. 3, pp. 468-491, available at: https://doi.org/10.1353/lib.2016.0004

Lazar, J. and Briggs, I. (2015), "Improving services for patrons with print disabilities at public libraries", *The Library Quarterly*, Vol. 85 No. 2, pp. 172-184.

Lee, S., Nam, T. and Nam, Y. (2013), "Revising cataloging rules and standards to meet the needs of people with disabilities", *Library Resources & Technical Services*, Vol. 57, pp. 18-29.

Lewthwaite, S. (2014), "Web accessibility standards and disability: developing critical perspectives on accessibility", *Disability and Rehabilitation*, Vol. 36 No. 16, pp. 1375-1383, available at: https://doi.org/10.3109/09638288.2014.938178

Lundh, A.H. and Johnson, G.M. (2015), "The use of digital talking books by people with print disabilities: a literature review", *Library Hi Tech*, Vol. 33 No. 1, pp. 54-64, available at: https://doi.org/10.1108/LHT-07-2014-0074

McNaught, A., MacMullen, R., Smith, S. and Dobson, V. (2018), "Evaluating e-book platforms: lessons from the e-book accessibility audit: evaluating e-book platforms", *Learned Publishing*, Vol. 31 No. 1, pp. 5-10, available at: https://doi.org/10.1002/leap.1143

Maatta Smith, S.L. (2014), "Web accessibility assessment of urban public library websites", *Public Library Quarterly*, Vol. 33 No. 3, pp. 187-204, available at: https://doi.org/10.1080/01616846.2014.937207

Maatta, L.S. and Bonnici, J.L. (2014), "An evaluation of the functionality and accessibility of e-readers for individuals with print disabilities", *The Electronic Library*, Oxford, Vol. 32 No. 4, pp. 493-507.

Maskery, H. (2007), "Crossing the digital divide – possibilities for influencing the private-sector business case", *Information Society*, Vol. 23 No. 3, pp. 187-191, available at: https://doi.org/10.1080/01972240701323614

Mulliken, A. and Djenno, M. (2017), "Faculty visions for teaching web accessibility within LIS curricula in the United States: a qualitative study", *Library Quarterly*, Vol. 87 No. 1, pp. 36-54.

Mune, C. and Agee, A. (2016), "Are e-books for everyone? An evaluation of academic e-book platforms' accessibility features", *Journal of Electronic Resources Librarianship*, Vol. 28 No. 3, pp. 172-182, available at: https://doi.org/10.1080/1941126X.2016.1200927

Ng, C. (2017), "A practical guide to improving web accessibility", *Weave: Journal of Library User Experience*, Vol. 1 No. 7, available at: http://dx.doi.org/10.3998/weave.12535642.0001.701

Ng, C. and Schofield, M. (2017), "A practical starter guide on developing accessible websites", *The Code4Lib Journal*, available at: http://journal.code4lib.org/articles/12697 (accessed 5 December 2017).

Ostergaard, K. (2015), "Accessibility from scratch: one library's journey to prioritize the accessibility of electronic information resources", *Serials Librarian*, Vol. 69, pp. 155-168, available at: https://doi.org/10.1080/0361526X.2015.1069777

Oud, J. (2011), "Improving screencast accessibility for people with disabilities: guidelines and techniques", *Internet Reference Services Quarterly*, Vol. 16 No. 3, pp. 129-144, available at: https://doi.org/10.1080/10875301.2011.602304

Oud, J. (2012), "How well do ontario library web sites meet new accessibility requirements?", *Partnership: The Canadian Journal of Library & Information Practice & Research*, Vol. 7, pp. 1-17.

Phukubje, J. and Ngoepe, M. (2017), "Convenience and accessibility of library services to students with disabilities at the university of Limpopo in South Africa", *Journal of Librarianship and Information Science*, Vol. 49 No. 2, pp. 180-190.

Pionke, J.J. (2017a), "Accessible instruction", *Public Services Quarterly*, Vol. 14 No. 1, pp. 92-97, available at: https://doi.org/10.1080/15228959.2017.1404547

Pionke, J.J. (2017b), "Beyond ADA compliance: the library as a place for all", *Urban Library Journal*, Vol. 23, pp. 1-17.

Pionke, J.J. (2017c), "Toward holistic accessibility: narratives from functionally diverse patrons", *Reference & User Services Quarterly*, Vol. 57 No. 1, pp. 48-56.

Pionke, J.J. and Manson, J. (2018), "Creating disability LibGuides with accessibility in mind", *Journal of Web Librarianship*, Vol. 12 No. 1, pp. 63-79, available at: https://doi.org/10.1080/19322909.2017.1396277

Reitersjö, S. (2015), "More than an arm's reach", *Scandinavian Public Library Quarterly*, Vol. 48, pp. 16-17.

Riley-Huff, D.A. (2015), "Supporting web accessibility with HTML5 and accessible rich internet applications: insights for libraries", *Advances in Librarianship* Vol. 40, pp. 143-167, available at: https://doi.org/10.1108/S0065-283020150000040016

Rosen, S. (2017), "Accessibility for justice: accessibility as a tool for promoting justice in librarianship", *in the Library with the Lead Pipe*, available at: www.inthelibrarywiththeleadpipe.org/2017/accessibility-for-justice/ (accessed 10 December 2017).

Schmetzke, A. (2002), "Guest editorial: accessibility of web-based information resources for people with disabilities", *Library Hi Tech*, Vol. 20 No. 2, p. 135.

Schmetzke, A. (2015), "Collection development, E-Resources, and barrier-free access", *Advances in Librarianship*, Vol. 40, pp. 111-142, available at: https://doi.org/10.1108/S0065-283020150000040015

Small, R.V., Myhill, W.N. and Herring-Harrington, L. (2015), "Developing accessible libraries and inclusive librarians in the 21st century: examples from practice", *Advances in Librarianship*, Vol. 40, pp. 73-88, available at: https://doi.org/10.1108/S0065-283020150000040013

Sorrell, M., Norton, D., McAdams, J., Winterling, R. and Dipple, K. (2017), "Creating an online scientific art exhibit formatted for people with a visual impairment", *Journal of Web Librarianship*, Vol. 11 No. 2, pp. 105-123, available at: https://doi.org/10.1080/19322909.2017.1300788

Southwell, K.L. and Slater, J. (2012), "Accessibility of digital special collections using screen readers", *Library Hi Tech*, Bradford, Vol. 30 No. 3, pp. 457-471, available at: http://dx.doi.org.proxy.libraries.rutgers.edu/10.1108/07378831211266609

Southwell, K.L. and Slater, J. (2013), "An evaluation of finding aid accessibility for screen readers", *Information Technology and Libraries*, Vol. 32 No. 3, pp. 34-46.

Wakimoto, D.K. and Soules, A. (2011), "Evaluating accessibility features of tutorial creation software", *Library Hi Tech*, Bradford, Vol. 29 No. 1, pp. 122-136, available at: http://dx.doi.org/10.1108/07378831111116958

Walker, W. and Keenan, T. (2015), "Do you hear what I see? Assessing accessibility of digital commons and CONTENTdm", *Journal of Electronic Resources Librarianship*, Vol. 27 No. 2, pp. 69-87, available at: https://doi.org/10.1080/1941126X.2015.1029395

Wang, V. (2017), "College websites must accommodate disabled students, lawsuits say", *The New York Times*, available at: www.nytimes.com/2017/10/11/nyregion/college-websites-disabled.html (accessed 4 January 2018).

Wentz, B., Jaeger, P.T. and Lazar, J. (2011), "Retrofitting accessibility: the legal inequality of after-the-fact online access for persons with disabilities in the United States", *First Monday*, Vol. 16 No. 11, p. 20.

WHO (2018), "Disabilities", available at: www.who.int/topics/disabilities/en/ (accessed 4 March 2018).

Willis, C.A. (2012), "Library services for persons with disabilities: twentieth anniversary update", *Medical Reference Services Quarterly*, Vol. 31 No. 1, pp. 92-104, available at: https://doi.org/10.1080/02763869.2012.641855

Wray, C.C. (2013), "Practical strategies for making online library services and instruction accessible to all patrons", *Journal of Library & Information Services in Distance Learning*, Vol. 7 No. 4, pp. 360-371, available at: https://doi.org/10.1080/1533290X.2013.844219

Xie, I., Babu, R., Joo, S. and Fuller, P. (2015), "Using digital libraries non-visually: understanding the help-seeking situations of blind users", *Information Research: An International Electronic Journal*, Vol. 20 No. 2.

Yesilada, Y., Brajnik, G., Vigo, M. and Harper, S. (2015), "Exploring perceptions of web accessibility: a survey approach", *Behaviour & Information Technology*, Vol. 34 No. 2, pp. 119-134, available at: https://doi.org/10.1080/0144929X.2013.848238

Yoon, K., Hulscher, L. and Dols, R. (2016a), "Accessibility and diversity in library and information science: inclusive information architecture for library websites", *The Library Quarterly*, Vol. 86 No. 2, pp. 213-229.

Yoon, K., Dols, R., Hulscher, L. and Newberry, T. (2016b), "An exploratory study of library website accessibility for visually impaired users", *Library & Information Science Research*, Vol. 38 No. 3, pp. 250-258, available at: https://doi.org/10.1016/j.lisr.2016.08.006

Zaid, Y.A. and Zaid, Y. (2018), "The exclusion of Persons with visual impairment in Nigerian Academic Libraries' Websites", *Library Philosophy and Practice*, pp. 1-12.

Further reading

ADA National Network (2018), "What is the definition of disability under the ADA?", available at: https://adata.org/faq/what-definition-disability-under-ada (accessed 18 March 2018).

Belger, J. (2013), "The inclusive library: an investigation into provision for students with dyslexia within a sample group of academic libraries in England and Wales", *Library and Information Research*, Vol. 37 No. 115, pp. 7-32.

Pionke, J.J. (2016), "Sustainable library services for all", *Library Management*, Vol. 37 Nos 6/7, pp. 317-325, available at: https://doi.org/10.1108/LM-04-2016-0030

United States Access Board (2018), available at: www.access-board.gov/ (accessed 3 February 2018).

Web Accessibility Initiative (2018), "Introduction to web accessibility", available at: www.w3.org/WAI/intro/accessibility.php#more-info (accessed 24 October 2017).

Corresponding author
Amy Kazuye Kimura can be contacted at: amy.kimura@rutgers.edu