

Developing Digital Libraries for People with Disabilities: Accessibility Compliance and Challenges

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Abstract : This study explores how digital library (DL) developers address accessibility when creating digital collections to support people with disabilities, especially blind and visually impaired (BVI) users. It investigates whether developers comply with accessibility guidelines and the challenges they face. A total of 31 DL developers from U.S. institutions participated, recruited through listservs, professional organizations, and snowball sampling. Data were collected via a questionnaire and asynchronous focus groups conducted through Canvas. Quantitative and qualitative methods were used to analyze the data. Findings show most developers follow legal and accessibility guidelines, though a few do not. Challenges include limited resources, a lack of awareness, legacy system issues, a lack of engagement with BVI users, administrative and vendor constraints, and complex guidelines.

Keywords: Accessibility guidelines, compliance, challenges, people with disabilities, blind and visually impaired users, digital libraries

1. Introduction

According to the World Health Organization (2023), approximately 1.3 billion individuals are affected by significant disability. Though not always recognized as significant, individuals living with some form of visual impairment represent a substantial portion of the population. Therefore, providing access to this group has become increasingly important since the digital environment is implemented in every aspect of our life. Blind and visually impaired (BVI) users, who depend on screen readers to interact with the web due to their limited vision encounter distinct challenges when accessing contents on the web. Therefore, design consideration is stressed to address people with disabilities including BVI users' unique needs in accessing information and utilizing services on the web.

In light of the rise in their needs, the World Wide Web Consortium's (W3C) Web Accessibility Initiative (WAI) created Web Content Accessibility Guidelines (WCAG) to support and provide a set of guidelines to ensure accessibility on the web. For equal access to the public, different organizations and governments implemented or formalized WCAG as the standard in developing or designing web content to be accessible to individuals with disabilities (American Library Association, 2012; NZ Digital Government, 2025; UK Government Digital Service, 2018).

Digital libraries (DLs), a type of information retrieval (IR) system, offer structured digital collections designed to support information access, management, and dissemination (Xie & Matusiak, 2016). The purpose of this study is to explore how DL developers address accessibility issues when creating digital collections to support individuals with disabilities, especially BVI users. Specifically, the study intends to answer two research questions: 1) How do DL developers comply with accessibility guidelines when creating digital collections for people with disabilities, in particular BVI users, and why? 2) What challenges do DL developers face in creating DL collections, and what solutions have they implemented?

2. Literature Review

2.1 Accessibility standards and guidelines and their compliance

Governments and organizations have worked to ensure and improve accessibility on the web. The most internationally recognized accessibility standard is WCAG developed by WAI. WCAG, first published in 1999, widely accepted and embraced by different governments and organizations as a standard (American Library Association, 2012; NZ Digital Government, 2025; UK Government Digital Service, 2018). WCAG 2.2 is the most recently published version with categorized guidelines into four principles (perceivable, operable, understandable, and robust) extended from WCAG 2.0 to embrace accessibility to more diverse disability groups and extended additional success criteria (Campbell et al., 2024).

In association with government legislation, several accessibility standards were identified. In the United States, the Rehabilitation Act of 1973, specifically Section 508, mandates that federal departments and agencies ensure the accessibility of digital information and services for people with disabilities (U.S. Access Board, n.d.). In Europe, the European standard on information and communication technologies, EN 301 549, serves a similar role in promoting accessibility (European Telecommunications Standards Institute, 2021). Similarly, in New Zealand, the Government Web Accessibility Standard 1.2 requires public service department websites to conform to WCAG 2.2 at Level AA (NZ Digital Government, 2025).

Different guidelines and tools have been utilized by researchers, practitioners, and organizations in identifying accessibility issues and facilitating compliance with accessibility guidelines (Ara, 2024; Kuppusamy and Balaji, 2023; Singh et al., 2024a). As a result of the evaluation, studies have identified fluctuations in accessibility guideline compliance, including both improvements and declines (AlMeraj et al., 2021; Gonçalves et al., 2012; Hanson & Richards, 2013; Lopes et al., 2010; Martins et al., 2017; WebAIM, 2024). Hanson and Richards (2013) reported the progress made by the US and the UK over 14 years from 1999 to 2012 in complying with WCAG 2.0. WebAIM (2024) reported that 95.9% of website homepages had detectable errors identified by WAVE, representing a 13.6% increase from the previous year. However, according to WebAIM (2025), a slight decrease in detectable error was later observed. Despite this improvement, the prevalence of accessibility issues signifies the ongoing needs to promote and implement an accessible digital environment. Different violations have been identified by both automatic tools and human evaluators. These violations largely fall into six categories: violations associated with visual materials; violations related to design elements, such as the labeling of buttons, features, or links; violations concerning structural elements; violations involving feedback and help resources; and violations related to compatibility (Alajarmeh, 2022; AlMeraj et al., 2021; Chee & Weaver, 2021; Gonçalves et al., 2018; Khan et al., 2015; Martins et al., 2017; Singh et al., 2024a; Yang et al., 2020; Yi, 2020; Yoon et al., 2016).

2.2 Types of challenges in compliance with accessibility guidelines

While much research have focused on identifying accessibility problems, there are lines of research on implementing accessibility guidelines throughout the web development process. During the development of accessible websites, different stakeholders have been identified as influencing the process presenting diverse challenges in complying with accessibility guidelines (Huq et al., 2023; Inal et al., 2020; Petrie et al., 2011; Velleman et al., 2017). Petrie et al. (2011)

studied three key stakeholders which are website commissioners, web developers, and accessibility experts in relation to web accessibility. One study targeted User experience (UX) professionals as influential stakeholders in designing accessible web and investigated their challenges in practice (Inal et al., 2020). Some research looked into developers' perceptions in compliance with accessibility guidelines (Alghamdi et al., 2024; Farrelly, 2011; Lazar, Dudley-Sponaule, & Greenidge, 2004; Trewin et al., 2010).

One category of challenges is related to institutional support for accessibility implementation. Previous research has identified barriers such as budget constraints, overall costs, a lack of managerial support, and insufficient training support as barriers to developing accessible websites (Billingham, 2014; Lazar et al., 2004; Leite et al., 2021; Petrie et al., 2011; Trewin et al., 2010; Velleman et al., 2017). Huq et al. (2023) highlighted the importance of persuading leadership to reinforce and promote the implementation of accessibility during the development process. This finding echoes that of Petrie et al. (2011), who reported that website commissioners did not perceive people with disabilities as part of their target user group. They also emphasized the need to provide training in the development phase not only to teach how to implement accessibility guidelines but also to convey the rationale behind it (Huq et al., 2023).

Another category of challenges is related to developers' knowledge and skills associated with accessibility tools and guidelines. These barriers include a lack of knowledge and skillset on accessibility and assistive technology, perceived complexity of guidelines, and challenge in using accessibility tools and resources have been identified (Billingham, 2014; Brys & Vanderbauwhede, 2006; Colwell & Petrie, 2001; Farrelly, 2011; Huq et al., 2023; Lazar et al., 2004; Swallow et al., 2016; Velleman et al., 2017). For instance, Farrelly (2011) reported that developers' unawareness and misconceptions hindered the development of accessible websites. Developers exhibit knowledge gaps regarding the operation of assistive technologies, which hamper their ability to incorporate adequate measures when developing or designing websites. In line with this gap, developers found it to require more guidance and learning resources related to accessibility (Alghamdi et al., 2024; Huq et al., 2023). Moreover, difficulties in understanding the organization of accessibility guidelines and in locating wanted information were also addressed as the issues faced by practitioners (Colwell & Petrie, 2001; Farrelly, 2011; Swallow et al., 2016). They indicated that the extensive volume and complexity of the guidelines posed a challenge in acquiring the necessary knowledge and applying it during development (Farrelly, 2011; Petrie et al., 2011; Trewin et al., 2010).

The last category of challenges is related to the development process of creating accessible websites, in which the barriers consist of a lack of prioritization, time constraints, complication with or lack of control over outside resources and infrastructure compatibility is recognized as obstacles in implementing

accessible web (Billingham, 2014; Leite et al., 2021; Huq et al., 2023; Trewin et al., 2010; Velleman et al, 2017). For example, in Trewin et al.'s (2010) research, the developers mentioned the difficulty in “finding workarounds to problems with toolkits, cross-browser support, and third-party components” (p.4) and difficulty in comprehending how disabled users would interact with the system in relation to understanding the accessibility requirements. Similarly, Billingham's (2014) study on Edith Cowan University (ECU) Library website reported that vendor issue associated with lacking control over vendor platforms was one of the challenges in compliance with the WCAG guideline.

While several studies have investigated the challenges of implementing accessible environments, persistent challenges remain despite ongoing research and technological development. Furthermore, few studies have specifically examined the challenges encountered in developing accessible DLs. Therefore, to bridge this gap, this study aims to examine challenges faced by developers of DLs in compliance with accessibility guidelines.

3. Methods

3.1 Sampling

To recruit experienced DL developers, a multi-method recruitment strategy was employed. Recruitment flyers were distributed via email to partner organizations, such as the Digital Library Federation and the American Library Association. Additionally, recruitment materials were sent to DL developers affiliated with approximately 200 U.S. universities, identified through the Carnegie Classification of Institutions of Higher Education. The snowball sampling method was also utilized, wherein participants who had consented to participate in the study were asked to invite or recommend other DL developers who might be interested in the study.

In total, 31 DL developers were recruited. Table 1 presents the background characteristics of the participants who represented a range of age groups, gender identities, and ethnic backgrounds. The participants were from 30 institutions of different sizes and at different locations across the United States, and their work titles included but were not limited to digital collection specialist, web developer, software engineer, and director of digital strategies. On average, the participants had 10.76 years in DL development and management at the time of the study.

Table 1. Background information of participants (N = 31)

Demographic group	Percentage
Age	
18-29	3%
30-39	32%
40-49	52%
50-59	13%
Gender	0%
Female	65%
Male	32%
Other	3%
Ethnicity	
Asian/Pacific islander	13%
Hispanic or Latino	6%
White	81%
Highest degree earned	
High School/Some college/Associate's	3%
Bachelor's	6%
Master's	81%
Doctorate's	10%

3.2 Data collection

The data collection methods consist of pre-questionnaires and online focus groups. It began with prequestionnaires to gather demographic information and information regarding participants' DL-related work experience.

The primary data source was the asynchronous online focus groups. Participants were invited to participate in a two-week online focus group on Canvas, a web-based learning management system. In total, there were four separate focus groups with three of them involving eight participants and one involving seven participants. Before each focus group started, the researchers created a course on Canvas and posted all the discussion questions in the "Discussion" section (Figure 1). The online focus groups provided valuable discussions on several key topics: the first discussion question was about the guidelines participants followed in their professional practice and the challenges they faced when applying those guidelines (Figure 2), and the following questions and their recommendations for improving various components of the DLAUG guidelines (<https://sites.uwm.edu/guidelines>). The DLAUG includes 27 distinct help-seeking situations, each accompanied by a comprehensive set of guidelines. For every situation, the guidelines cover key components such as definitions, influencing factors, recommended practices and design suggestions, underlying rationale and goals, applicable techniques and methods, suggested features, illustrative examples, related resources, and cross-references. In addition, the DLAUG contains relevant appendices and glossaries to support understanding and implementation. Instruction information was sent to participants, showing

them step-by-step information regarding how to create Canvas accounts and how to register for the course.

To protect participants' anonymity, all participants were asked to use their participant IDs (e.g., P1, P2, and P3) as their usernames in the online focus group. In this way, their institution identities can also be protected. During the two-week period of each focus group, participants could post their own messages and reply to others at their convenient time. During the focus group sessions, the primary investigator of the research project actively moderated all the discussions by acknowledging their contributions with compliments gratitude, asking follow-up questions based on participants' initial posts, requesting clarification or elaboration, and encouraging deeper reflection. The active moderation helped foster a respectful and engaging online discussion spaces for participants. This study focused on the discussion question related to the guidelines they followed in practice and the challenges they encountered when creating and maintaining DLs.

▼ Pinned Discussions

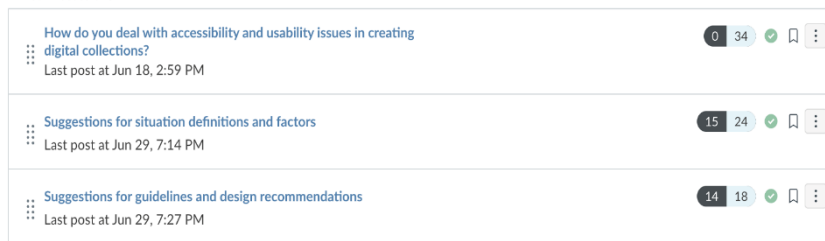






Figure 1. Example discussion questions of the online focus groups

 P2 

We are aware of guidelines but do not currently have any formal policy or workflows that enforce them as we create our digital collections. This is due, I think, to lack of resources and staffing, and use of an out-of-the-box (CONTENTdm) system for our digital collections. We largely rely on the vendor to meet minimal specifications. This is not ideal, and we are aware of this as a shortcoming. Where we have discussed accessibility and usability issues most extensively is with regard to streaming media and captioning (as opposed to site usability). We are aware of and refer to the W3 web content accessibility guidelines (<https://www.w3.org/TR/WCAG/> ) and this is the set of specifications we refer to most often when considering accessibility. It's an area for much closer consideration, but I think requires additional staff and prioritization.

[Reply](#) |  | [> 1 Reply](#)

Moderator 

Thank you, P2. It is interesting that you mentioned prioritization. What is your priority in creating digital collections?

Figure 2. Example of participant–moderator interaction in a focus group

3.3 Data analysis

Descriptive statistics were used to analyze participant information collected through pre-questionnaires. Frequencies were calculated to summarize participant characteristics, including age, gender, ethnicity, and education background. Furthermore, the distribution of different types of accessibility and usability guidelines used by participants were analyzed, helping identify the most commonly referenced guidelines.

The open coding method was used to analyze the textual data from the online focus group discussions, specifically by breaking down, examining, comparing, conceptualizing, and categorizing unstructured textual transcripts (Straus & Corbin, 1990). The analysis for qualitative data focuses on identifying different types of guidelines used by DL developers in practice and challenges they encountered when dealing with accessibility issues in creating and maintaining

DLs. The research team conducted multiple rounds of group discussions to refine and finalize the coding schemes (Table 2 & 3). Using the finalized schemes, two coders independently analyzed the data. Using Holsti's (1969) formula, inter-coder reliability for types of challenges was 0.97.

Table 2. Coding scheme for accessibility guidelines compliance in creating DLs

Category	Definition	Example
Legal stipulation	Legal requirements that have specific accessibility requirements that institutions across the country are mandated to follow	American with Disabilities Action Act (ADA) issued by the U.S. Department of Labor
International guidelines	Guidelines that are recommended for institutions around the world	Web Content Accessibility Guidelines (WCAG) developed by the Web Accessibility Initiative (WAI) of the World Wide Web Consortium(W3C)
Regional guidelines	Guidelines that are recommended for developers in a state or a specific area	Illinois Information Technology Accessibility Act Implementation Guidelines for Web-Based Information and Applications 1.0 (formerly Illinois Web Accessibility Standards)
Institutional guidelines	Guidelines that are recommended for a specific institution	Specific guidelines for a university or an institution DL
Awareness	No specific guidelines followed in practice despite being aware of accessibility and usability concepts and guidelines	Accessibility and usability are theoretical concepts
Other	Other types of guidelines that do not belong to the above categories	Ten guidelines to improve the usability and accessibility of your site (https://usabilitygeek.com/guidelines-improve-usability-accessibility/)

Table 3. Coding scheme of DL developers' challenges when creating and managing DLs

Category of challenges		Definition
Institution-related	Lack of administration support	The challenge of receiving limited support from people working at the administration or management level of an institution
	Lack of formal policies or workflows	The challenge of having no established formal guidelines or procedures
	Lack of funding	The challenge of having limited financial support provided by an organization/institution
	Lack of staff	The challenge of having a limited number of people with relevant expertise employed by an organization/institution
DL developer-related	Difficulty understanding and addressing user needs	The challenge of DL developers having difficulty identifying and meeting the specific needs of BVI users
	Insufficient attention to BVI users' needs	The challenge of DL developers having limited attention paid to the unique needs of BVI users
	Lack of knowledge of assistive technologies	The challenge of DL developers having limited knowledge of assistive technologies
	Lack of real-life accessibility testing	The challenge of involving BVI users in conducting accessibility testing
Development-related	Difficulty migrating legacy repositories	The challenge of DL developers having difficulty transferring old repositories to updated systems
	Difficulty remediating legacy content	The challenge of DL developers having difficulty providing remedies for legacy content that was digitalized or created before
Vendor-related	Vendor restriction	The challenge of relying on vendors to meet accessibility requirements
Guideline/tool-related	Insufficient relevant accessibility assessment tools	The challenge of limited tools to evaluate DL accessibility

	Unclear guidelines in practice	The challenge of applying guidelines in developing DLs
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4. Findings

4.1 Guidelines used by DL developers in practice

According to the focus group discussions, DL developer participants followed legal stipulations and various types of guidelines at different levels in their practices of creating DLs, including international guidelines, regional guidelines, institutional guidelines, awareness but without formal guideline use and others. Figure 3 presents the distribution of guideline compliance by DL developers.

Accessibility requirements from legal statements including the Americans with Disabilities Action Act (ADA) and the 508 of the Rehabilitation Act of 1973 were followed by eight participants. International guidelines were widely used among the participants. Specifically, 52% of the 31 DL developers mentioned that they complied with WCAG Guidelines in their DL development practices in their institutions, and 6.5% of participants reported complying with the Accessible Rich Internet Application (ARIA) specifications. In terms of institutional guidelines, three DL developers also complied with the accessibility guidelines created by their institutions. For example, P6 noted that “Anyone who is responsible for maintaining websites and digital collections affiliated with my institution is required to follow accessibility guidelines. These guidelines are set forth by my institution.” One participant (P1) mentioned complying with regional guidelines: Illinois Information Technology Accessibility Act Implementation Guidelines for Web-Based Information and Applications 1.0 (formerly Illinois Web Accessibility Standards).

It is worth noting that not all DL developers followed specific guidelines in their work. 13% of participants pointed out that they did not comply with any design guidelines in their institutions. For example, P3 commented that “At my current institution, accessibility and usability are theoretical concepts. We rely on the guidance of the software developers and maintainers.” Notably, participants also pointed out that the requirements of people with disabilities were not considered or fully aware in their institutions, hoping to apply relevant guidelines in their future work. P8 said, “We rarely consider the requirement for people with disabilities, so this guide provides us an excellent reference for meeting the demands of disabilities when designing and implementing the digital library of next version.”

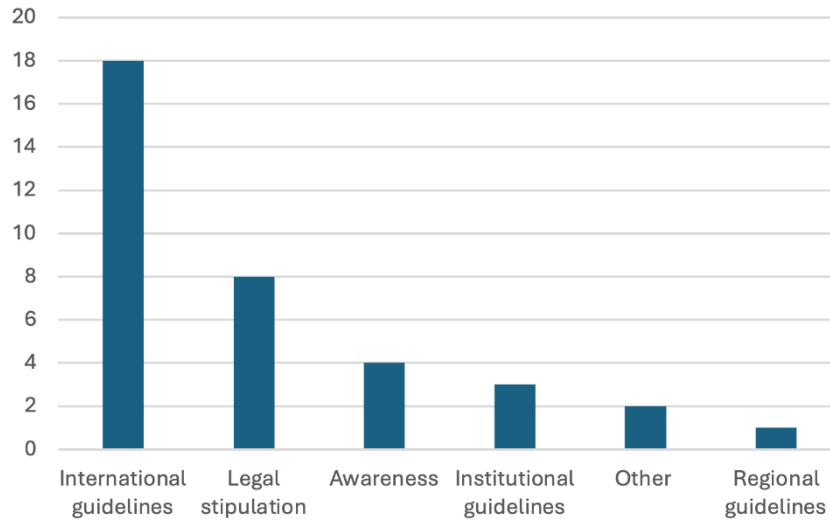


Figure 3. Distribution of guideline compliance by DL developers

4.2 Challenges encountered by DL developers in compliance with guidelines

Participants reported encountering a variety of challenges when creating and maintaining DLs. These challenges spanned different dimensions, including institution-related, DL developer-related, DL development-related, vendor-related, and guideline/tool-related. These challenges illustrate the multifaceted nature of DL development and practices, highlighting the importance of combining efforts made by different stakeholders.

Institution-related challenges were commonly mentioned by participants. Participants emphasized the importance of receiving support from administration or management in institutions. As P10 stated, “As is the case with any number of initiatives at a large or small institution, what is required first and foremost is support from the top down.” Along with the lack of administration support, some institutions did not have formal policies or workflows to implement accessibility practices. P2 shared that “We do not currently have any formal policy or workflows that enforce them as we create our digital collections.” Meanwhile, lack of funding was another challenge, limiting the access to the facilities needed. P9 noted that “I learn about large accessibility efforts, but it’s tied to an expensive application used by Central IT and to which we don’t have the means to access.” In addition, a lack of staff dedicated to DL development and practices was observed. P10 commented that “We have a very small staff supporting our digital library efforts.” These institution-related challenges highlight the need for stronger institutional commitment to and support of DL development and accessibility practices.

There were also challenges directly related to DL developers themselves. One main challenge is that DL developers have difficulty understanding and addressing the unique needs of BVI users. As P13 explained, “The challenges we have encountered include addressing specific user needs and general awareness of the issues among library staff,” indicating a low level of awareness of user needs among library staff. Insufficient attention to BVI users’ needs is another challenge related to DL developers. It has been found that not all DL developers pay attention to BVI users’ unique needs and take accessibility into account in practice. For example, P15 admitted that “As we create records, we are not thinking of BVI users and we are fairly constrained by what type of file, what can be in a folder, and so forth in creating our collections at this time.” This suggests that not only is accessibility sometimes excluded from development priorities, but existing technical and organizational constraints can further hinder the inclusion of accessible features. DL developers may also have difficulty involving BVI users for real-life accessibility tests. P24 stated that “We don’t have a person on our development team that uses JAWS to go through our site, so we really are depending on SortSite and haven’t done real-life testing.” Sole reliance on tools alone without feedback from actual BVI users limits DL developers’ ability to ensure accessibility in practice. Moreover, DL developers might not be familiar with assistive technologies. As P19 suggested, “Insufficient staff have skill with assistive technologies (primarily screen readers) to test with them.” This highlights the need to provide relevant training for DL developers to enable them to better ensure accessibility in practice.

In terms of development-related challenges, difficulty migrating legacy repositories and difficulty remediating legacy content are two challenges. Difficulty migrating legacy repositories may occur due to a lack of resources and training. P14 noted that “At the moment, we are caught in the development cycle where we haven’t made as many changes to our current platform because we plan to migrate to another system in the near future, however, that near future has been in the queue for a few years now due to resources and training.” Even after successful migration, DL developers may still have difficulty providing remedies for legacy content. For example, P31 noted that “One of the hardest challenges is to remediate legacy content, content that was digitized and described years ago.” Similarly, P29 pointed out that “our historical records have accessibility barriers. Many digitized documents are handwritten or typewriter-written, making accurate OCR very difficult.”

Vendor restriction is also an issue because it is often the case that DL developers have to rely on vendors to meet accessibility requirements. For example, P2 mentioned that “We largely rely on the vendor to meet minimal specifications.”

Participants also reported guideline/tool-related challenges. One challenge is related to insufficient relevant accessibility assessment tools. P19 shared that “In the past, we had difficulty locating good accessibility assessment tools. (Me from two years ago would have been overjoyed to find a document like your guidelines),” highlighting the needed resources to help find relevant tools. In addition, participants expressed concerns about unclear guidelines and how to apply them in practice to satisfy the unique needs of individual DLs and their users. P27 commented:

I think some of the challenges we run into are in relation to guidelines and recommendations for how to do common tasks such as displaying scanned images and their associated OCR for a user. Also, many of the guidelines for AV work are tailored more towards broadcast content but archival footage is sometimes very different, and it is unclear how we should be treating some of it.

5. Discussion

5.1 Guideline compliance

While most DL developers follow some form of accessibility standards, 13.3% of the participants do not comply with any guidelines or rely on theoretical knowledge. This suggests that accessibility is not always a priority or is inconsistently implemented across institutions. The varying levels of complying with accessibility guidelines are associated with challenges in relation to institutions, developers, standards/guidelines, development process, and vendors discussed below.

It is critical that DL developers not only acknowledge the importance of accessibility but also actively implement guidelines that ensure their DLs are accessible for all users, including those with disabilities. Legal standards like the ADA and Section 508 set a baseline, but guidelines like WCAG and DLAUG provide more comprehensive and detailed recommendations for DL design. The problem is that some developers do not follow any guidelines despite being aware of these standards. Further support and training might be necessary to bridge this gap, especially in institutions where accessibility is still seen as a “theoretical” concept. Additionally, we also need to consider regional guidelines and local policies to ensure that accessibility efforts fulfil both legal and contextual requirements.

5.2 Types of challenges

The findings of this study identify not only the similarities between the previous literature and the results of this paper but also the differences between them. Previous research recognizes the institutional barriers that hinder compliance with accessibility standards including a lack of managerial support, limited training, and budget constraints (Billingham, 2014; Lazar et al., 2004; Leite et al., 2021; Petrie et al., 2011; Trewin et al., 2010; Velleman et al., 2017). However, while this study echoes the same barriers, it also highlights challenges specifically addressed in DLs, in particular, there are no internal policies or

workflows that DL developers can follow in complying with accessibility standards.

As to developer-related barriers, while the literature discusses a lack of applicable tool/resources or knowledge, the study points out the problems of not including BVI perspectives in the DL development and the over-reliance on automated tools for accessibility checking. According to previous literature, developers often lack training and understanding of accessibility and assistive technologies (Alghamdi et al., 2024; Farrelly, 2011; Huq et al., 2023; Swallow et al., 2016). The results of this study go beyond the confirmation of these issues, further revealing that DL developers have a limited understanding of BVI users' needs and are unfamiliar with screen readers and other technologies. Most importantly, they have to rely on automatic tools but are unable to conduct real user testing.

One outstanding issue in the DL development process is difficulties in migrating legacy repositories and remediating legacy content like handling written documents with accurate OCR due to limited training or resources. These challenges are not explicitly addressed in the reviewed literature. Moreover, vendor-related challenges are identified from both previous literature and the study. While researchers and practitioners consider that the inability to control over vendor platforms prevents WCAG compliance (Billingham, 2014), DL developers rely even more on vendors to customize internally in DL settings, which are constrained by vendor contracts or its infrastructure.

Furthermore, the guideline and tool related challenges are specific to applying guidelines in the DL context. Previous studies considered accessibility guidelines, such as WCAG as complicated, and not easy to apply in the development process (Colwell & Petrie, 2001; Farrelly, 2011; Swallow et al., 2016). Additionally, it is difficult for developers to find and understand specific guidelines (Trewin et al., 2010; Petrie et al., 2011). The findings of the study highlight the unique barriers in the DL environment. DL developers struggle applying guidelines to DL specific materials, such as OCR for scanned documents and audiovisual materials. Simultaneously, it is a challenge to find suitable accessibility assessment tools.

6. Conclusions

This study extends prior research by exploring accessibility guideline compliance and associated challenges in the DL environment with greater depth and detail. The challenges include the unique struggles with legacy content, media types, vendor reliance, and the lack of engagement with real BVI users. The findings of the study suggest several approaches to the improvement of accessibility compliance: 1) Institutional support associated with budgeting and staffing is crucial for making progress in accessibility; 2) More training and

user-centered testings, including disabled users, are needed to effectively address the accessibility issues in the DL setting; 3) New technologies or tools are required to ensure legacy systems and content are accessible to all users; 4) Institutions need to work more closely with vendors to guarantee DL accessibility features can be implemented; 5) The DL accessibility guidelines need to be developed detailed and specific enough for implementation.

This study also has its limitations, particularly its relatively small sample size and limited data collection methods. Future research could expand the sample to include a broader range of developers from diverse institutions, allowing for more data to be analyzed. Additionally, interviews could be conducted along with focus groups to gather more in-depth data on accessibility compliance and related challenges. Finally, incorporating administrators into the study may provide valuable insights into institutional concerns and potential solutions for improving DL accessibility.

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