Evaluation of Academic Library Website in Compliance with Wcag Guidelines: Pour Principle Vs. Cudun Approach

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Abstract

WCAG 2.2 guidelines cater to the development, management and evaluation of websites in common. Academic library websites have unique support and services that need exclusive evaluation concepts and parameters to cater for the changes in line with technological development. Therefore, this paper attempts to fulfil the gap between website evaluations in common in adherence to WCAG 2.2 guidelines Vs. Academic library website framework (CUDUN approach). This caters to comprehending and augmenting the academic library websites to prioritise the concepts and sub-concepts to enhance the user support with social inclusivity, competence and recent technologies. Five select universities were evaluated on the sub-concept level to optimise the privacy, operability, user support and technological development in Content, Usability & accessibility, Design & functionality, User engagement & quick links and Networking & performance (CUDUN). The results found that POUR concepts, understandable, secured the highest mean of (1.47) of rank first, with the CUDUN approach of design and functionality, with a maximum score of availability of 2 (Yes) of parameters like structure and navigation in all select 5 universities. Comparatively less importance was given to the other 3 POUR concepts ranked as 19th that aligned with the web environment. Based on universities, TNOU ranked first with 1.32 as the mean that covers POUR and CUDUN concepts equally to satisfy the major parameters of the library website, followed by PU with a minimal difference of 0.01 mean value from 1.31. The MTWU and TNFU ranked higher than MKU may be because the library website is incorporated with the university's main portal of the host institution, sharing information without a dedicated website to cater for the library user needs. MKU has a standalone website with vast information provided for the library users with accessibility compliance and performance efficiency, but may be ranked lower due to the lack of information to web standards. This paper highlighted that institutional integration or a standalone portal of the library should be centralised for uninterrupted web governance that meets the requirements and challenges of user needs. Through the standardised CUDUN framework, library websites can achieve socially inclusive, exclusive, sustainable and high-quality web services.

Keywords: WCAG 2.2 Compliance, Library website, social inclusiveness, POUR principles, academic libraries

INTRODUCTION

Web Content Accessibility Guidelines (WCAG), an international web standard, was developed by the World Wide Web Consortium (W3C) to make web content accessible for persons with disabilities. It becomes an essential need in the field of daily life, education, government services, etc. The WCAG guidelines are framed for digital exclusion, to create common guidelines for websites, to structure the rapid growth of information, to enable assistive technologies, to frame legal and human rights concerns, need for inclusive design. Based on need, perseverance of WCAG helps designers and developers to create website and digital content for users purpose and also exclusively for peoples with disabilities according to (POUR) principles (i.e.) Perceivable (users can visualize and perceive the information), Operable (users can navigate the information), Understandable (users can understand the information) and Robust (users can work across many devices for compatibility and adaptability). To stabilise this, WCAG versions are developed with advancement ad WCAG 2.0 (2008), 2.1 (2018), and 2.2 (2024). WCAG 2.2 with 9 success criteria and conformance level (A-basic, AA-Intermediate, AAA-Highest) compliance is the current standard to be followed for updating or developing a website to keep content accessible for a wider range. With recent information, W3C is also developing WCAG 3.0, a new framework expected to focus on real user outcomes instead of restricting to checklist items in progress and likely to be used in the upcoming years.

In the context of higher education institutions, WCAG guidelines are essential for hosting information and services being offered. Therefore, the library becomes the central hub for delivering the information through Online Public Access Catalogue (OPAC), Institutional repositories, e-resources, discovery tools and support services. The POUR principles define the accessibility requirement with success criteria at the technical and functional level of the website in common. The academic library website becomes a broader ecosystem that includes content-oriented, interactive user services, and quick performance of delivering content to meet user expectations. To address this complexity, the CUDUN approach has framed in alignment with align to guidelines of WCAG 2.2 principles to develop a dynamic and exclusive library website for the academic environment. Within this connection, perceivable directly relates to Content and User engagement & Quick links ensuring scholarly resources, metadata and required formats with appropriate text alternatives, multi-language support and an integrated feedback mechanism, personalised access, interactive sessions with an inclusive layout of support system. The operable signifies Usability & Accessibility denotes navigation, compatibility and efficiency of quick performance. Understandable relates to Design & Functionality, where design, significant information, clear vocabulary, and user communication that augments information retrieval efficiency are called recall and precision. The Robust aligns with Networking & Performance, confirms compatibility with browsers, devices, and assistive technologies to support scalability, security and long-term sustainability.

The current development in WCAG 2.2 strengthens this CUDUN framework by enhancing legal compliance, improving user experiences, enabling sustainable digital practices and promoting inclusive access to information with exclusive information. The academic libraries benefit from a holistic evaluation model. Thus, the integration of the WCAG-CUDUN framework not only ensures accessibility conformance but also advances in academic library websites towards user-centred and future –ready digital ecosystems.

Table 1 depicts an indicative example for describing the WCAG 2.2 guidelines that are related to the most important parameters to connect academic institutions, users, and available information provided globally over the internet.

Table1: Indicative list of WCAG parameters

Description	WCAG Guidelines	WCAG Success Criterion	WCAG Conformance Level	WCAG Principles
Privacy				
Emails and Contact	Labels or Instructions	3.3.2	A/A	Understandable
Data error prevention	Error Prevention	3.3.4	AA	Understandable
Repetitive data / Retype	Redundant Entry	3.3.7	A	Understandable
Password Entry	Accessible Authentication	3.3.8	AA	Understandable
Password Entry (Captcha)	Accessible Authentication	3.3.9	AA	Understandable
Social Inclusiveness				
Screen-reader access	Non-text Content	1.1.1	A	Perceivable
Transcription of Multimedia	Captions	1.2.2	A/AA	Perceivable
	Audio Description	1.2.3	A/AA	Perceivable
Screen-reader access	Info &Relationship	1.3.1	A	Perceivable
	Meaningful sequence	1.3.2	A	Perceivable
Accessibility of Keyboard & Visibility	Keyboard	2.1.1	A/AA	Operable
Content Skipping/Bypass linking	Bypass blocks	2.4.1	A	Operable

Accessibility of Keyboard & Visibility	Focus visible	2.4.7	A/AA	Operable
	Focus not obscured	2.4.11	A/AA	Operable
Pointers	Dragging Movements	2.5.7	AA	Operable
Size	Target Size	2.5.8	AA	Operable
Messages	Status messages	4.1.3	AA	Perceivable
User Support				
Notification	Timing & General Usability	2.2	AA	Operable
Help Content	Readable	3.1	AA	Understandable
	Predictable	3.1	AA	Understandable
Consistent Help link	Consistent Help	3.2.6	AA	Understandable
Announcements & Notifications	Status Messages	4.1.3	AA	Perceivable
Technological Development				
Mobile Responses & Compatibility	Reflow	1.4.10	A	Operable
	Target Size	2.5.8	A	Operable
Widgets & Keyboard controls	Keyboard	2.1.1	AA	Robust
Semantic Coding & Widgets	Name, Role and Value	4.1.2	AA	Robust
	Status Messages	4.1.3	AA	Robust

OBJECTIVE

1. To examine the influence of WCAG standards on concept-wise evaluation of the academic library website
2. To identify and analyse POUR principles relevant to privacy statement, social inclusiveness, user friendliness, and technological development in academic library websites.
3. To quantitatively analyse 5 university library websites using the CUDUN approach
4. To scrutinise the significant concepts and sub-concepts to build an effective library website.

LITERATURE REVIEW

Many studies were conducted earlier in regard to web accessibility of library websites on privacy statement, social inclusiveness, user support and services, and technological development. The review of these studies is given below.

Privacy

Bareh (2024) reviewed the consequences of India's Digital Personal Data Protection Act (DPDP Act, 2023) privacy policies from the perception of libraries that stated digital environment is growing rapidly in India therefore to secure the patron data the act was enacted to prevent data breaches to vendors, that are aligned with privacy policies with align to (Reid, 2019) examined the Identity and Access Management (IAM) for usability and Privacy policies in academic libraries on Bath Spa University found that control of personal information through institutional Identity Providers (IdPs) to protect users' privacy under the General Data Protection Regulation (GDPR) and also recommended for practical measures to safeguard, creating awareness, education and to regulate the act for build user trust to sustain library environment globally, ensuring privacy-preserving access to digital resources that rely on institutional sites. Ziyue (2020) investigated the disputes and approaches for safeguarding user privacy in library services with the advancement of technologies of AI tools and cloud management. Correspondingly, (Zimmer, 2013) also researched patrons' privacy in library 2.0. The study found that

to reduce the risk factor of data breaches due to a vast amount of users' data, this framework is enabled with third-party service providers as well as user-centred tools such as social media, tagging, and personalised recommendations.

As part of privacy concerns, the paper concerned about suggested a policy vacuum for practitioners, researchers and policy makers to confirm that libraries can protect users' privacy in terms of long-term technologies, for example, block chain, data encryption, data mining, and robust guarantees of library services. By stating privacies of users, WCAG addresses privacy-preserving access by safeguarding secure, transparent and interoperable web interactions. With align to CUDUN method, privacy is ensured through secure content delivery, user identity, and access management with authenticated network connectivity. This helps users to protect data from malicious interruptions by data protection policies to build a trustworthy and authorised academic library website.

Social Inclusiveness

Asok & Rekha (2025) assessed the barriers and hindrances of digital inclusivity for users with disabilities based on the accessibility of 50 Asian university libraries with the compliance of WCAG 2.1 standards. Wave and Axe Dev tool is used across Asia to factor in the regional language and cultural diversity, are varying from institutions. Similarly, it is identified that six inclusivity services in the Lithuanian regional library for disabilities are proposed based on qualitative research and a theoretical model for people concerned with libraries.

Correspondingly, (Kulikauskiene & Liukineviciene, 2020) reviewed the systematic changes of inclusivity essential stakeholders' interest, transformation of socially responsible institutions to meet the diverse users with different needs to enhance web accessibility of legal frameworks, adherence to standards, frequent audits and user feedback. Through worldwide aspects, leads library operations to align with a wider framework for long-term development goals. These papers are aligned with the CUDUN approach by adopting an easy way of accessing massive information with recent innovations and technological development of WCAG 2.2, based on library web services that serve persons with disabilities. Kumar (2021) investigated the web accessibility aspects among people with disabilities of the top 15 Indian universities as per NIRF (National Institutional Ranking Framework) 2020. The study found that standards for WCAG and Guidelines for Indian Government Websites (GIGW) are different in many respects, and, however, the NIRF ranking system for higher education institutions does not include these recommendations," observes the study.

Javed & Sajid (2025) also faced barriers in academic libraries during the growth and development of technology, economic and environmental ways. To ensure uninterrupted education as mandated by the National Education Policy 2020 and Rights of Persons with Disabilities Act, 2016, it also stressed on the importance of implementation of accessibility laws and policies in universities and teaching web developers about digital inclusivity and also sustainable framework can brought libraries to enhance ecological footprints to balance social equity, economic viability and environmental responsibility for developing metrics to create awareness and guide users. In globally, institutional standards of Diversity, Equity, and Inclusion (DEI) on academic library websites in UBorrow Constoria are analysed to ensure the DEI for inclusive, accessible and clearly characterised for institutional assurance to actively engaged in nurturing digital environment (Eric Ely, 2021). Boyalakuntla (2021) proposed suitable criteria and guidelines for WAccess, based on WCAG 2.0, 2.1, and 2.2, a web accessibility tool over 2200 Indian government websites and Patra (2018) assessed both international (WCAG 2.0) and national (GIGW) websites to check violations against WCAG standards. It is found that the significant violations against key principles of the four criteria faced issues with lack of compliance, such as alternative text for multimedia, page layout, colour combinations, triangulation and input support. It helps to support the existing tools with newer guidelines, including additional features of AI (Artificial Intelligence), automation software and domain-specific standards to enhance accessibility to those efforts put forth by web developers and policy makers to add additional features to enhance government websites more accessible and user-friendly globally. By combining both studies, the WCAG 2.2 and GIGW recommend standards for websites in common. Based on this CUDUN framework is enunciated on the academic library website to follow uniformity in accessing content. To bring into line, the Ministry of Higher Education Department (MHRD) must insist in National Education Policy (NEP) 2020 to mandate the regulation as one of the criteria for evaluation metrics of libraries to strengthen the institutions and maintain sustainability.

User Support & Services
Savanur & Ranavagol & Pawar (2025) reviewed literature based on library services adopted for students with disabilities. This critical analysis of 76 research papers from 1990 to 2024 was conducted. This paper suggested that by adopting the

social model of disability to shift focus from individual impairments to develop the infrastructural facilities, such as assistive technologies, traditional and digital accessibility, a framework of legal commitments, conducting staff training and development for widespread user-centred approaches for seamless access for all users in the library. Therefore, Haridasan (2021) explored the provision of web-based sources and services through Indian university library websites, of 42 library websites shortlisted from the top 50 NIRF-ranked universities in 2020. The study found that libraries predominantly offer traditional services like referral services and library catalogues in web-based environments, but lag in innovative services like library applications, instant messaging, and virtual library tours. They are also not fully utilising social media and Web 2.0 tools. The WCAG brings out with standardized foundation for developing an authorised website for accessible digital services to each menu, submenus, multimedia and links with respect to sophisticated facilities. With the availability of information CUDUN framework strengthens the content clarity based on the needs of users. It connects academic libraries to move beyond basic service provision toward comprehensive, inclusive, and technologically enriched web environments.

Technological Development

Ara et. al. (2025) evaluated the framework for automated web content accessibility. The study found major key issues such as ambiguities in guidelines, inadequate combination of users and expert feedback, less consideration of semantics, ontologies, followed by its analysis of current approaches o algorithmic level, heuristic methods, non-textual features and crowd sourcing. Followed by, (Ara & Sik-Lanyi, 2024) insisted automated evaluation framework based on WCAG 2.2 success criteria, to enhance accuracy, usability, and inclusivity of web accessibility to validate and suggested to improve the evaluation practices for developers, researchers and practitioners. Fakrudeen (2025) assessed the university homepages by using automated testing tools in Gulf countries based on accessibility and usability with the WCAG 2.0 standard, and Paul (2023) evaluated 65 Indian e-government websites with WCAG 2.1 standards to check accessibility. The study found that Webometric ranking also influences the United Arab Emirates (UAE) and Saudi Arabia, and the non-existence of accessibility in websites and endorses explicit suggestions to augment inclusivity in services. Therefore, it concluded that practical supervision for policy developers and makers is needed to enhance services on government websites.

Vallez (2022) examined the 2030 agenda on web visibility of university websites through sustainability development goals based on quantitative and qualitative analysis using SEMrush Search Engine Optimisation (SEO) tools. The findings reveal that only a few universities rank higher in providing relevant content, as their web visibility for Sustainable Development Goals (SDGs) related searches is low. This study suggested improving their visibility through effective SEO practices in universities globally. This framework supports POUR guidelines by ensuring compatibility and regular assessment of websites. From CUDUN perception, automated web content accessibility is necessary to evaluate and strengthen the academic library website through inclusive content delivery, compliance, effectiveness and compatibility with adherence to policy makers, scalability, digital inclusivity and sustainability.

RESEARCH GAP

Despite the availability of WCAG guidelines and national accessibility policies, academic library websites continue to face challenges in delivering inclusive, usable, and sustainable digital services for users with disabilities. Moreover, the absence of accessibility considerations in institutional ranking and assessment frameworks limits accountability and continuous improvement. These gaps highlight the absence of an integrated framework or standards for developing exclusive library website that links WCAG compliance, library service concepts, social inclusivity, operability, adaptability and institutional accountability.

NEED AND PURPOSE OF THE STUDY

To develop a basic structure of website for searching the information, web based online platforms are emerged to facilitate accessible, usable and inclusive for users with disabilities with WCAG guidelines. With adherence to academic library website, the existing evaluations emphasis technical compliance, user services, and functionalities but often lack in library website guidelines. Consequently, the objective of this inquiry is not just to evaluate but also to scrutinize the academic library websites systematically by incorporating the WCAG POUR principles into the CUDUN framework which makes it possible to perform thorough evaluation. The overall aims of such an approach are to support inclusive education, increase

institutional accountability, and move academic libraries toward digital environments that are both sustainable and user-centered.

PROBLEM STATEMENT

The literature review points out several important gaps. First, many studies focus mainly on automated WCAG compliance testing. They do not consider usability, engagement, and sustainability, which are important for academic libraries. Second, current assessments often see accessibility as just a technical checklist. They ignore user experience, service effectiveness, and performance factors. Third, while the WCAG POUR principles provide useful theoretical guidance, there is little research on how to apply these principles using a practical framework like CUDUN for academic library websites. Additionally, national ranking systems like NIRF do not include measures of accessibility or inclusivity. This absence creates a disconnect between policy goals and evaluation methods. Therefore, this study tackles the issue of lacking a complete evaluation framework for academic library websites that connects WCAG principles with functionality, usability, engagement, and performance.

SCOPE OF THE STUDY

This study covers the library website of the 5 select universities and is limited to the State of Tamil Nadu, namely Periyar University (PU), Madurai Kamarajar University (MKU), Mother Teresa Women's University (MTWU), Tamil Nadu Fisheries University (TNFU), and Tamil Nadu Open University (TNOU). The data was collected from the websites of the respondent universities during the second week of November, 2025.

RESEARCH METHODOLOGY

This study adopts a standards-based evaluation methodology by utilising WCAG (POUR) principles as the primary framework to categorise and assess academic library website concepts. To ensure relevance to academic libraries, each POUR principle is aligned through sub-concepts derived from the CUDUN approach. 282 parameters were identified and collected from the library websites of the selected 5 universities. Out of them, 227 parameters were finalised for the study by eliminating the repetitions. The parameters were evaluated based on a dichotomous scale, No (1) and Yes (2), as per the availability marked. The parameters and the university scores were evaluated using the SPSS (ver. 26) package and Microsoft Excel. Categorising academic library website concepts under the POUR principle provides a systematic, comprehensive and user-centred evaluation. The integrated WCAG-CUDUN framework ensures not only accessibility compliance but also a sustainable, socially inclusive, functional and digital environment that aligns with policy requirements.

DATA ANALYSIS AND INTERPRETATION

The analysis and interpretation of the data collected through the checklist were followed for the study.

Parameters specified under WCAG and GIGW taken for the study are considered as

Let $\{C_i : 1 \leq i \leq 5\}$ denotes the five concepts namely Content, Usability & Accessibility, Design & Functionality, User Engagement & Quick Links and Networking & Performances.

- For Concept C_1 mean of the parameters of Content is defined as $\{\alpha_1, \alpha_2 \ldots, \alpha_{98}\}$

- For Concept C_2 mean of parameters of Usability & Accessibility are defined as $\{\beta_1, \beta_2, \ldots \beta_{29}\}$

- For Concept C_3 mean of the parameters of Design & Functionality is defined as $\{\gamma_1, \gamma_2 \ldots, \gamma_{19}\}$

- For Concept C_4 mean of parameters of User Engagement & Quick Links are defined as $\{\delta_1, \delta_2 \ldots, \delta_{30}\}$

- For Concept C_5 mean of parameters of Networking & Performances are defined as $\{\xi_1, \ldots \ldots \xi_{51}\}$

- For all parameters marked for different concepts collectively Q_i

  For Perceivable (P) mean of parameters of content and User engagement & quick links

$$P = \{\sum_{\alpha=1}^{98} + \sum_{\delta=1}^{30}\} = 128$$

For Operable (O) mean of parameters of Usability & Accessibility

$$O = \sum_{\beta=1}^{29} = 29$$

For Understandable (U) mean of parameters of Design & Functionality are defined as

$$U = \sum_{\gamma=1}^{19} = 19$$

For Robust (R) mean of parameters of User Engagement & Quick Links are defined as

$$R = \sum_{\xi=1}^{51} = 51$$

University library website be defined as $\Psi j = \{\Psi 1, \Psi 2, \dots \Psi 5\}$ where $Qi \in \Psi j$ We mean that the parameter Qi is available on the university library website.

Define $\Psi j : Q \rightarrow [1,2]$ by

$$\Psi j (Qi) = \{1 \text{ if } Qi \notin \Psi j , 2 \text{ if } Qi \in \Psi j \} \text{ that is } \Psi j$$

$\Psi : Q \rightarrow \mathbb{R} \text{ by } \Psi(Q) = \sum j = 1 n \text{ where } \Psi j(Q)$ denotes the cumulative function.

$$Qi = \{\sum_{\alpha=1}^{98} + \sum_{\beta=1}^{29} + \sum_{\gamma=1}^{19} + \sum_{\delta=1}^{30} + \sum_{\xi=1}^{51}\} = 227$$

Table 2, depicts the comparison of WCAG and CUDUN parameters that relates to sub-concepts for evaluating universities library websites mentioned below in Table 3.

Table 2: POUR WCAG 2.2 Code vs. CUDUN Library website parameters – a comparison

S. No	WCAG Concepts	WCAG Concept Code	Total No. of WCAG Concept Code	Library website Concepts	Library website Sub-concepts	Library website Code	Total No. of. Library website parameters
1	Perceivable	1.1-1.1.1	33	Content	Library General Information	CLG1-CLG16	16
		1.2-1.2.9			Library Collections & Resources	CLCR1-CLCR29	29
		1.3-1.3.6			Library Services	CLS1-CLS53	53

		1.4-1.4.13		User Engagement & Quick Links	Social Media	UEQLSM1-UEQLSM9	9
					Events	UEQLE1-UEQLE8	8
					Quick Links	UEQL1-UEQL4	4
					Communication & Help	UEQLCH1-UEQLCH7	7
					Social Media & Alerts	UESMA1	1
					Community Engagement	UEQLCE1	1
2	Operable	2.1-2.1.4	39	Usability & Accessibility	Navigation	UAN1-UAN7	7
		2.2-2.2.6			Design	UAD1-UAD3	3
		2.3-2.3.3			Accessibility & Compliance	UAAC1-UAAC11	11
		2.4-2.4.13			User Experience Enhancements	UAUEE1	1
		2.5-2.5.8			Security & Privacy	UASP1	1
					Operational Intelligence	UAOI1	1
					User-Friendly	UAUF1-UAUF5	5
3	Understandable	3.1-3.1.6	24	Design & Functionality	Features	DFF1-DFF3	3
		3.2-3.2.6			Structure	DFN1-DFN4	4
		3.3-3.3.9			Navigation	DFF1-DFF4	4
					Search Tools	DFST1-DFST3	3
					Multimedia & Interactive Features	DFMIF1-DFMIFI5	5
4	Robust	4.1-4.1.3	4	Networking & Performances	Web Hosting	NPWH1-NPWH4	4
					Infrastructure	NPI1-NPI32	32
					Performance	NPP1-MPP7	7

						Operational Intelligence	NOPI1-NOPI2	2
						User Experience Enhancements	NPUEE1	1
						Website Management	NPWM1-NPWM5	5
Total	4			5	27			227

Table 3: POUR WCAG 2.2 Vs. CUDUN University-wise comparison

S.No	WCAG Concepts	Library website Sub-concepts	PU	MKU	MTWU	TNFU	TNOU	MEAN	STD. DEV.	Rank	Overall Mean	Overall Rank
1	Perceivable	Library General Information	1.50	1.50	1.25	1.19	1.50	1.39	0.490	1		6
		Library Collections & Resources	1.69	1.24	1.28	1.07	1.38	1.33	0.472	2		7
		Library Services	1.23	1.06	1.09	1.04	1.11	1.11	0.308	7		15
		Social Media	1.00	1.00	1.00	1.44	1.26	1.20	0.405	4		11
		Events	1.25	1.25	1.25	1.25	1.13	1.23	0.423	3		10
		Quick Links	1.00	1.00	1.25	1.00	1.50	1.15	0.366	6		14
		Communication & Help	1.00	1.00	1.14	1.29	1.43	1.17	0.382	5		12
		Social Media & Alerts	1.00	1.00	1.00	1.00	1.00	1.00	0	8		19
		Community Engagement	1.00	1.00	1.00	1.00	1.00	1.00	0	8		19
		MEAN	1.19	1.12	1.14	1.14	1.26				1.17	
		RANK	2	5	4	3	1					
2	Operable	Navigation	1.43	1.29	1.29	1.14	1.29	1.29	0.458	4		9
		Design	2.00	1.67	2.00	1.00	1.67	1.67	0.488	1		4
		Accessibility & Compliance	1.36	1.09	1.18	1.27	1.64	1.31	0.466	3		8

		User Experience Enhancements	1.00	1.00	1.00	1.00	1.00	1.00	0	5		19
		Security & Privacy	1.00	1.00	1.00	1.00	1.00	1.00	0	5		19
		Operational Intelligence	1.00	1.00	1.00	1.00	1.00	1.00	0	5		19
		User-Friendly	1.60	1.60	1.40	1.40	1.60	1.52	0.510	2		5
		MEAN	1.34	1.24	1.27	1.12	1.31				1.25	
		RANK	1	4	3	5	2					
3	Understandable	Features	1.00	1.00	1.00	1.00	1.00	1.00	0.00	4		19
		Structure	2.00	2.00	2.00	2.00	2.00	2.00	0	1		1
		Navigation	2.00	2.00	2.00	2.00	2.00	2.00	0	1		1
		Search Tools	1.67	1.00	1.33	1.00	1.33	0.46	0.458	5		27
		Multimedia & Interactive Features	1.00	1.20	1.00	1.00	1.20	1.08	0.277	3		18
		MEAN	1.53	1.44	1.47	1.40	1.51				1.47	
		RANK	1	4	3	5	2					
5	Robust	Web Hosting	2.00	1.00	1.75	2.00	2.00	1.75	0444	1		3
		Infrastructure	1.19	1.16	1.16	1.16	1.16	1.16	0.370	2		13
		Performance	1.00	1.17	1.17	1.00	1.17	1.10	0.41	3		16
		Operational Intelligence	1.00	1.00	1.00	1.00	1.00	1.00	0	5		19
		User Experience Enhancements	1.00	1.00	1.00	1.00	1.00	1.00	0	5		19
		Website Management	1.00	1.00	1.20	1.40	1.00	1.10	0.332	3		16
		MEAN	1.20	1.06	1.21	1.26	1.22				1.19	
		RANK	4	5	3	1	2					

		OVERALL MEAN	1.31	1.21	1.27	1.23	1.32					
		OVERALL RANK	2	5	3	4	1					

RANKING BASED ON PARAMETERS

Table 3 depicts that the total of 27 sub-concepts comprises 227 parameters exclusively for analysing the library website. Under the perceivable principle, library general information ranked first with the highest mean (1.39), followed by library collection resources (1.33), which denotes the visibility of library information resources. The community engagement and social media alerts (1.00) were less focused. Marketing of library resources through social media like RSS feeds, etc., may not be given importance as it needs special attention and time. But this sharing of Current Dissemination of Information (CDI) helps foster community via discussions through social media platforms.

In an operable concept, design gets importance followed by user-friendliness as key parameters with higher significance. User experience enhancement parameters like "Accessibility Score ((WCAG compliance rating)-UAUEE1)", security & privacy and operational intelligence were not mentioned in any of these select 5 universities. Therefore, it was ranked as the least among 7 operable sub-concepts. Under the understandable concept defined by WCAG, with 5 sub-concepts in the CUDUN approach structure and navigation ranks first with the maximum mean, which implies that all the universities have clear information. Search tools were given the least importance, maybe because users are used to search engines like Google, Firefox, etc. In robustness, web hosting was given much importance, followed by infrastructure, with mean 1.75, 1.16 respectively. Parameters like "Study Room Booking Analytics (Peak hour insights)-(NPUEE1)" that were classified under user experience enhancements and operational intelligence were given the least importance in varying degrees by select 5 universities.

RANKING BASED ON UNIVERSITIES

Based on Table 3, among the select 5 universities, TNOU ranked first under perceivable concepts of WCAG with the highest mean value of 1.26, and PU ranked second (1.19). Parameters that connect to key websites that need instant connectivity, covered under Quick links and library general information, were projected well by the Tamil Nadu Open University library website, with a mean of around 1.50, approximated to two decimals.

Under operable concepts, PU ranked first, which provides significant information on design with 19 parameters (2.00). TNOU is in the second place with 1.67 as the mean, which matches the overall mean with other universities depicts that they have prioritised the updated information on parameters like virtual tour, Ask Librarian, etc.

PU and TNOU scored equal values in the structure and navigation of the mean (2.00), topping the list. But, highlights that the packaging of information is higher with parameters like a navigating tool in understandable concepts.

There is a very minimal difference of 0.02 in mean for robust among TNFU and TNOU. Parameters like website updated date, webmail and Information kiosk, etc., are listed under sub-concepts, namely website management and performance.

FINDINGS

The sub-concepts, *Structure* and *Navigation* under the WCAG concept "Understandable" were ranked highest among all the universities, with maximum information availability. This score proves that the universities pay much attention towards parameters like static and dynamic content update, active & inactive status, main & sub-menu hierarchy, etc. The web hosting concept was given the highest importance by 3 universities that cover parameters like a dedicated website or webpage, a direct link under the host institution's website, etc. Design was given importance by 2 universities with auxiliary information, with animation, infographic or graphical presentation of updated data. Social media alerts, community engagement, security & privacy management protocols, etc., were not marked up to the mark in the university websites. Practically, these parameters play a vital role in marketing the services, adherence to protocols and impact user experience. Universities that have not paid attention to these parameters should implement and focus to provide latest information. The MTWU and TNFU library websites are integrated within the university's main website and share a common header and footer, technical infrastructure that shaped centralised web governance with a consistent user experience. These universities ranked 3rd and 4th place, but with less focus on library-exclusive information. In contrast, MKU, though ranked in 5th place,

functions as a standalone library website portal, designed independently and maintained without dependence on the main website that featured with library information in vast quantities but lastly focuses on accessibility and optimisation performances. From the evaluation perspective, the shared components form an inseparable part of the library's digital access environment, which should be considered within the scope of academic library website assessment.

OVERALL PERFORMANCES

Among perceivable, operable, understandable and robust, understandable stands first with 1.47 as the overall mean, which represents that only 1/4th of information was not available in universities website among 227 parameters. Without much difference in mean (0.22) operable concept that covers parameters like assistive technologies and browser compatibility.

TNOU, having 1.31 as the overall mean, ranked first. PU follows with a minimal of 0.02 mean difference from TNOU. If PU provided a few more parameters, it would have been equally ranked. MKU ranked the least with 1.21 as the overall mean. This shows that the university may or may not have the amenities or facilities, but was not properly reflected on the website. These basic and support information sharing will enhance the user experience with social inclusiveness, privacy security, and updated technological management in adherence with recent developments.

RECOMMENDATIONS

The study based on the results has brought out the following recommendations.

- Literature indicates that importance of digital inclusivity in libraries focusing audit, legal compliance and user centered model.

- Automated accessibility evaluation tools perform efficiency in identifying technical problems must be aligned to experts review and user feedback.

- WCAG POUR principles highlight standardized accessibility for website, while CUDUN approach emphasis website components for academic library website.

- Integration of WCAG and CUDUN permits a holistic evaluation framework that include content, usability, design, engagement and networking.

- Academic libraries should regularly conduct the automated and manual accessibility audits associated with WCAG standards.

- Library parameters should fuse into internal quality assessment and ranking system of higher education institutions.

- The compliances may be strengthened with accessibility legislation and seamless access to scholarly communications.

- Continuous staff training, user awareness and feedback mechanism are needed for accessing available information over the internet.

- Through enhancing accessible interactive services, robust and networking & performances provisions sustainable digital library environments.

CONCLUSION

WCAG 2.2 in sub-concepts and parametric level expands to 100, whereas the CUDUN framework for exclusive library website evaluation has 227 parameters. A few parameters exclusively required for library management, like circulation of resources, digital repository, and customised assistive technology with reference to the library website content extends the WCAG guidelines and parameters list. Parameters like Grant writing support services, plagiarism check services are tagged under the common sub-concept of services in WCAG, which makes the number of parameters less than the CUDUN parameter list. Practically, these services have unique purposes and functionality specifications. Such parameters were listed as distinct parameters for easy evaluation. From the overall evaluation of library websites, a few unique parameters should be added in an online website evaluation tool like WAVE, Axe Dev Tool, and ARC toolkit for evaluating the library website.

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