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University Libraries' Response to Online Teaching and Learning in Bangladesh: A Perspective on Online Library Services during COVID-19 Pandemic

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ABSTRACT

Purpose - This study aims to explore the online services provided by the university libraries of Bangladesh during the COVID-19 pandemic and how they cope up with the new demands of the students and faculties to support online teaching and learning activities.

Design/methodology/approach - The descriptive research design of the online survey was used to collect data from 50 public and private university libraries. The population of this study was 160 UGC-approved universities in Bangladesh. A structured online questionnaire was developed using Google Forms and delivered to 72 university libraries via Email. 50 university libraries responded to the survey, and later the data were analyzed using SPSS v-25.0.

Findings - The findings of this study reveal that to support online teaching and learning, and research activities, most of the university libraries of Bangladesh started to provide online library services for their patrons. This study suggests libraries need to improve their technical infrastructure and provide equal opportunity to each professional for acquiring new technical skills of various emerging library tools and techniques to disseminate knowledge using a digital platform. Libraries also need to promote their services through email and social media to make library users aware of the new services and also need to secure more funding from the university authorities to acquire more electronic resources.

Limitations – With the COVID-19 movement and safety restrictions, we had to rely only on online data collection methods. We could not manage a large part of the university libraries because the contact information was available on the university web directory.

Originality - This study will provide a comprehensive idea about the ability of the university libraries of Bangladesh to provide online library services in emergency/pandemic situations. A few studies have been published that focused on university library services during the COVID-19 pandemic situation. This study is the first effort to provide a combined picture of all the online services offered to the patrons by public and private university libraries in Bangladesh. The researchers believe that the library professionals, university authorities, and policymakers in Bangladesh will highly be benefited from this research by understanding the strengths and weaknesses of the online library services.

KEYWORDS: University libraries; online teaching and learning; online library services; ICT infrastructure; availability of e-resources; Covid-19; Bangladesh

Paper Type – Research paper

1. Introduction

The outbreak of COVID-19 pandemic has emerged as a global health crisis (Rehman et al., 2021) and made a tragic impact on the entire globe throughout the business, economy, jobs, education, etc. It became a long-term reality disrupting all aspects of life and impacting nearly every profession, including libraries. The severity of the pandemic led to the closure of the university campus of Bangladesh (Emon et al., 2020) and placed online teaching and learning as the new normal in higher education (Martzoukou, 2020). To survive and minimize the losses during this pandemic, most of the university libraries of Bangladesh suspended traditional in-person services and switched utterly to virtually online services (BRAC, 2021; EWUL, 2020; NSU Library, 2021). As many universities started online classes, libraries need to continue their support to the communities' research, learning, and online teaching endeavors during this time. They need to maximize the online accessibility of electronic resources and provide virtual research supports.

According to UNESCO (2021), 1.6 billion learners from more than 190 countries are affected by this viral pandemic. The COVID-19 pandemic has posed a significant threat to the global education system, and the higher education sector has already been severely affected by the unexpected closure of the universities and colleges (Ameen, 2021). Followed by the COVID-19 restriction and the subsequent stay-at-home order, online-based distance education has replaced the traditional face-to-face teaching and learning method (Casacchia et al., 2021). Online education has become the primary teaching method in higher education, which has

created significant challenges and opportunities for university libraries. University libraries are service-oriented information institutions (Alam, 2021) which provide appropriate resources and quality services for users to meet their academic needs. With the help of technology, library professionals are working hard to adapt to the rapidly changing circumstances caused by the COVID-19 pandemic. Libraries are increasingly relying on social media platforms to promote programs, resources, and service changes on a regular basis. Online library resources and services need to be more visible for the users; most of the university libraries of Bangladesh are trying to enhance their tools and techniques to assist the parent institutions' teaching, learning, and research activities.

Before the pandemic, almost all the public and private university libraries in Bangladesh heavily depended on traditional physical library services. However, Begum and Elahi (2022) revealed that most university libraries in Bangladesh had operated their activities in a hybrid mode since long before COVID-19 Pandemic. Only some leading private and public university libraries started to provide digitized and online services for patrons, including plagiarism checking, text analysis, reference management, data analysis, virtual literacy training, web publishing, skill-building training, etc. But Ahmed (2014) widely observed the inadequacy of online resources and technological infrastructure in the university libraries of Bangladesh. He noticed that newer universities lag behind older universities in terms of online subscription resources and the use of the latest technology applications. Habiba and Ahmed (2020) also observed university libraries are suffering from inadequate financial support and a lack of trained human resources. This study also reported that faculty members were not satisfied with the subscribed e-resources of the university libraries. Regarding technological support, Shuva (2014) finds that most libraries still depend on the ICT division attached to the university. Most libraries have not yet been able to establish their IT cells.

Academic libraries established in public and private universities in Bangladesh have been transforming rapidly. The COVID-19 pandemic has resulted in increased use of and reliance on digital technologies, and libraries show more interest in online services. The pandemic has also provided library professionals with an extensive opportunity to exhibit the value of their expertise by offering comprehensive virtual library services. Many university librarians are also helping students to develop their information and digital media literacy skills to combat the post-truth era and infodemic of fake news regarding COVID-19 and other issues (Adekoya and Fasaie, 2021; Ali and Gatiti, 2020; Chisita, 2020). On the other side, many public and private university libraries of Bangladesh, especially those with comparatively less

prevalence of online presence, this pandemic caused numerous challenges. This study explored how the university libraries of Bangladesh adopted existing services into digital format to support institutional online teaching and learning and how they coped with the new demand for educational materials during this COVID-19 pandemic.

2. Review of related literature

2.1 COVID-19 and higher education in Bangladesh

The global outbreak of COVID-19 has spread worldwide, and World Health Organization (WHO) declared it a global pandemic (Rehman et al., 2021). This deadly virus has affected almost every country and territory of the world, infecting and killing millions of people. The first cases of SARS-CoV-2 infection were reported in Bangladesh on March 8, 2020 (Emon et al., 2020). Till then, the number of COVID-19-infected patients has increased to 1,580,559, with 28,041 deaths by December 19, 2021 (WHO, 2021). On March 16, 2020, considering the severity of the COVID-19 infection, the Government of Bangladesh decided to keep all educational institutions, including universities, closed from March 17, 2020 (Emon et al., 2020).

The suspension of face-to-face teaching and learning facilities on the university campus during the COVID-19 pandemic severely affected 95% of the world's student population (Engzell et al., 2021). These raised concerns about the consequences for students' learning and minimized the gap; many countries started introducing the online education system as an alternative to traditional classroom-based education (Tabassum et al., 2021). On March 24, 2020, The University Grants Commission (UGC) of Bangladesh urged all universities to continue online classes during the closure to engage youth in learning at this challenging time (The Daily Star, 2020). Despite having some difficulties, the vice-chancellors of public universities in Bangladesh had agreed to take online classes during the ongoing coronavirus pandemic (The Business Standard, 2020). As the wild spread of COVID-19 has disrupted educational activities, online learning has become the new normal in higher education (Martzoukou, 2020). The emerging use of modern technology in higher education during this pandemic has brought radical shifts in the learning dynamics.

2.2 COVID-19 and the global library field and the responses of the university libraries

As an information arm of higher educational institutions, this unprecedented turbulence of the COVID-19 pandemic also affects the regular activities of the university library. Social

distancing and restricted movement policy have significantly disrupted traditional library services and forced all academic libraries to close their doors (Fasae et al., 2020; Rafiq et al., 2021) in response to the safety of students, faculty members, and the staff of the library. On 23rd March 2020, the American Library Association (ALA), in a public statement, recommended that

“to protect library workers and their communities from exposure to COVID-19 in these unprecedented times, we recommend that academic, public, and school library leaders and their trustees and governing bodies evaluate closing libraries to the public and only reopening when guidance from public health officials indicates the risk from COVID-19 has significantly subsided” (Morales, 2020).

The International Federation of Library Associations and Institutions (IFLA) also recommends closing the library “temporarily or reducing services to a minimum to contribute to efforts to limit the spread of the disease” (IFLA, 2020). In compliance with the Government's direction and recommendations from professional bodies, university libraries worldwide, including in Bangladesh, are closed to regular library users (Fasae et al., 2020; IFLA, 2020; Rafiq et al., 2021). Facing the global COVID-19 pandemic, university libraries in different countries are searching for ways to cope with the situation. Though this pandemic has unprecedentedly impacted university libraries’ regular services, Rafiq *et al.* (2021) believe it also brought many opportunities and calls for a digital shift. Many university libraries have already reviewed and redesigned their library services to support online education (Ameen, 2021). It is essential for university libraries to assist online education during the pandemic. According to Henda (2020), during this COVID-19 pandemic, “the role of libraries and the duties of the librarians have shifted dramatically to handle the new user demands, technology, and collection.” As university libraries gradually start addressing users’ diverse information needs, they adopt new tools and techniques to disseminate knowledge using the digital platform (Nandi, 2021).

University library professionals are crucial in facilitating students, researchers, and faculty members by providing desired information resources and services. Ameen (2021) believes that this is the right time to transform services into a digital mode to meet the changing needs of the patrons. Tsekea and Chigwada (2020) added that libraries must integrate and expose their online library resources, services, and content into e-learning management systems on a larger scale, as it provides access points in the online teaching and learning process. Nandi

(2021) noticed several changes in library services during this pandemic. Library staff started using phones, email, WhatsApp chat, and social media (Rafiq et al., 2021) to communicate with library patrons. To support online educational activities during this COVID-19 pandemic, many university libraries in America, Europe, Kenya, Nigeria (Fasae et al., 2020), Pakistan (Rafiq et al., 2021), Kuwait (Hendal, 2020), and Indonesia (Winata et al., 2020) started to provide online library services to their faculty members and students. Many libraries started virtual reference desk facilities on the library website (Ameen, 2021), delivering online information literacy instruction through social media (Rafiq et al., 2021), providing digital library services (Tsekea and Chigwada, 2020), and facilitating off-campus e-resource access through EZproxy and Virtual Private Network (VPN) (Nandi, 2021).

2.3 Role of university libraries to online/distance education during COVID-19 pandemic

The COVID-19 pandemic has boosted online and distance education expansion to ensure an uninterrupted education system among higher education students. As an information arm of the institutions, many university libraries started to provide a wide range of online support and services for their patrons to support distance education. Zhou (2021) conduct a comparative analysis to explore how academic libraries in China and Italy cope with new demands for educational materials and satisfy online education needs with the help of digital technologies during the COVID-19 pandemic. Tsekea and Chigwada (2020) investigate the various new strategies applied and the role of Zimbabwe university libraries in supporting e-learning during the COVID-19 lockdown period. Their study revealed that university libraries played a significant role in supporting e-learning by providing electronic information resources. It also suggests that libraries must ensure a robust ICT infrastructure and continuous remote access facilities to subscribed online resources to assist online education during the pandemic shutdown. Begum and Elahi (2022) discuss the East West University Library's response to the pandemic by transforming online services. To support online learning, research, and innovation in the institution, they shifted all the possible physical library services to digital services, i.e., remote access, Web-OPAC, online document delivery, virtual reference services, online literacy training, article on request, engagement users through social media, etc. Estacio et al. (2022) identify eight new library services that are used to support distance learning during COVID-19. Those services are:

- a. Outdoor Library Book Return,
- b. Online Book Request,

- c. Online Library Instruction,
- d. Online Book Suggestion,
- e. Remote Reference and Information Access,
- f. Library and Information Research Assistance,
- g. Library Community Engagement, &
- h. Library G-Site.

To ensure proper usage of resources during the pandemic period, the Fr Moses Library provides WEB OPAC, Library Bulletin, Institutional Repository services, Ask-a-librarian service, and Remote access to electronic resources facilities (Devan NV and Tripathi, 2021). Rafiq et al. (2021) conducted an exploratory investigation on university libraries' response to the pandemic in Pakistan. To support online education, he finds digital library services, remote access, online document delivery services, institutional repositories of thesis and e-books, and open-access resources useful.

2.4 Overview of online education during pandemic in the universities of Bangladesh

During the 2020-21 and 2021-22 academic years, most Bangladeshi Universities extensively conducted online learning to continue educational activities. Several previous studies have looked at how Bangladeshi universities went through the online learning phenomenon. Shahriar *et al.* (2021) identified the critical challenges of online classes faced by the private university students of Bangladesh during this corona pandemic. They discussed the transformation of traditional face-to-face education and the practice of online-based distance education. Ela *et al.* (2021) explored the impact of the COVID-19 pandemic on university students' academic life and career development. To reduce the education gap caused by the pandemic, they suggested shortening the academic year, curtailing the preparatory level, and taking extra classes over the weekends when universities reopen. During this pandemic, Shrestha et al. (2021) explored Bangladeshi and Nepali university students' and teachers' online education experiences. They found poor network connectivity, lack of digital skills, and limited technical support from the institutions are significant challenges to smoothly providing online education in both countries. Sarkar *et al.* (2021) found that many Bangladeshi public university students faced difficulty participating in online classes. Most of them preferred traditional face-to-face learning instead of virtual courses. Nasiruddin (2021) discussed why it is necessary to transition from the conventional to an online education

system during this upward transmission of COVID-19. He further suggests a few plans, ideas, and practical loopholes that need to minimize students' academic gaps.

This COVID-19 epidemic has forced many changes to administer the ways in university libraries operation. Academic libraries are constantly transforming their services in response to student, researcher, and faculties' information needs. To meet the users' changing demands, libraries increased their reliance on digital content, online services, and remote access facilities. Despite some challenges, it is high time to remind the university stakeholders of the importance of libraries and librarians in organizing and disseminating information during this pandemic.

3. Aims and objectives of the study

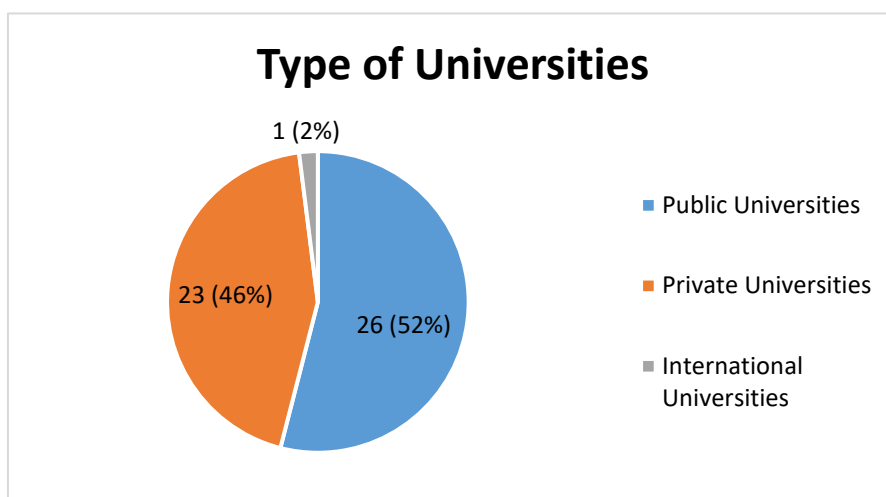
This study aims to investigate how the university libraries of Bangladesh managed their library services during the COVID-19 pandemic and what services they offered during this time. The specific objectives are as follows:

- i. to identify whether university libraries of Bangladesh offer any online services or not in this pandemic;
- ii. to look into how they manage and contact with their users;
- iii. to examine the online services they offered to users during COVID-19 pandemic; and
- iv. to indicate the challenges being faced by the university libraries in Bangladesh to serve users during the lockdown.

4. Research methods

This study is quantitative in nature, and a descriptive online survey research design was carried out to explore and attain empirical evidence of how university libraries of Bangladesh served users' information needs during the COVID-19 pandemic and established a factual picture of what online services they offered to support online teaching and learning of the institutions. A structured questionnaire was prepared with Google form to gather the primary data from the respondents. This questionnaire contained 21 close-ended questions that were designed to collect data about the status of the online services provided to the patrons, tools used to provide remote online services, technological capabilities, and the challenges the university library faced during this pandemic. The online survey was conducted from 1st July to 17th September 2021 to get the primary research data from the respondents.

Figure 1. Type of respondent universities.



Since the study intended to gather quantitative data on online library services offered by university libraries in Bangladesh to support online teaching and learning during the COVID-19 pandemic, the targeted respondent of our study is all public and private universities in Bangladesh. According to the University Grant Commission of Bangladesh, the number of approved universities in Bangladesh is 160 (UGC, 2021). We collect the email and contact information of the librarian/library personnel from the universities' official websites. By looking at the websites, library websites, and directories of the mentioned universities, we found the contact information of the librarians/library officials of 72 universities. While collecting data, we also observed that most university libraries in Bangladesh do not have a website. After collecting the contact information from the websites, the questionnaire was circulated among the 72 university librarians using email. We also communicated with many library professionals over the cell phone and social media for quick responses, and by 17th September 2021, a total of 50 universities had responded (See appendix 1). Among the 50 universities, 26 (52%) are public, 23 (46%) are private, and 1 (2%) are international universities operating in Bangladesh (see Figure 1). The collected survey data were downloaded from Google form, then carefully inputted, organized, and tabulated using IBM SPSS V25.0 data analysis tools.

5. Results

5.1 Status of online library services

The rapid spread of the COVID-19 pandemic significantly disrupted traditional library services and presented unique challenges to library professionals worldwide (Fasae et al., 2020). In response to the health and safety concern of the students, faculty members, and

staff, the university libraries in Bangladesh temporarily closed their doors to prevent physical access. During this time, 58% (n=29) university library premises were completely closed for physical access. The rest of the 42% (n=21) libraries started offering limited in-person official services with various restrictions ever since the Government relaxed the pandemic restriction. The closure of most academic libraries' traditional in-person face-to-face library services requires libraries to provide online services. To support users in these physical contactless-oriented changes, 82% (n=41) university libraries started offering online services and online resources accessible remotely. Only 18% (n=9) of libraries did not provide any online services during this period. Before the pandemic, almost all the public and private university libraries in Bangladesh heavily depended on traditional physical library services (Begum and Elahi, 2022). However, most university libraries in Bangladesh have operated their activities in a hybrid mode since long before COVID-19 Pandemic. This study also reveals that users' online queries for resources and services have dramatically increased during the pandemic. Table 1 indicates that 42% (n=21) of the libraries strongly agreed, and 24% (n=12) agreed that the online resources/services queries had increased during this closure. In comparison, only 16% (n=8) somehow agreed, 8% (n=4) disagreed, and 10% (n=5) strongly disagreed with this statement. Due to the strict movement restriction imposed on library users during the COVID-19 pandemic lockdown, 14.63% (n=6) of library professionals provide online library services from home, 12.19% (n=5) from the library, and 73.17% (n=30) from both home and office.

Table 1. Status of online library services during the COVID-19 pandemic.

Status of online library services	Frequency	Percentage
Physical access to the library complex	Yes (n=21)	42%
	No (n=29)	58%
	Strongly agree (n=21)	42%
Online resource/service queries have rapidly increased during the pandemic	Agree (n=12)	24%
	Somehow agree (n=8)	16%
	Disagree (n=4)	08%
	Strongly disagree (n=5)	10%
Provide any online library services during this pandemic	Yes (n=41)	82%
	No (n=9)	18%
From where library staff provides online library services	From home office (n=6)	14.63%
	From library (n=5)	12.19%
	Both (n=30)	73.17%

5.2 COVID-19 service updates through the library website

In higher education in Bangladesh, online-based distance education is steadily moving forward during the corona pandemic and attracted more and more attention (Mitul, 2021; Shahriar et al., 2021). As an information hub of higher education, most of the university

libraries of Bangladesh have already started to provide a wide variety of online services to users. However, in this case, libraries need to consider how library users get informed about the new online library services and where they get information on several topics, including library opening hours, general access policy, available services, online resource access policy, etc. (Condic, 2021). The library website is one of the ways to display available services to the users. This study reveals (Table 2) that 50% (n=25) university libraries created specific web pages to display information on the services offered during this pandemic, and the rest of the 50% (n=25) did not create specific web pages. Among the libraries those have created COVID-19 service update pages on their website, 80% (n=20) libraries frequently update their web-page information when needed, 8% (n=2) daily, 8% (n=2) weekly, and 4% (n=1) monthly. The result of the study indicates that 68% (n=34) libraries started to promote access to digital resources and online services through social media, library websites, and email.

Table 2. COVID-19 service update through the library website.

COVID-19 service update through the library website	Frequency	Percentage
COVID-19 service update page on the library website	Yes (n=25)	50%
	No (n=25)	50%
How frequently do university libraries update the COVID-19 service update page?	Daily (n=2)	8%
	Weekly (n=2)	8%
	Monthly (n=1)	4%
	When needed (n=20)	80%
Did the libraries of Bangladesh promote access to online resources & services during this pandemic?	Yes (n=34)	68%
	No (n=16)	32%

5.3 Online library services

During the pandemic, university libraries of Bangladesh were involved in offering several online services to assist students, faculty members, and academic researchers. Data from Table 3 indicates that 86% (n=43) libraries provide online e-book delivery services, while 64% (n=32) provide e-books download services through Online Public Access Cataloguing (OPAC) and 62% (n=31) provide online reference services, followed by 60% (n=30) full-text article delivery service, 52% (n=26) provide remote access service, 50% (n=25) provide institutional repository access service, 46% (n=23) provide online research guidance service, 34% (n=17) provide plagiarism checking service, 34% (n=17) provide posting news and service updates on the library website, 26% (n=13) shared latest COVID-19 news and information with the community, 24% (n=12) provide online information literacy instruction

service, 24% (n=12) support COVID-19 research work by providing the latest research articles, and 14% (n=7) libraries provide online reference services during this time.

Table 3. Online library services.

Online library services	Frequency	Percentage
Plagiarism checking Service	n=17	30%
Online full-text article delivery service	n=30	60%
Online e-books delivery service	n=43	86%
Institutional repository service	n=25	50%
E-book download through Online Public Access Catalogue (OPAC)	n=32	64%
Online research guidance service	n=23	46%
Online information literacy instruction service	n=12	24%
Online research support service	n=7	14%
Online reference services	n=31	62%
Posting news and service updates on the library website	n=17	34%
Online remote access services	n=26	52%
Sharing COVID-19 information with the community	n=13	26%
Support COVID-19 related research with the latest articles	n=12	24%
Other	N=2	4%

Note: Multiple responses taken

5.4 Tools used to manage contact with library users

Libraries need to promote their new resources and services continuously to the users. It helps users who cannot reach the library for knowing what new library resources and services have been added during this pandemic. Promotional tools that can be used to promote services and resources include, social media, libraries' website, email, blog post, etc. (Mandrekar and Rodrigues, 2020; Yi, 2016). The maximum online presence of the university libraries through different online communication tools and social media is much more essential in this case. The findings of this study (Table 4) indicate that 90% (n=45) university professionals used email as a primary means of managing contact with library users during the pandemic. 80% (n=40) libraries used phone calls, 64% (n=32) used social media platforms, followed by 54% (n=27) online chatting, 40% (n=20) used instant messaging tools, 36% (n=18) used ask a librarian button on web site, and 4% (n=2) of surveyed libraries used other tools to managing contact with the library users.

Table 4. Tools used to manage contact with library users.

Tools used to manage contact with library users	Frequency	Percentage
Email	n=45	90%
Social Media	n=32	64%
Phone call	n=40	80%
Instant Messaging	n=20	40%
Online Chatting	n=27	54%
Ask a Librarian	n=18	36%
Other	n=2	4%

Note: Multiple responses taken

5.5 Availability of ICT tools, facilities, and technical personnel

University libraries must have adequate tools and online resources to support the institution's online teaching, learning, and research activities. The findings (Table 5) of this study reveals that 54% (n=27) university libraries believed they had enough tools and online resources to support online teaching, learning, and research activities during this pandemic. The rest of the 46% (n=23) university libraries do not have the necessary tools and online resources to support online teaching, learning, and research activities. 54% (n=27) university libraries also claimed that they had adequately trained technical staff to manage remote online library services. In comparison, 46% (n=23) agreed that their library staff members are not qualified to serve users remotely. During this period, 62% (n=31) libraries provide off-campus e-resources (e-journals, e-books, etc.) access facilities to the users. The libraries used several remote access tools, e.g., OpenAthens, RemoteX, EZproxy, etc., to facilitate remote resource access services. Remote resource access tools, e.g., RemoteX, OpenAthens, VPN, etc., are helpful for students, faculty members, and researchers who are off-campus and would like to access subscribed online journals and books using a commercial internet connection (Choukimath and Koganuramath, 2011). This study indicates that most of the university libraries used RemoteX (48.38%), OpenAthens (29.03%), VPN (12.90%), EZproxy (6.45%), and other tools (3.22%) to facilitate remote resources access services. During this time, 34% (n=17) libraries arranged virtual information literacy sessions for the faculty members and students to take advantage of library resources and services that support their online teaching and learning needs. In comparison, 66% (n=33) libraries did not arrange any virtual sessions.

Table 5. Availability of tools, facilities, and technical personnel.

Availability of ICT tools, facilities, and technical personnel	Frequency	Percentage
Libraries have enough ICT tools and resources to support the online teaching and learning of the university during this pandemic	Yes (n=27)	54%
	No (n=23)	46%
Libraries have enough technical personnel to support remote online services	Yes (n=27)	54%
	No (n=23)	46%
Libraries offer off-campus e-resources access facilities	Yes (n=31)	62%
	No (n=19)	38%
Tools used to facilitate off-campus e-resources access facilities	OpenAthens (n=9)	29.03%
	RemoteX (n=15)	48.38%
	EZproxy (n=2)	6.45%
	VPN (n=4)	12.90%
	Others (n=1)	3.22%
Arranged virtual information literacy instruction sessions during this pandemic closer	Yes (n=17)	34%
	No (n=33)	66%

5.6 Satisfaction over libraries' ICT infrastructure, staff skills, service quality, and availability of e-resources

Despite the uncertain challenges faced by the university libraries during the COVID-19 pandemic, many libraries have already started providing students and other library users with continued access to online resources. A robust ICT infrastructure, the library staff's ICT knowledge, and the availability of e-resources play a vital role in providing remote online library services to users during the pandemic. Respondents of this study were asked to rate their satisfaction level with the quality of libraries' ICT infrastructure, ICT skills of the library's staff, overall library services, and availability of e-resources. Data presented in Table 6 indicates that the library's ICT infrastructure quality to support online teaching and learning is moderately satisfactory ($\bar{x}=3.24$, $\sigma=1.27$). The overall ICT skills of the library staff are a bit satisfactory ($\bar{x}=3.22$, $\sigma=1.26$), and the training facilities of the library staff are moderately satisfactory ($\bar{x}=3.12$, $\sigma=1.24$). Table 6 also reveals the respondents' satisfaction with the overall library services is moderately satisfactory ($\bar{x}=3.10$, $\sigma=1.24$). Satisfaction with library services during this pandemic largely depends on the availability of e-resources. This study reveals that the e-resource collections, both e-books ($\bar{x}=3.12$, $\sigma=1.35$) and e-journals ($\bar{x}=3.30$, $\sigma=1.36$), are not at a satisfactory level.

Table 6. Satisfaction over libraries' ICT infrastructure, staff skills, service quality, and availability of e-resources.

Satisfaction over libraries' ICT infrastructure, staff skills, service quality, and availability of e-resources	Highly Satisfactory	Satisfactory	Moderately	Dissatisfactory	Highly Dissatisfactory	Mean (\bar{x})	SD (σ)
Quality of the ICT infrastructure of the library to support online teaching and learning.	n=9 (18%)	n=13 (26%)	n=16 (32%)	n=5 (10%)	n=7 (14%)	3.24	1.27
Overall ICT skills of the library staff	n=8 (16%)	n=15 (30%)	n=14 (28%)	n=6 (12%)	n=7 (14%)	3.22	1.26
Training of the library staff	n=6 (12%)	n=15 (30%)	n=16 (32%)	n=5 (10%)	n=8 (16%)	3.12	1.24
Satisfaction level of the overall library services	n=6 (12%)	n=14 (28%)	n=15 (30%)	n=9 (18%)	n=6 (12%)	3.10	1.20
Availability of e-book	n=8 (16%)	n=15 (30%)	n=11 (22%)	n=7 (14%)	n=9 (18%)	3.12	1.35
Availability of online journal	n=12 (24%)	n=13 (26%)	n=9 (18%)	n=10 (20%)	n=6 (12%)	3.30	1.36

Note: \bar{x} denotes mean score and σ denotes Standard Deviation (SD)

5.7 Challenges to providing remote online services

Ever since the emergence of the COVID-19 pandemic, it has brought several challenges for academic libraries, especially university libraries (Shahriar et al., 2021). In this study, respondents were asked to identify the challenges they faced while providing remote online services to the users. Table 6 specifies that 86% (n=43) of the libraries encountered

challenges while providing online remote library services to users during this COVID-19 pandemic. Challenges to delivering remote online library services during this pandemic, as identified by the respondents (See Table 7), are:

- Maximum library users are unaware of online library services (76.44%).
- Lack of technical expertise (60.46%),
- Lack of online resources (55.81%),
- Lack of internet connectivity in remote areas (53.48%),
- Lack of online journals (48.33%),
- Limited bandwidth (34.88%),
- Power outage (18.60%), and
- Copyright (39.53%).

Table 7. Challenges to providing remote online services.

Challenges to providing remote online services	Frequency	Frequency	Percentage
Challenges faced while providing online library services to users' during this COVID-19 Pandemic	Yes	43	86%
	No	7	14%
Challenges to providing remote online services during the pandemic*	Limited bandwidth	15	34.88%
	Lack of internet connectivity in remote areas	23	53.48%
	Power outage	8	18.60%
	Lack of online resources	24	55.81%
	Lack of technical expertise	26	60.46%
	Lack of online journals	21	48.83%
	Maximum library users are not aware of online library services	33	76.44%
Copyright	17	39.53%	

Note: * Multiple responses taken

6. Discussion

The COVID-19 pandemic already affects regular in-person traditional library services. To support online teaching, learning, and research activities, most university libraries in Bangladesh started to provide online/virtual library services to their faculty members, students and researchers during the closure. The demand for online/virtual library services among library users has increased as most universities have started online teaching and research activities. University libraries are becoming the most appropriate and reliable sources of information for the academic and research community (Deol and Brar, 2021). Online/virtual library services are placed as the new normal practice for library professionals and users. The findings of this study indicate that most of the libraries started to promote their

online library services using social media and websites so that the maximum number of library users can avail of their services.

Another crucial finding indicates that the demand for online e-book delivery services, Online Public Access Catalogue Services (OPAC), online full-text article delivery services, online reference services, and online remote access services has increased significantly during this pandemic shutdown. Most of the university libraries in Bangladesh rely on three sources to meet the demand for users' e-books and online journals: i) UGC Digital Library (UDL) Consortium, ii) Library Consortium of Bangladesh (LiCOB), and iii) Institutional direct subscription to the online databases. However, the number of databases and online journals accessed through these sources is insufficient for researchers, faculty members, and students. It is only accessible on campus premises through universities broadband or wi-fi connection. Since the university campus remained closed due to corona infection, almost half of the university libraries of Bangladesh started to provide remote access services for remote library users through RemoteX, OpenAthens, VPN, and EZproxy remote access tools. These tools allow library users to remotely download full-text journal articles and e-books from the universities' subscribed online databases. However, many university libraries remain out of the remote journal and e-book access services.

To provide better and more effective online library services during this pandemic, libraries need to ensure a reliable and stable Information and Communication Technology (ICT) infrastructure with skilled and trained library human resources. After analyzing the findings, it can be observed that the quality of the library's ICT infrastructure and the library professionals' ICT skills to support online teaching and learning activities are not highly satisfactory. The foremost challenge for library professionals in Bangladesh is identified as many library users are unaware of the full extent of online library services offered during this pandemic closure. Besides, the training facilities of the library staff to improve their technical skills are not adequate. University libraries in Bangladesh need to invest more to develop their libraries' Information and Communication Technology (ICT) infrastructure.

Based on the findings of this study and the review of the relevant literature, the following recommendations are suggested to improve the online library services of universities in Bangladesh to support online teaching and learning activities.

1. Every library needs to develop a user-friendly website that is easy to navigate and should provide clear and concise information about the library's resources and services. Websites can include various features and functionalities depending on the library's specific needs, including Online Public Access Catalogues, users account management, e-resources access, research guides, etc.
2. Social media, especially Facebook and WhatsApp become an increasingly popular way for libraries to engage with their users and promote their services. University Libraries in Bangladesh need to focus more on using social media to communicate effectively with patrons. Creating a Facebook page/WhatsApp group for the university library and posting engagement content, news, events, and services is an excellent way for libraries to connect with more patrons and promote their services.
3. The COVID-19 pandemic has highlighted the critical importance of digitization, information, and online technologies. With social distancing measures and the closure of physical spaces, libraries need to invest in these technologies to provide access to resources and services remotely. As such, it is recommended that university libraries in Bangladesh invest more in these technologies to support their patrons in the new digital era.
4. It is also important for the university libraries in Bangladesh to provide ongoing training and workshop for their existing staff to develop their technological skills. These will ensure that libraries can offer more effective and high-quality services to the academic communities and keep pace with technological advances.
5. University libraries need to increase their e-resources subscriptions by subscribing to new resource databases or joining more e-resources database consortia. This will provide access to a wide range of e-books and electronic journals. Increasing e-resource subscriptions will also allow libraries to support remote learning and enhance the academic and research capabilities of the academic community. Library staff should work closely with faculty members to identify and acquire relevant electronic resources and make them easily accessible to users through the library's website
6. Libraries should collaborate to share resources and expertise with each other. Collaborative initiatives can include joint collection development, interlibrary loan, collaborative e-resource subscriptions, and digital repository partnerships.
7. University libraries in Bangladesh need to promote their new and regular online services via social media platforms, library websites, training sessions, library orientations, or a

variety of outreach programs that highlight the benefits of the services for the students, researchers, and faculty members. It will attract more users to the library.

7. Implications of the study

The findings of this study have a broad significance for the online services of university libraries in Bangladesh. By exploring the current state of online library services provided by the university libraries in Bangladesh in the context of the COVID-19 pandemic, university libraries worldwide can improve the quality and accessibility of their resources and online services to be prepared to deal with similar situations caused by the pandemic situations in the near future.

8. Conclusion

The wild spread of the covid-19 pandemic disrupted the universities' normal educational activities and the standard operating procedures of the libraries. To support the universities' online teaching, learning, and research activities in times of crisis, many university libraries in Bangladesh have already started to overhaul their traditional services and accelerate the shift to online platforms in a short space of time. However, we observed that some university libraries do not have separate library websites. Among the surveyed 50 university libraries' websites, only a few meet the standards and requirements of global best practices. Half of the university libraries did not post any covid-19 pandemic time service updates related to content on their library websites. As libraries shift to communicating with patrons online, all university libraries must publish real-time service and collections updates, virtual events, re-opening information, and the latest news to patrons on their websites.

The COVID-19 pandemic has increased the demand for electronic resources and digital library services more than before. Our findings revealed university libraries in Bangladesh play a vital role in supporting online education and research activities. Libraries started to provide online e-books and e-journals delivery services, OPAC search facilities, online reference services, on-demand online plagiarism checking services, etc., to ensure that students' research and online teaching activities are not disrupted even during the pandemic crisis. However, the libraries' technological infrastructure and the staff's ICT skills have not been considered satisfactory in terms of providing remote online services to the patrons. To enhance the quality of the library's technological infrastructure, librarians need to use their lobbying skills to secure adequate funding from higher authorities and the Board of Trustees.

Similarly, university administration and higher authorities of libraries must pay due importance to organizing workshops and training programs time-to-time to enrich the professional and technological skills of the library personnel. The other findings of this study indicate that a good number of university libraries in Bangladesh have already changed their working practices, added new e-resources and content on their web portals, enlisted more open educational resources (OER), and developed emergency communication plans. Libraries need to use promotional approaches to convey new tools, resources, and online services to the users' community. Social networking sites (e.g., Facebook, Twitter) and online web communication technologies (e.g., email, WhatsApp) may provide powerful tools to stay connected with the patrons, even when they can't be together in person.

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Appendix 1: List of surveyed university libraries

Serial	Name of the University	Type	Location
01	Bangladesh Agricultural University (BAU) Library	Public University	Mymensingh
02	Bangladesh Open University (BOU) Library	Public University	Gazipur
	Bangladesh University of Professionals (BUP) Library	Public University	Dhaka
03	Bangabandhu Sheikh Mujibur Rahman Agricultural University Library	Public University	Gazipur
04	Central Library, Begum Rokeya University	Public University	Rangpur
05	Central Library, Dhaka University of Engineering & Technology (DUET)		
06	Central Library, Bangladesh University of Engineering & Technology (BUET)	Public University	Dhaka
07	Central Library, Rajshahi University of Engineering &	Public University	Rajshahi

	Technology (RUET)		
08	Central Library, Chattogram University of Engineering & Technology (CUET)	Public University	Chattogram
09	Central Library, Khuna University of Engineering & Technology (KUET)	Public University	Khulna
10	Central Library, University of Barishal	Public University	Barishal
11	Central Library, Noakhali Science and Technology University	Public University	Noakhali
12	Central Library, Patuakhali Science and Technology University	Public University	Patuakhali
13	Central Library, Shahjalal University of Science and Technology	Public University	Sylhet
14	Central Library, University of Chattogram	Public University	Chattogram
15	Central Library, Islamic University	Public University	Kushtia
16	Central Library, Hajee Mohammad Danesh Science & Technology University	Public University	Dinajpur
17	Central University, Jahangirnagar University	Public University	Dhaka
18	Central Library, Jagannath University	Public University	Dhaka
19	Central Library, University of Rajshahi	Public University	Rajshahi
20	Comilla University Central Library	Public University	Comilla
21	Chattogram Veterinary and Animal Sciences University	Public University	Chattogram
22	Dhaka University Central Library	Public University	Dhaka
23	Jashore University of Science and Technology	Public University	Jashore
24	JatiyaKabiKaziNazrul Islam University	Public University	Mymensingh
25	Rabindra University Bangladesh	Public University	Sirajganj
26	Sher-e-Bangla Agricultural University Library	Public University	Dhaka
27	American International University- Bangladesh Library	Private University	Dhaka
28	Asian University of Bangladesh Library	Private University	Dhaka
29	Ayesha Abed Library, BRAC University	Private University	Dhaka
30	BGMEA University of Fashion & Technology	Private University	Dhaka
31	BUBT Central Library	Private University	Dhaka
32	Daffodil International University Library	Private University	Dhaka
33	East West University Library	Private University	Dhaka
34	Eastern University Library	Private University	Dhaka
35	Fareast International University library	Private University	Dhaka
36	Gono Bishwabidyalay Library	Private University	Dhaka
37	Green University Library	Private University	Dhaka
38	German University Bangladesh Library	Private University	Gazipur
39	Independent University, Bangladesh (IUB) Library	Private University	Dhaka
40	IUBAT-Library	Private University	Dhaka
41	North South University Central Library	Private University	Dhaka
42	Pundra University of Science and Technology Central Library	Private University	Bogra
43	Port City International University Library	Private University	Chattogram
44	Royal University Library	Private University	Dhaka
45	Southeast University Library	Private University	Dhaka
46	United International University Library	Private University	Dhaka
47	University of Science and Technology Chittagong (USTC) Library	Private University	Chattogram
48	ULAB Library	Private University	Dhaka
49	Uttara University Library	Private University	Dhaka
50	Islamic University of Technology (IUT) Library	International University	Gazipur