

Information and Communication Technology (ICT) Tools and Provision of Digital Reference Services in University Libraries: A Review

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ABSTRACT

The paper discusses the concept and types of digital reference services provided in university libraries. The paper also highlights some media tools that university libraries can employ to provide digital reference services given the effect of social media platforms such as FaceBook, WhatsApp, X, blogs, etc on human communications especially, the communication patterns and information services and user attitudes in university libraries. This means that the available social media tools can enhance the digital reference services provided in university libraries. Consequently, major services such as current awareness services, selective dissemination of information, document delivery services, and readers' advisory services offered with the aid of technology are discussed. The paper emphasizes that effective digital services using information and communication tools enhance work output in university libraries. Several recommendations for effective digital reference services in Nigerian university libraries were made including adequate budget, strategic plan, and availability of skilled personnel. This would ensure that university libraries provide effective digital reference services and stay updated with the developments brought about by information and communication technology (ICTS) tools

***Keywords:** Information, Communication Technology, Libraries, Digital Reference Services, University Libraries, Academic Libraries*

Introduction

The proliferation of information and communication technology is making many libraries move toward digitalization. To support its learning, teaching, research, and community service objectives, academic libraries play a crucial role in academic institutions. This is because the library's main function is to provide a variety of resources and services to contribute to the research community it serves. Therefore,

reference is one of the library services that academic libraries provide to their users. Gama (2008) noted that reference service refers to any form of assistance given to those seeking information, whether direct or indirect, in-person or remotely. Librarians provide reference services through various formats, ranging from fixed desk, telephone, and e-mail, to more recent virtual reference and information services. As a result of the availability of ICT tools such as search engines, smartphones, electronic books, and social collaboration tools, users demand easy

and efficient access to scholarly publications as opposed to traditional reference desks. However, libraries relied on face-to-face communication, telephones, and fax machines to answer reference questions before using the Internet and other digital means. The growth of the Internet made it possible for libraries to use a new medium to provide digital reference services. Consequently, users expect their libraries to provide more online services, such as access to online catalogs, the ability to submit requests online, access to electronic resources, and the provision of some kind of digital reference service. This paper aims at examining the available information and communication technology (ICT) tools and the provision of digital reference services in university libraries for effective information services delivery.

Concept of digital reference services

Reference services are the part of library work where users receive direct or indirect help, either in person or through electronic means (Prytherch, 2015). Dollah et al. (2015) state that libraries have provided reference services for many years. Since its emergence about 140 years ago, this service has been offered at all kinds of American libraries since 1876 (Deng, 2014). In addition to all the operations of libraries, one service that links users and libraries is a reference service. To meet users' demands, the library organization relies heavily on direct user interaction. To gain a deeper understanding of reference services, many academics have undertaken extensive research on the subject, including Samuel Sweet Green, Margaret Hutchins, and Samuel Rothstein (Deng, 2014).

Digital reference services refer to all activities carried out by qualified librarians to meet the information needs of users in a digital environment. Today, digital reference services are one of the main services offered by libraries. Historically, digital reference services first started in 1984 as an e-mail service and was called electronic access to reference services (Dollah et al, 2015) while

in 1992, AskERIC was started (Singh, 2012). By mid-2002, digital reference services had been adopted by more than 1,000 libraries in the US (Bakar, 2012). In cooperation with OCLC, the Library of Congress and OCLC have established Question Point Service as a service for collaborative reference.

Usman and Attahiru (2015) opined that digital reference service is the act of bringing into contact with the right reader and the right digital reference resources at the right time and in the right personal way. Digital reference service goes beyond bringing the user in contact with the digital reference sources; it is a daily routine of responding to users' queries. In its broadest sense, it is designed to help the user in his search for information, education, and knowledge (Owolabi, 2015). Similarly, Salami, Akawu, and Saka (2017) argued that a fundamental part of library activities is the provision of digital reference services without which research and development cannot be justified in digitization era.

According to Janakrmani and Subramanian (2015), the provision of an effective digital reference service and the rapid resolution of user inquiries by the digital librarian, which have a significant impact on user satisfaction is one of the means of meeting the needs of the university and research community. In the context of the importance of digital reference services, Kumar (2013) argued that digital reference services help clients get the right documents and information at the right time, thus boosting the library institution. To avoid duplication of efforts, digital reference services assist researchers in developing new ideas. To make the right decisions, information is made available for decision-makers. A satisfied user is a friend of the digital reference service. To that extent, digital reference services are one of the most important services that allow for the efficient and convenient operation of referral services in real-time, e.g. by email service, FaceBook, Instagram, X (formerly Twitter), etc., (Malik & Mahmood, 2013).

According to Uzoigwe and Eze (2018), digital reference services have always been the main component of library services as well as being very important for university libraries around the world. This is because it helps users with their information needs. According to Dollah et al (2015), digital reference services generally contain the following elements: users of the service: a library user who is asking questions, etc.; the interface: e.g. email, web pages, chat, videoconferencing, etc.; Information professionals: librarians or information agents who will find and answer users' questions; and electronic resources, including CDRoms, web resources, local materials, printed materials, etc.

Types of Digital Reference Services Provided in Academic Libraries

The digital reference service can be broadly classified into two types asynchronous and synchronous, based on the way it receives and responds to queries in university libraries.

Asynchronous Digital Reference Services

A service characterized by communication in one direction at a time is an 'Asynchronous digital reference service'. A library user may use a web-based e-mail, or web form, or Ask-a-Librarian service to enquire about his or her information needs from a librarian. According to Uutoni (2018), asynchronous communication is defined as the transmission of messages in one direction or another. In addition, the researcher pointed out that the term asynchronous refers to a transaction in which there is a time delay between the question and the answer. In Khan, Malik, and Idrees (2017) it is argued that asynchronous services lead to delays and prolongation of responses, particularly by using e-mail and web forms. Younus (2014) noted that the asynchronous reference service allows librarians to answer requests in their own time after a proper search has been performed. This could improve the accuracy and completeness of the responses. Asynchronous transactions, such as email,

web forms, and Ask-a-Service, are usually used.

Synchronous Digital Reference Services

Synchronous transactions occur in real time, with an almost immediate response to a query or request. Synchronous transactions generally take the form of chat reference, video-conferencing or web-camera services, digital reference robots, collaborative digital reference services, etc (Uutoni, 2018). Similarly, synchronous service is described as 'real-time', with an immediate response to the query. It is a two-way communication between the user of the library and the librarian over the Internet. Communication tools such as telephone, instant messaging, voice over internet protocol (VoIP), and webcam services are employed in this communication (Dollah, 2012). Synchronous services provide real-time communication between the library user and the librarian in the library, using interactive technologies, e.g. a library user clicking a button on a web page to communicate with the librarian and receive instant feedback on their questions.

Collaborative Network for Reference

In the case of collaborative networks for reference, however, numerous libraries work together to become members of these networks to employ collaborative services for digital reference services. This shows that reference services on any of the online formats are provided as part of the service by collaboration between two or more libraries. Some library consortiums provide member libraries with the ability to exchange reference questions over the Internet or other technologies. The collaborative digital reference service (CDRS), operated by the Library of Congress is an international network of libraries, consortia, and museums Aska service that uses a help desk system to route questions to appropriate institutions based on member profiles.

ICT infrastructure for the Provision of Digital Reference Services in Libraries

Information and communication technologies (ICT) is a general term used to describe technologies that are used for the collection, storage, editing, or communication of information in different formats (Raji, 2018). However, information and communication technology is the application of technologies consisting of hardware, software, network, and media for the collection, storage processing transmission, and presentation of information in vocal, textual, pictorial, and multimedia formats (Sheik, 2019). ICT also refers to the use of computers and other technologies for library practices such as the acquisition, storage, organization, and dissemination of information. In the areas of reference service using ICT, Gama (2012) added that for digital reference services to be provided in libraries, ICT infrastructure ranging from Communication and its peripherals, telecommunication facilities including modem, Internet service providers, relevant software that would allow interconnectivity among computers remotely, constant power supply as well as trained personnel, etc. must be provided. Babatunde et al, (2020) noted that the application of ICT to store and process large volumes of information in combination with the ability of IT professionals to transfer such information from one place to another has a huge impact on data storage, retrieval, and dissemination in libraries.

Khan (2016) opined that information and communication technology (ICT) has transformed library services globally. The majority of information is recorded in electronic form, and ICT has also greatly contributed to the work of librarians in carrying out their tasks, such as cataloging and classification, reference services, circulation management, serials control, and eLibrary (Adibi & Okocha, 2019). Some ICT applied in digital reference services in libraries include:

1. Computers

Computers are essential management tools that can be used for more

efficient operation of the various operations. Computers may be used for different activities such as the creation, processing, storage, analysis, and dissemination of information for digital reference services. A large number of advantages, such as rapid information transmission, cost-effectiveness, and optimum use of available resources are noted for the use of computers in libraries.

2. Internet

This ICT resource is a means to speed up the flow of information. It is a network of computers, communicating with others, often via a telephone line. The Internet provides a worldwide platform for information sharing among individuals, institutions, and organizations for digital reference services. The use of the internet enables libraries to provide current and timely information to enhance digital reference services (Toyo, 2017).

However, the Internet has become an information superhighway and opened the floodgates for scholarly communication. Also, Internet is a truncated version of internetworking, which refers to interconnecting two or more computer networks. The Internet is also described as a worldwide network of computers and people. It is an important tool for global online services. The emergence of the Internet offered very high bandwidth, which widened the scope for information processing and dissemination as never before. Consequently, the Internet connects universities, colleges, schools, and other educational institutions for information sharing and exchange. Access to information through the Internet has changed the total scenario of librarianship (Mishra & Mishra, 2014).

3. Social Networking and Networking Technology

Social networking is the use of Internet-based social media sites to stay connected with clients by libraries for digital reference services. Social networking as an infrastructure for the provision of digital reference services can be through sites such

as FaceBook, X, LinkedIn, and Instagram, among others (Toyo, 2017).

One of the new consequences of creating communication networks was social networking in libraries (Eslami, 2014; Serrat, 2017). Social networks are social relationships that have grown significantly compared with other media and have been able to attract massive and heterogeneous audiences around the world (Amiri & Abadi, 2012). Hence, these networks have been able to occupy their place in people's lives including librarians.

Also, many people from different ages and different social groups including libraries, have come together in social networks, and they are communicating from real-world far away distances through social networks. Hence, the tendency towards social networking sites around the world is still growing in libraries (Serrat, 2017; Eslami, 2014).

Social networks consist of generally individual or organizational groups as well as university libraries that are interconnected with one or more types of affiliations and, in the context of a complex information society, depicts the effective functioning of the convergent network, and their growing success and popularity is as a result of their social nature (Asadi, 2014). The origin of social media was the Web 0.2 phenomenon, which provided the necessary mechanisms through social networking sites to create a new space called "cyberspace" (Kratzer, Christopher, Nikolaus & Peter, 2016). In other words, social networks are groups of people or organizations as well as university libraries with common interests or interests that come together to achieve specific goals in digital reference services.

4. World Wide Web (WWW)

This is also an internet-based infrastructure for digital reference services. The World Wide Web was developed in 1989 by Tim Berners Lee and by 1995 the Web had expanded to global proportions

(Mishra & Mishra, 2014). The World Wide Web (WWW) is a client server-based, distributed hypertext, and multimedia information system on the Internet. Websites help university libraries in the dissemination of information and services. Relevant information is made available to members of the university community through the library websites. Being on the web places any organization on the right course for speedy and digital reference services in line with the emergence of changes in technology (Toyo, 2017). A library website provides a library with a website to offer its services and to tell its story to its community. An online catalog is included on most library websites. A library web page or Universal Resource Locator (URL) facilitates single-window access to various web-enabled library services.

Online Public Access Catalogue

It is the computer equivalent of the library catalog used to access information materials in the library. It is an online database of materials held by a library or group of libraries. It is a computerized library catalog made available to the public. Most OPACs are accessible over the internet to users all over the world. Ndumbaro (2018) investigated the provision of an online public access catalog (OPAC) by librarians, to see the causes behind success and failure in search results. The results of the study revealed that the author, subject, and title of the documents were preferred areas to retrieve information in the university libraries. Moreover, the study added reasons behind failure in the search results, mainly misspelled entered queries, searching inappropriate fields, and users' lack of knowledge and syntax also affected unsuccessful results for access to digital reference services. Wu, Liang and Bi (2018) conducted a study to understand the cross-device online public access catalog-search characteristics and query reformulation patterns during device transformation. The research approach was a months-long quantitative analysis in the university library to evaluate the richness of vocabulary, use of

specific terminologies in searching, query reformulation, and query divergence. The study revealed that PC-PC transition was significant in device transition, time break of device and web search transition were different, rapid transition found on the web thus short device transition occurs in the daytime and a good number of users preferred to search same field for access to digital reference services in university libraries.

5. Library Management Software

The software consists of step-by-step instructions that tell the computer what to do. In a university library, the most common computer software used are library automation, database management, antivirus, and application software. Many software packages for various applications in the field of library & information services and management are CDS/ISIS, SOUL, LIBSYS, KOHA, etc. used for automation purposes (Mishra & Mishra, 2014). In the same vein, Open Source Software or OSS is a freely available computer software, which allows for altering the source code and customizing the software to anyone and for any purpose. In the last few years, we have seen the development of many Integrated Learning System (ILS) products in the open-source world such as Koha; Digital library software, like Greenstone; Digital Repository Software, like DSpace; Content Management Software, like Moodle, etc. In the same vein, Sobalaje, Ajala, and Salami (2018) reported that the provision of Koha software has become a burning issue among librarians in Nigeria. The researchers further noted that providing Koha in university libraries was extremely necessary to achieve digital reference services. Also, the findings showed that Koha could not function at full strength if required tools and accessories were not incorporated for appropriate applications. Consequently, the computerization of library processes was the only way to ensure that the librarians performed efficiently and improved service delivery to the library and prospective users for digital reference services.

6. Institutional Repositories

According to Mishra and Mishra (2014), an institutional repository is an online archive for the collection, preservation, and dissemination of digital copies of the intellectual output of an institution, particularly a research institution. They further noted that this includes materials such as electronic journal articles, both before (preprints) and after (post-prints) undergoing peer review, as well as digital versions of theses and dissertations that are adopted and used for digital reference services. Also in their study, Kari and Orji (2022) described institutional repositories as an online platform for storing research output that does not meet the standard of publishing in peer-reviewed journals. Also, the researchers further described institutional repositories as a digital community that hosts and preserves the intellectual output of a single or multi-university community that provides evidence of the features of such a community. According to them, institutional repositories serve two purposes which include collections of intellectual research output and showcasing the characteristics of the institution involved. In a nutshell, institutional repositories serve as a way of communicating the ideologies of an academic institution and positioning it in the minds of the general public both locally and internationally for digital reference services.

Major Services Provided through Digital Reference Services in University Libraries

A well-established university library is essential for any academic institution. However, as a focal point for teaching, learning, and research, librarians are expected to provide standard information resources for digital reference services. Today, university libraries are struggling to keep their place as the major source of inquiry in the face of emerging digital technology. In this regard, digital technology has revolutionized not only the way information is packaged, processed, stored, and disseminated but also how users seek

and access information (Sankar, & Sankar, 2022).

Electronic Current Awareness Services

The advent of electronic information services has created a new set of demands for librarians and other information providers for digital reference services. Toyo (2017) noted that a selection of current awareness services in the form of table of contents (TOC) alerts, a list of new arrivals of journals and books, press clippings, and research digests, including abstracting and indexing services, had been provided by librarians in electronic form for digital reference services. Jafaru, Abubakar, and Isah (2021) studied the impact of web search engines on digital reference services in academic libraries in Sokoto State. The findings revealed that 32% of the respondents indicated that the libraries offered selective dissemination of information services, 56% current awareness services, 4% receiving and answering questions, and 4% all of the above services. This shows that the majority of the services offered by the libraries are current awareness services. It, therefore, signifies that academic libraries in Sokoto State offered the most current awareness services to their users, followed by selective dissemination of information.

Electronic selective dissemination of information (SDI).

The emergence and widespread use of Internet and web technologies have had a profound impact on library operations and services. Consequently, reference and information services rendered by university libraries manually consume a lot of time for the expectations and aspirations of patrons to be met in today's digital age. Okehie, Nnadieto, Obiano, & Ogonna (2022) submitted that selective dissemination of information (SDI) refers to tools and services provided by librarians to keep library users informed of new resources on specific topics for digital reference services. They further stressed that the main reason for the selective dissemination of information was to provide users with information that would promote

their research and day-to-day activities. Also, it relieved users of the problem of sieving through a large number of documents before getting the relevant document. Electronic Document Delivery Services

Document delivery services in the digital environment typically involves a combination of paper, digital, and electronic media. Document delivery is a "hybrid" medium provided by librarians for digital reference services. In this regard, librarians provide ICT-based interlibrary lending systems via electronic networks to deliver copies of electronic journal articles and other documents in digital format, mainly in portable document format (PDF) for digital reference services. Document delivery services were slightly different from interlibrary lending (Nche Che, Njiraine, & Makori, 2022) because they involved the delivery of information directly to the users with the aid of technology applications such as facsimile and specialized applications such as Ariel and Odyssey to deliver information for digital reference services (Kristof, 2018).

•Online Readers Advisory Services

University libraries were implementing web-based versions of readers' advisory services through digital reference services. However, it helps to find the right information as well as reading material for the right person at the right time and provides the best information that matches the needs and interests of the users for effective digital reference services. (Mishra & Mishra, 2014). Imam, Oyeleye, and Remilekun (2019) studied the influence of readers' advisory services on the information retrieval competencies of the students in the colleges of education in south-west Nigeria. Results showed that students' information retrieval competencies were on average and that readers' advisory services enhanced students' effective access to library online collections provided by librarians in university libraries.

Use of Social Media Tools for Digital Reference Services in University Libraries

The emergence of social media also powered by information and communication technologies, has led to changes in users' attitudes, and behaviour as well as the way university libraries serve reference and information services. Social media tools such as FaceBook, Blogs, X, and YouTube, among others, have changed many aspects of human communication, including the attitudes and communication patterns of users of university libraries and information services by university libraries. This means that social media tools available to enhance the digital reference services provided to users are now being used by university libraries.

Okoro and Nwafor (2013) argued that social media are interactive Web-based platforms that offer users of digital reference services the possibility to share opinions, experiences, views, contacts, knowledge, or expertise remotely with university libraries. To that end, Ogbe (2014) asserted that social media as an Internet medium is giving rise to digital reference services that are beyond the constraints of traditional media.

In addition, Shehu, Urhefe & Aworo (2015) also explained that social media is “a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content; social media consists of various user-driven marketing channels, e.g. FaceBook, X, Blogs, WhatsApp, etc for digital reference services and has many benefits for libraries and their clientele.

1) Facebook

Another tool that university libraries can use to disseminate information and improve the library's global profile is FaceBook. According to Priolkar and Kumbhar (2015), there are several ways in which FaceBook can be used to raise awareness of the use of digital reference services. They stressed that through the

FaceBook page/account, university libraries can draw users' attention to useful hidden treasures of the library that library users have forgotten or are not aware of, such as grey literature, current awareness resources, and reserve resources.

Other platforms, such as X feedback, library calendar, and library blog, can also be used to populate FaceBook. Similarly, to facilitate users of the library, OPAC search can be embedded on a FaceBook page. Gallardo (2013) also suggests best practices for libraries' FaceBook pages: stay to the point, pin important posts to the top of the page, be casual and conversational, use images, post consistently, post the same types of content on the same day of the week, give fans access to exclusive information or content, find the optimal time to post and take advantage of Insights.

Also, Mwantimwa and Ndenje Sihalwe (2017) in a study conducted on the use of digital information resources in Tanzania, revealed that the library website (48.7%), academic staff (46.2%), and social media platforms such as FaceBook were the most relied upon sources for access to the available digital resources in their respective institutions.

2) X (formerly Twitter)

X is another platform that can be used for digital reference services for frequently updating collections, new arrivals, current content services of the library, and advertising library services. Waddell and Barnes (2012) noted that the ease of posting and sharing information on X makes it an essential tool for university libraries to reach their users. Libraries can use this platform to give users firsthand information on ongoing events.

Bosque, Leif & Skarl (2012) posit that many features make X suitable and probably preferred for use in libraries. One such feature is that X is free and thus eliminates cost implications for use. Again because X utilizes microblogging, staff time involved is minimal. Moreover, because many patrons use X, it is easy to forge connections with them using X.

This infers that users send in queries and get feedback from university libraries. X can be used to keep university libraries and patrons updated on the library's daily activities for example, frequently updated library collections. Users can utilize this platform to type in short messages or status updates. It was also emphasized that X can create library service alerts (Ezeani & Igwesi, 2012).

3) Blog

The blog is an important social media tool for digital reference services that enables university libraries to provide and promote their library activities and services. Kwanya, Stilwell & Underwood (2012) observed that blogs are very helpful in promoting library services like new acquisitions, opening hours, library events and programs, online discussions, etc.

Wasike (2013) added that university libraries can post news about the library as well as events occurring in the library. This implies that there is a need for consistent updating of the blogs to keep the libraries as well as users abreast of available library services and resources. Also, Blogs enable university libraries to post messages periodically, share information on a particular subject matter, and let users comment or contribute to the subject matter that is being discussed and expect instant feedback (Ezeani & Igwesi, 2012)

4) WhatsApp

WhatsApp is yet another social media platform for digital reference services that allows interaction between library staff and their colleagues and also promotes library services to users. WhatsApp Messenger is a 'cross-platform messaging application which allows users to exchange messages without having to pay for SMS' (WhatsApp.com, 2012). The application is compatible with iPhone, BlackBerry, Android, Nokia, and other Windows smartphones.

WhatsApp features include one-on-one chat, group chat, push notifications, and sending and receiving both video and audio

files (Shambare, 2014). By September 2015, it was estimated that WhatsApp had more than 900 million monthly active users up from over 700 million in January 2015. The service is one of the most popular mobile apps worldwide (Statista, 2015).

Conclusion and Recommendations

In conclusion, university libraries should stay updated with advances in the information and communication technology (ICTS) era to provide digital reference services. Meanwhile, one method to stay up with change is to give library patrons unrestricted access to electronic information resources while monitoring them. The ability of university libraries to handle the issues related to ICT is also a determining factor in the success of ICTS applications to provide digital reference services. Based on these following recommendations were made;

1. Budget should be allocated for the development of ICTS infrastructure. University libraries ought to consider the possibility of consistently requesting from their administration adequate funding allocations for the advancement of ICTS for effective digital reference services delivery in libraries.

2. A strategic plan for ICT infrastructural development in university libraries for information services should be provided. This signifies that policies and strategic plans should be offered for the development of ICT infrastructure in university libraries to support information services, this will create an environment that is conducive to effective digital reference services.

3. Librarians and other paraprofessionals should be trained and retrained to function effectively in an IT-driven information environment. Gaining the necessary ICT skills will enable them to create digital information resources and make strategic plans for effective digital reference services delivery in university libraries.

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