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**RESEARCH ARTICLE**

# IMPEDIMENTS OF ICT-BASED LIBRARY SERVICES IN SUPPORTING UNIVERSITY EDUCATION: THE CASE OF SELECTED UNIVERSITIES IN KENYA

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## ABSTRACT

Information and communication technology (ICT) has greatly contributed to the phenomenal change in university education and their subsequent libraries. However, university libraries in developing countries have moved at a slower pace towards catering for the technological needs of the changing nature of users, thereby making little impact on the educational revolution. This study examines the challenges library users face when using ICT-based services in selected universities in Kenya, followed by recommendations on ways to alleviate these challenges. A case study survey using a concurrent triangulation mixed-method approach was adopted. Three universities took part in the survey. Quantitative data was collected through questionnaire administration from a random sample of 154 fourth-year undergraduate students. Qualitative data was obtained from librarians, university deans/directors, and purposely selected representatives from representative from key government agencies. The study revealed that students faced challenges in using ICT. The main challenges were slow/inadequate internet connectivity (79.5%), limited variety of ICT facilities (73%) and inadequate number of ICT facilities in the library (68%). Ultimately, the study recommends measures to alleviate these challenges and make ICT-based services supportive of university education.

Keywords: Academic libraries, ICT-based services, ICT challenges, Kenya, Universities, Library services

## INTRODUCTION

University education has been experiencing a global transformation, subsequently leading to the transformation of the institutions' libraries. This is a phenomenon that several observers refer to as a new paradigm shift (Virkus & Metsar, 2004; Blessinger, Reshef & Sengupta, 2018; Dhahri et al., 2020). The main impetus for change in education has been attributed to: rapid advancement in Information and Communication Technology (ICT), evolution in the education system, changing

user needs, emergence of social media, and changes in scholarly communication (Jain, 2013). According to Blessinger, Reshef and Sengupta (2018), higher education has been undergoing tremendous change since World War II, precipitated by the demand for high-quality education at all levels across the globe. Academic libraries have been participants in the educational transformation. The library is expected to contribute to the teaching, research, and service missions of the university (Kaufmann, nd.; Chiware, 2010). Based on the argument that university education is increasingly employing the use of technology (Chiware, 2010; Ifijeh & Yusuf, 2020), it follows that libraries also commensurate the level of university expectations through the harnessing of appropriate technologies. Pambulo (2014) however, observed a slow intake of technology use in education in Africa, unlike in the United States. Lewitzky (2020) quips that with the creation of the internet and rapid technological growth, libraries have shifted from providing resources to a more active and integrated role in the university setting. Pambulo (2014) adds that where technology exists, most libraries in Africa do not use it to its full potential. McGillis (2016) opined that the working behaviour of academic libraries was traditional despite moving from print to digital at a fast pace. Many libraries embraced technological solutions mainly to automate the already existing processes and services. However, they have yet to utilize ICTs to make a revolutionary contribution to university education.

Technological challenges directly affect library users, who mostly comprise the tech-savvy generation. ICT, in essence, contributes to the overall student learning experience in the university. Several studies have deliberated on the challenges faced in the offering of library services, including the use of ICT. However, according to Shonhe and Jain (2019), most literature focuses on the challenges faced by librarians in providing services, rather than user experiences. This study attempts to take into consideration the user perspectives in selected universities in Kenya as the main focus and attempts to propose possible remedies. The objectives were to ascertain the nature of the adoption of ICT-based library services in selected universities; too analyze the impediments of the existing library ICT infrastructure and facilities in supporting educational activities in selected universities, and to recommend strategic measures and possible solutions to the challenges faced.

## LITERATURE REVIEW

### Nature of adoption of ICT

It is generally acknowledged that many academic libraries have adopted ICT in their service provision. However, owing to the emergence of newer technologies and a dynamic user environment, traditional technologies in use do not adequately meet current and emerging needs. The operations that have been revamped through the use of technology in academic libraries, in general, include but are not limited to library automation, digitization, Web 2.0 and Library 2.0, barcode technology applications, mobile phone applications, the internet and web-based services, networking technology, scanning technology, etc. (Oyedokun et al., 2018). The tool application areas associated with the term Web 2.0, which was first coined by O'Reilly Media in 2004, include blogs, wikis, RSS, podcasts and videocasts, mashups, social sharing services, communication tools, social networks, folksonomies and tagging, and virtual worlds (Han & Liu, 2010). Thus, it

incorporates common technologies and social media such as Facebook, YouTube, WhatsApp, and Twitter (Tsekea & Chigwada, 2021). Mobile services to libraries, as indicated by Palumbo (2014), include access to the online catalog, readers' advisory apps, downloadable audiobooks, access to databases, text notification, and text reference. Additional services identified by Shonhe and Jain (2019) include quick response (QR) codes, social media networks (e.g., Twitter, Facebook, WhatsApp, Instagram), library websites, web cam, personal space/my library platform, and online video-on-demand (VOD) system.

The nature of possible technologies that may affect library services more in the future is associated with the concept of the fourth industrial revolution (4IR). This was coined by Klaus Schwab, a German engineer and economist, in 2016. The driving technologies identified by Chigwada and Chisida (2021) are big data, artificial intelligence (AI), robotics, virtual and augmented reality, advanced security systems, the Internet of Things, drones, 3D printing, and nanotechnology. These tools and applications have the potential to boost productivity in libraries, reduce costs, and improve the quality of products and services. The use of AI in academic libraries, such as in the provision of reference services, has become a subject of discussion in recent past. ChatGPT, a new-generation chatbot released by OpenAI in November 2022 has drawn the attention of information professionals (Chen, 2023). It is seen as a possible valuable tool for libraries in the future, with possible implications for higher education. As explained by Cox and Tzoc (2023), it is a tool that uses deep learning techniques to generate text in response to questions posed to it. The generation of text is made possible through the prediction of the next word through a series of words to produce sentences, and then the entire page of content. ChatGPT has the potential of being used by academic libraries for discovery and searching like Google by learning a user's information needs and preferences and providing personalized results (Cox & Tzoc, 2023). Microsoft and Google have announced a plan to integrate it into their tools. Furthermore, Cox and Tzoc (2023) suggest that the technology will soon be integrated into library discovery tools, providing answers to questions and collection items on a topic, besides other benefits. Another related development is the development of the Dall-e chatbot that can create images from simple text instructions. Other examples of generative AI in an academic setting identified by Akakpo (2023) are BardAI, Copilot, and WriteSonic. It is, however, noted that though students in the African continent are facing a huge wave of digital transformation, literature about the use of AI in African universities is still scanty (Adarkwah et al., 2023; Akakpo, 2023).

The adoption of technology by libraries has been necessitated by many factors. These include limited physical space in the library and increased enrolment (Saleh, 2015), and digitization of information resources (Black, 2003).

Ndege, Gichohi, and Mueni (2025) note that developed countries such as the United States, United Kingdom, South Korea, Singapore, and Australia have advanced significantly in ICT library integration. Such advancements include 100 per cent access to digital resources even in public universities, open-access repositories, AI-driven platforms that minimize physical library reliance, and big data analytics for personalized user experiences. In addition, different countries have developed ICT in education policies and implemented them in different capacities, depending on the prevailing socio-economic factors (Manyasa, 2022). The Republic of Korea for instance, launched its policy in 2011 with the main aim of digitizing its education content by 2015. South

Africa's ICT in education policy can be traced back to 2004. In Kenya, the education policy on ICT was initially embedded in three documents, namely the e-Government strategy, national ICT policy and Sessional paper no. 1 of 2005. A policy on ICT in education and training was developed in 2021 (Ministry of Education, 2021). Despite the several achievements made, the implementation has met challenges such as capacity and resource limitations, and poor coordination among the various actors (Manyasa, 2022).

Modern and traditional technological solutions have been identified to be in use in Kenyan universities. Makori & Mauti (2016) identify the use of mobile computer devices, preferably portable digital gadgets (laptops and tablets), hand-held devices (smartphones and personal digital assistants), and the use of e-learning as among the top brands for enhancing learning in the country. According to Chaputula and Mutula (2018), studies show that mobile phone use in university libraries in Africa is still at an early stage. Despite the popularity of these technologies among the digital natives, Makori & Mauti (2016) observe that traditional information sources such as the internet and web resources, repositories, portals, and social media technologies are also in demand.

**Impediments in the use of ICT infrastructure and facilities**

The challenges in ICT integration in education have been a persistent concern. In a study on the adoption of ICT in academic libraries in Nigeria, Ani et al. (2005) found that the main hindrances to ICT adoption, in order of prominence, were a lack of adequate funding, frequent power outages, a lack of trained personnel, and a negative attitude among university management towards information technology. The least ranked obstacle was the lack of awareness of information technology potentials by users and the negative attitude of library staff toward library automation. A similar study, conducted by Adeniji, Adeniji, and Ogunniyi (2011) at Olabisi Onabanjo University Library, highlighted the high cost of connectivity, lack of ICT skills, interconnectivity problems, and obsolete equipment as the main obstacles to the use of ICT in supporting university education. The main reason given for poor connectivity within the campus, as opposed to off-campus in the ECAR (2015) study of undergraduate students' ownership and use of mobile devices, is the high number of mobile devices connected to the network at a given time. Another study conducted on the use of library online services by users in Indonesia during the COVID-19 pandemic showed that the internet speed was not adequate to sustain an effective online activity. This additionally resulted in the wastage of money in the use of internet bundles (Winata, Fadelina & Basuki, 2020). Technical issues such as unreliable technology, limited bandwidth, and power outages have also been identified by Tsekea & Chigwada (2021). Scarce electronic content was added to the list by Nyerere (2020). As observed by Ndege, Gichohi and Mueni (2025), these challenges mostly relate to infrastructure and affordability. Consequently, users experience frustration, dissatisfaction, and underutilization of ICT resources. This requires strategic ICT infrastructure investments, robust training programs, and user-centered design improvements.

Kenyan libraries are faced with a myriad of problems relating to the usage of ICT to support education. Nyamache et al. (n.d.). point out that the licensing options and models for the dissemination of e-content are yet to take shape, while information technology continues to evolve at a faster pace for academic libraries to cope. Research conducted by Burudi, Wasike and Ndegwa (2021) on the utilization of mobile devices in accessing information in Kenyatta University and the University of Nairobi established that 95% of library users used mobile devices to access

library materials. However, the main challenges experienced were insufficient mobile-accessible resources and inadequate technical support for mobile access. The findings of a study by Adamu and Ajayi (2023) showed that the main challenges faced by Kenyatta University's post-modern library in ICT usage were inadequate ICT facilities, low internet connectivity, and inadequate technological skills.

The challenges with the implementation of distance learning hinge on technology (Nwezeh, 2010). The major ones identified by Nyerere et al. (2012) are technological constraints, whereby internet connectivity is concentrated in urban areas, and the lack of a trained cadre of professionals to support the implementation of distance education. These broad challenges relate directly to the library's ICT-based services. Garbutt and Wanami (2017) explain that innovation in support services, such as library services, financial aid, registration, and advising, has been one of the determinants for the success of distance learning. A study by Kamau et al. (2016) on the provision of library services to distance learners by two public university libraries in Kenya revealed low e-readiness. This was characterized by low ICT infrastructure, low usage of electronic communication in using library services, low usage of mobile phones in library service delivery, and low usage of e-services.

## RESEARCH METHODOLOGY

This study adopted a case study survey research design using a concurrent triangulation mixed method approach. Three institutions were selected, comprising two public and one private university. Quantitative data was collected through questionnaire administration from a random sample of 154 fourth-year undergraduate students. Qualitative data was obtained from 3 professional librarians, 6 university deans/directors, 1 representative from the Commission for University Education (CUE) and 1 representative from the Ministry of Education, Science and Technology (MOEST) who were all purposively selected as key informants of the study. The informants were to provide more clarity and attempt to gather some insider or expert knowledge that goes beyond the private experiences, beliefs, and knowledge base of the respondents.

### Data analysis and findings

The overall response rate is as shown on the following table.

**Table 1: Response rate of the target population.**

| Subjects | Distributed/sampled (N=165) | Responded | Percentage |
|---|---|---|---|
| Students | 154 | 112 | 72.7 |
| Deans and Directors | 6 | 4 | 66.6 |
| Library staff | 3 | 3 | 100 |
| MoE Representative | 1 | 1 | 100 |
| CUE Representative | 1 | 1 | 100 |
| Total | 165 | 119 | 72.1 |

Out of a total of 154 questionnaires distributed to students in the three institutions, 112 were returned. This constituted a response rate of 72.7%. Most questionnaires were distributed before the closure of learning institutions when COVID-19 was reported in the country. Using a collective administration method to distribute the questionnaires was instrumental in achieving a high response rate. This was successful to a large extent through the assistance of class representatives and lecturers who made personal follow-ups to collect the filled questionnaires. However, the response rate during COVID-19 was very low due to the inconsistent learning schedules.
Among the student respondents, the majority (N=87) were studying full time followed at a distance by school-based mode (N=16); part-time/evening (N=5), and online mode (N=3) respectively. Most of the respondents (84%) used library services in general, while the usage of online services and regular services (circulation, reading space and print resources) was relatively in equal measure. The majority of student respondents (76%) fell under the age bracket of 21 – 25 years, followed distantly by the age bracket of under 21 (11%). This age group constitutes the digital natives, commonly called Gen Z.

The deans and directors had utilized library services and were in a position to comment on the library's ICT services. In addition, they also regularly referred their students to use the library services.

**Nature of adoption of ICT**
Desktop computers topped the list of the most used gadgets at 34.8%, followed by a tie between laptop computers and smartphones at 26.8%. Libraries of institutions under study mostly provided shared desktop computers for student use. Other closely mentioned facilities were printers/photocopies and scanners respectively, with respondents wishing that the library provided more of these. The majority of respondents owned smartphones and mobile phones (49.1%), followed by laptop computers (35.7%) and tablets/PDAs (32.1%).

Respondents indicated that they were aware of the other ICT services and resources offered by their institutions, and a significant number used them. These include the Internet, online (subscribed) information resources, institutional repositories, websites/portals, online catalogue, communication tools (email, short message service), and e-learning platforms. Services that were considered inadequate or unavailable by respondents were academic writing tools (anti-plagiarism, referencing), audiovisual, teleconferencing tools, mobile apps, remote access platforms, and social networks. Respondents wished they were adequately availed by each case's respective libraries/institutions. According to the responses from library staff and deans/directors, the ICT resources and services used were similar to those mentioned by the students. They were fairly common among the three institutional libraries, except for the anti-plagiarism tool offered by a different department from the library in one of the universities under study.

**Challenges experienced in using the library ICTs**
Out of the 112 student respondents, 83 (74.1%) indicated that they experienced challenges in using the ICT resources. Another 16 (14.3%) pointed out that they did not face any challenges. The remaining 13 (11.6%) did not answer the question.
The following table enumerates the various challenges identified by the respondents from a guided list.

**Table 2: Challenges experienced by respondents in using the library ICTs**

| S/N | Challenge faced | n | % |
|---|---|---|---|
| 1 | Slow internet connectivity | 89 | 79.5 |
| 2 | Limited variety of ICT facilities | 82 | 73.2 |
| 3 | Inadequate number of ICT facilities in the library | 77 | 68.8 |
| 4 | Low online interaction with librarians | 73 | 65.2 |
| 5 | Network restrictions (e.g. firewall) | 71 | 63.4 |
| 6 | Lack of adequate or appropriate software installed on available technologies | 69 | 61.6 |
| 7 | Poor maintenance of the available technologies, e.g. software, hardware | 66 | 58.9 |
| 8 | Limited capability of the existing ICT facilities | 66 | 58.9 |
| 9 | Lack of adequate skills for using ICT resources | 56 | 50 |
| 10 | Inadequate assistance from library staff | 55 | 49.1 |
| 11 | Lack of awareness of the potential benefits of ICT | 54 | 48.2 |
| 12 | Lack of integration with other educational technologies in the university | 50 | 44.6 |
| 13 | Usage of outdated technologies | 48 | 42.9 |
| 14 | Incompatibility of library systems, technologies with personally owned technologies | 46 | 41.1 |
| 15 | Irrelevance of ICT facilities to educational activities | 43 | 38.4 |
| 16 | Fear of using technology (technophobia) | 42 | 37.5 |
| 17 | Other | 10 | 8.9 |

The most outstanding challenge experienced by users in using library ICTs was slow internet connectivity (79.5%). This was followed by the limited variety of ICT facilities (73%), inadequate number of ICT facilities in the library (68%), and low online interaction with librarians (65.2%) among others respectively. Other challenges that were mentioned by the student respondents were: Weak WiFi, concerning slow internet connectivity (n=1) and Rude systems librarians or librarians in charge of ICT services (n=2)

The most outstanding challenges faced by the users, as observed by the three librarians who were interviewed, were slow internet connectivity, few computers, limited content and low literacy levels. One of the libraries under study later received a boost in its internet services when more Wi-Fi points were added. The capacity was also upgraded from 450mbps to 650mbps, as informed by the readers' services librarian. According to the respondent,

> *users prefer using the structured network to access the internet since they are relatively faster compared to the wireless network. They either use the provided desktop computers or request the library staff to provide the Ethernet cables. However, due to challenges in the provision and maintenance of cables, the library has preferred to offer mainly the wireless network to students. But the problem is that as the number of users at any one time increases, the network slows down to the point that users do not find it of much help* (Q8).

Users generally expected the library/university to enhance the internet, add ICTs and support facilities, and improve the accessibility and variety of the information resources. The major problems encountered in the use of ICT, as per the deans and directors, were similar to those mentioned by students, namely slow internet connection, power fluctuation, and limited variety and number of the acquired technologies. They gave additional problems, such as negative attitudes and low adoption of technologies, especially by the teaching staff, and abuse by users, such as usage for non-academic purposes. However, in terms of numbers, one of the deans opined that the adequacy of the ICT resources was pegged on the quality policy of the respective institutions, and the resources were considered to have met the minimum requirements. This was mainly based on the ISO-9000:2015 institutional accreditation. According to the CUE representative, the main impediment to the use of ICT by users was associated with inadequate training.

> *In many of the university libraries we have inspected, there is inadequate staff to train the users, and in some instances the absence of a systems librarian to spearhead the process… Students on the other hand need much training, especially on remote access to information resources. Training should be a continuous event in a university library*. [Q6]

One related challenge mentioned by one library staff was the limited capacity of the library building to accommodate many gadgets, especially the desktop computers. This was mainly attributed to the limited distribution of power sources and internet access points that had been later introduced into the building arrangement. Most of the available furniture such as computer tables and chairs were not custom-made for the acquired ICT resources. Discussion areas were also improvised to serve users, with less provision for technological support. The library space was part of a general-purpose building renovated to support campus-wide services. The respondent added that:

> *We do not have adequate space to house all library services. As you can see, it has not been easy putting things in their place. The computer area is somehow congested … and less accommodating if we were to add more computers. Fortunately, many users come with their laptops [computers] and use the available Wi-Fi.*

## DISCUSSION

The challenge of poor internet connectivity significantly topped the list. This was followed by the limited variety of ICT facilities and the limited number of ICT facilities available to users. The perennial problem of lack of adequate and efficient internet access persisted despite earlier studies that revealed the same findings. The problem of poor internet connectivity is similar to the findings of the already mentioned study done by Winata, Fadelina and Basuki (2020) on institutions in Indonesia during the early stages of the COVID-19 pandemic. Regarding online learning, poor internet connectivity cannot sustain meaningful online activity. Similar findings were pointed out about Nigerian academic institutions by Tsekea and Chigwada (2021). A stakeholders' meeting in Kenya, including CUE and the vice-chancellors of universities also identified a lack of internet access and laptops for some students and the inability of some lecturers to adapt to e-learning

programmes (Nyamai, 2020). The meeting was conducted in 2020 when institutions shifted to virtual learning due to the COVID-19 pandemic. Similarly, Adamu and Ajayi (2023) established that low internet connectivity was still a problem affecting library users at Kenyatta University in Kenya.

Good internet access is a requirement for any meaningful online learning activity to take place. The researcher observed that the cost of purchasing internet bundles in Kenya from many service providers was relatively high compared to airtime bundles. These bundles have not been adequately packaged in a way that students in e-learning programmes are best supported. Short-term bundles were relatively cheaper, yet students require seamless connectivity for their educational activities. Internet bundles remained expensive for students despite a World Bank disclosure that Kenya's mobile data pricing is the lowest among regional peers (Mwangi, 2024). The gaps in the provision of internet services have led to the booming of parallel data markets within university spaces in Kenya, sometimes from the black market, popularly known as '*bundles mwitu*'. The existence of the parallel market was revealed during focus group discussions among students of the University of Eldoret and the Technical University of Kenya (Tallam, 2022). The study further showed that students used smartphones to access information and conduct studies, such as accessing information for class assignments, downloading research materials, and attending virtual classes, especially during the COVID-19 period.

Gradual improvements in internet access have been realized in due course, such as infrastructural developments, rural electrification, digital literacy, and ICT adoption. However, much more efforts are required to realize a better internet. Disruptive technologies are expected to offer a myriad of solutions to the overall internet problem. There may come a time when internet access will be more affordable, much faster, offered by a variety of service providers, connected to a wide variety of gadgets, and useful for a wide range of functions. The researcher's visualization of the future of the internet is that soon it will possibly be a free service to everyone in Kenya. Knott-Craig (2018) identifies public Wi-Fi as the most likely face of the free internet. Though there will be infrastructural and related costs associated with internet access, the end user will benefit for free. Many organizations and business enterprises already provide free internet services as part of value addition. The government will provide substantive support services for internet access as part of the country's policy towards economic progression. For instance, the government launched a massive rollout of 25,000 hotspots of free public Wi-Fi in 2023 and received funding from the World Bank to support the project in 2025 (Njuguna, 2025). The ICT arena is open to the exploitation of emerging innovations that may make the Internet a basic service. In addition, various stakeholders have roles to play in the improvement of internet access and in addressing the other challenges mentioned by the respondents.

*Learning institutions*

Universities bear the responsibility of enabling students and staff to access the internet. Because of facilitating online education, CUE standards of 2014 require universities to "ensure availability and adequacy of technical, and ICT infrastructure and appropriate technical support staff for the infrastructure" (section ODEL/STD/12). During the COVID-19 pandemic, one of the universities under study supported students by providing data bundles to facilitate online learning.

The standards set by CUE highlight the minimum requirements of ICT services for a university and its library. These standards do not limit a library from exploiting existing and emerging technological innovations. There is no set range of gadgets and other ICT resources and systems that libraries should restrict themselves to. In a way, library ICT-based services and many other traditional services are open to change, leading to a likely change in the definition of library services.

*Individuals*

Adoption and effective use of ICT resources start with individual students and staff. Individual effort in the purchase of personal gadgets such as smartphones and laptops boosts the usage of these resources in the university setting. Many cooperative societies, for instance, offer product loan arrangements for their members to acquire such resources. This arrangement works well, especially for working students as well as parents of university students. Some of the mobile network operators, such as Safaricom, Telkom, and Airtel, offer smartphones under various arrangements, including loyalty points, arrangements with co-operative societies, and regular sales. Safaricom has announced a plan to boost the uptake of smartphones by setting up a smartphone factory in Kenya. This is expected to assemble between 1.2 million and 1.4 million smartphones a year (Mutai, 2023). Besides smartphones, mobile network operators also offer various packages of internet bundles as they market their products. The use of personal gadgets in educational activities eases the dependency on already-constrained institutional resources. Personal gadgets also promote the use of remote access and e-learning platforms and promote digital literacy by exposing the user to frequent and exploratory usage. One of the universities under study had a Bring Your Own Device (BYOD) policy statement whereby students were encouraged to own laptops and any other relevant mobile device to enhance a more hands-on approach to learning. This was entrenched in the course curriculums. The same statement is promoted in the policy on ICT in education and training developed by the Ministry of Education (MoE, 2021). This was confirmed by the MoE respondent as part of the policy initiatives that are meant to promote the use of ICT in education in the country.

Respondents also prominently highlighted the challenge of the limited number and variety of ICT facilities. Besides the high number of users of the available resources, this also signals the readiness of the respondents to explore the use of alternative technologies. A significant number of users indicated that librarians did not actively feature on the social media network. It is a possibility that their impact on social media may not be adequately felt by the young generation of learners. Social media has mostly been utilized in the marketing of library services and general non-academic purposes, as pointed out by Collins and Quan-Haase (2014) and Makori (2016). However, the presence of library staff on these platforms may help identify emerging needs and create a friendly environment for engagement with library users. There is a possibility that the social media platforms will develop additional features that enable users to socialize as well as share their career and/or academic activities similar to the academic networking in LinkedIn and Academia. The expressed interest of respondents in reaching out to librarians on social media is a likely move to make general inquiries or seek assistance where the ICT services were not adequately meeting a 'self-service' expectation. For instance, the study carried out by Burudi, Wasike and Ndegwa (2021) showed that the main challenge faced by library users at Kenyatta University and the University of Nairobi in accessing information using mobile devices was a lack

of sufficient mobile-library information. Most users accessed library information resources using desktop and laptop computers. This challenge agrees with the expressed user need in this study to expand the variety of ICT resources in supporting their educational activities. The social interaction with librarians, however, cannot be overlooked as it impacts the user's overall satisfaction level.

## CONCLUSION

This study looked at the impediments of the existing library ICT infrastructure in supporting educational activities in selected universities. Universities and their libraries have generally shown a commendable adoption of various ICTs in information services and delivery of academic programmes. The internet remains the main backbone among technologies that support education, and inadequate access negates the development of ICT-based services. Mobile devices in education are gaining popularity among the present generation of users who prefer mobile-accessible content. Thus, efforts should be geared towards continual improvement of internet access by all stakeholders, innovation in the adoption and use of technologies, and adequate exposure to these technologies among users. This way, the contribution of libraries to the overall mission of their respective universities will be sustained in the ever-changing educational landscape.

## RECOMMENDATIONS

The leadership of a university plays a central role in facilitating the optimal use of technologies across the institution. The team of administrators, led by the university librarian, is responsible for appropriate budgeting and the mobilization of human capital to ensure that technological resources are efficiently utilized. This leadership includes the recruitment of competent and innovative systems librarians to spearhead ICT services. Through yearly budgeting, the university is able to alleviate shortages of ICT facilities and plan for the acquisition of emerging technologies in a systematic manner.

Government interventions also have a significant impact on the state of ICT in universities. Policies enacted by the government influence the purchasing costs of ICT resources and the accessibility of internet services. When deliberate measures such as tax reductions on ICT resources and internet access are implemented, they enhance the purchasing power of citizens and institutions alike. Furthermore, the government’s adoption of ICT in service provision encourages citizens to embrace digital platforms. The success of Huduma Centre services, for example, demonstrates the benefits of ICT integration in service delivery. Such initiatives also shape citizens’ experiences in educational processes—from university placement and career choices facilitated by KUCCPS to the delivery of learning content and administrative services.

Investment in internet infrastructure and other ICT resources is equally vital. Universities, government agencies, private investors, and individuals must continuously enhance internet connectivity and access to ICT facilities. Significant progress has been achieved through improvements in network infrastructure such as fibre optic cables, satellite connections, expanded

mobile network coverage, and the provision of affordable internet by private companies. Further, the installation of free public Wi-Fi by the government would significantly ease existing ICT challenges and broaden access to online resources.

Empowering users remains one of the most effective ways to promote the meaningful use of ICT resources. Regular exposure and interaction with these technologies enhance users' competence and confidence. Various initiatives exist to help users acquire devices and services, including product loan offers from financial cooperatives like Saccos, institutional programmes for students and staff, and purchase arrangements with mobile service providers. Such empowerment initiatives foster a conducive environment for the Bring Your Own Device (BYOD) campaign highlighted in the study. Beyond acquiring the necessary hardware and platforms, ICT literacy programmes enable users to maximize the potential of available resources. These programmes—comprising user-friendly guides, regular training sessions, and marketing of ICT services—are already operational in university libraries at varying levels. Nonetheless, respondents emphasized the need to strengthen these initiatives and regularly review them to align with emerging technological skills and innovations.

The creation of a desirable online environment is another key factor in enhancing ICT use. The current educational landscape shows a growing preference for blended and online learning modes. Librarians can contribute to this transition by enriching online services to make them more appealing to users. Respondents in the study expressed a particular interest in facilities such as teleconferencing, which enhance the online experience. University libraries can respond by improving access to information resources through appropriate acquisition and access models, ensuring reliable technical support, offering interactive guides and chat options, and maintaining user-friendly platforms. Integrating library systems with online education platforms and enterprise resource planning (ERP) systems further enhances efficiency and user satisfaction.

Optimization and reconstitution of ICT services ensure that existing technologies are fully leveraged for educational purposes. For instance, the development of integrated library systems (ILS) should focus on features that support broader academic activities, including live chats, anti-plagiarism tools, links to supplementary resources, advanced search capabilities, self-service options, and accessibility features for users with special needs. Regular maintenance of both software and hardware components is essential for seamless functionality.

Librarians should also be actively involved in developing relevant applications tailored to institutional needs. This includes creating mobile apps for library services, e-learning platforms, ERPs, and remote access systems. Such innovations address user needs directly and help mitigate challenges related to budget and technological limitations. The continued development and adoption of open-source software further reduce costs and promote flexibility. On a broader scale, librarians should engage with emerging technologies associated with the Fourth Industrial Revolution—such as artificial intelligence and the Internet of Things—to enhance productivity and efficiency in library operations.

Finally, meaningful online interaction between librarians and users forms an essential part of modern service delivery. Once an enabling online environment and appropriate ICT facilities are established, users naturally expect real-time support. Therefore, maintaining an online presence among library staff should form part of the institution's service strategy, modeled after 24-hour call centres in customer-oriented businesses. While libraries are not legally obligated to engage in social media, as noted by the American Library Association (ALA), such platforms offer valuable opportunities for outreach and user engagement. Following the guidance of scholars such as Antwi and Obeng (2025) and ALA recommendations, libraries can effectively connect with their users across diverse online channels, thereby enhancing access, interaction, and the overall user experience.

## REFERENCES

Adamu, A.A. & Ajayi, A.S. (2023). Evaluation of ICT facilities and use by patrons of Kenyatta University Post-Modern Library, Kenya. *International Journal of Information Science and Management*, 21(1), 207-215. https://ijism.ricest.ac.ir/article_700762_0f82b7aade1f790ca2b23287208dafdf.pdf

Adarkwah, M. A., Amponsah, S., van Wyk, M. M., Huang, R., Tlili, A., Shehata, B., … Wang, H. (2023). Awareness and acceptance of ChatGPT as a generative conversational AI for transforming education by Ghanaian academics: A two-phase study. *Journal of Applied Learning and Teaching*, 6(2), 1–16. https://doi.org 10.37074/jalt.2023.6.2.26

Adeniji, A. M., S. E. Adeniji, S.E. & Ogunniyi, S. (2011, Summer). Availability and use of ICT in Olabisi Onabanjo University Library. *Official Publication of the Pacific Northwest Library Association*. 75(3)

Akakpo, M.G. (2023). Skilled for the future: information literacy for AI use by university students in Africa and the role of librarians. *Internet Reference Services Quarterly*, https://doi.org/10.1080/10875301.2023.2280566

Antwi, V, & Obeng, S. (2025). Should libraries have a social media presence? An analysis of the schools of thought. *International Journal of Library and Information Science*, 17(1), 14-21. https://doi.org/10.5897/IJLIS2024.1101

Black, N. E. (2003). Distance library services in Kenya: observations and overview of some of the issues. *The New Review of Libraries and Lifelong Learning*, 4 (1), 45-62.

Blessinger, Reshef & Sengupta (2018, October 5). The shifting paradigm of higher education. *University World News*. https://www.universityworldnews.com/post.php?story=20181003100607371

Burudi, P.S., Wasike, J. & Ndegwa, L. (2021). Challenges facing academic libraries in utilizing mobile devices in access and use of information in Kenyatta University and University of

Nairobi in Kenya. *African Journal of Education, Science and Technology*, 6(3). Retrieved November 30, 2021, from https://ajest.info/index.php/ajest/article/view/562/537

Chaputula, A.H. & Mutula, S. (2018). Provision of library and information services through mobile phones in public university libraries in Malawi. *Global Knowledge, Memory and Communication*, 67(1/2), 52-69. https://doi.org/10.1108/GKMC-05-2017-0048

Chen, X. (2023, February 23). ChatGPT and its possible impact on library reference services. *Internet Reference Services Quarterly*. https://doi.org/10.1080/10875301.2023.2181262

Chigwada, J.P & Chisita, C.T. (2021). Introduction to the fourth industrial revolution and libraries. *Examining the Impact of Industry 4.0 on Academic Libraries*, 3-15. https://doi.org/10.1108/978-1-80043-656-520201010

Collins, G. & Quan-Haase, A. (2014). Are social media ubiquitous in academic libraries? a longitudinal study of adoption and usage patterns. *Journal of Web Librarianship*, 8(1), 48-68. https://doi.org/10.1080/19322909.2014.873663

Commission for University Education (2014). *Universities standards and guidelines 2014*. CUE

Cox, C. & Tzoc, E. (2023). ChatGPT implications for academic libraries. *ACRL TechConnect*, 84(3). https://crln.acrl.org/index.php/crlnews/article/view/25821/33770

Dhahri et al. (2020). The psychological impact of COVID-19 on medical education of final year students in Pakistan: a cross-sectional study. *Ann. Med. Surg*., 60, 445-450

Garbutt, G. & Wanami, S. (2017). Challenges facing implementation of distance education in Kenya. *Africa Journal of Technical & Vocational Education & Training*, 2(1), 132-239. https://afritvet.org/index.php/Afritvet/article/download/44/pdf/

Han, Z. & Liu, Y.Q. (2010). Web 2.0 applications in top Chinese university libraries. *Library Hi Tech*, 28(1), 41-62. https://doi.org/10.1108/07378831011026689

Jain, P. (2013). A paradigm shift in the 21st century academic libraries and librarians: prospectus and opportunities. *European Journal of Academic Research*, 1(3), 133-147. Retrieved July 12, 2016, from https://www.academia.edu/4449946/A_PARADIGM_SHIFT_IN_THE_21ST_CENTURY_ACADEMIC_LIBRARIES_AND_LIBRARIANS_PROSPECTUS_AND_OPPORTUNITIES

Kamau, G. W., Kiplangat, J. &Odini, C. (2016, August). Access to and use of ICTs in the provision of information to distance learners in Kenyan universities. *In* Kwanya, Tom, Kiplangát, Joseph & Wamukoya, Justus (eds). *Emerging trends in information and knowledge management. Paper presented at the International Information and Knowledge Management*

*Conference at Technical University of Kenya*, (pp. 51-74). Eldoret, Kenya: Moi University Press

Knott-Craig, Alan. The internet will be free one day. Retrieved September 20, 2025, from https://www.bizcommunity.com/Article/196/544/169552.html#

Lewitzky, R.A. (2020). Educating, learning, and growing: a review of the teaching role in academic librarianship. *College & Undergraduate Libraries*, 27(1), 32-40.

Makori, E. O. & Mauti, N. O. (2016). Digital technology acceptance in transformation of university libraries and higher education institutions in Kenya. *Library Philosophy and Practice*. Retrieved February 21, 2018, from http://digitalcommons.unl.edu/libphilprac/1379

McGillis L. (2016). The lights are on but nobody's home: the future of academic libraries? *Partnership: The Canadian Journal of Library and Information Practice and Research*, 11(1): 1–5.

Ministry of Education (2021). *Policy on information and communication technology in education and training*. MoE. https://www.education.go.ke/sites/default/files/2023-01/ICT%20IN%20EDUCATION%20AND%20TRAINING%20POLICY%202021.pdf

Mutai, E. (2023, May 24). Safaricom reveals plan to set up smartphone factory. *Business Daily*, p. 1

Mwangi, K. (2024, August 20). Kenya's mobile data pricing lowest among regional peers. *Business Daily*, p. 5

Ndege, M.W., Gichohi, P.M. & Mueni, C. (2025, September). Leveraging ICT system user utilization experiences to improve library services for virtual and distance learners at Byte Size College in Botswana. *Journal of Information and Technology*, 5(8), 23-35. https://doi.org/10.70619/vol5iss8pp23-35

Njuguna, S.M. (2025, February 25). Kenya gets World Bank cash to expand ICT and lower Internet costs. https://www.kenyans.co.ke/news/109319-kenya-gets-world-bank-cash-expand-ict-and-lower-internet-costs

Nwezeh, C.M.T. (2010). Libraries and distance education in Nigerian universities: a revisit. *New Review of Academic Librarianship*, 16(1), 102-115. https://doi.org/10.1080/13614530903584255

Nyamai, F. (2020, November 2). *Kenya: blended learning? Here are the rules, says CUE*. Retrieved March 21, 2022, from https://allafrica.com/stories/202011030116.html

Nyerere, J. (2020, April 29). *Kenya's university students and lecturers face huge challenges moving online*. Retrieved March 21, 2022, from https://theconversation.com/kenyas-university-students-and-lecturers-face-huge-challenges-moving-online-136682

Nyerere, J. K. A., Gravenir, F. Q. & Mse, G. S. (2012). Delivery of open, distance, and e-learning in Kenya. *The International Review of Research in Open and Distributed Learning*, 13(3). Retrieved March 22, 2018, from http://www.irrodl.org/index.php/irrodl/article/view/1120/2203

Oyedokun, T. T. et al. (2018). Assessment of ICT competencies of library staff in selected universities in Kwara state, Nigeria. *Library Philosophy and Practice*, 1797. Retrieved June 20, 2018, from https://digitalcommons.unl.edu/libphilprac/1797

Palumbo, L. B. (2014). Mobile phones in Africa: opportunities and challenges for academic librarians. *New Library World*, 115(3/4), 179-192. https://doi.org/10.1108/NLW-01-2013-0008

Saleh, A. G. (2015). Meeting the information needs of remote library users: the case of University of Maiduguri Distance Learning Programme. *Information Impact: Journal of Information and Knowledge Management*, 5(2): 1-16.

Shonhe, L. & Jain, P. (2019). Reshaping libraries for the 21st century: user perspectives. *Zambia Journal of Library & Information Science*, 3(1&2)

Tallam, E. (2022, May 24). *'Bundles mwitu' and Kenya's booming parallel data markets*. Retrieved August 30, 2023, from https://datarightsafrica.org/bundles-mwitu-and-kenyas-booming-parallel-data-markets/

Tsekea, S. & Chigwada, J.P. (2021). COVID-19: strategies for positioning the university library in support of e-learning. *Digital Library Perspectives*, 37(1), 54-64. https://doi.org/10.1108/DLP-06-2020-0058

Virkus, S. & Metsar, S. (2004). General introduction to the role of the library for university education. *Liber Quarterly*, 14, 290-305, retrieved June 10, 2016, from https://www.liberquarterly.eu/articles/10.18352/lq.7780/

Winata, A.P., Fadelina, R. & Basuki, S. (2020). New normal and internet services in Indonesia: a case study of university libraries. *Digital Library Perspectives*. https://doi.org/10.1108/DLP-07-2020-0059