Information Accessibility Services in American University Archives: A Study and Implications

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Abstract

The development of accessible archival information systems is of significant importance for ensuring equitable access to archival information services for disadvantaged groups. Accessible information in university archives constitutes a vital component of this endeavor and requires enhanced development. The United States maintains a relatively high standard of archival information services among Western nations; therefore, this study examines American universities ranked within the top 30 of the QS World University Rankings, investigating the accessibility of their archival information. The findings reveal relatively well-developed construction in areas such as accessible website design, accessibility statements and regulatory standards, human assistance services, and accessible infrastructure and assistive tools. It is hoped that these insights may inform the development and research of accessible archival information in Chinese university archives.

Full Text

Research on Information Accessibility Services in American University Archives and Its Implications: A Case Study of the Top 30 Universities in the United States

Abstract

The development of information accessibility in archives is crucial for ensuring that vulnerable groups have equitable access to archival information services. University archives represent a critical component of this effort and require strengthened development. The United States maintains a high standard of archival information services among Western countries. This study examines the top 30 American universities in the QS World University Rankings, investigating the state of information accessibility in their archives. The findings reveal well-developed construction in areas including accessible website design,

accessibility statements and legal standards, manual assistance services, and accessible infrastructure and assistive tools. This research aims to provide insights for the development and study of information accessibility in Chinese university archives.

Keywords: American university archives; Archive website; Information Accessibility Services

Currently, both domestically and internationally, the population of people with disabilities and the elderly is substantial. As network information technology has permeated every aspect of daily life, individuals with disabilities and the elderly have become information-vulnerable groups due to congenital physical limitations and age-related degeneration. These groups often struggle when confronted with new information technology devices. Eliminating the "digital divide" for these populations and ensuring equal access to information services requires collaborative efforts from all sectors of society.

The concept of "information accessibility" first emerged in the Tokyo Declaration of the G8 Summit in 2000, alongside issues related to the digital divide [1]. In Chinese, it is translated as "信息无障碍" (information barrier-free) or "信息可及性" (information accessibility). The United Nations defines information accessibility as: "Access to and use of information should provide equal opportunity and similar cost for different populations [2]." China's Ministry of Industry and Information Technology defines it as: "Through information technology means, compensating for differences in physical functions and environmental conditions, so that anyone (whether able-bodied or disabled, whether young or elderly) can equally, conveniently, and safely access, interact with, and use information [3]."

Currently, information accessibility development primarily targets information-vulnerable groups as a public welfare service, with various fields advancing systematically both domestically and internationally. Regarding archival information accessibility development, foreign initiatives involve more dimensions and have addressed university archives specifically. In contrast, domestic development and research on information accessibility in Chinese university archives remain in a blank stage, a phenomenon worthy of reflection among Chinese scholars.

2. Research Situation

A search of CNKI and the Web of Science database reveals that information accessibility research in the library and information science field domestically and internationally concentrates on computer science, information science, and library science, with relatively few studies in archival science. Domestic research on archival information accessibility primarily focuses on interpreting accessibility standards, discussing specific solutions for accessible services in public archives, evaluating archival websites, and conducting field surveys of public archives.

In comparison, foreign scholars have also noted information accessibility in university archives. Although these studies remain limited to accessibility evaluation of university archival websites [4] and assessment of information services [5], they have opened a new research perspective. As members of the cultural undertakings family, university archives have an unshirkable responsibility to provide information accessibility services for vulnerable groups. This study aims to provide references for the development of information accessibility in Chinese university archives.

3. Investigation of Information Accessibility in American University Archives

3.1 Survey Objects and Methods This study selected the top 30 American universities in the 2023 QS World University Rankings published by Quacquarelli Symonds (QS). Using the WAVE accessibility testing software, we examined the archives websites of these 30 American universities, combined with manual website visits by the author. The resulting data provides the most authentic and objective reflection of information accessibility construction in American university archives. WAVE is a testing tool recommended by WebAIM (Web Accessibility In Mind) that follows relevant standards and principles of WCAG 2.0.

WAVE testing involves six indicators: Errors, Contrast Errors, Alerts, Features, Structural Elements, and ARIA. (1) Errors primarily involve missing form labels, missing document language, empty headings, empty links, and empty text. (2) Contrast Errors refer to insufficient contrast between webpage text or images and background colors for visually impaired users. (3) Alerts involve redundant headings, redundant links, suspicious links, untitled structures, and JavaScript jump menus. (4) Features refer to the presence of alternative text for images, images with alternative text, and skip link targets. (5) Structural Elements involve disorganized heading structures, unordered lists, and inline frames. (6) ARIA usage facilitates webpage semantics and keyboard navigation [6]. Each indicator is marked with a color to identify existing problems.

3.2 Website Testing Using the WAVE tool to conduct accessibility testing on university archives websites, the results are shown in Table 1 (as of February 12, 2023). The table presents data for 30 American universities across six metrics: Errors, Contrast Errors, Alerts, Features, Structural Elements, and ARIA.

The testing results reveal that for the first indicator (Errors), the overall performance is excellent—the best among all evaluation results. All websites had between 0-20 errors. Specifically, 28 websites (93%) had 0-10 errors, with 14 websites having zero errors. Only 2 websites had 11-20 errors, accounting for 6%. This indicates that American university archives websites have relatively few problems with missing form labels, document language, empty links, and empty text, demonstrating good overall quality.

Regarding the second indicator (Contrast Errors), the number of errors ranged from 0-50. Twenty-four websites (80%) had 0-10 errors, 3 websites (10%) had 11-20 errors, and the remaining 3 websites had 21-50 contrast issues. Among all surveyed institutions, the archives websites of Caltech, University of Pennsylvania, Northwestern University, and Brown University had no contrast issues. Overall, website contrast construction is satisfactory, with slight variations among different university archives websites.

For the third indicator (Alerts), website issues ranged from 0-30. Twenty-three websites (77%) had 0-10 issues, 5 websites (17%) had 11-20 issues, and 2 websites (7%) had 21-30 issues. The overall results are also commendable, indicating few problems with redundant headings, redundant links, suspicious links, untitled structures, and JavaScript jump menus.

For the fourth indicator (Features), all websites had 0-50 issues. Eighteen websites (60%) had 0-10 issues, 8 websites (27%) had 11-20 issues, and 4 websites (13%) had 21-50 issues. The University of Wisconsin-Madison had 24 issues, UC Davis had 31, Harvard had 32, and the University of Pennsylvania had 44. The results show that most websites have few problems with alternative text for images, images with alternative text, and skip link targets. However, some websites have more issues in these areas, which is extremely important for vulnerable groups relying on screen readers.

For the fifth indicator (Structural Elements), the overall construction of university archives websites is less than ideal, with numerous and dispersed issues. Twenty-five websites (67%) had structural problems ranging from 0-50. Only Cornell University's archives website had structural element issues in single digits. Issues were distributed as follows: 13% had 11-20 issues, 23% had 21-30, 27% had 31-40, and 17% had 41-50. Among the remaining 5 websites, 4 had 51-70 issues (13%), and one had over 100 issues. Overall, these university archives websites require continued improvement in structural construction.

For the sixth indicator (ARIA), this aspect is slightly better than structural elements. The majority of issues (76%) ranged from 0-50. Eleven websites (37%) had 0-10 issues, 17% had 11-20, 13% had 21-30, and 10% had 31-50. The remaining websites had over 91 issues, accounting for 14%. Among all surveyed institutions, MIT's archives website had zero ARIA issues, while Boston University's archives website had 230 ARIA issues, indicating significant differences in webpage semantics and keyboard navigation design among different institutions.

3.3 Service Content A web-based survey of information accessibility services in 30 American university archives yielded the results shown in Table 2 (as of February 17, 2023). The table covers five major categories: standards and legal frameworks, help/feedback mechanisms, manual assistance services, infrastructure, and assistive technologies.

The survey reveals that American university archives information accessibility services involve relevant statements and legal standards, help/feedback chan-

nels, manual assistance services, related activities, infrastructure, and assistive software and hardware.

(1) Relevant Statements and Legal Standards All 30 American university archives have corresponding information accessibility statements. Fifty-seven percent of website statements are titled "Accessibility," while others use titles such as "Accessibility Statement," "Accessibility Help," "Accessibility & Privacy," "Privacy & Accessibility," "Assistive Technology and Services," "Accessibility Services," "Report an Accessibility Issue," "Patrons with Disabilities," and "Web Accessibility." These titles show little substantive difference.

In terms of placement, 77% of website statements are located at the bottom of the page. The University of Washington and Columbia University place their accessibility statements at the top of the page using library positions, while Carnegie Mellon University's statement appears on the right side. Other institutions such as the University of Illinois at Urbana-Champaign, University of Texas at Austin, University of Chicago, and Johns Hopkins University place their archives accessibility statements on internal pages. Non-discrimination statements typically accompany accessibility statements. Among all surveyed institutions, 20% of university archives publish non-discrimination statements, including those at MIT, Stanford, Columbia, UC Berkeley, Northwestern, and Boston University.

The survey found that over half of university archives explicitly state on their websites that their information accessibility construction strictly follows the Americans with Disabilities Act (ADA) and Section 504 or 508 of the Rehabilitation Act, as well as the Web Content Accessibility Guidelines (WCAG 2), accounting for 60%, 53%, and 60% respectively.

(2) Help/Feedback Channels Ninety-three percent of university archives provide telephone or text message consultation services, 90% provide email consultation, and a few offer fax services. Online application forms for reporting information accessibility issues are also commonly used, accounting for 70%, while 30% provide online appeal procedures. In addition to these feedback channels, contacting accessibility institutions or coordinators is a convenient form of assistance, supported by 77% of university archives. Overall, American university archives offer diverse help/feedback channels, with satisfactory overall conditions. Notably, Carnegie Mellon University's archives website restricts access to account holders, while UC Davis's archives website only provides email access.

(3) Manual Assistance Services and Related Activities Thirty percent of university archives provide assistance with document retrieval, scanning, printing, and delivery. To meet the needs of hearing-impaired groups, 30% support sign language and interpretation services. Over half provide video captioning and audio description services, as well as assistive technology demonstration and training. To ensure everyone can properly use online content, 50% offer website accessibility testing assistance. Considering physical or psychological needs,

60% allow service animals. A few provide accessible equipment loan services, though this number is small.

(4) Infrastructure Considering the on-site needs of special groups, American university archives have made accessible modifications to their facilities and equipped them with appropriate assistive technology devices. The survey shows that over 50% provide accessible maps and parking spaces, 47% provide accessible learning spaces and lounges, and over 30% provide accessible entrances, pathways, and restrooms. Some provide dedicated accessible shuttle services, accessible elevators, and accessible tables and chairs, accounting for over 20%, with a few offering wheelchairs. Additionally, to systematically develop information accessibility services, a minority of university archives organize accessible conferences and accessible lectures.

(5) Assistive Software and Hardware Comprehensive-function assistive computers, optical character recognition scanners, accessible printers, and digital smart pens are common foundational tools, accounting for 27%, 23%, and 17% respectively. Considering the needs of groups with motor skill disabilities, some archives provide specially functional keyboards and mice, accounting for 23% and 17%. Over 40% also provide assistive magnifiers, displays, Braille embossers, and alternative format materials for visually impaired groups. Additionally, considering the needs of language and hearing-impaired groups, a few provide talking calculators and assistive listening devices.

University archives also provide supporting assistive software tools for information accessibility construction. The most popular comprehensive reading scanner is Kurzweil, supported by 37% of university archives. JAWS is the second most popular screen reader and intelligent learning tool, recommended by 27%. Dragon series voice recognition software also appears frequently, accounting for 33%. Among screen magnification software, ZoomText is the most popular, supported by 40%, with some recommending Windows Magnifier. Sensus Access is the most supported text conversion tool, though few archives support such tools. A few also provide Braille translation software Duxbury and captioning tools like 3Play Media.

4. Service Characteristics

(1) High Level of Accessible Website Construction Formally, American university archives websites demonstrate good accessibility construction. WAVE testing results show that most archives websites have very few issues in indicators 1-4, though indicators 5 and 6 show slight deficiencies. Overall, most university archives website designs basically comply with WCAG 2.0 standards and principles. MIT and Cornell University archives websites have the fewest total issues, representing the best accessibility design. Substantively, American university archives websites feature comprehensive information accessibility content construction. Most provide dedicated information accessibility service sections with systematic accessible service resources. Princeton Univer-

sity Archives' accessibility section includes six modules: "About," "Policies & Guidelines," "Website Testing," "Training," and "How To," covering accessibility organizations and staff, relevant policies and standards, website accessibility testing, accessibility training, and accessible website design [7].

(2) Strict Accessibility Statements and Legal Standards All university archives websites provide information accessibility statements. Despite variations in titles and placement, they clearly express awareness of accessibility services. All surveyed institutions solemnly state their obligation and responsibility to provide equitable information services for vulnerable groups, representing tremendous respect and inclusion that significantly promotes social information equity. Some archives publish non-discrimination statements, generally demonstrating a spirit of equality and an open, inclusive attitude toward diversity.

Furthermore, most archives explicitly state their compliance with the Americans with Disabilities Act (ADA), Sections 504 and 508 of the Rehabilitation Act, and WCAG 2.0. The ADA, passed in 1990 and amended in 2008, is specialized legislation for people with disabilities that requires public institutions to ensure equal information services. Section 504 of the 1973 Rehabilitation Act prohibits discrimination against people with disabilities by federal agencies and related programs or activities and requires reasonable accommodations. The Rehabilitation Act Amendments' Section 508 requires federal agencies to ensure that information and communication technology they develop, procure, maintain, or use allows employees and members of the public with disabilities to access and use information and data [8]. The Web Content Accessibility Guidelines (WCAG), developed by the World Wide Web Consortium, help people with disabilities more conveniently utilize web content, including versions 2.0, 2.1, and 2.2. This demonstrates that American university archives attach great importance to legal norms and standards in information accessibility construction.

(3) Dedicated Accessibility Organizations and Personnel The vast majority (77%) of university archives have established dedicated accessibility organizations and personnel. Organizations are typically named Accessibility Office, Accessibility Liaison Office, Disability Resources Office, Disability Management Department, Disability Accessibility and Compliance Office, Disability Accessibility Liaison Center, Accessibility Advisory Committee, or Student Disability Services Office. Personnel titles include Accessibility Director, Student Coordinator, Accessibility Coordinator, and Campus Disability Coordinator. For example, UC Berkeley has established a Disability Access and Compliance Office responsible for captioning, ASL (sign language and interpretation), mobility access, and event access application services, while providing personalized consultation, discrimination incident appeals, and accessibility training [9]. Dedicated organizations and personnel can better provide targeted accessibility services for people with disabilities.

(4) Comprehensive Accessible Facilities and Technical Equipment American university archives provide relatively complete and systematic facilities worth learning from. Considering the on-site utilization needs of

physically disabled vulnerable groups, most archives have made accessible modifications to building facilities, providing accessible maps and parking spaces, and carefully modifying accessible entrances and pathways at archives entrances. Inside university archives, there are accessible learning spaces, accessible lounges, accessible restrooms, accessible elevators, accessible tables and chairs, and wheelchairs. Some archives also provide customized accessible routes and accessible shuttle services. For example, UC Berkeley provides the Bear Transit accessible shuttle system, planning accessible routes and shuttle schedules and frequencies [10], providing disabled groups with a strong sense of security for on-site utilization.

Simultaneously, American university archives provide corresponding assistive technology equipment and resources for groups with motor skill disabilities, visual impairments, language impairments, hearing impairments, and other disabilities. From hardware devices such as optical character recognition scanners, accessible printers, assistive keyboards, mice, magnifiers, displays, and Braille embossers, to software such as screen readers, voice recognition software, text converters, and screen magnification tools, to various audio, video, and text alternative format materials, these provide tremendous convenience for vulnerable groups. Johns Hopkins University provides height-appropriate viewing and listening stations and telephones, equipping its accessible group study rooms with wheelchairs, study tables, public computers with ZoomText 10 and large-font keyboards, OPAL portable handheld video magnifiers, Smart View Xtend text magnifiers, Kensington Expert Mice (trackballs), and other technical facilities, with lighting controlled by dimmers [11], maximizing user needs.

(5) Meticulous and Humanized Accessibility Services While providing various smooth feedback channels, American university archives also offer basic services such as assistance with retrieval, scanning, printing, and document delivery for a convenient and efficient user experience. Additionally, they provide targeted humanized services, such as on-site or remote sign language and interpretation services, video captioning and audio description services for special groups, and specialized assistive technology training for groups experiencing difficulties using assistive technology. For example, to facilitate service communication, Harvard provides communication services including American Sign Language (ASL) interpretation, Communication Access Real-time Translation (CART), text-to-speech, Braille, large print, and audio description [12]. Users with questions about website accessibility can receive staff assistance for accessibility testing. For groups with special circumstances requiring service animals, applications can be made to university archives, and the vast majority of universities approve such requests. A minority of archives provide accessible technology loan services and equipment rental to help economically disadvantaged special groups obtain needed materials promptly.

Despite these achievements, American university archives information accessibility service construction still has issues. Significant differences exist among institutions in website construction, related services, and technical equipment

provision, and the standardization of relevant statements and policies lacks uniformity. Additionally, accessible browsing channels for American university archives websites are missing, and online accessibility service items require continued improvement.

5. Implications for Information Accessibility Services in University Archives

While foreign university archives actively develop information accessibility construction and related research gradually advances, domestic development and research on university archives information accessibility remain in a blank stage. Based on the situation of American university archives information accessibility services, China can learn from the following aspects.

5.1 Establish Accessibility Service Awareness Through individual visits to Chinese university archives websites (formerly "985" universities), not a single archive was found to have published an information accessibility statement. Searching their websites for terms like "disability" and "accessibility" also yielded no relevant content. This demonstrates how weak awareness of information accessibility is in Chinese university archives. Because the number of disabled faculty and students is small and their use of archives is infrequent, some scholars argue that information accessibility construction in university archives is meaningless. This viewpoint is not accepted here. A single spark can start a prairie fire; minority groups are also members of society and should never be abandoned by mainstream society under any circumstances. All members should have the right to equal information services. University archives, as members of social and cultural institutions, have an obligation to provide barrier-free services and humanistic care for these groups.

To enhance information accessibility service awareness in university archives, we must first start with accessibility service statements and policies, solemnly promising users to provide equal and barrier-free information services. Second, official surveys and assessments of current service conditions should be conducted, as authoritative data and realistic situations can effectively stimulate archives' own accessibility service awareness. Simultaneously, academic research should be strengthened to broadly attract attention to university archives information accessibility. Currently, academic research awareness on university archives information accessibility is lacking, and theoretical research is scarce, significantly affecting practical work development.

5.2 Improve Industry Regulations and Standards A full-text search of the National Archives Administration's official website regulations and standards database found no content related to "disability" or "accessibility." This indicates that archival professions have not yet incorporated information accessibility construction into their legal norms. Other legal provisions, such as the 2008 revised Law of the People's Republic of China on the Protection of Persons

with Disabilities, the 2012 Regulations on the Construction of a Barrier-Free Environment, and the 2020 Ministry of Industry and Information Technology and China Disabled Persons' Federation's Guidance on Promoting Information Accessibility, mention information accessibility construction at the macro level but do not specifically address how archives as cultural institutions should conduct accessibility construction and transformation. The Chinese government should solicit opinions from multiple parties, stipulating strategies for archives information accessibility construction at the legal level, detailing specific provisions for archives accessibility transformation at the administrative regulation level, and issuing various targeted standards and policies. University archives should formulate specific provisions for information accessibility services based on official regulations and standards, combined with their actual conditions.

5.3 Optimize Website Accessibility Design Websites are an important platform for university archives to provide services, and website construction is a key link in archives information accessibility development. Successful accessible website design must meet four core principles: perceivable, understandable, operable, and robust [13]. These are precisely WAVE's core requirements for website construction. These can be specifically detailed as: accuracy of webpage defined language, appropriateness of image alternative text, impact of empty links and buttons, impact of labeled or unlabeled form inputs, impact of low-contrast content, appropriateness of page titles, presence and prevalence of animation and motion, presence of keyboard focus indicators, and impact of other keyboard auxiliary functions [14]. These elements are important bases for WAVE testing.

Using the WAVE tool to test some Chinese university archives websites revealed numerous issues, reflecting these institutions' neglect of special groups. Of course, relying solely on WAVE testing tools to evaluate website accessibility is far from sufficient. During Chinese university archives website accessibility construction, multiple website evaluation tools can be utilized, combined with relevant indicators for accessibility transformation. Additionally, Chinese university archives website column modules lack content related to "accessibility" and "disability," requiring more attention to vulnerable groups' needs in future website resource construction. Simultaneously, university archives need to further explore accessible browsing channel design to provide more convenient utilization experiences for vulnerable groups.

5.4 Equip Infrastructure and Devices Although the Chinese government has not yet proposed requirements for university archives accessibility construction, it attaches great importance to school accessibility construction. The 2017 revised Regulations on Education for Persons with Disabilities stipulate that local people's governments at or above the county level and their education administrative departments should gradually promote barrier-free campus environment construction in schools at all levels [15]. The 2022 Implementation Plan for the Assistive Devices into Campus Project explicitly states: All regions

should increase investment in assistive device adaptation services for people with disabilities, with relevant resources and work funds prioritized to support assistive device adaptation for disabled students. Encourage qualified areas to implement public welfare assistive device adaptation projects for disabled students, providing subsidies for economically disadvantaged disabled students to obtain large-value assistive devices. It also points out that disabled persons' federations and education administrative departments at all levels should incorporate the "Assistive Devices into Campus" project into annual work plans for implementation [16]. As an important component of higher education institutions, university archives should conduct accessibility transformation and construction according to regulations. Infrastructure transformation includes accessible parking spaces, accessible pathways, ramps, and entrances outside the building, and accessible elevators, wheelchairs, accessible reading rooms and lounges, and accessible restrooms inside. Assistive technology transformation includes equipping assistive public computers, optical character recognition scanners, accessible printers, functionally specialized keyboards and mice, magnifiers, smart pens, and other hardware devices, as well as various screen readers, voice recognition software, text conversion software, screen magnification software, and real-time captioning software. Additionally, for users with material reading difficulties, university archives should provide alternative format material conversion services. These infrastructure and assistive devices can provide the most convenient help for various disability groups to the greatest extent, well reflecting university archives' humanistic care for vulnerable groups.

5.5 Establish Dedicated Organizations and Personnel Specialized work should be completed by professional organizations and personnel. Due to relevant national regulations, Chinese university archives have various restrictions on staffing numbers. Currently, they can apply to establish school-level accessibility teams, set up school-level information accessibility specialists, recruit student volunteers, and provide accessibility service training for various departments including archives. School accessibility specialists and volunteers can temporarily be responsible for related consultation services. Accessibility teams should organize discussion meetings periodically, requiring archives staff participation to analyze achievements and shortcomings during the period and determine how to improve moving forward. While providing information accessibility services, they must also consider psychological discomfort experienced by people with disabilities during utilization, providing psychological counseling and dedicated accompaniment services when needed. Appropriately organizing inspirational speeches by disabled groups and fun activities promoting exchange can enhance these groups' confidence in future work and life. After conditions mature, dedicated archives information accessibility teams can be established to handle specialized work for school archives information accessibility services.

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Note: Figure translations are in progress. See original paper for figures.