



Information provision on Academic library websites in Ghana: Pre- and post-COVID-19 pandemic analysis

Patience Emefa Dzandza Ocloo 
University of Ghana, Legon, Ghana

Lizette King 
University of the Western Cape, South Africa

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Abstract

Academic library websites are used to provide relevant information and services to the immediate academic community and beyond. This study aimed to determine the kind of services and information provided by academic libraries in Ghana on their websites before and after the COVID-19 pandemic. Using content analysis, the study adapted Pareek and Gupta's (2013) academic library website checklist as a tool for collecting data on the websites of nine selected academic libraries in Ghana before and after the COVID-19 pandemic. Paired sample t-test was used to compare the two data sets. The findings revealed that the websites are used mainly as avenues for information provision on some aspects of resources and services provided. However, there has been a reduction in the number of websites, the extent of information and service provision when the data from pre- and post-COVID-19 were compared. Service provision on the websites, which is the current demand from library users, is very minimal, and the libraries lack information on their websites about their unique and rare collections. Evidence from the websites of Ghanaian academic libraries gives an indication that the libraries are not making extensive use of their websites to meet the demands of the 21st-century information service provision through virtual service delivery. This prevents global access to the contents of the library collection. It is therefore recommended that libraries see their website as a modern marketing tool and develop strategies to optimise its use.

Keywords: Academic Libraries, Library website, Ghana, Library Services, Digital Libraries, Library Portal, Electronic Libraries.

Introduction

Libraries' web presence is a very significant component of library service provision in the 21st century. It helps break the barrier of space and time to open up library resources and services to a broader user community. This became very evident during the COVID-19 pandemic, when physical visits to the library were impossible, but libraries still had to provide essential services to researchers and students to enable information access. As noted by Naughton (2023) and Ashiq et al. (2022), people and services were moved to the virtual world during the COVID-19 pandemic. Library websites were a major means of achieving

this. Hence, He and Huang (2023) recognised access to electronic resources as the best solution during the period of the COVID-19 pandemic and after. This has made remote access to library content via library websites very popular among users (He & Huang, 2023). Likewise, Ramanayaka et al. (2019) considered the library website as its lifeline that seeks to promote the library's image virtually, and according to Reinsfelder and O'Hara-Krebs (2023) serves as the electronic gateway for users. The library website helps to provide better visibility for both print and e-resources.

Libraries need to develop resources for dissemination of information to users through

electronic media, enabling users to discover information without mediation from library staff or visiting the physical library. The creation of a library website, therefore, provides an important opportunity for the library to asynchronously interact with users (Hopkins et al., 2011). Libraries all over the world have therefore developed websites as a basic technology to help provide information to their users (Rubin et al., 2010; Verma et al., 2022). However, library websites have evolved over the years to enable web discoveries (Cirelli, 2022) and have become very popular among library users (Wijayarathne and Singh, 2015). Also, most library patrons depend heavily on the library website to access library services and products such as e-journals, the online public access catalogue (OPAC), chat reference services, e-books and other electronic-based services (Arshad & Ameen, 2015; Chen et al., 2023), and these products and services are used to create a web presence and visibility of libraries (Pant, 2015; Tella, 2022). Researchers such as Arendt and Peacemaker (2023), Camp (2023), and Munshi et al. (2023) have used the library website as a source of data for research. Najjar (2023) has also advocated for the use of library websites to provide information that enhances the quality of life of users, such as consumer health.

Academic libraries in Ghana lead other categories of libraries in the country in terms of technology adoption. Still, it has been a journey of progress amidst various challenges. From initial automation of catalogues to set up OPACs and circulation services, there has been an increase in the adoption of technology and electronic service provision. There is currently the use of different kinds of library management systems among academic libraries; provision of electronic resources and IT support services; adoption of social media; and establishment of institutional repositories (Ankrah et al. 2019; Dzandza, 2019; Kodua-Ntim & Fombad, 2020; Bentil et al. 2021; Mensah & Onyancha, 2021; Ankrah et al., 2019; Afrane et al. 2022; Koteikor Baidoo & Nwagwu 2024). In as much as progress has been made by academic libraries in Ghana with regards to electronic service provision, the rate of progress is not the same among all academic libraries due to inadequate provision of financial resources, technical challenges and lack of expertise as identified by (Kodua-Ntim and Fombad, 2020; Dei and Asante, 2022; Asimah and van der Walt, 2023). For academic libraries in Ghana to harness maximum benefit from the adoption of electronic platforms and services, they need to have a strong web presence. Academic

libraries in Ghana have thus joined the global trend of establishing websites as a major means of showcasing their collections and services virtually and rendering remote services to users. However, there remains a significant gap in how academic libraries in Ghana are utilising their websites for information provision.

This study, therefore, sought to investigate the extent to which academic libraries in Ghana use their websites to provide adequate information on both their physical and electronic services and products.

Statement of the problem

Information on digital resources in libraries has been noted to be buried in library websites, requiring many clicks before accessing them (Choi and Hastings, 2024). This makes such services not readily accessible to users. Another issue of concern has been the low traffic recorded by library websites (Cirelli and Long, 2020). It is evident that the design of library websites is becoming more complex, and their functionality and use are also becoming more advanced as new technologies emerge. Also, due to the importance of websites to libraries, library website analysis has become an area of focus in library science research.

Available literature shows that though Agyemang et al. (2015); Bilson & Markwei (2019); White & King, (2021) and others have studied the use of the library website for different functions in academic libraries in Ghana, not much research work has been carried out on the holistic use of academic library websites in Ghana for information provision. It has also been identified that most libraries had to enhance their electronic services to meet the demands of the COVID-19 pandemic. This study, therefore, seeks to analyse the content of some academic library websites in Ghana to determine the extent of information and service provision and navigational tools provided prior to and after the COVID-19 pandemic.

Objectives

1. To compare the availability of academic library websites in Ghana before and after COVID-19.
2. To determine the tools and features made available to aid the use and navigation of the websites before and after COVID-19.
3. To determine the extent of information provision on academic library websites before and after the COVID-19 pandemic.
4. To determine the kind of services provided via academic library websites before and after the COVID-19 pandemic.

Literature Review

Library Websites

The academic library environment in Ghana has progressed over the years from a purely manual system to embrace the technological wave through various initiatives such as the implementation of library management systems, establishment of institutional repositories, the use of social media for service delivery, and acquisition of electronic resources among others (Afrane et al., 2022; Ocloo & King, 2022; White & King, 2021; Dzandza, 2019). Most of these initiatives were in place in a majority of academic libraries in Ghana before the COVID-19 pandemic, and studies, including that of Boakye et al. (2022) and Asimah et al. (2021), identified that, amidst the challenges that academic libraries faced during the pandemic, Ghanaian academic libraries were able to provide support to the academic community through technological interventions. Information on and links to such services need to be provided on the websites of the libraries to ensure maximum utilisation of these technological interventions.

Through a library website, an all-round presence is provided, and this serves as an innovative way of enhancing the value of a library (ChanLin & Hung, 2016). Nzomo (2023) noted that some studies have documented the dynamism academic libraries embraced during the pandemic by leveraging digital platforms and skills to ensure service continuity. Libraries had to use their websites as innovative tools during the COVID-19 pandemic by upgrading their services and products (Paterson, 2021; Chakraborty & Jana, 2021). Chisita et al. (2022) and Yu & Mani (2020) asserted that, besides posing challenges to institutions, the COVID-19 pandemic brought out creative initiatives from academic libraries to increase the use of digital platforms as a means to support teaching and learning in the educational sector. Some academic libraries had to extend their virtual operation time (Yu & Mani, 2020). Despite the high level of provision of library websites, to achieve user satisfaction, they must be usable (Ramanayaka et al., 2019), and this can only be achieved if library websites provide relevant information and online services efficiently, with links properly organised in meaningful ways for users (Sundt and Eastman, 2019), as the library website is a tool that can be used to bring to light the offerings of a library (Faulkner, 2018).

Information and service provision on library websites before the pandemic

A literature review on the use of library websites was conducted before the pandemic by Arshad and Ameen (2015) revealed that academic libraries used their websites to provide a wide spectrum of services to enable library usage both on and off campus, and that e-products covering different disciplines are necessary in meeting the needs of the academic library user community. They therefore conducted a study to determine the usage pattern of an academic library website. It was revealed that traffic to the website was from all over the world, and the majority of users were interested in “free scholarly journal articles”. Faulkner (2018) indicated how the websites of libraries were used as a discovery tool for all resources, including databases and subject guides, that were available in selected libraries on entrepreneurship. Faulkner (2018) noted that the websites had search-all boxes on the homepages with drop-down menus that aided users to combine the use of the library website, catalogue, events, FAQs and other government webpages, which opened up the discoverability of available resources on entrepreneurship to users.

Wickramanayake (2012) in a study in Sri Lanka evaluated the content of “instruction” and “help” on academic library websites. The result of the evaluation revealed that there was clear evidence of underutilization of the library websites for the provision of instruction and help services to library patrons. In addition, Wickramanayake (2012)’s study revealed that a number of the websites did not categorise the instructions provided logically and some concepts used were not meaningful. To Wickramanayake (2012), the issue of non-logical information provision on library websites was not limited to Sri Lanka but was rather a global situation of concern, as it was identified in the literature. Wilson (2015) also laments that the bad nature of the layout of library websites makes them ineffective in search and retrieval of content. The study of Wilson (2015) in Alabama, academic libraries revealed that the home pages of the libraries were used to provide employee directories, phone numbers, addresses and OPAC access. All the libraries studied by Wilson (2015) provided access to e-books, a majority of the libraries provided social media links and not all libraries provided basic information on their libraries and also chat services. Pareek and Gupta (2013) bemoan the fact that website development of academic libraries in Rajasthan, India, is not done out of a conscious effort aimed at marketing library

services, and the library websites lack the application of advanced web-based interaction techniques.

Kebede's (2014) study of top African university libraries' website revealed the use of Web 2.0 features by most of the libraries. In another study by Oladapo (2016) in Nigeria and South Africa, it was noted that though University libraries in the two countries have adopted Web 2.0 features, these features were more prominent among library websites from South Africa. Also, the library portals of South African universities provide access to more electronic databases, with more efficient retrieval tools, than university libraries in Nigeria. Mabweazara (2018) found that university libraries in Zimbabwe provide links on their websites to their social media handles. In Ghana, Agyemang et al. (2015) observed that although academic libraries have active websites, the information provided on the websites is mostly static.

Information and service provision on library websites after the pandemic

Review of relevant literature on library websites use during and after the pandemic revealed that libraries encountered difficulties due to the physical closure of their premises as a measure of safety during the pandemic (Lembinen, 2023) and had to suddenly switch to electronic content provision and drastic update their websites (Rafiq et al., 2021). Researchers have documented a number of initiatives carried out in libraries during the pandemic. In a study on the resources and services that are provided on academic health science libraries in the United States throughout the COVID-19 pandemic by Yu and Mani (2020), it was revealed that the library websites were used as a primary tool for reaching out to library users. Updated information on how to access library resources and services remotely, policy changes, due dates and associated fines, processes for laptop checkouts, virtual workshop and instruction sessions, announcements and interlibrary loan options were provided. Library guides to provide information on various subject areas relating to COVID-19 were provided by 50% of the libraries studied. Kang et al. (2022) noted that though all libraries studied in China provided access to available e-resources remotely prior to the pandemic, during the pandemic, the libraries studied embraced extended and enhanced remote access approaches by joining the CERNET Authentication and Resource Sharing Infrastructure alongside other measures. Likewise, though the library websites provided virtual reference services before the pandemic, the pandemic

period witnessed a rise in the use of artificial intelligence robot chat interfaces among libraries. Naughton (2023) posits that many academic libraries, including Queen's College, New York, updated their websites with information on accessing library resources remotely and that the use of the library website for information resources became the norm, with visits to the websites from about 145 countries. Likewise, Dadhe and Dubey (2020) noted that academic libraries in India expanded the extent of online services in order to link users to relevant information materials during the pandemic. Zimbabwean academic libraries were recorded to have shifted to electronic information resources on their websites, such as electronic books, newspapers, journals, and past examination papers as a major means to help their users cope with the demands of learning and research during the pandemic (Chisita et al., 2022).

This increased the demand in the use of off-campus authentication software such as RemoteXs and EZProxy (Chisita et al., 2022) and other library services. These services include: remote access to e-resources, as well as free and expanded access and resources related to COVID-19 (Dadhe & Dubey 2020); the creation and upload of tutorial videos to educate users alongside regular announcements and virtual reference services (Robinson & Wilson, 2023), and audio technology devices available in their libraries (Camp, 2023); instructions on interlibrary loans (Hebert & Visperas, 2023); links to online chats (Maixner et al., 2023); information on available spaces and room reservation tools (Scronce, 2023) and different categories of librarians available for consultation (Arendt & Peacemaker, 2023).

Technical advancement and challenges in academic library website development

The available literature on the extent of information provision on academic library websites provides mixed findings. Libraries had to undergo instant transformation during the period of the pandemic (Ashiq et al., 2022). While some libraries in advanced countries had moved from basic information provision to self-service websites even before the pandemic, others still lag in the provision of basic information due to several challenges. Some of these challenges, which have been outlined by Wijayaratne & Singh (2015) and Pant (2015), include the difficult task of designing and maintaining library websites to satisfy the needs of a wide range of information users, high cost implications, and a lack of skilled personnel

(especially in developing countries). To cope with the rate of transformation demanded by the exigencies of the era, Ashiq et al. (2022) proposed the establishment and improvement of infrastructure and accessibility. However, Cirelli & Long (2020) identified that the use of technical jargon on library websites affects their usage and leads to low traffic. Cirelli & Long (2020) also noticed that library users mainly depended on quick links rather than searching the library website. These challenges necessitated a call from researchers like ChanLin & Hung (2016) recommending research to investigate online service provision of libraries, while others, including Silvis et al. (2019), have recommended a framework to be used in studying the information architecture of academic library websites or upskilling of librarians' knowledge on website development and management (Munshi et al., 2023).

Methodology

The researchers used the members of the Consortium of Academic and Research libraries in Ghana (CARLIGH) as the population of the study. The main focus of the consortium is to assist member libraries with access to electronic resources and to train library staff. Thus, members of CARLIGH may be in a good position to make prudent use of their library website than other libraries that are not members.

The academic library membership of CARLIGH, as at the time this research was initiated, was 30 academic libraries made up of eight (8) public universities and twenty-two (22) private universities. Based on the assertion of Durrheim and Painter (2006) that for a small population, 30% should be selected as the sample size; nine of the academic libraries were selected as the sample size. In order to give equal representation for public and private academic libraries, proportionate sampling was used to select two public and seven private universities from the consortium. The nine participating libraries (see Table 1) were selected purposively, taking into consideration the levels of technological innovations implemented.

The researchers adapted Pareek and Gupta's (2013) academic library website content checklist as the tool for analysing the content of the selected library websites (see Table 1). The use of this checklist is deemed appropriate as the purpose of this work is to determine the extent of information provision. To reflect the current evolution of library websites, the researchers added interactive web, Myaccount and Discovery (one search point) to the original list and changed the word accessibility to availability to reflect

the context of use in this work.

Table 1: List of Institutions Selected

University Libraries Selected	Status
University of Ghana	Public
Kwame Nkrumah University of Science and Technology	Public
Central University	Private
Wisconsin University College	Private
Methodist University College	Private
Presbyterian University College	Private
Ashesi University	Private
Valley View University	Private
Regent University College	Private

The data collection for each period took approximately one month. The first set of data on the library website was collected in June 2018 as part of the PhD work of the first author; this was used as the pre-COVID-19 pandemic data. The second set of data on the library websites was collected in July 2023, when it is believed all libraries may have initiated and completed various activities on their website to cope with the demands of the COVID-19 pandemic.

To help analyse the data, the availability of information on the various items on the checklist used for the content analysis was scored one point when the information was present, and zero when the information was not available on the website. The scores gathered were uploaded into SPSS to generate frequencies and means on each item. To compare the difference in the information provision on each item listed during the two periods studied, a paired sample t test was performed on the three categories of information collected (website quality, information quality and service quality) to determine if there is any statistically significant difference between the mean score of information provision on the academic library website studied before and after the COVID-19 pandemic.

Table 2: Pareek and Gupta's (2013) academic library website checklist

	System Quality
1	Availability and Speed
2	Navigation
3	Website aid and tools
4	Link to e-resources, including a research portal
	Information Quality
5	Authority and Accuracy
6	Currency
7	Language
	Service Quality
8	Library resources
9	Library collection
10	Information on e-resources
11	Library services and technical services
12	Library General Information
13	Information on different library sections
14	Value-added services

Findings

The study's findings are organised according to the following sub themes as listed on the adopted check list: accessibility and speed of library website; website navigation; website aid and tools; link to e-resources, including a research portal; authority and accuracy; currency; language; library resources/ collection; information on e-resources; library services and technical services; library general information; information on different library sections and value-added services.

Availability and speed of the library website

The data revealed that before the COVID-19 pandemic, the main university homepage for all nine libraries had a link to the library website, they were publicly accessible, and the link to the library page was not more than three clicks away from the main university homepage. Four libraries (44%) had some inactive links, and the website of one of the libraries (11%) was still being designed, though it had an active website link. However, data collected after COVID-19 shows that out of the nine libraries, seven (78%) have an active website, while one of the remaining libraries had no library link and the other library still does not have a website, though it had an active website link;

rather, it has a page with a link named online resources under "academics".

Website navigation

Data on website navigation reveal that before the COVID-19 pandemic, the home link of the library website was available on every page of six (67%) of the library websites, seven (78%) of the libraries had page titles to describe contents, eight (89%) of the websites had page titles that appeared in the top window bar, six (67%) of the libraries provided information using charts, pictures and graphics, while three (33%) library websites provided information in text only. After the COVID-19 pandemic, it was revealed that 44% of the library websites provided a home link on every page and 56% had page titles describing the content. This shows a reduction in navigation features on the websites of the libraries studied after the pandemic.

Website aid and tools

With regards to website aids and tools assessment, prior to the COVID-19 pandemic, only one (11%) library provided a site map, webmaster link, website index and mobile version of the site; seven (78%) of the libraries provided features for searching the site. Feedback link and frequently asked questions (FAQs) were not provided by any of the libraries. The situation after the pandemic revealed that out of all the checklists of website aids and tools, only two libraries provided a search link to their website, a reduction from seven before the pandemic, and none of the other features was present on any of the websites.

Link to e-resources, including a research portal

Assessment of the library websites revealed that before the COVID-19 pandemic, seven (78%) out of the nine library websites analysed provided links to the Institutional Repositories (IRs) of their libraries and also to electronic journals. Research tool was provided by six (67%) libraries, five (56%) library websites provided links to e-books, four (44%) out of the nine library websites had links to other important databases, manual for using e-resources was provided by three (33%) of the websites and one (11%) website each had links to search engines, reference tools lists and a discovery service. Analysis of the websites after the pandemic revealed that 56% of the sites provided links to IRs, e-journals, and e-books, Libguides and other databases, while research tools were provided by 22% of the websites and a discovery service was still provided by only one library. Findings are captured in

Table 3.

Table 3: Link to e-resources, including a research portal (n=9)

Check list	Pre Covid-19		Post Covid-19	
	Frequency	Percentage	Frequency	Percentage
Link to Institutional Repository	7	78	5	56
Link to Professional organisations or associations	1	11	0	0
Links to e-journals	7	78	5	56
Links to e-books	5	56	5	56
Link to Reference tools list/LibGuides	1	11	2	22
Links to manuals for e-resources	3	33	2	22
Link to other databases	4	44	2	22
Links to search engines	1	11	0	0
Link to Discovery services	1	11	1	11
Link to Research tools	6	67	2	22

Paired Sample t-test on the quality of the websites

The result of a paired sample t-test to compare available information on the websites to determine the quality of the website shows a decrease from (M = 4.38, SD= 3.278) to (M 2.97, SD= 2.847; $t = 5.639$, $P < .001$, $d = 1.047$). Thus, there was a significant reduction in the amount of information provided on the websites on factors that were used to determine the quality of the website.

Authority and accuracy

Assessment of the authority and accuracy of information provided on the website reveal that, before the pandemic, seven of the library websites (78%) provided information on copyright, four (44%) of the websites provided contact information, eight (89%) of the sites had well-structured information and three (33%) had links to other available credible sites. When compared with the data collected after the pandemic, five (56%) of the websites provided copyright information, contact information and had well-written information. Only one (11%) had links to other credible websites.

Currency

Using the last date of update of the website, the data collected shows that not even a single one of the sites analysed before and after the pandemic was regularly updated, nor updated three months before data collection. Data collected before the pandemic shows that 56% of the websites' information was current, with an indication of the website being updated within the last six months before data collection. However, after the pandemic, six (67%) of the websites contain information which is current, with seven (78%) indicating the last date of update.

Language

Assessment of language used on the websites that were studied before the pandemic showed that all the websites (100%) use the English language. It was, however, noted that before the pandemic, one of the websites provided the librarian's welcome address in French. The situation remained the same after the pandemic, except that the library with the welcome message in French now has a French version of its entire page.

Paired sample t-test on the quality of information on the websites

The paired sample t-test for items provided to check the information quality of the websites showed a

decrease from ($M = 3.69$, $SD = 2.915$) to ($M = 3.22$, $SD = 2.906$; $t = .800$, $P = .447$, $d = .267$). This result shows that, though there was a reduction in the quality of information provided on the websites after the pandemic, this was not statistically significant.

Library resources/collection

Provision of information on library collection or resources before the pandemic revealed that, information on books and OPAC was provided by six (67%) of the library websites, information on serials was provided by three (33%), information on dissertations, CDs and link to other online catalogues was provided by two (22%) of the websites each and one (11%) of the websites had information on its audio-visual resources. There was no information on music collections, microfilms, project reports, manuscripts, legal deposits and maps on any of the websites. Analysis of the websites after the pandemic showed that four (44%) of the library websites provided information on OPAC, two (22%) each of the websites provided information on books and dissertations and one (11%) website each had information on audio-visuals and CDs.

Information on e-resources

Information on available e-resources on the website of the libraries indicated that before the pandemic, information regarding online databases was provided by six (67%) of the websites, information on available e-journals was provided by seven (78%), five (56%) of the websites had information on e-books, four each of the websites had information on how to access e-resources from off-campus and e-theses. However, none of the library websites had information on online exhibitions, e-standards, online seminars and e-patents. The situation after the pandemic depicted that six (67%) of the websites provided information on electronic databases and e-journals, four (44%) provided information on e-books, two (22%) provided information on e-theses, five (56%) provided information on off-campus access and one of the sites provided information on online seminars.

Library services and technical services

Table 3 indicates that before the pandemic, three (33%) of the websites provided information on reference services and photocopying. Checks after the pandemic revealed that two (22%) of the websites provided information on photocopying services, and three (33%) provided information on reading room services. None of the websites provided information on indexing, classification, cataloguing and translation services before or after the pandemic.

Table 4: Library services and technical services (n=9)

Check list	Pre Covid-19		Post Covid-19	
	Frequency	Percentage	Frequency	Percentage
Photocopying service	3	33	2	22
Reference services	3	33	0	0
Information search request	2	22	1	11
Reference queries 'Ask a librarian'	2	22	1	11
Purchase suggestions	2	22	2	22
Reading room	2	22	3	33
Internet access services	1	11	0	0
Issue-return (Browsing, self-check in/ out)	1	11	0	0
Renew material	1	11	0	0
Material reservation	1	11	0	0
Bibliography services	0	0	1	11
Interlibrary loan	0	0	1	11

Information about classification and cataloguing	0	0	0	0
Indexing services	0	0	0	0
Translation service	0	0	0	0

Library general information

Analysis of information on general library services on the websites revealed that eight (89%) of the websites provided information introducing the libraries, their working hours and services. Seven (78%) provided information on the rules guiding the use of the library, six (67%) each gave information on staff and library collection, five (56%) described the library collection and provided information on the mission and or objectives of the libraries before the pandemic. After the pandemic, seven of the websites studied had an introduction to the library and information, such as its opening hours. Six (67%) had information about library resources and contact information. None of the websites provided information on administrative activities, annual reports or library committee members before or after the pandemic. See Table 5.

Table 5: Library general information (n=9)

Library General Information	Pre Covid-19		Post Covid-19	
	Frequency	Percentage	Frequency	Percentage
Library introduction	8	89	7	78
Information about library services	8	89	7	78
Working hours	8	89	7	78
Library rules	7	78	5	56
Information about library resources	6	67	6	67
Staff directory	6	67	4	44
Library collections	5	56	3	33
Library's mission statement or objectives of library	5	56	5	56
Contact information	4	44	6	67
News and events	4	44	3	33
Mail to facility or to librarian/staff	4	44	5	56
Information about membership	3	33	2	22
Library department's information	3	33	2	22
Library location	2	22	2	22
Library policies and procedures	2	22	2	22
Information about the branches of library (if any)	2	22	3	33
Information about the building	1	11	0	0
Instructions or tutorials about library use	1	11	4	44
On-going projects	1	11	0	0
Annual reports/statistics	0	0	0	0
Administrative activities	0	0	0	0
Information about library committees	0	0	0	0

Information on different library sections

The website analysis showed that before the pandemic, it was noted that three (33%) out of the nine websites studied had information about the library stack areas, information regarding acquisition and circulation sections was given by two (22%) of the libraries and information about technical processing unit, photocopying and periodical sections were indicated by one out of the nine libraries (11%) studied. After the pandemic, however, two (22%) of the library websites had information on photocopying unit, and one website had information about its technical processing unit.

Value-added services

The assessment of the websites of the libraries was also to determine if the libraries provided other services through the websites. The data gathered showed that before the pandemic, four (44%) out of the nine library websites studied had RSS feeds and news alerts, web 2.0 functionalities were provided by three (33%) (none of the websites had web 3.0 nor 4.0 functionalities), two (22%) provided guidelines for users, information on newly acquired information resources and virtual help desk, one (11%) provided information on library calendar of events. After the pandemic, one (11%) provided news alert, two (22%) libraries each provided web 2.0 functionalities, guidelines for users, myaccount services, library blog and online journals. Three libraries provided a directory of library staff. There was no link to library projects, library archive, image gallery, union catalogues, job vacancies, consultancy or book vendors on any of the library websites studied. This is depicted in Table 6.

Table 6: Value-added services (n=9)

Check list	Pre Covid-19		Post Covid-19	
	Frequency	Percentage	Frequency	Percentage
Library 'news alerts'	4	44	1	11
RSS feed	4	44	0	0
Web 2.0	3	33	2	22
User guidelines	2	22	2	22
Virtual help desk	2	22	1	11
New-arrival section	2	22	1	11
Myaccount	1	11	2	22
Library events calendar	1	11	1	11
Job vacancies	0	0	0	0
Image gallery of library	0	0	0	0
List of librarians	0	0	3	33
Online tutorials	0	0	2	22
Projects and consultancy	0	0	0	0
Library archive	0	0	0	0
Book vendors links	0	0	0	0
Library blog	0	0	2	22
Union catalogue	0	0	0	0

Paired sample t-test on the quality of services on the website

Information available to determine the services provided on the website also decreased from ($M = 2.0952$, $SD = 2.26348$) to ($M = 1.6429$, $SD = 2.03962$; $t = 3.139$, $P = .002$, $d = .342$). This shows that there was a significant reduction in the amount of information provided on the websites on factors that were used to determine the services provided on the websites.

Discussion of findings

In order for the researchers to put the findings of the study in the context of existing literature and the objectives of the study, the discussion section is organised according to the following themes: availability of websites, website navigation and tools, and services provided on the library website.

Availability of websites

The first objective of the study was to determine the availability of library websites among the libraries studied. In this study, it was discovered that before the pandemic, all the academic libraries studied had websites, aligning with the findings of Rubin et al. (2010) and Verma et al. (2022) that libraries all over the world are developing websites. However, it was noted that the information on one of the websites pertained not to the selected library but to a foreign university library to which it was affiliated. There was therefore no information about the library under study, though it had a website. The situation after the pandemic was even more concerning, as the number of active library websites had decreased by one. The website of the institution that was linked to a foreign library's webpage is also no longer available; rather, a page named "online resources" under the academic section has been created with a list of only e-resources. The reduction in the number of websites after the pandemic presents a different picture from what has been found in other contexts by Nzomo (2023), Chakraborty and Jana (2021) and Paterson (2021) that libraries took digital initiatives and frantically advanced their websites to meet the challenges of the Covid-19 pandemic. Despite the reduction in the number of available websites, all the websites available are linked from the home page of their mother institution.

Website navigation and tools

Another objective of the study was to determine the tools and features available on the websites to aid accessibility. Ramanayaka et al. (2019) indicated that library websites must be usable to aid the library in satisfying the needs of its customers. Usability of the website means that it provides features to aid its functionality, which include navigation and website aids and tools. Though majority of the library websites provide navigational tools such as provision of a link to the homepage on every page, page titles to describe the content and page titles on the upper window bar, provision of website tools and aids was basically absent as the only tool provided by the majority of the libraries

is the search tool before the pandemic, and the number of websites with this feature reduced from eight before the pandemic to two after the pandemic, although it has been recommended by Sundt and Eastman (2019) that library website should have adequate navigational features. Mobile version, site map, website index, feedback link, webmaster link and frequently asked questions were basically absent. This affirms the assertion of Munshi et al. (2023), Wijayaratne & Singh (2015) and Pant (2015) that libraries have challenges in providing advanced features on their websites. It is also surprising that the libraries did not even take advantage of the challenges of COVID-19 to advance on some of these features, as was done by other libraries noted in the work of Thompson et al. (2021), Paterson (2021), Yu and Mani (2020), Kang et al. (2022) and Naughton (2023). This shows a lack of innovation during the pandemic, which is contrary to the assertion of Chisita et al. (2022) and Yu and Mani (2020) that libraries used innovative digital tools to enhance service provision during the pandemic.

Information Provision on Library Websites

The study also sought to determine the extent of information provision on academic library websites before and after the COVID-19 pandemic. Information provision on the library websites was analysed on library resources and collection, Information on e-resources, Library services and technical services, Library general information and library sections.

Library resources and collection

The researchers sought to find out if the library websites provided information and links to library resources and collections. It was revealed that the number of websites that provided information on the availability of OPAC, books, journals, magazines and newspapers reduced after the pandemic. Information about other library resources, such as legal deposits, project reports, manuscripts, microfilms, music and maps, was not provided on any of the websites before and after the pandemic, even though these materials are part of the resources of some of the libraries studied. It is also interesting to note that two of the libraries studied are designated legal deposit centres in Ghana, but had no information on this on their websites. This does not project the library website as an online interface which serves as a source of providing information on all the services and resources provided in a library (Arshad & Ameen, 2015 and Verma et al., 2022). This is also contrary to the findings of Rafiq et

al. (2021), Dadhe & Dubey (2020) and Camp (2023) that libraries enhanced the provision of information and services on their websites during COVID-19. It can also be inferred that managers of library websites do not see the library website as a marketing tool and have therefore not dedicated adequate time to provide relevant information that will be of benefit to users on the websites. This also gives an indication of a lack of adequate measures to link the library and its resources to the global world.

Information on e-resources

Information available about e-resources on the library websites studied was mostly on online databases, e-magazines and e-journals. Even with this, the numbers reduced when the data from pre- and post-COVID-19 were compared. All the libraries have “off-campus access” privileges as part of their subscription package through CARLIGH; however, not all of them had this service listed on their websites before the pandemic. Nonetheless, there was an increase in the number of sites that provided off-campus access after the pandemic. Though the increment in the number of remote access provisions is low, it is in line with the global trend recorded during the pandemic (Chisita et al., 2022, Kang et al., 2022 and Naughton, 2023). None of the libraries provided any service or information on e-patents, online exhibitions and e-standards. This does not make the website a gateway to the library’s collection, as recommended by Faulkner, 2018. This study is thus in consonance with Wickramanayake (2012) that there is clear evidence of underutilization of library websites. It also means that Ghanaian academic libraries did not take advantage of the COVID-19 pandemic to improve their web presence, as was noted by Paterson (2021) and Ashiq et al. (2022) about other libraries.

Library services and technical services

As library services have advanced in the 21st century, libraries in developed countries are making use of their websites to provide virtual services to their patrons, including e-reference services and virtual library services backed by artificial intelligence (Kang et al., 2022, Reinsfelder & O’Hara-Krebs, 2023 and Noh, 2022). The data from this study shows that academic libraries in Ghana lag in this regard. Information provision on photocopying, reference services, and Ask-a-librarian was reduced after the pandemic. Reference queries, information search requests, Ask-a-librarian, reading room requests and

purchase suggestions are the only actual virtual services provided by a few of the libraries. It is also noted that none of the libraries provides interlibrary loan services on their website; interlibrary loan was only listed as a service by one of the websites after the pandemic. The lack of virtual service in Ghanaian academic libraries may be due to a lack of personnel with technical expertise and a lack of resources. This situation does not put academic libraries in the position to fully embrace the benefits of the 21st-century library.

Library general information and library sections

To determine information that was generally provided on the websites, the researchers used twenty-two items as a checklist. The outcome of this observation shows that the libraries were not making maximum use of their websites. The data gathered before and after the pandemic revealed that aside from working hours, services and introduction to the library that were provided by the majority of the websites before and after the pandemic, all other items were not provided by the majority of the libraries. Thus, unlike the libraries studied by Dadhe & Dubey (2020); Robinson & Wilson (2023); Camp (2023); Scronce (2023) and Arendt & Peacemaker (2023) which provided information on different library services, the Ghanaian academic libraries studied lacked such information on their websites as none of the libraries provided information on all the items that were indicated on the check list.

Value-added services

Library website use has progressed from basic information provision to other functionalities for a better user experience. The fourth objective was based on this premise to determine the kind of services provided via academic library websites before and after the COVID-19 pandemic.

Library websites now use alert services, RSS feeds, my account services and even AI to make the websites personal to users. Data from this study indicates that efforts were made by a minority of libraries to provide RSS feeds and “news alerts” before the pandemic. However, the data collected after the pandemic revealed a drastic reduction of RSS feed provision to zero and news alerts to only one. Also, links to social media handles on the websites were reduced after the pandemic, while there was a slight increase in the Myaccount service. Though two of the websites indicate a link to their blogs, only one has content. The post-COVID analysis shows that two of the websites

introduced online tutorials for accessing e-resources, possibly to help users find relevant information during the pandemic. Union catalogue was totally absent from the websites studied as Ghana currently does not have a union catalogue, and none of the libraries has any form of collaboration to form one. These findings are the direct opposite of the findings of Kang et al. (2022), Naughton (2023) and Thompson et al. (2021) that indicate extensive adoption of advanced technology to enhance remote access, intelligent robotic charts, and integration of search results, among others.

The findings of this study resonate with those of Oladapo (2016) which indicates limited use of Web 2.0 features on the websites of academic libraries from West Africa than their counterparts from South Africa. Thus, there is a lack of extensive application of interactive features, which is contrary to the recommendations by Cirelli (2022), and He & Huang (2023) for libraries to provide web-based, interactive and personal services.

The researchers, based on the checklist adapted, also assessed the authority, accuracy, currency and language of the information provided on the websites.

Authority and accuracy

The authors assert that the library website should serve as the most credible source of information about the library and its resources to the user community. It has been considered the lifeline to the library by Ramanayaka et al. (2019). This can only be achieved if the information provided on the website can be deemed authoritative and accurate. The sites should indicate clearly who owns the content of the websites, a contact address to which queries should be addressed, well-written text, and provide links to other external credible sites. As much as these features are important, not many of them were available on the sites studied. This is contrary to the findings of Wilson (2015) who found that contact information, for instance, is part of the information on the home page of library websites.

Currency

The currency of a library website is very crucial, as was projected during the COVID-19 pandemic. Libraries all over the world were noted to update the content of the websites to meet the exigencies of the period. Out of the five indicators used, only two were met by the majority of the libraries, both before and after the pandemic. It was, however, noted that none of the pages was updated within the last three months before both data sets were collected. Library users have

been noted by Chen et al. (2023) to depend greatly on the websites to make use of library resources. To maintain the level of dependence, the information provided on library resources and services on the website needs to be current.

Language

In a 2023 study, Naughton found that library websites drew traffic from different parts of the world and provided the benefit of global access to information. This can only be fully realised if a website is in different international languages. The use of multiple international languages on a website is more crucial for Africa, which is multilingual, and more so for Ghana, which is bordered by French-speaking countries. The use of multiple languages on academic library websites, unfortunately, has not been given the necessary consideration, as only one of the libraries studied provided its content in English and French, though all the universities studied admit international students who may not have English as their first language.

Conclusion

The availability of technology has pushed the frontiers of library services into online spaces, where users, especially in developed countries, can access comprehensive library services. However, as has been discovered by this study, Ghanaian academic libraries are not making extensive use of their websites, as there was a general lack of even basic information and minimal use of the academic library websites for the provision of electronic services such as purchase suggestions, Ask-a-librarian, user guidelines, reservation services, “my account” and LibGuides.

The global health crises highlighted the need for institutions such as libraries to invest in robust digital infrastructure, including websites with adequate features for ensuring service continuity. Inadequate website features and content, as discovered in this study, point to structural and strategic gaps in service delivery in libraries in a post-pandemic environment that has embraced technological transformation.

The academic library environment is, therefore, not adequately projected to the global information community to reveal the worth of information resources that are available in these libraries. Likewise, the current situation places a limit on the extent to which users can use the library resources remotely, as not many services are provided on the library websites.

Recommendations

The study, based on its findings, recommends that:

- Academic libraries in Ghana must, as a matter of urgency, develop strategies to help them make maximum utilisation of their websites, as this will open the library resources and services to the global community. Academic libraries should invest in digital infrastructure and web development capacity by employing a web developer who will work in collaboration with the various units in the libraries to ensure that all relevant information about the library and its services is provided on the websites of the libraries.

- All academic library website links should be a maximum of three links from the university's homepage. It will be appropriate for the link to the library to be placed under academics and titled "library".

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Author Contributions

Patience Emefa Dzandza Ocloo

- Conceptualization
- Data curation
- Formal Analysis
- Funding Acquisition
- Investigation
- Methodology
- Project Administration

Lizette King

- Conceptualization
- Investigation
- Methodology

Conflict of Interest

No conflict of interest was disclosed

Corresponding Author

Patience Emefa Dzandza Ocloo

pedzandza@ug.edu.gh