



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



## Post Covid-19 pandemic and library users' education: Impact on examination and survey

Adebowale Jeremy Adetayo

Adeleke University, Ede, Osun State, Nigeria

### ARTICLE INFO

#### Keywords:

COVID-19  
Post-pandemic  
Library users' education  
E-exams  
Examination  
Questionnaire administration  
Survey

### ABSTRACT

The study investigates the impact of post-COVID-19 pandemic on library users' education course, specifically on examinations and survey practices upon the resumption of on-campus instruction. A descriptive survey research design was employed with 384 students from Adeleke University responding to the survey. Descriptive statistics were used to analyze the data collected. The study found that library users' education was significantly impacted post-pandemic in terms of examinations, questionnaire administration, lectures, and orientation exercises. The majority of students preferred computer-based tests (CBT) for exams and online methods for questionnaire administration, but the study also identified challenges such as rigid examination schedules, internet connectivity issues, and a limited number of computers available. The study, therefore, recommends that universities invest in technology infrastructure to improve internet connectivity, increase the number of computers available for students, and offer more flexible examination schedules to accommodate students who face internet connectivity issues. These measures would help ensure a smoother transition to online learning for library users in the case of a future pandemic and beyond.

### Introduction

The COVID-19 pandemic swept the world in just a matter of months, originating in Wuhan City, China in late 2019. The World Health Organization (WHO) declared the disease a Public Health Emergency of International concern due to its sporadic spread beyond its country of origin. In light of the fast pace at which the virus was spreading globally, WHO later declared COVID-19 an epidemic and then a pandemic (World Health Organization, 2020). Transmission of the virus occurs through respiratory droplets that are expelled when an infected person talks, coughs, or sneezes, and can be inhaled by those in close proximity (Kumar et al., 2020). The spread of COVID-19 highlighted the need for heightened vigilance and preventive measures to curb the transmission of the virus and protect public health.

The Nigerian government had taken various measures to slow the spread of COVID-19 in the country. To this end, the government had promoted effective personal hygiene practices, such as frequent hand washing with soap and water and the use of hand sanitizers (Okonoko et al., 2020). The use of face masks had also been encouraged as a means of reducing the transmission of respiratory droplets from infected individuals to others. In addition to promoting personal hygiene, the government had implemented physical distancing measures to reduce

the risk of transmission. This includes avoiding crowded spaces, such as markets, worship centers, academic institutions, and libraries (Okonoko et al., 2020). The government had also taken the drastic step of shutting down international and local flight operations to curb the spread of the virus. These measures had been put in place to mitigate the impact of COVID-19 on public health and to prevent its spread. While the measures had disrupted normal life and economic activities, they've been crucial in controlling the transmission of the virus and safeguarding public health.

Before the outbreak of COVID-19, traditional learning methods were widely used in developing countries like Nigeria. However, the pandemic forced a rapid shift to emergency online education as libraries closed and academic calendars pressured librarians to find alternative ways to continue education. Universities across Nigeria turned to online platforms like Google classroom, WhatsApp, Microsoft Teams, and Zoom to facilitate remote learning. The sudden switch to online education highlighted the need for careful consideration and adaptation of teaching methods in response to the changing educational landscape caused by the pandemic.

As the pandemic subsided and schools resumed operations, many libraries embraced technology-driven education and continued to explore new ways of delivering user education. One of these areas is

E-mail address: [adebowale.adetayo@adelekeuniversity.edu.ng](mailto:adebowale.adetayo@adelekeuniversity.edu.ng).

<https://doi.org/10.1016/j.acalib.2023.102695>

Received 4 February 2023; Received in revised form 5 March 2023; Accepted 10 March 2023

Available online 15 March 2023

0099-1333/© 2023 Elsevier Inc. All rights reserved.

assessment, which has seen a shift towards CBT. The use of CBT was necessitated in part by the pandemic, offering students a quick and less stressful means of assessment, and enabling librarians to manage a large number of students efficiently. The adoption of CBT also ensured that students become familiar with modern technologies, better prepared for future lockdowns and better equipped to handle technology-driven education in the future. This new normal of technology-infused education and assessment presents exciting opportunities for libraries to enhance the user education experience and keep pace with the ever-evolving technological landscape.

Despite extensive research on online learning during the COVID-19 pandemic, there remains a gap in understanding students' perceptions of taking technologically-driven library users' education exams like CBT post-pandemic. The shift to technology-driven teaching has presented important challenges for educational institutions in terms of organizing exams and ensuring students' progress in their studies (OECD, 2020). Electronic exams (E-exams) were introduced as an effective mode of assessment, offering immediate feedback to students, which can be challenging for academic staff members due to the increased number of students (Alruwais et al., 2018). Today, E-exams are considered a critical component of distance education (Wibowo et al., 2016). Further exploration into how students perceive the use of E-exams post-pandemic will help educational institutions effectively implement technology-driven assessment and improve the overall library user education experience. Therefore, the study aims to examine the impact of the post-COVID-19 pandemic on library users' education course, with a focus on examination and survey practices. This research seeks to shed light on the students' preferences in a post-pandemic world where technology-driven assessments have become the new normal.

#### *Objective of the study*

The overarching aim of this study is to explore the effects of the post-COVID-19 pandemic on library users' education, with a focus on examinations and surveying practices. The specific objectives of the study are as follows:

1. To assess the impact of the COVID-19 pandemic on library users' education in the post-pandemic era.
2. To examine the preferred examination method for post-pandemic library users' education.
3. To survey the preferred method of questionnaire administration by library users in the post-pandemic era.
4. To identify the challenges faced by library users in using CBT for their users' education.
5. To explore the potential for continued use of CBT-based examinations in library users' education.

By achieving these objectives, the study aims to provide valuable insights into the effects of the COVID-19 pandemic on library users' education and inform strategies for addressing any challenges that may arise.

#### **Literature review**

##### *Covid-19 impact on libraries*

The rapid shift to online learning due to the Covid-19 pandemic has shed light on the crucial role libraries play in supporting e-education. National and international library associations, such as the International Federation of Library Associations and Institutions (IFLA), American Library Association (ALA) and Online Computer Library Center (OCLC), have provided guidance for libraries to continue delivering their services virtually. IFLA has created a dedicated webpage for COVID-19 and the global library community, sharing resources, best practices, and advocacy tools (IFLA, 2020). Similarly, ALA has provided COVID-19

guidance for libraries, including safe reopening guidelines, advocacy, information, and professional development, based on international collaboration and resources (ALA, 2020). OCLC conducted interviews with 29 library leaders to identify four themes for positive change: adapting to changing user needs and expectations, reinforcing library values, reconnecting with users and communities, and rebuilding library staff capacity and well-being. OCLC also offers a learner guide and list of resources to support libraries during COVID-19 (Connaway et al., 2021).

Digital libraries, in particular, have become indispensable tools for education by offering access to a wealth of resources that are always available, up-to-date, and easily accessible from anywhere with an internet connection (Vrana, 2017). The pandemic has highlighted the importance of libraries in ensuring the continuity of education, even in times of crisis. The efforts of library associations and digital libraries in supporting e-education during the pandemic have laid the foundation for a more technology-driven future in library services and education.

The COVID-19 pandemic has emphasized the crucial role of libraries in supporting higher education institutions. With a sudden shift to remote learning, faculty and students alike have come to appreciate the importance of digital library services (Mehta & Wang, 2020). Libraries have stepped up to meet the demands of e-learning by providing academic communication support, allowing students to access resources from any location, and offering a portal to knowledge resources (Özgüven & Beygirci, 2022).

One of the primary ways that libraries have supported remote learning is through their databases, e-books, e-journals, and online catalogues. These resources have been instrumental in facilitating faculty, student, and researcher access to the information they need, even while physical libraries were closed (Özgüven & Beygirci, 2022). The ability to access these resources from anywhere, at any time, has made it possible for faculty, students, and researchers to continue their learning and research despite the challenges posed by the pandemic. In conclusion, libraries have played a critical role in supporting higher education during the COVID-19 pandemic. By providing access to digital resources and facilitating academic communication, libraries have ensured that faculty, students, and researchers are able to continue their learning and research without interruption.

##### *Library users education in Nigeria*

The concept of User Education in libraries encompasses a range of instructional programs aimed at equipping users with the necessary knowledge and skills to effectively and efficiently utilize the information sources and services provided by the libraries. As Pagore and Chalukya (2020) highlights, user education encompasses not only the traditional tools for accessing information, such as book catalogues and databases, but also the technical skills required for utilizing new media such as the Internet, e-books, and CD-ROMs. Given the ever-evolving landscape of information resources and services, user education must be developed and delivered in a manner that effectively prepares all users to take advantage of these resources. Through user education, libraries can empower their patrons to independently and effectively navigate the vast wealth of information available to them.

Many Nigerian students enter universities without prior experience using a library, leaving them overwhelmed by the size of the library collection and uncertain about how to locate the materials they need. However, acquiring the skills to effectively locate and utilize information within the library is an educational experience with a value that extends beyond the university setting. To address this issue, it is crucial for professional librarians to provide students with training on how to effectively use basic bibliographic tools such as card catalogues, indexes, abstracts, reference books, and how to conduct in-depth literature searches within their specific field of study. Recognizing the importance of this issue, the National Universities Commission has mandated the inclusion of library use as a required course for university students. This ensures that students have a thorough understanding of the library and

its resources, enabling them to produce quality research and high-standard academic papers (Ofordile & Ogugua, 2022).

The significance of user education in libraries is emphasized by *Esse (2014)*, who asserts that without proper user education, users cannot fully connect with and utilize the materials and tools provided by libraries. User education imparts the knowledge and skills necessary for users to develop logical, creative, and critical approaches to information-seeking. The study by *Esse (2014)* found that the highest number of respondents (98.5 %) had participated in curriculum-based use of the library, followed by orientation of the user platform (66.8 %). Additionally, 61.4 % of the respondents believed that library courses had a significant impact on their understanding of the library and its uses, while 85.95 % indicated that library orientation allowed them to maximize their use of the library. These results highlight the importance of user education in ensuring that users can effectively and efficiently utilize the resources and services provided by libraries.

According to *David-West (2020)*, a study on library user education and students' utilization of library resources at the University of Port Harcourt, Nigeria, revealed that library orientation had improved the utilization of library resources, reading culture, access to information, and retrieval of information. Additionally, *Adeolu's (2022)* research found a positive significant relationship between user education and the use of library information sources and services among engineering undergraduates. *Adeniran (2011)* further highlights the importance of user education, stating that it has the potential to transform library and information users from dependent learners into independent, self-directed, and lifelong learners. User education enables individuals to make immediate and lifelong use of information, fosters independent information utilization, critical thinking and evaluation skills, search skills, knowledge and retrieval skills, and information literacy skills. By providing these key skills and abilities, user education helps to ensure that individuals can effectively and efficiently utilize the resources and services provided by libraries.

Furthermore, *Folorunso and Njoku (2016)* emphasized the importance of establishing strong and lasting relationships between libraries, users, faculty members, and undergraduates. They advocated for university libraries to make adequate plans to foster daily intellectual information searches for knowledge advancement. By establishing these relationships and providing users with the necessary skills and resources, university libraries can help to facilitate an environment that supports and encourages lifelong learning and intellectual growth.

Despite the shift from in-person to remote instruction due to the pandemic, which had a major impact on library services (*Herker & Bingham, 2020*), this shift also shed light on the limitations of traditional library services that are geared towards users who can physically visit the library (*Code et al., 2020*). The pandemic brought to the forefront the issue of accessibility and prompted library leaders to reevaluate the needs and requirements of their users (*Melo et al., 2021*). This new reality challenged libraries to find new ways to provide equal access to information and services to all users, regardless of their location or physical ability.

#### *Technology-driven assessment and survey*

Assessment plays a crucial role in measuring a student's learning progress and evaluating their knowledge, skills, and abilities. This process is essential in the education system and helps educators determine the effectiveness of their teaching methods and make any necessary adjustments. Assessment has two components, formative and summative. Formative assessment occurs continuously and involves regular feedback and evaluations, while summative assessment is typically given in the form of mid- or end-of-semester exams. These exams serve as a comprehensive evaluation of what the student has learned throughout the semester and provide an opportunity to demonstrate their mastery of the course material. In conclusion, assessment is a fundamental aspect of the educational system, providing valuable

insights into a student's learning progress and helping to ensure that their educational experience is effective and beneficial.

The shift towards technology-driven assessments has brought about new challenges, particularly concerning internet connectivity and the lack of direct supervision of students during evaluations. As highlighted by *Gonzalez et al. (2020)*, educators must rethink their evaluation methods to adapt to distance learning and assessment, and address concerns over students using additional resources during assessments. CBT, or computer-based testing, is gaining popularity as a solution to these challenges as it requires students to physically present at the university, using designated computers to answer multiple-choice questions (*Gamage et al., 2020*). *Khan and Jawaid (2020)* mention various assessment techniques that can be implemented through synchronous or asynchronous modes, including assignments, Assessment Portfolios, Multiple Choice Questions, Open Book Exams, and Objectively Structured Practical/Clinical assessments.

However, despite the benefits of online learning and assessments, there are still challenges and limitations that must be addressed. The importance of authentic assessments and timely feedback cannot be overstated as they play a crucial role in facilitating online learning. The availability of formative assessments and feedback can help to support online learners in their learning journey by providing regular and constructive guidance, allowing them to gauge their progress and identify areas where they may need to focus their efforts (*Doucet et al., 2020*). However, to ensure that the assessment process remains valid and reliable, it is important to carefully design and implement these tools to address the unique challenges and limitations of the online learning environment.

## **Method**

### *Settings*

The study was conducted at Adeleke University, a private institution located in Osun State, Nigeria. As per the standard procedure followed by universities in the country, students are mandated to undergo library user education. The participants of this study were students who underwent university exams, which consisted of both paper-based and E-examinations. However, the COVID-19 pandemic led to a significant shift in the examination process, resulting in the complete transition from physical library user education to a strictly CBT method. The post-pandemic era saw a comprehensive adoption of CBT, providing a unique opportunity to assess the effectiveness of this mode of library user education in the university setting.

### *Research design*

The current study employed a descriptive survey research design to gain a comprehensive understanding of the impact of the COVID-19 pandemic on library user education. This research design was deemed suitable for the study as it offers a precise and reliable picture of the study's phenomenon of interest, which was the impact of the pandemic on the examination and survey practices associated with library user education. The survey research method is a widely used approach for data collection, providing valuable insights into complex issues, and was considered ideal for this study due to its ability to differentiate the crucial aspects of the topic being investigated. This approach allowed for a thorough examination of the impact of the pandemic on library user education, which was crucial to obtaining a detailed and accurate understanding of the situation.

### *Population and sampling size*

The participants of the study were the students enrolled at [university name] during the time the research was conducted. The university had a total student population of 3457 individuals, which served as the

population for the study. To obtain a representative sample of the student population, 15 % of the students were selected through a simple random sampling technique, resulting in a sample size of 517 participants. The choice of a 15 % sample size was made with the intention of obtaining a sample that accurately reflects the population, while also ensuring the feasibility of conducting the study. The use of simple random sampling was deliberate, as it provides each individual in the population an equal opportunity of being selected for the sample. This approach was crucial in ensuring that the results of the study were not biased and were representative of the entire population, rather than just a select group of individuals.

#### Instrumentation

The data for this study was collected through the use of a self-administered questionnaire, which was designed to gather the participants' perceptions about the subject matter. The questionnaire consisted of items that were carefully crafted to address the specific research questions and objectives of the study. Before administering the questionnaire to the participants, it underwent a rigorous pretesting process to ensure its clarity and feasibility. This process was crucial in identifying any areas of improvement and making necessary modifications to the questionnaire to guarantee an accurate response from the sample group. Based on the observations made during the pretesting phase, several questionnaire questions were modified to ensure that they were clear and relevant to the participants, leading to a more accurate and reliable response. This approach was crucial in obtaining high-quality data that accurately reflected the participants' perceptions and experiences, which was essential to achieving the objectives of the study.

#### Method of data collection

The data for this study was collected through the distribution of a self-administered questionnaire to the participants. The participants were asked to complete the questionnaire and return it within a specified timeframe, and efforts were made to encourage their participation and follow-up with any non-responders. It was emphasized to the participants that the information they provided would be kept confidential and used only for academic research purposes, and that it would not be made available to any third parties. This assurance was critical in ensuring the participants' trust and cooperation, leading to a higher response rate.

The response rate for the study was 74.3 %, with 384 participants out of the 517 selected individuals returning the completed questionnaire. This response rate is considered acceptable for survey research, as it provides a large enough sample to make valid inferences about the population of interest. The high response rate was a result of the efforts made to encourage participation and follow-up with non-responders, which was crucial in obtaining accurate and reliable data for the study.

#### Method of data analysis

The data collected from the participants were analyzed using descriptive statistics, which were used to summarize the data and provide a general understanding of the impact of the COVID-19 pandemic on library users' education, specifically on examinations and survey practices. Frequency counts, percentages, mean and standard deviation scores were employed to gain insights into the participants' perceptions and experiences. Descriptive statistics was a crucial tool in this study as they allowed for the quick and easy interpretation of the large amount of data collected. The results obtained from the descriptive statistical analysis were used to identify patterns and trends in the data. This information was then used to address the objectives of the study, providing a comprehensive and detailed picture of the impact of the COVID-19 pandemic on library users' education at [university name].

#### Ethical consideration

The ethical considerations for this study were of utmost importance, and all measures were taken to ensure that the study was conducted in an ethical manner. The participants were fully informed of the purpose of the study and were assured of the confidentiality of their responses. Informed consent was obtained from each participant before they were asked to fill out the questionnaire. This was to ensure that the participants were aware of the purpose of the study, the procedures involved and the use of the data collected. The participants were also informed that their participation was voluntary and that they had the right to withdraw from the study at any time. In addition, efforts were made to minimize any potential harm that may arise from participating in the study. The participants were assured that any information they provided would be kept strictly confidential and would only be used for academic research purposes. Such information was likewise not made available to a third party.

#### Findings

This section presents the findings of the study using descriptive statistics. The details are illustrated in Tables 1–6.

In the study, there was a gender imbalance in the sample of respondents, with the majority of the participants being female (62.2 %) and only 37.8 % being male. The age distribution of the respondents showed a skewed distribution, with the largest group (51.8 %) being individuals under the age of 20 and the smallest group (3.4 %) being those between the ages of 26 and 30.

The results of the study as presented in Table 2 reveal a significant impact of the COVID-19 pandemic on library education. The majority of the students surveyed agreed that the pandemic had a significant impact on library users' education. In response to the pandemic, the delivery of library education examinations shifted towards a computer-based approach, with a mean score of 3.38 reflecting a high level of agreement among the participants. The administration of questionnaires also underwent a shift towards online administration, with a mean score of 3.31, indicating a high level of agreement among the participants. Additionally, the delivery of lectures, which traditionally took place in a physical setting, also moved online, with a mean score of 3.20, reflecting a moderate level of agreement among the participants. Library orientation was the least impacted of the categories, with a mean score that was still above average.

The results of the study in Table 3 showed a clear preference among the students surveyed for computer-based examinations. An overwhelming majority of 87.0 % indicated that they preferred taking exams on a computer, while only a small minority of 13.0 % expressed a preference for paper-based examinations.

The results of the study presented in Table 4 indicate a strong preference among the students surveyed for online survey administration of questionnaires, as opposed to paper-based methods. An overwhelming majority of 88.3 % expressed a preference for online surveys, while only 11.7 % indicated a preference for paper-based surveys.

The findings of the study as presented in Table 5 shed light on the challenges experienced by students when using computer-based tests

**Table 1**  
Demographics of respondents.

	Frequency (N = 384)	Percent
Gender		
Female	239	62.2
Male	145	37.8
Age group		
30 & above	82	21.4
26 to 30	13	3.4
21 to 25	90	23.4
20 & below	199	51.8



**Table 2**  
Impact of covid-19 on library users' education post-pandemic.

S/ N	Impact	SA	A	D	SD	Mean	Std Dev
i.	User education examinations became computer-based	177 (46.1%)	178 (46.4%)	25 (6.5%)	4 (1.0%)	3.38	0.654
ii.	Questionnaires Administration became more online	158 (41.1%)	192 (50.0%)	29 (7.6%)	5 (1.3%)	3.31	0.666
iii.	Library orientation was done less physically	105 (27.3%)	181 (47.1%)	91 (23.7%)	7 (1.8%)	3.00	0.765
iv.	Lectures were largely done online	153 (39.8%)	163 (42.4%)	59 (15.4%)	9 (2.3%)	3.20	0.780

**Table 3**  
Post-pandemic library users' education examination method preference.

Examination methods	Frequency	Percent
Paper based	50	13.0
Computer based test	334	87.0
Total	384	100.0

**Table 4**  
Post-pandemic questionnaire administration method preference.

Questionnaire methods	Frequency	Percent
Paper based survey	45	11.7
Online survey	339	88.3
Total	384	100.0

**Table 5**  
Challenges faced using CBT for library users' education.

S/ N	Impact	SA	A	D	SD	Mean	Std Dev
i.	Difficulty of CBT usage	35 (9.1%)	72 (18.8%)	215 (56.0%)	62 (16.1%)	2.21	0.820
ii.	CBT makes it easier to cheat	34 (8.9%)	64 (16.7%)	194 (50.5%)	92 (24.0%)	2.10	0.867
iii.	Dislike for objective-oriented CBT questions	47 (12.2%)	93 (24.2%)	190 (49.5%)	54 (14.1%)	2.35	0.869
iv.	Rigidity of examination time	97 (25.3%)	181 (47.1%)	91 (23.7%)	15 (3.9%)	2.94	0.802
v.	Insufficient number of computers	94 (24.5%)	160 (41.7%)	102 (26.6%)	28 (7.3%)	2.83	0.881
vi.	Internet connectivity issues	109 (28.4%)	154 (40.1%)	89 (23.2%)	32 (8.3%)	2.89	0.915

**Table 6**  
Continuous usage of CBT based examinations for library users' education.

Indicators	Frequency	Percent
No	47	12.2
Yes	337	87.8
Total	384	100.0

(CBTs) for library education. The results of the survey revealed three main challenges that were widely agreed upon by the students. The most significant challenge was identified as the rigidity of examination time, with a mean score of 2.94, indicating a high level of agreement among the participants. The next significant challenges were internet connectivity and the insufficient number of computers available, with mean scores of 2.89 and 2.83, respectively. However, the students surveyed disagreed with the idea that CBTs were difficult to use, and also disputed the notion that CBTs made it easier to cheat or that they disliked objective-oriented CBT questions. These findings provide valuable insights into the challenges faced by students in using CBTs for library education and can inform efforts to improve the overall experience of students in this regard.

The results of the study presented in Table 6 reveal that despite the decline in the COVID-19 pandemic and the continuation of campus life, a large majority of students surveyed, 87.8 %, believe that computer-based tests (CBTs) should continue to be used for the examination of library users. These findings indicate a strong preference among students for the continued use of CBTs, even as the world returns to some level of normalcy following the pandemic. This preference may be due to the increased comfort and familiarity with digital technology that has developed as a result of the pandemic, as well as the convenience and flexibility that CBTs offer in comparison to traditional, paper-based methods. These findings suggest that CBTs have become a widely accepted and preferred method of examination among students, and may continue to be widely used in the future.

*Discussions of findings*

The COVID-19 pandemic has left a lasting impact on library users' education post-pandemic era. One aspect the post-COVID-19 pandemic has significantly impacted is the way library users' education examinations are conducted, which has shifted towards a computer-based approach. The students surveyed in this current study reported a shift in the delivery of exams of library users' education, with a move towards computer-based examination methods. In addition to exams, the administration of questionnaires has also undergone a change after the pandemic. This is supported by Singh and Sagar (2021) who found that the restrictions imposed to control COVID-19 led to a rise in online survey-based studies due to their ability to collect data more efficiently and quickly compared to traditional methods. These changes highlight the need for continued adaptation and innovation in the education sector in response to future challenges.

Furthermore, the COVID-19 pandemic has accelerated the widespread adoption of technology-driven learning, a trend that has been forecasted in previous studies (Kim & Bonk, 2006). Today, there is a vast array of online courses available in every subject and field. The current study revealed that the delivery of library users' education lectures, which were traditionally held in physical settings, moved online during the pandemic and, to some extent, continues even after the pandemic has declined. This shift to online classes offers numerous benefits, such as reduced travel costs, saved time, and access to education for those in remote areas (James, 2002). In addition, the study found that the impact of the post-pandemic on library orientation was minimal, with students agreeing that it was also impacted. This is supported by Hickner et al. (2021), who noted that prior to 2020, library orientation for first-year medical students at Weill Cornell Medicine took the form of an on-site treasure hunt competition. Due to the COVID-19 pandemic, the orientation was shifted to an all-virtual format. The authors suggest that a successful virtual library orientation requires careful preparation, including testing the competition tasks, full rehearsals with library facilitators, and a thoughtful approach to technology and logistics.

The findings of the study indicate a clear preference among library users for computer-based examination methods over traditional, paper-based exams. This trend is supported by research conducted by Eltahir et al. (2022), which found that students, particularly females,

demonstrated a moderate acceptance of e-exams during the COVID-19 pandemic. The shift towards computer-based exams has numerous advantages, such as saving time and effort for faculty members and providing students with a safer examination environment (Bashithalshaaer et al., 2021). This preference for computer-based exams post-pandemic can be attributed to increased comfort with digital technology as a result of the pandemic and its impact on education. Other studies have also noted that students prefer e-exams because they can receive feedback and marks more quickly, have more control over the examination process, are easy and quick to use, and are environmentally friendly (Eljinini et al., 2012; Osuji, 2012). In contrast, traditional paper exams have several disadvantages, such as being time-consuming and requiring manual grading, which can lead to inaccurate results. The manual nature of grading traditional exams also increases the risk of results being lost and the amount of time required to check results.

The results of the present study showed a pronounced inclination among the students surveyed towards the online administration of library user questionnaires. This shift towards online administration can be attributed to the growing utilization of digital technology and the widespread availability of internet access, especially during the COVID-19 pandemic, which has hastened the transition towards digital modes of communication and information collection. These findings indicate that there has been a marked change in the preferred method of questionnaire administration among students, with a noticeable trend towards a preference for online methods. The increasing reliance on technology and the internet have allowed students to more easily access and complete questionnaires at their own pace and convenience. The ability to receive instant feedback and results is another attractive aspect of online questionnaire administration, and likely plays a significant role in the students' preference for this method.

The findings of this study highlight several challenges faced by library users in their education, specifically related to the mode of examination. One of the main challenges is the inflexibility of the examination schedule, which limits the ability of students to complete the test at their convenience. This is a widely recognized challenge of e-learning, as noted by Murgatrot (2020). Another significant challenge faced by students is internet connectivity issues. As reported in a study by Roy (2020), students in Uttarakhand were forced to travel long distances to access proper internet signals for their online classes. This presents an unfair challenge for students who are unable to access the internet due to connectivity or electricity problems, as reported by Sahu (2020).

Furthermore, the study revealed that there is a shortage of computers available for CBT due to the high number of students taking the exams. As a result, students have to take turns completing the test, which can be disruptive to their learning experience. This shortage of technology resources also echoed the findings of Okonoko and Eruwwe (2021), who reported that there are limited ICT facilities available to support the effective utilization of ICT-based information resources in library user education programs.

## Conclusion

The COVID-19 pandemic has brought about significant alterations in the way library users access their education. This study investigated the impact of post-COVID-19 pandemic on library users' education, specifically on examinations and survey practices. The results of the study indicate that despite the challenges faced post-pandemic, such as rigid exam schedules, limited computer availability, and internet connectivity issues, library users have embraced the use of these technologies and prefer them to traditional methods. The findings of this study provide important insights into the potential benefits of technology in shaping the future of library user education. The study recommends that library administration continue to invest in technology and address the challenges that arise, in order to enhance the user experience. The implementation of flexible exam schedules and the resolution of internet

connectivity and computer availability issues would greatly improve the efficiency and accessibility of CBT and online surveys. In light of these findings, it is clear that libraries must continue to embrace change and invest in technology in order to serve their users effectively. The COVID-19 pandemic has shown that technology can play a crucial role in shaping the future of library user education, and libraries must be prepared to adapt and evolve in response to these changes. This study adds to the existing literature on the impact of the post-COVID-19 pandemic on library user education and highlights the new normal that is shaping the future of library education. By continuing to invest in technology and address the challenges that arise, libraries can continue to serve their users effectively and provide them with the best possible educational experience.

## Implications of the study

The study's findings suggested that the post covid-19 pandemic had a massive impact on library users' education in terms of examinations and survey administrations. As a result, the study's findings have policy and practical implications. The findings of this study emphasize the need for Nigerian libraries to invest in technology that would improve the educational experience of its users. Libraries should invest in upgrading their internet infrastructure and ensuring that they have the required equipment and resources to efficiently conduct computer-based exams. Furthermore, the post-COVID-19 pandemic has demonstrated the need for libraries to be able to adapt and evolve in response to changes in the educational context. This research emphasizes the need for libraries to embrace change and be open to new technology to effectively serve their users. Policymakers and librarians should collaborate to foster an atmosphere that encourages innovation and change. Libraries must also recognize that students' comprehension levels vary, and they should consider adopting flexible test timetables to accommodate slower writers. By following these ideas, libraries may continue to serve their patrons effectively and deliver the finest educational experience possible.

## Funding

There was no funding for this research.

## CRediT authorship contribution statement

**Adebowale Jeremy Adetayo:** Conceptualization, Methodology, Formal analysis, Writing – original draft, Visualization, Investigation, Writing – review & editing.

## Declaration of competing interest

None.

## References

- Adeniran, P. (2011). User satisfaction with academic libraries services: Academic staff and students perspectives. *International Journal of Library and Information Science*, 3(10), 209–216. <https://doi.org/10.5897/IJLIS.9000114>
- Adeolu, O. S. (2022). Influence of user education on library information resources and services use among engineering undergraduates of private universities in Oyo State, Nigeria. *International Journal of Education, Library and Information Communication Technology*, 1(1), 22–33. <https://ijelict.acu.edu.ng/index.php/ijelict/article/view/84>.
- ALA. (2020). Guidance Content & Protocols. <https://www.ala.org/tools/covid/guidance-protocols>.
- Alruwais, N., Wills, G., & Wald, M. (2018). Advantages and challenges of using e-assessment. *International Journal of Information and Education Technology*, 8(1), 34–37. <https://doi.org/10.18178/IJET.2018.8.1.1008>
- Bashithalshaaer, R., Alhendawi, M., & Avery, H. (2021). Obstacles to applying electronic exams amidst the COVID-19 pandemic: An exploratory study in the Palestinian universities in Gaza. *Information*, 12(6), 256. <https://doi.org/10.3390/INFO12060256>

- Code, J., Ralph, R., & Forde, K. (2020). Pandemic designs for the future: Perspectives of technology education teachers during COVID-19. *Information and Learning Science*, 121(5–6), 409–421. <https://doi.org/10.1108/ILS-04-2020-0112/FULL/PDF>
- Connaway, L. S., Faniel, I. M., Brannon, B., Cantrell, J., Cyr, C., Doyle, B., Gallagher, P., Lang, K., Lavoie, B., Mason, J., & van der Werf, T. (2021). New model library: Pandemic effects and library directions. *OCLC*. <https://doi.org/10.25333/2D1R-F907>
- David-West, B. T. (2020). Library user education and Student's utilization of library resources in University of Port Harcourt, Rivers state Nigeria. *Information and Knowledge Management*, 10(1), 5–10. <https://doi.org/10.7176/IKM/10-1-02>
- Doucet, A., Netolicky, D., Timmers, K., & Tuscano, F. J. (2020). Thinking about pedagogy in an unfolding pandemic by education international. [https://issuu.com/educationinternational/docs/2020\\_research\\_covid-19\\_eng](https://issuu.com/educationinternational/docs/2020_research_covid-19_eng).
- Eljini, M. A. H., Alsamarai, S., Hameed, S., & Amawi, A. (2012). The impact of E-assessments system on the success of the implementation process. *International Journal of Modern Education and Computer Science*, 4(11), 76–84. <https://doi.org/10.5815/IJM ECS.2012.11.08>
- Eltahir, M. E., Alsalhi, N. R., & Al-Qatawneh, S. S. (2022). Implementation of E-exams during the COVID-19 pandemic: A quantitative study in higher education. *PLoS ONE*, 17(5), Article e0266940. <https://doi.org/10.1371/JOURNAL.PONE.0266940>
- Esse, U. C. (2014). Effects of library instruction on satisfaction with the use of library and its services: A study of undergraduate students in five universities in the southern part of Nigeria. *European Scientific Journal*, 10(13), 441–450. <http://repository.elizadeuniversity.edu.ng/handle/20.500.12398/743>.
- Folorunso, O., & Njoku, E. (2016). Influence of library environment and user education on undergraduates' use of library at the university of Ibadan, Nigeria. *European Scientific Journal*, 12(19), 288. <https://doi.org/10.19044/ESJ.2016.V12N19P288>
- Gamage, K. A. A., Wijesuriya, D. I., Ekanayake, S. Y., Rennie, A. E. W., Lambert, C. G., & Gunawardhana, N. (2020). Online delivery of teaching and laboratory practices: Continuity of university programmes during COVID-19 pandemic. *Education Sciences*, 10(10), 291. <https://doi.org/10.3390/EDUCSCI10100291>
- Gonzalez, T., De la Rubia, M. A., Hincz, K. P., Comas-Lopez, M., Subirats, L., Fort, S., & Sacha, G. M. (2020). Influence of COVID-19 confinement on students' performance in higher education. *PLoS ONE*, 15(10), Article e0239490. <https://doi.org/10.1371/JOURNAL.PONE.0239490>
- Herker, G., & Bingham, J. (2020). Leveraging STEM and makerspaces during the COVID-19 crisis. *Essentials Magazine*. <https://essentials.edmarket.org/2020/04/leveraging-stem-and-makerspaces-during-the-covid-19-crisis/>.
- Hickner, A., Wright, D., Merlo, L., Gordon-Elliott, J. S., & Delgado, D. (2021). Redesigning library orientation for first-year medical students during the pandemic. *Journal of the Medical Library Association: JMLA*, 109(3), 497–502. <https://doi.org/10.5195/JMLA.2021.1190>
- IFLA. (2020, October 13). COVID-19 and the Global Library Field. <https://www.ifla.org/covid-19-and-the-global-library-field/>.
- James, G. (2002, July 15). Advantages and Disadvantages of Online Learning. The Digital and Development Network. <https://www.comminit.com/ict-4-development/content/advantages-and-disadvantages-online-learning>.
- Khan, R. A., & Jawaid, M. (2020). Technology enhanced assessment (TEA) in COVID 19 pandemic. *Pakistan Journal of Medical Sciences*, 36(COVID19-S4), S108–S110. <https://doi.org/10.12669/PJMS.36.COVID19-S4.2795>
- Kim, K.-J., & Bonk, C. J. (2006). The future of online teaching and learning in higher education: The survey says.... *Educuse Quarterly*, 29(4), 22–30.
- Kumar, D., Malviya, R., & Sharma, P. K. (2020). Corona virus: A review of COVID-19. *Eurasian Journal of Medicine and Oncology*, 4(1), 8–25. <https://doi.org/10.14744/EJMO.2020.51418>
- Mehta, D., & Wang, X. (2020). COVID-19 and digital library services – a case study of a university library. *Digital Library Perspectives*, 36(4), 351–363. <https://doi.org/10.1108/DLP-05-2020-0030/FULL/XML>
- Melo, M. M., March, L., & Hirsh, K. (2021). Examining the impacts of the covid-19 pandemic on library makerspaces and LIS makerspace curricula. *Education*. <https://hdl.handle.net/2142/110939>.
- Murgatroid, S. (2020). COVID-19 and online learning. *Journal of Educational Technology*, 9(3), 25–32. [https://scholar.google.com/scholar?hl=en&as\\_sdt=0%2C5&q=Murgatroid%2C+S.+%282020%2C+March%29.+%22COVID-19+and+Online+learning%22%2C+Alberta%2C+Canada.+doi%3A10.13140%2FRG.2.2.31132.85120&btnG=#d=gs\\_cit&t=1675416707703&u=%2Fscholar%3Fq%3Dinfo%3AQ-dg8\\_M9CGwJ%3Ascholar.google.com%2F%26output%3Dcite%26scirp%3D0%26hl%3Den](https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Murgatroid%2C+S.+%282020%2C+March%29.+%22COVID-19+and+Online+learning%22%2C+Alberta%2C+Canada.+doi%3A10.13140%2FRG.2.2.31132.85120&btnG=#d=gs_cit&t=1675416707703&u=%2Fscholar%3Fq%3Dinfo%3AQ-dg8_M9CGwJ%3Ascholar.google.com%2F%26output%3Dcite%26scirp%3D0%26hl%3Den).
- OECD. (2020). Remote online exams in higher education during the COVID-19 crisis. [https://www.oecd-ilibrary.org/education/remote-online-exams-in-higher-education-during-the-covid-19-crisis\\_f53e2177-en](https://www.oecd-ilibrary.org/education/remote-online-exams-in-higher-education-during-the-covid-19-crisis_f53e2177-en).
- Ofordile, J. O., & Ogugua, U. J. (2022). User education programmes and the use of the library in Chukwuemeka Odumegwu Ojukwu University: The state of the art. *International Journal of General Studies*, 2(2), 172–183. <https://www.nigerianjournalsonline.com/index.php/IJGS/article/view/2660>.
- Okonoko, V. N., Abba, M. A., & Arinola, A. E. (2020). Users' expectation of library services and resources in the COVID 19 pandemic era: A comparative study of two academic libraries in Nigeria. *Library Progress (International)*, 40(2), 236–246. <https://doi.org/10.5958/2320-317X.2020.00027.6>
- Okonoko, V. N., & Eruvwe, U. (2021). Utilization of information and communication technology based information resources in library user education programmes: A study of colleges of education in south-south, Nigeria. *Information Impact: Journal of Information and Knowledge Management*, 12(1), 76–87. <https://doi.org/10.4314/ijikm.v12i1.6>
- Osuji, U. (2012). The use of E-assessments in the Nigerian higher education system. *The Turkish Online Journal of Distance Education*, 13(4), 140–152. <https://doi.org/10.17718/TOJDE.25466>
- Özgülven, Ü., & Beygirci, B. (2022). Library use of undergraduate students in the distance education process due to the Covid-19 pandemic: The case of Bartın University. *The Journal of Information and Documentation Studies*, (18), 33–49. <https://doi.org/10.26650/BBA.2022.18.1194193>
- Pagore, R., & Chalukya, B. V. (2020). Academic libraries and MOOCs era. In *Reinventing academic libraries*. Atharva Publication. [https://www.researchgate.net/publication/359392763\\_Academic\\_Libraries\\_and\\_MOOCs\\_Era](https://www.researchgate.net/publication/359392763_Academic_Libraries_and_MOOCs_Era).
- Roy, S. (2020, May 25). Education in lockdown: Poor internet connectivity shadows online classes, many students walking to reception areas. *Hindustan Times*. <https://www.hindustantimes.com/education/education-in-lockdown-poor-internet-connectivity-shadows-online-classes-many-students-walking-to-reception-areas/story-YixpW2WHFoyOgNxxK3GxBO.html>.
- Sahu, P. (2020). Closure of universities due to coronavirus disease 2019 (COVID-19): Impact on Education and mental health of students and academic staff. *Cureus*, 12(4). <https://doi.org/10.7759/CUREUS.7541>
- Singh, S., & Sagar, R. (2021). A critical look at online survey or questionnaire-based research studies during COVID-19. *Asian Journal of Psychiatry*, 65, Article 102850. <https://doi.org/10.1016/J.AJP.2021.102850>
- Vrana, R. (2017). The perspective of use of digital libraries in era of e-learning. In *17th 40th international convention on information and communication technology, electronics and microelectronics, MIPRO 2017 - Proceedings* (pp. 926–931). <https://doi.org/10.23919/MIPRO.2017.7973555>
- Wibowo, S., Grandhi, S., Chugh, R., & Sawir, E. (2016). A pilot study of an electronic exam system at an Australian university. *Journal of Educational Technology Systems*, 45(1), 5–33. <https://doi.org/10.1177/0047239516646746>
- World Health Organization. (2020). Novel Coronavirus (2019-nCoV): situation report, 13. World Health Organization. <https://apps.who.int/iris/handle/10665/330778>.