

Rural accessibility to digital libraries: requirements and challenges

Mapheto J. Mamabolo and Oluwole Oluvide Durodolu
*Department of Information Science, University of South Africa,
Pretoria, South Africa*

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Abstract

Purpose – This study aims to determine the requirements and find out the challenges for the use of digital library services for rural areas of Capricorn District Municipality, Limpopo province. The research questions of the study are: What are the requirements for the use of digital library services in rural areas of Capricorn District Municipality? What are the challenges of accessing digital library services in rural areas?

Design/methodology/approach – Data was analysed thematically and deductively in this study, as researcher required to accomplish the purpose of the study through consistent structure (Zalaghi and Khazaei, 2016). In deductive analysis, the researcher starts with a set of categories, which are then used to categorize and organize data (Bertram and Christiansen, 2020). The researcher got familiar with data from the interviewing process and when transcribing data from audio tape. The transcription process was done for the coding purposes. Coding allows the researcher to simplify and focus on specific characteristics of data.

Findings – The study findings advocate for the establishment of digital libraries in rural areas. The library authorities are challenged to adapt digital ways of information provision. Since librarians have been providing digital content in libraries for use on users' laptops and other gadgets, this implies that the Department of Sport, Arts and Culture has been lagging behind in finding innovative ways to provide information, especially in rural areas. To successfully keep libraries as sources of information, transformative measures have to be taken, and where possible, revisit the policies and keep drifting with the societal changes. The library authorities have to delve into new ways of providing LIS to the communities. Unquestionably, information and communication technologies have penetrated our societies and became a way of life. In addition, there are unlimited benefits which can be derived from digital technologies, especially given the lack of physical libraries in rural areas.

Originality/value – To the best of the authors' knowledge, the academic research is original and has not been published anywhere before.

Keywords Digital library, Digital library access, Requirements, Challenges, Library and information services, Rural areas

Paper type Research paper



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1. Introduction and background

This study focuses on digital library as a tool which enables access to Library and Information Services. The study is based in the rural areas of Capricorn District Municipality. Rural areas in this study refer to remote and scattered dwellings characterised by poverty, uneven distribution of essential services and lack of proper infrastructure. People in these areas have to travel to urban or semi-urban areas to access basic services such as libraries, shopping and health care. The rationale behind this study was inaccessibility of physical libraries for rural inhabitants, who suffer from accessing library and information services. Additionally, the pace at which physical libraries are built is remarkably slower as compared to the demand. The backlog in the provision of library services through physical libraries and the growing population also show that it might take forever to realise inclusive library and information services. With the rise of “the internet way of things” by Rifkin (2014), the researcher was motivated to investigate if the internet and computer technologies could be used as a medium for accessing LIS. That was how digital library concept became the centre of this study. The study sought to investigate the requirements and challenges of accessing digital libraries in the rural setting. The study aspire to create context-specific data or knowledge on accessibility to digital libraries by rural users. The rural areas can benefit from this tool since Khanya (2021) attests that digitised service enables easier and faster accessibility, which increases the usage of materials in public libraries. However, there might be prerequisites which users need to be able to access the digital library. Therefore, affordability or provision of the requirements and solutions to the challenges are believed to facilitate the smooth access of DLs.

Digital library can be described as a technological resource for collecting information, storing in electronic format and making information available and accessible remotely through the use of internet and end-user interface. Zha *et al.* (2015) support that, with digital libraries, users can be freed from temporal and spatial limitations to enjoy the ubiquity and convenience of digital libraries. Moreover, digital libraries can deliver information resources and associated services to their users through various information and communication technologies (ICTs) (Zha *et al.*, 2014; Chisita *et al.*, 2021). Leedy and Ormrod (2010) indicate that libraries may eventually exist with the advances in telecommunications. Leedy and Ormrod (2010) further express that one can access books from all available sources and through a familiar language in all spaces, such as homes, offices, classrooms and cars. Zirra *et al.* (2019) add that African countries can have the capacity of filling the information gaps in their various sectors if digital libraries are put in place to facilitate proper information gathering, processing, distribution, access as well as its application.

2. Purpose of the study

This study is aimed to determine the requirements and find out the challenges for the use of digital library services for rural areas of Capricorn District Municipality, Limpopo province. The research questions of the study are:

- RQ1. What are the requirements for the use of digital library services in rural areas of Capricorn District Municipality?
- RQ2. What are the challenges of accessing digital library services in rural areas?

3. Theoretical frame work and literature review

This study is guided by the constructs of system quality and intention to use from the theory of Delone and McLean (2003) (Figure 1).

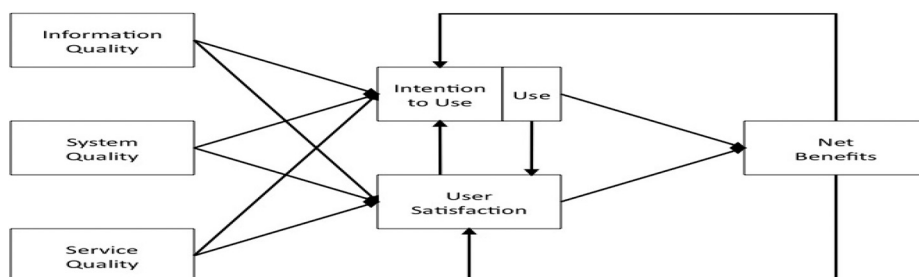
The Delone and McLean’s information system success (D and M ISS) model was used to provide structure and direction to frame the research questions, collection of data and data analysis. [Bertram and Christiansen \(2020\)](#) allude to the fact that researchers may use a theory to design a study, which has an influence on how they collect data and analyse it. The constructs of system quality and intention to use from the D and M ISS were used, and they enabled the researchers to construct and design the research questions and provided guidance on selection of relevant data and interpretation of data. Moreover, it explained the relationships between variables, which are central to this research study. The independent variable (system quality) has a direct influence on dependent variable (intention to use), which influences the ultimate use of the digital library. The constructs of the theory are discussed as follows:

3.1 Information quality

Information quality has been seen to be a noticeable success factor when investigating overall information system success, particularly in the context of Web-based systems ([Schaupp et al., 2006](#)). [Delone and McLean \(2004\)](#) corroborate that information quality affects information satisfaction. Relevance, understanding, accuracy, conciseness, completeness, currency, timeliness and usability are determinants of information quality ([Delone and McLean, 2016](#)). For a digital library service to be regarded as of good standard, it has to provide information sources that satisfy the end-users demands. Its value can directly attract or detract the users from using or relying on the digital library.

3.2 System quality

System quality is often assessed under the dimensions of flexibility, reliability, functionality, ease of use, data importance, integration and quality ([Delone and McLean, 2003](#)). Measuring variables to system quality are accessibility, ease of use, navigation, reliability, efficiency and flexibility ([Alzahrani et al., 2017](#)). The digital library system has to be accessible with ease and meet the expectations of users. For it to be accessible, there should be requisites from the users to match the provisions of the information system (digital library). The researchers were motivated to investigate the requirements which are needed for accessing digital libraries. Therefore, this construct aligns with the research objective that sought to determine the requirements for the use of digital library services in the rural areas of Capricorn District Municipality.



Source: Delone and McLean (2003)

Figure 1.
Updated DeLone and
McLean IS success
model (2003)

3.3 Service quality

The quality of support that the system users get from the information system organisation and IT support personnel, for instance, responsiveness, accuracy, reliability, technical competence and empathy of IT personnel staff, determine the service quality of information systems. The digital library personnel have a role to play in ensuring that the system and client management are in the best position to ensure that the users feel free to use or ask queries about the digital library. This ensures that the digital library services of good value might be provided to the rural users.

3.4 Use

It is the degree and manner in which the users of the digital library use the services of the digital library system. It can be measured by the amount of use, frequency of use, nature of use, appropriateness of use, the extent of use and purpose of use.

3.5 User satisfaction

According to [DeLone and McLean \(1992\)](#), user satisfaction and use of the system are interlinked. The use of an information system directly affects whether or not the user will be satisfied. User satisfaction triggers the user to use the system for the future use or the next project, while non-satisfaction may discourage future use. [Alzahrani et al. \(2017\)](#) outline variables such as adequacy, effectiveness, enjoyment, information satisfaction, system satisfaction and overall system as the determinants of user satisfaction. This concept aligns with the research objective, which sought to find out the challenges of accessing digital library services in rural areas. If the challenges of accessing the digital libraries are provided solutions, the users will be content with the use of such libraries, and the probability of using them for future information need is likely.

3.6 Intention to use

The user-satisfaction and net benefits trigger the intention to use an information system. The experience of usage and satisfaction or non-satisfaction from using the system of information directly have an effect on the user on whether it is worthwhile to use the system or not. In addition, the fewer the challenges, the more likely digital libraries are to be used as means of information access. Therefore, the researchers were intrigued to find out the challenges which have a potential to discourage the use of digital libraries and to find ways which can promote user-satisfaction and attainment of digital libraries' benefits in the rural areas. Therefore, the concept of *intention to use* shaped the research objective, which sought to find out the challenges of accessing digital library services in rural areas.

3.7 Net-benefits

Net-benefits are the extent to which information systems are contributing to the success of information system users. Contributions may be in the form of improved decision-making, improved productivity, increased sales, cost reduction, improved productivity, enhanced profits, market efficiency, consumer welfare, creation of jobs and economic development ([Delone and McLean, 2016](#)).

3.8 Requirements for the use digital library services

With lack of financial resources, African countries may not afford to buy the necessary information materials to support quality education and research programmes ([Juma et al., 2014](#)). However, digital libraries in developing countries are a great hope as long as

computers and internet are available (Da Rosa *et al.*, 2012). Juma *et al.* (2014) add that digital libraries have potential to offset knowledge deficits, particularly in Africa.

Digital libraries depend heavily on the digital media, particularly the internet. For the African continent to make a meaningful impact on generation and dissemination of digital content and reduction of the knowledge gap between citizens, libraries and the rest of the world, their internet connectivity must be in good condition (Juma *et al.*, 2014). The internet is an essential resource for accessing information from various platforms and a cheaper way of communicating across all regions, regardless of location. Furthermore, it can enable human rights, empower communities, and facilitate sustainable development (Ayeni, 2019). Nazim (2009) points out that the digital library contains a digital representation of the objects found in it and is accessible through the internet, even though it is not accessible to everyone. Briggs (2021) notifies that by the year 2019 only 1.2% of the rural population had access to internet at home, with metropolitan areas at 15.4% and the urban areas at 7.2%. Moreover, data costs in South Africa are revealed to be 22 times more expensive than the cheapest data cost average in the world. However, internet generates prospects for individuals to access information and communicate inside and outside formal institutions (Goldie, 2016).

Recently, more and more libraries are embracing mobile technologies to deliver innovative services and presenting ways for users to incorporate library services into their daily lives (Wang *et al.*, 2012). Mobile phones are becoming more popular and becoming almost indispensable in people's day-to-day lives. People are adapting to mobile technology more easily than other technologies. Moreover, improvement in mobile communication technology will significantly facilitate the library and information services. Library mobile services are an extension of the digital library on the mobile communication network. Their services rely on mobile communication technology, mobile phone users and digital library systems (Kumar, 2014). Therefore, Da Rosa *et al.* (2012) suggest that if computer access in developing countries is a real challenge, a potential alternative is making digital libraries accessible on mobile phones. Contrary to that, West (2015) believes that smartphones are beyond the affordability of many people. User needs, requirements and issues related to the use of mobile phones for online activities have to be fully understood. Moreover, Da Rosa *et al.* (2012) mention the challenges of accessing digital libraries through mobile phones as reduced screen space, content inadequacy, input constraints and device limitations. The small screens are not easy to work on, the contents of a digital library require adjustment of the small screen size; the mobile phones are usually limited to the keypad with small keys and no pointing device; and some mobile devices have limited processing power, as well as working and storage memory.

Despite the assumed challenges of access to digital libraries through mobile phones, Da Rosa *et al.* (2012) guide that it is important to understand the potential users in advance of their information needs, what functionalities they want and kinds of mobile devices they possess; the mobile site should have distinguished interfaces for all kinds of phones; the mobile site should have all the functionalities found in the full desktop site; offline access is a critical necessity or some mobile-specific features are needed; therefore, a mobile application is recommended over the mobile site; and attention should be given to usability and interaction design to accommodate specificities of mobile environments and equipment.

3.9 Challenges of accessing digital libraries

The digital divide has an impact on access to and use of digital library. Digital divide is defined by Craig *et al.* (2015) as a gap between those who enjoy the benefits of internet access and those who do not. Over 3.1 billion people have access to the internet, while 4.2

billion people are outside the digital revolution, with internet usage growing at $\pm 9\%$ a year across the globe. Those left out cannot enjoy social, economic and civil benefits that derive from digital connectivity.

In some places, policy barriers take the form of censorship from the government or civil society, which puts information behind a firewall or makes it difficult to access helpful content. Moreover, poverty, expensive devices and high telecommunications fees are barriers to internet access in developing countries. Even people with higher incomes do not afford it, as devices and data costs make it impossible to access digital services. Users find themselves covering device prices, connection fees, call costs, text messaging expenses and broadband access. Policy, taxes and operational barriers play a role, as many countries in the developing world have barriers that constrain internet usage. This includes monopoly telecommunications providers, technology sector taxes, lack of digital content, the absence of local language content and censorship by civil or governmental authorities (West, 2015). Poverty is, therefore, a major catalyst for the digital divide, as it cuts across all the demographics.

Getting online, especially for many older and disabled people, is a challenge. West (2015) mentions that challenge for older people is lack of digital literacy. Many of them do not access the internet because they do not understand its benefits or fear its risks, and learning how to use computers requires significant effort, time and patience. Therefore, they demand considerable help and support. Craig *et al.* (2015) agree that digital literacy is fast becoming a fundamental requirement for full participation in the digital world. Other than that, they are vulnerable to capability challenges associated with cognitive and physical changes in the later life. This leads them to forget the sequential processes, negatively affecting their confidence levels in using ICTs. The design of ICTs also continues to pose many problems for older and disabled people, particularly relating to the speed of change and unnecessary complexity of software and products. Keyboard operating challenges caused by age-related conditions and sicknesses; the software updates, license agreements and their implications; and invisibility of accessibility features are other challenges posed by the design of ICTs (Farooq *et al.*, 2015).

Copyright poses a threat to access and management of informational resources in digital libraries. Pal (2015) articulates that the development of digital learning has thrown up new hitches due to the copyright implications of electronic text. Users affiliated with digital libraries should print-on-paper extracts of digitally available works under the same conditions. The library authorities should take the initiative to develop some solution on this aspect, which may benefit learners, publishers and authors. For libraries to qualify for the copyright exemption, they must meet three requirements:

- (1) The reproduction and distribution must not be for direct or indirect commercial advantage;
- (2) The library must be open to the public; and
- (3) The copies must contain a notice of copyright.

Other major challenges are that there is no mechanism available to establish standards for internet materials, instruction, design and quality of interaction; there is a lack of awareness about the use of electronic equipment; and access to the internet in developing countries may not be easy or widespread compared to developed countries.

In Africa, libraries were not quick to embrace digital technologies as compared to the developed parts of the world. This could be attributed partly to the perennial problems of technological infrastructure and requisite ICT knowledge and skills. Furthermore, digital

library initiatives in Africa largely revolved around university libraries, whose efforts in this area were made possible by the need to transform and beef up their print collections, which were highly inadequate (Juma *et al.*, 2014),

There are unpredictable changes in library and information services, which are facilitated by the advancement of information technology, posing challenges to the field as libraries have to accommodate the evolution. The evolution is caused by the advent of digital resources and computer-aided library management systems (Usman and Gopakumar, 2018). Siddiqui and Khan (2017) identify some of the challenges of the digital library establishment as IT infrastructure, electricity problems, computer literacy, technical skills, maintenance of digital resources and equipment, government funding, lack of social awareness, lack of readers and improper information acquisition.

4. Methodology

This study used an interpretive paradigm. Qualitative research approach was used to collect data from the participants. Purposive sampling technique was used to select qualified and practising public librarians to participate in the study from a pool of 23 public librarians. In purposive sampling, the researchers make specific choices about the kinds of people, groups or objects to include in the sample (Bertram and Christiansen, 2020). The researchers excluded the city librarian, senior librarians and assistant librarian from forming part of the sample. The reason was that the senior librarians and the city librarian often delegate the responsibility of providing LIS to the librarians and are understood to hold management positions in the libraries. The assistant librarian was removed for the reason that his or her responsibility involves assisting the librarians, and the duty of LIS provision is not entirely their responsibility but librarians'. Therefore, the sample was limited to 17 public librarians. The researchers encountered unforeseen challenges with regard to interviewing all 17 participants. The researchers could not get permission to conduct interviews from one (1) municipality, which had eight (8) librarians who purposely qualified to be part of the sample. Furthermore, one (1) librarian from another municipality denied being interviewed. Therefore, five (5) public librarians were interviewed during February 2021. Each of the interviews took less than thirty minutes. The remaining three public librarians were not interviewed as researchers realised repetition of responses or data saturation was reached. Jensen and Laurie (2016) attest that the researchers reached saturation point when the cases in the data collection are no longer expanding or changing the depth of relevant ideas that have already come up. Sample size in qualitative studies is not a necessity; instead, the researchers collect data until the saturation point is reached (Kumar, 2014). The researchers interviewed the librarians for the reason that they wanted to "access knowledgeable people" who were likely to provide "in-depth knowledge about particular issues" (Ball, 1990, cited in Cohen *et al.*, 2018, p. 219). The public librarians work on day-to-day basis, with the library users denoting that they were in a position to provide valuable data.

The participants are presented as L1, L2, L3, L4 and L5. Data was gathered through interviews, and the interview schedule was prepared to collect data (Appendix). The interviews were the appropriate data collection method for gathering qualitative data; they helped the researchers to stimulate participants' opinions. Face-to-face interviews were used as they have the advantage of enabling the researchers to establish a relationship with potential participants and therefore gain their cooperation (Henning *et al.*, 2004). Data was gathered through semi-structured interviews. In semi-structured interviews, the researchers use a list of questions which are custom-made to probe participant's reasoning (Henning *et al.*, 2004). The research questions in the interview schedule were set in an order which complemented the objectives and the main research questions of this study, which are about determining the requirements and finding out the challenges for accessing digital libraries in rural areas. The requirements and challenges were

derived from the D&M ISS model, which structured the study. The researchers used both audiotaping and wrote notes to collect information with permission of the participants.

Data was analysed to match the objectives of the study, which were devised from the D and M ISS model, and data which did not relate to the objectives was discarded. Moreover, analysis took cognisance of the requirements and challenges which promote or negatively impact the prospect of attainment *Net benefits* as devised by the model. Data was analysed thematically and deductively in this study, as researchers required to accomplish the purpose of the study through consistent structure (Zalaghi and Khazaei, 2016). In deductive analysis, the researchers start with a set of categories, which are then used to categorize and organize data (Bertram and Christiansen, 2020). The researchers got familiar with data from the interviewing process and when transcribing data from audio tape. The transcription process was done for the coding purposes. Coding allows the researchers to simplify and focus on specific characteristics of data. This allowed the researchers to move from data without structure to meaning finding from the data (Morse and Richards, 2002).

There was an era of neglect of public libraries in South Africa, and the government came up with conditional grant through the Department of Sport, Arts and Culture (DSAC) to redress imbalances through establishment of new libraries and purchasing of new books for the previously disadvantaged communities (Bopape *et al.*, 2021). A project by Bill and Melinda Gates Foundation came to the picture, providing free internet access, technology infrastructure, training and development of library staff on identified training needs through pilot libraries (Ralebipi-Simela, 2015). By the year 2017, Limpopo Province had a total of 97 libraries (National Library of South Africa, 2017), which have to provide LISs to 5,852,553 residents (Statistics South Africa, 2020). This denotes that a single library has to be shared amongst 60,335 people. The statistics are even appalling in rural communities, as most of these libraries are found in cities and towns (Mokgaboki, 2002). Ntsala and Mahlatji (2016) acknowledge that developments have been made to build public and school libraries and upgrade traditionally less equipped library facilities throughout the country. However, the noticeable inadequate provision of LIS remains a challenge even after more than 200 years since the establishment of the first public library in South Africa. The National Library of South Africa (2016) reports that providing libraries in rural communities is a significant challenge for the government. The administration of public libraries is found to be without clear direction, as a study by Bopape *et al.*(2021) revealed that there are sometimes conflicting instructions from the DSAC and the municipalities, and both the provincial and local governments struggle to find one another on issues related to policy, management and funding of community libraries (Mnkeni-Saurombe and Zimu, 2015).

5. Findings and discussion

This section reports and discusses the research findings. The findings are discussed based on the objectives of the study.

5.1 Requirements for the use of digital library services

5.1.1 *Information and communication technology tool requirements.* To find out about the ICT tools which are required by users to access digital library services, the following questions were asked:

- Q1. What kind of information and communication technology (ICT) tool would be needed for a digital library?
- Q2. What are the additional resources needed to use that ICT tool?

The participants provided variety of ICT tools required to capacitate users to access services of a digital library. Those tools are computers, laptops, smartphones, phone, tablets, internet, Wi-Fi, email, scanning and printing devices.

There is a difference between the types of ICT tools mentioned by the participants. A smartphone is defined by [Chmielarz \(2020\)](#) as a multimedia device that possesses the functions of both a mobile phone and a fully portable computer and functionalities of other devices such as electronic cameras, voice recorders, GPS navigation notebooks, computer game consoles and health sensor controllers. A mobile phone with no advanced applications as a smartphone can be used to call the digital library when the users experience difficulties accessing materials and other related queries, and it is limited to calls, short message services. Smartphones can do both computer tasks as well as all mobile phone tasks. A tablet is defined by [Burford and Park \(2014, p. 622\)](#) as a “lightweight, flat and portable computing technology that can be connected to the internet”. A laptop is described by [Foti and Mendez \(2014\)](#) as a portable mobile computer with a large screen and keyboard known for taking notes. L5 mentioned a printer as a necessity for accessing the services of a digital library. A printer is a device that converts electronic information to the paper form. It will be necessary for those who prefer reading on paper rather than on computer/smartphone screens or from a smartphone. Some users may print the information and use it. This shows that users have varying preferences for the format of information sources they need. The format in which information is found may influence the use of the information source. She further mentions a scanner.

A scanner is a device that converts paper-form information sources to electronic format. Users may use the scanner to send information to their study buddies or wherever they want information or documents. L5 regards email as a tool that may be needed for engaging with the digital library. It may be useful for receiving notices and communication between the user and the digital library. Access to the internet remains basic to accessing digital information services. Without internet, there is no realisation of digital libraries.

The users are spoilt to choose from the devices mentioned above but may be limited by financial costs as well as usability of the devices. For instance, smartphones cost less than laptops or desktop computers, while in terms of screen size, users may need laptops or desktops for bigger screen sizes which display information adequately. People earning lower salaries may be bound to access digital library from a smartphone, while other people with better financial standing may use laptops and desktops. Also, with printing devices, the less salary earners may be forced to read from screens and not from paper, as paper format requires more money. In terms of information sharing with peers, the digital library users may scan documents using their smartphones; a scanner may be a surplus.

5.1.2 Computer skills required for accessing a digital library. To find out the ICT tools required by users to access digital library services, the following questions were asked:

- Q3. What level of computer literacy do they require to use that ICT tool? (*the one stated in Section 6.1.1*)
- Q4. What could be done to acquire computer literacy?

The participants demonstrated that basic computer literacy is fundamental to the user on the ability to use the ICT tools mentioned in Section 6.1. They further provided that basic computer literacy can be acquired through self-training, librarians in public libraries, computer colleges and schools. [Fezaa \(2013\)](#) articulates that computer literacy can be acquired through various means. The participants signalled willingness of library professionals to teach and transfer computer skills. L5 adds that online training and

awareness can be inserted into the course of teaching computer skills. [Raju and Raju \(2010\)](#) confirm that librarians offer the opportunity for the public to develop skills for accessing information in diverse forms for effective use.

ICT tools are needed for accessing a digital library, including internet. Those are a gadget used to access internet, for instance, computer/laptop and a printer for those users who prefer reading on paper. Moreover, a scanner may be used for sharing paper-form information between users. However, digital library users need basic ICT literacy skills. [Anyim \(2018\)](#) attests that ICT literacy is an unavoidable element of a digital library, as users must access and evaluate information. The user may self-educate and receive training from public libraries and computer academies. However, it is noted that most people are able to use cell-phones, which they can use to access digital library services. This means that the public librarians perceive the digital library interface as easier and more friendly to use.

The overall view on ICT tools is that laptops, desktops, smartphones or tablets with internet connectivity enable access or are a minimum requirement to access the digital library. [Mnkeni-Saurombe and Zimu \(2015\)](#) in [Mugwisi et al. \(2016\)](#) postulate that access to information and communication technology is important for users. According to [Elahi and Islam \(2014\)](#), users prefer online information through mobile gadgets (for example, mobile phones, laptops and tablets) over desktop computers. A study by [Tella et al. \(2021\)](#) has arrived at similar findings, as it found out that smartphones are used to access library materials and services. Their sentiments support the findings, as all of the participants mention mobile gadgets such as laptops, smartphones and tablets. The advantage of mobile gadgets is that they are portable and rechargeable devices from which every user can access digital materials wherever they are, so long as they have internet access. Therefore, the library authorities have a duty to ensure that all the ICT tools mentioned are supported for accessing the digital LISs.

Access to the internet is reported to be fundamental for accessing digital library services. [Olaewe et al. \(2019\)](#) assert that the user of a digital library and people all over the globe can gain access to digital library as long as internet connection is available. Therefore, without internet, there is no access to digital library.

The printing devices were found to be significant as they support those users who prefer reading on paper rather than on screens. The study by [Jeong \(2012\)](#) showed that printed text has an upper hand over digital text, as reading from screens is associated with eye fatigue and strain. [Singer and Alexander \(2017\)](#) remark better comprehension of read texts from printed sources than from e-sources. In relation to this scenario, the users can access digital materials from a digital library and print for their convenience. In the view of [Perdana and Prasajo \(2020\)](#), many people still prefer to read printed books over e-books, and the demand of printed books in academic libraries surpasses the demand for e-books. Contrary to that, [Connaway \(2015\)](#) stresses that users are not interested in the format of information source but in the convenience of accessing it. Therefore, the library systems and user interfaces should be familiar and easily accessible and should require no training or less training, as convenience is an important factor in all user demographics ([Connaway, 2015](#)).

On the computer skills which are essential for accessing a digital library. It is established that basic computer literacy is important for the users to access digital library. For them to acquire those skills, this study reported that users may self-train, attend training from public libraries and computer colleges, and the scholars can be trained in schools. [Mugwisi et al. \(2016\)](#) acknowledge that most libraries have computer rooms in which users are trained to search for information. Rather than that, users can self-train, as a study by [Taskin and Tuzun \(2015\)](#) shows positive results on self-training. [Taskin and Tuzun \(2015\)](#) observed children between 6 and 10 years of age who never used a computer before; they were left on

computers on their own. After several days, they learned to start and play games, browse the internet, open and close MS Office documents, type through MS-Word and draw through paint. [Mitra and Dangwal \(2017\)](#) confirm that several studies have found that children can learn computer skills on their own, regardless of their demographics. The review mentioned above supports the findings of this current study that library users may “self-educate” themselves. A study by [Fambaza \(2012\)](#) reported that schools have a shortage of computers, and where computers are available, they are not always working.

5.2 Challenges for accessing digital libraries

5.2.1 *Accessibility hindrances to the use of digital library* The question was formulated in the following manner to find what might hinder the use of a digital library:

Q5. What could make accessing digital library services difficult?

The participants highlighted challenges of internet access, network coverage, electricity outages, lack of gadgets, illiteracy, computer skills, budget and infrastructure, which are seen to hinder the accessibility or use of a digital library. [Perdana and Prasojo \(2020\)](#) show that in the situation of electricity outages, a digital library cannot optimally operate. A failure in each role player will result in failure for the digital library to perform its duties accordingly. For an effective digital library to run, it requires funds from both the library body and its users. The users need skills, the gadgets and internet, while the library requires infrastructure. In a situation where one of the requirements is not met, the digital library cannot fulfil its role. Therefore, the network providers, power suppliers, library users and government have a role to play in reaching a digital library goal.

5.2.2 *Skills for accessing digital library.* The question posed was, in this manner, to discover the skills needed for accessing a digital library: Which skills are essential for accessing the Digital Library?

All participants ascertained that without the computer skills, digital library may not be accessed. Others add by mentioning that cellphone operating skills, online services access skills and knowledge of databases are critical for accessing digital library.

The subsequent follow-up question was asked to capture how the skills mentioned above could be acquired:

Q6. How can they be acquired?

The participants expressed that the skills that enable one to access a digital library can be acquired from the library, exhibitions, computer lessons or training. They further believe that the schools should include computer literacy as part of the curriculum. Moreover, users with financial resources can use the services of other institutions for learning the computer skills.

5.2.3 *Digital literacy as a requirement to use a digital library.* The question was formulated as follows to find out if digital literacy is necessary for using a digital library:

Q7. Would digital literacy be required in using the digital library?

All the participants shared a view that digital literacy would be mandatory for users to be able to use the digital library. As digital literacy is a combination of all skills required in the technological era, users need to have skills in locating and using information, creating digital content, communicating digital content ([Khosrow-Pour, 2018](#)) and others related to technologies around digital libraries.

5.2.4 *Library professionals' readiness to manage digital libraries.* The question was formulated as follows to find out about the readiness of public librarians to manage the digital libraries:

Q8. Would it be a challenge for library professionals to manage the digital library services?

The participants were of the view that library professionals can manage the digital libraries given that they are adequately trained. They believe that with training, all challenges will be resolved. According to [Sreenivasulu \(2000\)](#), digital libraries pose many challenges and opportunities. Moreover, digital librarians are required to digitally manage, organise knowledge and information, distribute and provide reference and information services. [Minniti et al. \(2019\)](#) acknowledge that in the rural context, training on the use of digital libraries is vital and is central to rollout of digital libraries. Therefore, training should accommodate all aspects of their daily duty demands for effective and efficient digital library services. Public librarians' responses showed that they are willing and ready to manage digital library services.

5.2.5 *Copyright issues and digital library.* To find out about copyright and its implications for digital library, the question was asked as follows:

Q9. Are copyright issues going to hinder digital library services?

Participants rendered varying answers in this regard. All of them acknowledge the importance of protecting the copyright, with three of the participants confident that the librarians can manage and protect the copyright. [Tripathi and Jeevan \(2011\)](#) express that library professionals should educate and manage the legitimate use of digital sources of information. L3 advised that when users are denied access to a specific book, they can get alternative books that are available for use. L4 and L5 remained unsure of how the issue of copyright can be tackled. L4 further mentioned that copyright, the library and information services or National library of South Africa are bodies that can resolve the issue at hand. Furthermore, it is suggested that the library bodies can compensate the authors for the works accessed online by digital libraries. However, they remain optimistic that there will be a solution.

According to [Fezaa \(2013\)](#), the digital library establishment requires clear policies on handling intellectual property rights. However, this issue remains gloomy as there is no clarity on digital sharing of digital resources through computer networks ([Ilahi et al., 2019](#)). Without the issue of copyright on digital sources being addressed and solution found, digital library will be haunted, which could lead to mismanagement of this kind of a library.

This study found out the challenges of accessing digital libraries. Those are: internet access challenges, network coverage, electricity outages, lack of gadgets, illiteracy, computer skills, finances and infrastructure. However, it is important to note the significant growth of internet users from 1 billion in 2005 to an estimated 3.5 billion at the end of 2015 ([Mishra, 2016](#)). This is due to the rapid diffusion of digital technologies spurred by the proliferation of smartphones, the economics of which have enabled even the poor in developing countries to purchase and connect to the world. In this context, digital illiteracy becomes the major hindrance, wherein the bridging of the digital divide contributes a paltry sum towards closing the knowledge divide gap. A classic case of Matthews's law is that those who possess knowledge reap the rewards, while those who do not possess such knowledge are led further into the darkness of abundant data. [Mishra \(2016\)](#) points out that democratizing knowledge necessitates not only increasing access to digital technologies but also teaching skills for everyone to make effective use of them.

All participants identified computer skills as the main gateway to accessing digital libraries. Furthermore, smartphone operating skills, online service access skills, knowledge of databases, and how they are accessed are additional skills mentioned by the participants. It can be added that these skills need to be complemented by analytical skills and agility of mind that enable the user to quickly adopt to the ever-changing digital environment. When asked how these skills can be acquired, the participants noted that an integral part of the library should play through exhibitions, computer lessons and training. Additionally, the participants said that schools can include computer literacy as a fundamental part of the curriculum. Moreover, users with financial resources can use the services of other institutions for the learning of computer skills. Furthermore, as noted above, the skills to navigate through the maze of information are essential for the effective use of digital libraries. "Within the digital context information sources take various forms, a characteristic that requires a deeper ability by the user to scrutinize and critically evaluate digital information sources". (Lawal, 2017: 23). Regarding the importance of making information literacy part of the mainstream curriculum, Lawal (2017: 23) notes that "by teaching the conceptual models for handling digital information sources through an integrated incremental approach, students can be provided with a broad context for developing mastery of information sources in digitally networked environments".

All the participants expressed the view that digital literacy would be mandatory for users to be able to use the digital library. Attahir (2018: 109) defines digital literacy as "new competencies that equip individuals with the confidence and ability to effectively use digital devices and the internet to find, assess, generate new information and communicate it to others". Apart from the domain of operating digital devices, library staff and patrons need the ability to comprehend and analyse information, and most importantly, the ability to distinguish between reliable and unreliable sources.

On the issues of copyright, the participants rendered varying responses in this regard. All of them acknowledged the importance of protecting the copyright, with three of the participants confident that the librarians can manage and protect the copyright. L3 advises that when users are denied access to a specific book, they can get alternative books that are available for use. L4 and L5 remain unsure of how the issue of copyright can be tackled. L4 further mentions copyright, the library and information services or National library of South Africa as bodies which can resolve the issue at hand. But they remain optimistic that there will be a solution. Copyright is deemed one of the most troublesome barriers to the development of digital library (Chepesuik, 1997). Perdana and Prasojo (2020) express that digital materials are susceptible to copyright infringement unless there are systems in place to detect plagiarism. They further show that most of the authors are reluctant to sell their books in a digital form.

6. Implication for policy and practice

The study findings advocate for the establishment of digital libraries in rural areas. The library authorities are challenged to adapt to digital ways of information provision. The findings on requirements which rural users need and the challenges which they are bound to encounter in their quest to access LIS from digital library put the role-players at bay. For instance, the library authorities shall have reference material on how to promote the effective use of the digital library by the rural user of Capricorn District Municipality and the possibility that the findings can be generalised to entirety of South African rural areas. Since librarians have been providing digital content in libraries for use on users' laptops and other gadgets, this implies that the Department of Sport, arts and culture has been lagging behind in finding innovative ways to provide information, especially in rural areas. To successfully keep libraries as sources of information, transformative measures have to be

taken, and where possible, revisit the policies and keep drifting with the societal changes. The library authorities have to delve into new ways of providing LIS to the communities. Unquestionably, ICTs have penetrated our societies and became a way of life. In addition, there are unlimited benefits which can be derived from digital technologies, especially given the lack of physical libraries in rural areas.

7. Contribution to DeLone and Mclean information system success model

The findings of the study advocate for the use of the D and M ISS model on systems evaluation research. The model has proven its validity around the information systems. The use of the independent variable of *system quality* to determine requirements of users to access digital library complemented the research objective. Delone and McLean (2003) mention ease of use, flexibility, reliability and integration of the system to succeed. The findings revealed various ICT tools which are deemed necessary to access the digital library. Therefore, the system success should also be based on integration of the tools to yield the predetermined outcomes. By so doing, the system shall achieve quality.

The *intention to use* construct was used to design the questions aimed to find out the challenges which may hinder the use of digital libraries. If challenges are dealt with and solutions provided, the users shall be satisfied, and the intention to use the system is likely. Therefore, the model has again proven reliability, as the researchers' objectives were fulfilled.

8. Recommendations and conclusion

This section provides recommendations and conclusion about the requirements for the use of digital library and the challenges of accessing digital libraries in rural areas.

8.1 Requirements for the use of digital library services in rural areas

The users need to be trained on how to search for information, for instance, on how to conduct Boolean search. Moreover, the library staff should invite the public for computer and digital library training for the effective use of digital libraries. As rural areas are engulfed with poverty, consideration should be placed on affordability of the gadgets and internet costs. It would make no sense for provision of digital libraries with the aim of striking balance of LIS access without taking the realities of rural dwellers into consideration. Therefore, the library authorities may have gadgets which the users may borrow and provide free internet access to the digital library interface. If measures to curb digital divide are not well addressed, the digital libraries shall remain inaccessible like physical libraries, which are mostly in towns and cities. On infrastructural issues, the digital library for rural areas should take cognisance of smartphones as the main gadget for accessing digital library. Therefore, its interface should be proper and be user friendly. As the smartphone screens are smaller than those of computers, it is recommended that the content should be printable to allow those who may like to print, especially because users' preferences differ. Even though using smartphones is much easier than computers, training should be provided either through video clips which may be accessible on the interface or for those users who may need to know how to fully use the digital library system. As internet is a challenge for rural areas of South Africa, it is recommended that the library authorities lobby stakeholders for internet accessibility and also provide means for free access and download of digital library content.

8.2 Challenges of accessing digital library services in rural areas

The study found out the challenges related to the rural areas in relation to accessing the digital library services. The first step towards realisation or implementation of digital libraries for rural dwellers is for library authorities to know and understand the challenges at hand. The second step is to have a comprehensive plan for how to mitigate the challenges and to understand that engagement with the society and its formations is necessary. Thirdly, the library authorities should understand that without properly dealing with the challenges, implementation might be difficult. With the challenges not addressed, accessing digital library will not be easy. Moreover, the absence or inaccessibility of the LIS will continue to burden the rural users. Therefore, this study recommends that the DSAC should work with the responsible departments and stakeholders in the plan for erection of digital libraries. Without multilateral approach to deal with some of the challenges, it might take forever to realise digital library access in rural areas. For example, Eskom should be approached for electricity provision of rural areas and network providers to provide network coverage. The libraries and schools should be encouraged to impart skills and alleviate illiteracy within societies. Computer operating skills initiatives should be taken to afford those users who prefer using computers. Free access to digital library interface is recommended, and the DSAC should cover the costs as the rural population in South Africa is poverty stricken and might not afford to buy some basic needs. Where possible, the library authorities should find ways of loaning out mobile gadgets to their users. On the issue of copyright, library authorities should find a way to purchase digital licences and pay subscription fees to collections and databases. Where financials fail, the libraries should raise funds, i.e. from donors.

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Further reading

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Appendix. Interview schedule

We, Mapheto Mamabolo and Oluwole Durodolu, are investigating the requirements and challenges of rural accessibility to digital libraries. The study is titled: “Rural accessibility to digital libraries: requirements and challenges”. The purpose of this study is to gather the perspectives of public librarians under Capricorn District Municipality on the mentioned title. Answering of the interview questions could assist in achieving the purpose of this study.

You are guaranteed that your information disclosed will be solely used for the purpose of this study and your anonymity will be protected. Audio-taping will be used on your own and confidentiality will as well be observed.

You are guided by the following instructions to answer the interview questions:

- Where you do not understand the question, ask the interviewer to repeat the question.
- Answer every question with honesty as possible.
- Answer of all questions accurately.
- Feel free to elaborate after answering, where possible.
- Avoid to remain silent, use ‘not sure’ in case you are unsure of the answer.

The interview questions to be answered are tabled below:

Research questions	Sub-research questions
1. What are requirements for the use of digital library services in rural areas of Capricorn District Municipality?	a) What kind of Information and Communication Technology (ICT) tool would be needed for a digital library? b) What are the additional resources are needed to utilize that ICT tool? c) What level of computer literacy do they require to utilize that ICT tool? d) What could be done to acquire computer literacy?
2. What are the challenges of accessing digital library services in rural areas?	a) What could make accessing digital library services difficult? b) Which skills are essential for accessing the digital library? c) What can be done to acquire those skills? d) Would digital literacy be required in using the digital library? e) Would it be a challenge for library professionals to manage the digital library services? f) Are copyright issues going to hinder digital library services?

The researchers hope that the information you shared will help to enable accessibility of library and information services through the digital platform.

We thank you!

Corresponding author

Oluwole Durodolu can be contacted at: woledurodolu@gmail.com

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